GOLDEN AGING

Prospects for Healthy, Active, and Prosperous Aging in Europe and Central Asia

Maurizio Bussolo, Johannes Koettl, and Emily Sinnott

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Foreword

The Europe and Central Asia (ECA) region has among the oldest populations in the world. Europe, in particular, is approaching the end of a demographic transition toward population stabilization, and Central Asia, although still younger, is following quickly. Aging in ECA is different from that in Western Europe and East Asia in that populations in ECA are aging, while people are not necessarily living longer. The rise in the average age in ECA is largely attributable to a decrease in fertility rather than to an increase in longevity. In 2015, life expectancy at birth is 73 years in ECA, 3 years lower than in East Asia and a full 10 years behind Western Europe. In many countries in ECA, the emigration of young people has also accelerated the aging of their societies.

More often than not, the aging of a population is a source of concern, given the potential for higher health care and pension costs, increasing dependency, lower growth, unsustainable fiscal deficits, and intergenerational tensions. Demographic trends are frequently viewed as unstoppable and as an inevitable cause of increasing economic costs. However, individuals and firms change their behavior in response to changing conditions, and policy can help or hinder adaptation to demographic shifts. In fact, demography itself is malleable. For these reasons, the nexus among demography, economic growth, and welfare distribution is quite complex.

Consider first demography and economic growth. At the macroeconomic level, a reduction in income per capita is seen as a consequence of increased dependency rates and, possibly, a reduction in workers' productivity. These are potential risks but not the inevitable effects of population aging. In fact, this report presents evidence that as longevity increases so does the propensity of workers to participate longer in the workforce. This choice means that many current workers, and perhaps even more in the future, will not become dependent once they turn 65. There is already some evidence that active older individuals today have better health and maintain their cognitive skills longer than their inactive counterparts and older individuals of previous generations. Productivity does not inevitably decline with age, and skills shift with aging. This report shows that firms can take advantage of these changes and increase application of production techniques that use age-appreciating skills more intensively.

Aging societies are not destined to experience stagnation or decline in living standards. However, the behavioral changes that help reduce dependency and sustain productivity do not necessarily happen automatically. A supportive environment, including the right incentives and policies, can facilitate this transition.

Indeed, in the ECA region, bold adaptive action is needed across many policy areas to support active, healthy, and productive aging. These areas include much more than reforming the intergenerational transfer and pension systems: they encompass, among others, shifting health systems toward preventive care, primary care, and more diagnostics; reforming educational systems to bolster the cognitive skills needed for productive employment along longer working lives; and reforming labor market institutions to allow women to reconcile family and career goals and older people to work more flexible hours.

What about aging and inequality? While it is quite difficult to establish a direct link, there are some concerns that disparities may increase with aging in the ECA region. The first concern is that the chances of living longer and healthy lives are not the same for every individual. Across the globe, mortality rates are inversely correlated with education and income, but this differentiation is especially large in ECA. In Central Europe, the Eastern Partnership, and the Russian Federation, life expectancy at age 50 for males with tertiary education is about 10 years higher than for males without secondary education. In comparison, that difference is about 6 years in the United States.

As for income, the impact of aging may not necessarily be negative for the average individual, but there is a risk of a growing dispersion. This report shows that income inequality within older age groups is greater than that within younger groups for several reasons, including that disadvantages in early years can compound over time, that differentials in earnings between skilled and unskilled rise with age, and that inequality in wealth accumulated during a lifetime is much larger than income inequality. Therefore, the disparity in wealth between the skilled and the unskilled is much larger than differences in their earnings alone.

To date, aging has not yet led to higher poverty rates and more inequality, especially for the elderly. The wide coverage and low dispersion of pension benefits—a legacy of the central planning system in many countries—has played a crucial role in limiting poverty and inequality among the old. But these pension systems need to be adapted to the new demographic situation, with attention paid to both fiscal sustainability and equity.

This report builds on a long tradition of analytical work on demography and development at the World Bank. In the ECA region specifically, recent reports such as *The Inverting Pyramid* (2014); *Demography, Aging, and Mobility in the ECA Region* (2013); and *From Red to Gray* (2007) have focused on pension reforms, migration, labor and financial markets, and health and long-term care expenditures. Similar to those earlier studies, this report aims to provide a better understanding of the aging process and its links with the economy—and ultimately to guide policy making.

The greatest risk we face is not aging itself, but the unwillingness or inability to adapt. Policy makers can meet the challenges and seize the opportunities of aging by facilitating behavioral adaptation. In such a scenario, Europe and Central Asia could one day enter a period of "Golden Aging," in which all people can live long, healthy, active, and prosperous lives.

Laura Tuck
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The World Bank Group

Acknowledgments

Abbreviations

ADL	activity of daily living
ASPIRE	Atlas of Social Protection: Indicators of Resilience and Equity
BiH	Bosnia and Herzegovina
CT	computed tomography
DIOC	Database on Immigrants in OECD Countries
ECA	Europe and Central Asia region
ECA-7	Bulgaria, the Czech Republic, Hungary, Poland, the Russian Federation, Slovenia, and Ukraine
ECAPOV	database of household surveys for Europe and Central Asia
EFTA	European Free Trade Association (Iceland, Liechtenstein, Norway, and Switzerland)
EHIS	European Health Interview Survey
EPL	employment protection legislation
EU	European Union
EU-15	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom
EU LFS	European Union Labour Force Survey
EU-SILC	European Union Statistics on Income and Living Conditions
EVS	European Values Study
GDP	gross domestic product
GEM	Global Entrepreneurship Monitor
GGS	Generations and Gender Survey
HFA-DB	European Health for All database
IADL	instrumental activity of daily living
ICT	information and communication technology
ILO	International Labour Organization
MRI	magnetic resonance imaging
OECD	Organisation for Economic Co-operation and Development
OLG	overlapping generations [model]
PAYG	pay-as-you-go
PIAAC	Programme for the International Assessment of Adult Competencies (OECD)
PISA	Programme for International Student Assessment (OECD)

PPP	purchasing power parity
PROST	Pension Reform Options Simulation Toolkit
R&D	research and development
RLMS–HSE	Russia Longitudinal Monitoring Survey–Higher School of Economics
S&T	science and technology
SHARE	Survey of Health, Ageing and Retirement in Europe
STEP	Skills Toward Employability and Productivity (World Bank)
TFR	total fertility rate
UN	United Nations
WDI	World Development Indicators
WHO	World Health Organization
WVS	World Values Survey
YDL	years of healthy life lost due to disability

Country Codes

AFG	Afghanistan
ALB	Albania
ARG	Argentina
ARM	Armenia
AUT	Austria
AZE	Azerbaijan
BEL	Belgium
BGD	Bangladesh
BGR	Bulgaria
BIH	Bosnia and Herzegovina
BLR	Belarus
BOL	Bolivia
BRA	Brazil
CAN	Canada
CHE	Switzerland
CHL	Chile
CHN	China
COL	Colombia
CRI	Costa Rica
CYP	Cyprus
CZE	Czech Republic
DEU	Germany
DNK	Denmark
DOM	Dominican Republic
ECU	Ecuador
ESP	Spain
EST	Estonia
ETH	Ethiopia

FIN	Finland
FRA	France
GBR	United Kingdom
GEO	Georgia
GHA	Ghana
GRC	Greece
GTM	Guatemala
HND	Honduras
HRV	Croatia
HUN	Hungary
IDN	Indonesia
IND	India
IRL	Ireland
ISL	Iceland
ISR	Israel
ITA	Italy
JAM	Jamaica
JOR	Jordan
KAZ	Kazakhstan
KGZ	Kyrgyz Republic
KHM	Cambodia
KSV	Kosovo
LAO	Lao People's Democratic Republic
LKA	Sri Lanka
LTU	Lithuania
LUX	Luxembourg
LVA	Latvia
MDA	Moldova
MDG	Madagascar
MEX	Mexico
MKD	Macedonia, FYR
MLI	Mali
MNE	Montenegro
MNG	Mongolia
MUS	Mauritius
MWI	Malawi
NGA	Nigeria
NIC	Nicaragua
NLD	Netherlands
NOR	Norway
NPL	Nepal
PAK	Pakistan
PAN	Panama
PER	Peru
PHL	Philippines

POL	Poland
PRT	Portugal
PRY	Paraguay
ROU	Romania
RUS	Russian Federation
RWA	Rwanda
SEN	Senegal
SLV	El Salvador
SRB	Serbia
STP	São Tomé and Príncipe
SVK	Slovak Republic
SVN	Slovenia
SWE	Sweden
SWZ	Swaziland
THA	Thailand
TJK	Tajikistan
TKM	Turkmenistan
TLS	Timor-Leste
TUN	Tunisia
TUR	Turkey
TZA	Tanzania
UGA	Uganda
UKR	Ukraine
URY	Uruguay
USA	United States
UZB	Uzbekistan
VEN	Venezuela, RB
VNM	Vietnam
ZAF	South Africa

Note: All dollar amounts are U.S. dollars ($) unless otherwise indicated.

Regional Classifications Used in This Report

This report covers 27 countries referred to as *Europe and Central Asia (ECA).* These are divided into four groups, as shown below: the *Western Balkans, Eastern Partnership and Russian Federation, Central Europe,* and the *young countries.*

    Western Europe, which includes the 15 European Union (EU) member states that joined before 2004 and the European Free Trade Association (EFTA) members, and *the Baltics,* which includes Estonia, Latvia, and Lithuania, are used in the report for comparison purposes.

Western Balkans
Albania
Bosnia and Herzegovina
Kosovo
FYR Macedonia
Montenegro
Serbia

Eastern Partnership and Russian Federation
Armenia
Belarus
Georgia
Moldova
Ukraine
Russian Federation

Central Europe
Bulgaria
Croatia
Czech Republic
Hungary
Poland
Romania
Slovak Republic
Slovenia

Young Countries (Central Asia and Turkey)
Azerbaijan
Kazakhstan
Kyrgyz Republic
Tajikistan
Turkey
Turkmenistan
Uzbekistan

Western Europe (EU-15 and EFTA)		
North and Central	**South**	**European Free Trade Association**
Austria Ireland	Greece	Iceland
Belgium Luxembourg	Italy	Liechtenstein
Denmark The Netherlands	Portugal	Norway
Finland Sweden	Spain	Switzerland
France United Kingdom		
Germany		

the Baltics
Estonia
Latvia
Lithuania
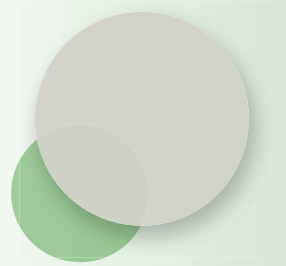
Overview: Golden Aging

The Golden Age in Greek mythology was a time of peace, harmony, stability, and prosperity when humans lived to a very old age.

Introduction

The countries of Europe and Central Asia (ECA) are aging. The average age of the population increased from 29 years in 1950 to 37 years in 2015, and the share of people 65 and older in the total population rose from 6 percent in 1950 to 12 percent in 2015. According to simple extrapolations based on the United Nations' medium-fertility demographic scenario, by 2050 the share of older people could reach 21 percent. This process is most advanced in Central Europe, the Western Balkans, the Eastern Partnership, and the Russian Federation. The populations of Turkey and Central Asia are much younger, but in coming decades they may age even faster than European countries did in previous decades. Aging in Europe and Central Asia is different from that in Western Europe and East Asia, two other regions that are already advanced in the aging process. Whereas aging is often driven by a fall in both fertility rates and mortality at old age, the rise in the average age in Europe and Central Asia is largely attributable to low and declining fertility rates rather than to increases in longevity. Thus, population growth has slowed sharply. Indeed, in more than half the countries in Europe and Central Asia the population is already shrinking. In several countries, emigration has accelerated population declines.

This remarkable aging is generally seen as a grave threat to social welfare. Among other issues, if older people eventually cease to work and begin to dis-save, then increases in the relative size of older cohorts will reduce productive capacity, while government revenues will not be enough to meet obligations to

older generations. It is not the first time that demographic trends have triggered serious concerns. During the 1970s, the opposite trend—high fertility rates and rapidly growing populations in many developing countries—was a reason for alarm (see Meadows et al. 1972; World Bank 1974).

Why have opposite demographic trends triggered similar gloomy forecasts for growth, welfare, and fiscal sustainability? One reason is the daunting challenges involved in providing education, jobs, equipment, and infrastructure for large and fast-growing younger cohorts and in providing health care, jobs, and pensions for large and fast-growing older cohorts. A second reason is that many analyses focus on the challenges but much less on the opportunities inherent in demographic trends.

And, significantly, these concerns also often reflect the mistaken assumption that individuals' behavior will remain constant in the face of demographic change. In reality, people do change their behavior to cope with aging, and there is considerable scope for government policy to encourage changes that will mitigate both the demographic drivers and the economic consequences of aging.

This report aims to take a broader perspective than many other publications, going well beyond a discussion of the macroeconomic challenges and the necessary fiscal responses. It concludes that, although many challenges are real and urgent, aging also creates many opportunities, including opportunities to increase labor productivity and the quality of education. The report emphasizes that behavioral responses, by individuals and firms, will result in a markedly different reality from the one implied by simple extrapolations. Finally, the report also highlights that while aging may bring some opportunities, these may not be equally available to everyone. Because earnings and savings gaps between skilled and unskilled individuals tend to increase with age, the increasingly larger old population may be divided into a poorer and a less well educated group that suffers from worse health, shorter life spans, and lower saving and another group that is still active, has large accumulated assets, and benefits from increased longevity.

A diagram that encapsulates this report's broader perspective—which jointly considers challenges and opportunities, policy and behavioral adjustments, and distributional dimensions—is presented in figure O.1. The diagram presents four quadrants with demographic dynamics shown on the top portion of the figure (quadrants O.1a and O.1b) and economic effects on the bottom (quadrants O.1c and O.1d). Challenges are presented toward the left and opportunities toward the right. The inner circles contain key examples of demographic drivers and economic effects for each of the four quadrants. The outer circles contain three additional dimensions of these key examples: the behavioral responses, the needed policy agenda, and the potential distributional consequences.

Quadrant O.1a shows that the main demographic *challenge* in Europe and Central Asia is low fertility and highlights the importance of labor market reforms to help families reach their desired number of children. Quadrant O.1b emphasizes the importance of shifts in health care systems toward preventive care, behavioral changes (less tobacco and alcohol use), and government efforts to reduce inequality in health status to increase life expectancy. It is striking that life expectancy in many countries in the region has hardly increased at all in previous decades and that in some cases it has even declined. Societies in Europe and Central

FIGURE O.1 The demographic drivers and economic consequences of aging create challenges and opportunities
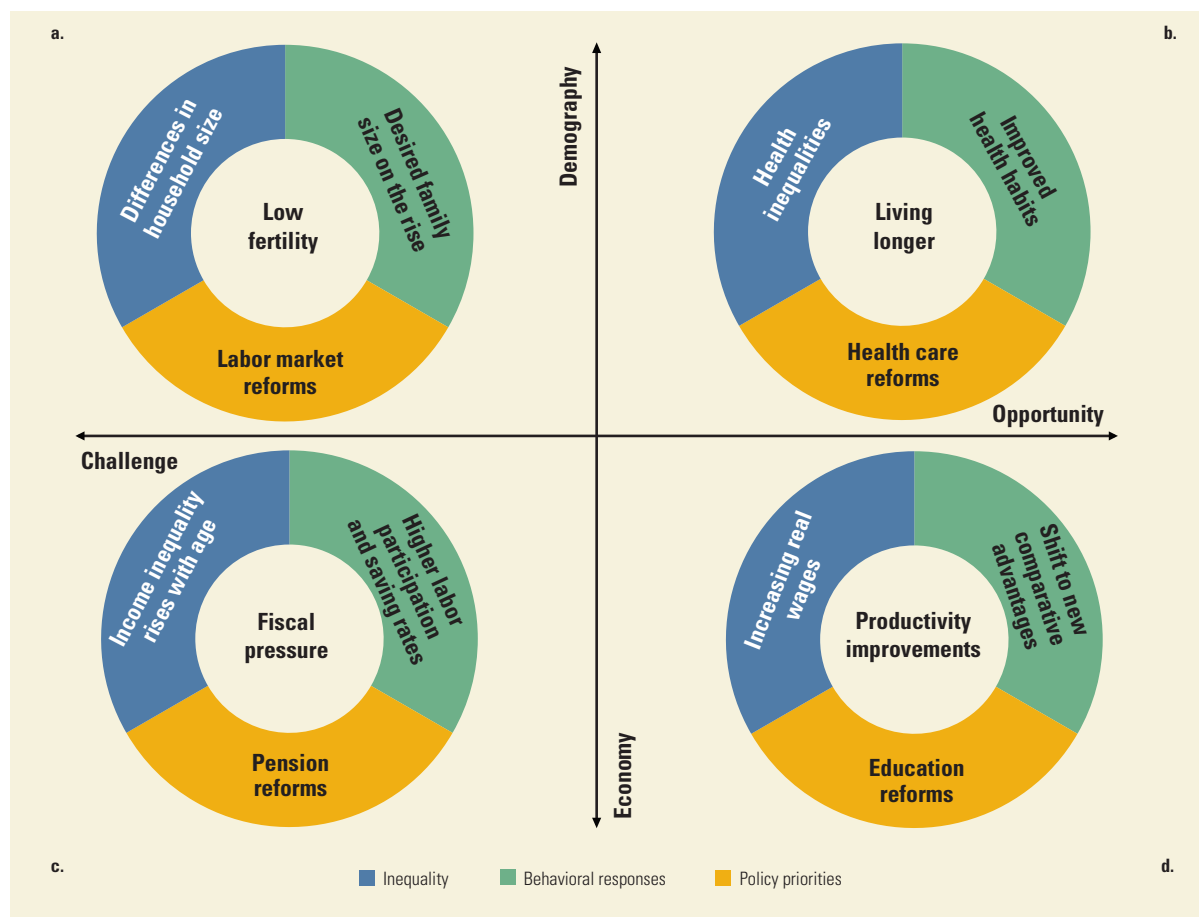
Asia are getting older, but people are not living longer.[1] Longer lives are within reach and are a key demographic *opportunity* for the region. Quadrant O.1c illustrates the need for pension reforms, which are under way in many countries (see also earlier World Bank reports on Europe and Central Asia: *From Red to Gray* [Chawla, Betcherman, and Banerji 2007] and *The Inverting Pyramid* [Schwarz et al. 2014]) and the risk of increasing economic inequality among the elderly. Finally, quadrant O.1d highlights a critical economic *opportunity* arising from slow-growing populations. With smaller young age groups, it is more feasible to increase the quality of education, while a lack of adequate education is a barrier to economic growth in many parts of the region. Similarly, with low or no population growth it is easier to provide workers with more physical capital, which will increase labor productivity. Compared to countries of similar economic conditions but with high population growth, the aging societies in Europe and Central Asia need to spend a smaller part of their income on investment to achieve this so-called capital deepening. These countries have an opportunity to strengthen their comparative advantage in skill- and capital-intensive production.

The report concludes by outlining policy reforms that could support the region in achieving a period of "Golden Aging," with relatively stable populations where people live long, healthy, active, and prosperous lives:

- *Policies for rebalancing demographic trends*

  ○ A focus on preventive care, primary care, and more diagnostics, instead of the predominant model of hospital care, could reduce mortality rates.

  ○ Labor market policies that help women reconcile family and career goals could encourage a rebound in fertility rates toward replacement levels.

  ○ Encouraging lifelong learning, mobility, and migration, both domestically and internationally, could improve the flexibility of labor markets.

- *Policies to tackle economic challenges and opportunities*

  ○ Reforms are required to place pension systems, health care, and long-term care on fiscally sustainable paths.

  ○ Adjustments in labor and pension laws and improved incentives to keep investing in human capital throughout an individual's working life would facilitate increased participation and productivity of the elderly in the labor market.

  ○ Appropriate social safety nets could ensure that health care and long-term care are affordable and support the elderly who are most at risk of poverty.

Figure O.2 indicates differences across countries in the intensity of the reforms required, according to demographic drivers (fertility, longevity, and migration) and economic consequences (ratio of inactive to active adults, education quality, relative poverty rates of the elderly, and debt ratios).[2]

Belarus, Bulgaria, Moldova, and countries in the Western Balkans, located in the upper-right quadrant of the scatter diagram, need large adjustments along both dimensions. Life expectancy and labor participation are low. Fertility rates are among the lowest in the region, and poverty rates among the elderly are relatively high. Armenia, Georgia, Russia, and Ukraine, also located on the right-hand side, confront an important unfinished demographic agenda, but their aging-related economic challenges are less serious than those in the first group of countries. Young countries are all located on the left, indicating that their challenges are not yet on the demographic side. However, the economic characteristics (especially educational quality and labor market participation rates) of countries in the upper-left quadrant are, at present, not conducive to dealing successfully with future aging. The challenges for countries in the lower-left quadrant, including some young countries and some countries in Central Europe and the Baltics, are more modest, as the fertility rates, educational quality, and labor participation rates in those countries are already high, complemented by low debt ratios and low relative poverty of the elderly. Those are all elements that fit the description of Golden Aging in this report.

The report consists of three parts. The first part covers the top two panels of figure O.1; it discusses demography and analyzes the determinants of fertility, mortality, and migration in the region. The second part covers the bottom two panels of figure O.1 and considers the economic consequences of aging, examining labor participation and productivity, savings, fiscal effects, and poverty and
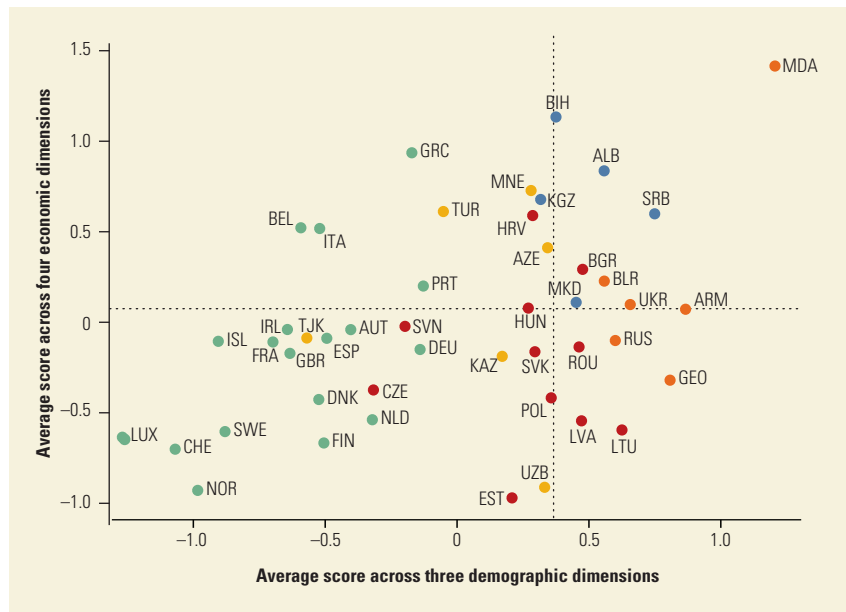
FIGURE O.2
The intensity of policy agendas varies across countries

- Western Europe
- Central Europe and the Baltics
- Western Balkans
- Eastern Partnership and Russian Federation
- Young countries

Source: World Bank calculations.
Note: Higher scores imply a more daunting agenda for demographic and economic policies. The lines that divide countries into four quadrants are drawn at the median values of Europe and Central Asia along the two demographic and economic dimensions.

inequality. The third and final part outlines the policy options, while also addressing complicated political economy issues like age-related voter preferences. The remainder of this overview summarizes the findings in these three parts in more detail.

The Demographics of Europe and Central Asia and Those of the Rest of the World

Europe and Central Asia are leading many other regions in the aging process (see box O.1 for more details on the definition of aging), but the region is split into two sides that are currently at two different stages. Turkey and Central Asia have only recently entered the late stage of demographic transition, with falling fertility and mortality at all ages. The rest of the region is not only geographically but also demographically closer to Western Europe and has already reached an advanced stage of aging. Only Japan currently has an older population than Europe. With persistently low fertility, Europe's population is expected to decline in the next 40 years—the only region in the world to do so. Other world regions are much younger. Africa is the youngest in the world, with the average age as low as 15 years in Niger.

While Europe and Japan are old compared to the rest of the world, their demographics are not at all exceptional. They are just ahead of the rest. They are harbingers of things to come globally. If anything, during coming decades other countries are expected to age even faster than European countries have done in

BOX O.1 How to Define Aging?

Observations about aging populations are often illustrated by citing the increasing number of elderly (65+) relative to the size of the working-age population (15–64).[a] This old-age dependency ratio is used to highlight a key concern in aging societies: how to support a growing number of retired persons with a declining number of workers? However, the dependency ratio is an imperfect measure of the age of populations for two reasons:

• Aging of populations involves more general changes in age structure than a mere increase in the relative size of old cohorts. For example, if aging is caused by a drop in fertility, then shrinking younger cohorts will also be a feature, and the average age of populations will increase. Therefore, this report often uses the mean or median age of populations, rather than old-age dependency ratios, as more general indicators.

• Especially when aging is caused by decreased mortality and ill health at older ages, there is no reason why 65 should continue to be treated as the threshold between working age and retirement age. If life expectancy increases, many people are able to work longer and even prefer to. In many European countries that evolution is already happening and is reflected in an increase in the effective retirement age (OECD 2013; ILO 2013). Another way of looking at dependency therefore is to measure directly the ratio of inactive to active population without an upper limit for working age.

MAP BO.1.1 People in Europe and Central Asia are older than in Western Europe when aging is measured by years of life remaining

a. Average number of years of life remaining, 2010
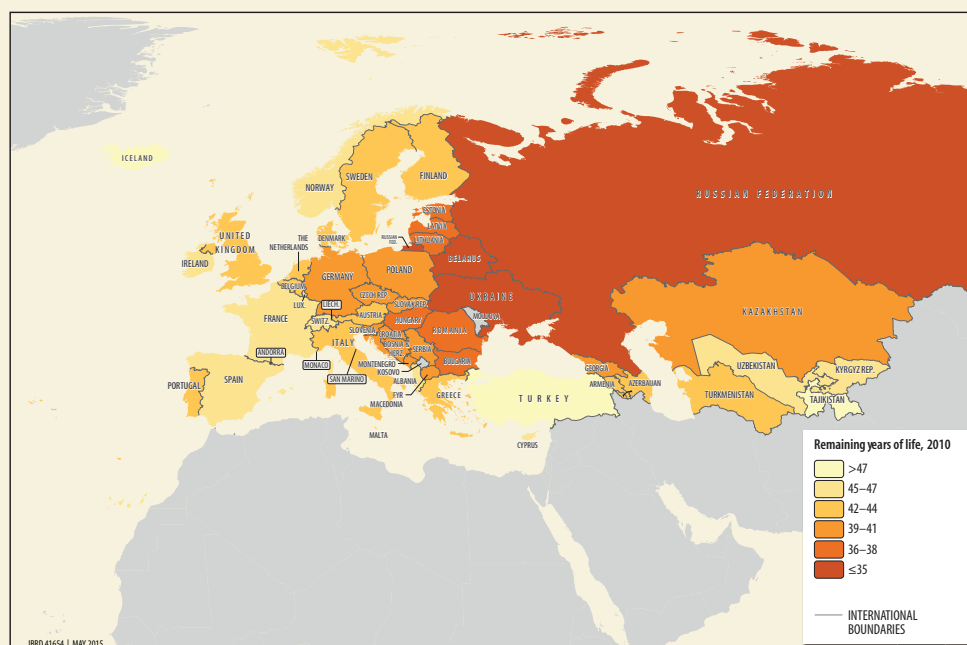
Source: World Population Prospects: The 2012 Revision.

(Continued)

BOX O.1 *(continued)*

An alternative definition of the age of populations can capture the phenomenon that people may feel younger as life expectancy increases ("70 is the new 60"). This can be measured as the "prospective old-age dependency," which is the number of people aged 20 or older with life expectancies of 15 or fewer years, divided by the number of people aged 20 or older with life expectancies greater than 15 years. Sanderson and Scherbov (2010) also argue that dependency should be measured as the presence of disability and not be based on chronological age and that people are younger if they are farther away from death. In this sense, aging can be measured as how far the population is, on average, from death.

Map BO.1.1a depicts age according to this definition, which is dramatically different from the popular concept that a person is younger when he or she is closer to birth. Only with an equal and constant life expectancy do the two concepts correspond. Indeed, in terms of median age (the distance from birth), Western Europe is older than most of Europe and Central Asia, with the exceptions of Central Europe, the Western Balkans, and the Baltics (map BO.1.1b). Measured by the average remaining life expectancy, Europe and Central Asia (with the exception of Central Asia and Turkey) is by far the oldest region in the world, even significantly older than Western Europe. This reflects the low fertility rates and the high mortality rates in older age groups. This measure of aging is relevant in the analysis of health care costs. As this report documents, these costs depend more on time to death than on time from birth, with the bulk of those costs expended during the last years of life.

b. Median age of the population, 2010
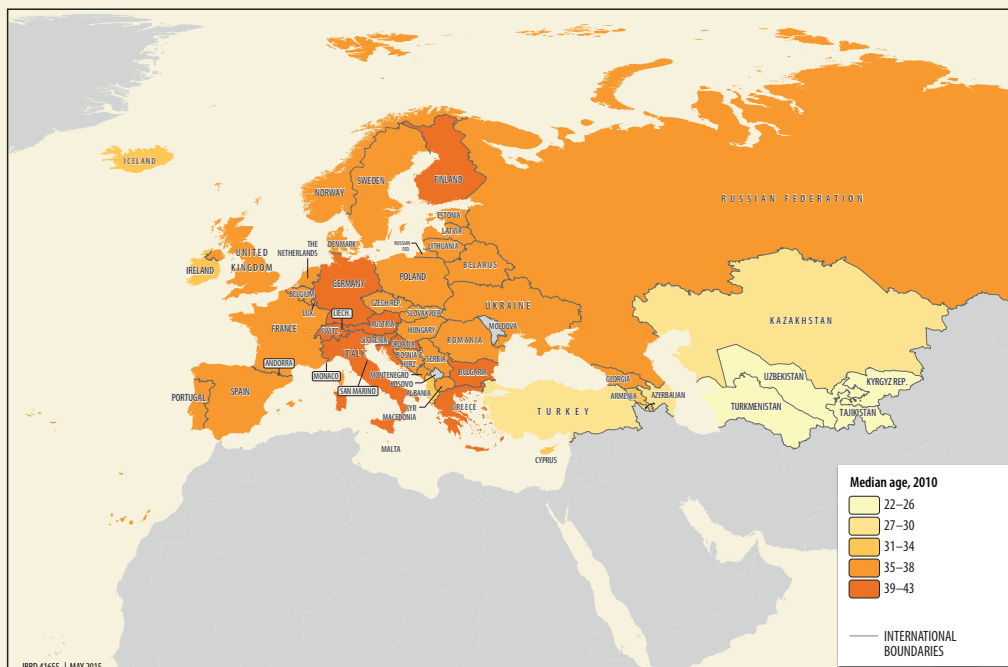
Source: World Population Prospects: The 2012 Revision.

a. See, for example, O'Connor 2014.

FIGURE O.3

The fertility transition in some countries in Europe and Central Asia is occurring much more rapidly than in advanced European countries

- France
- England
- Russian Federation
- Poland
- Ireland
- Korea, Rep.
- Albania
- Turkey
- Tajikistan
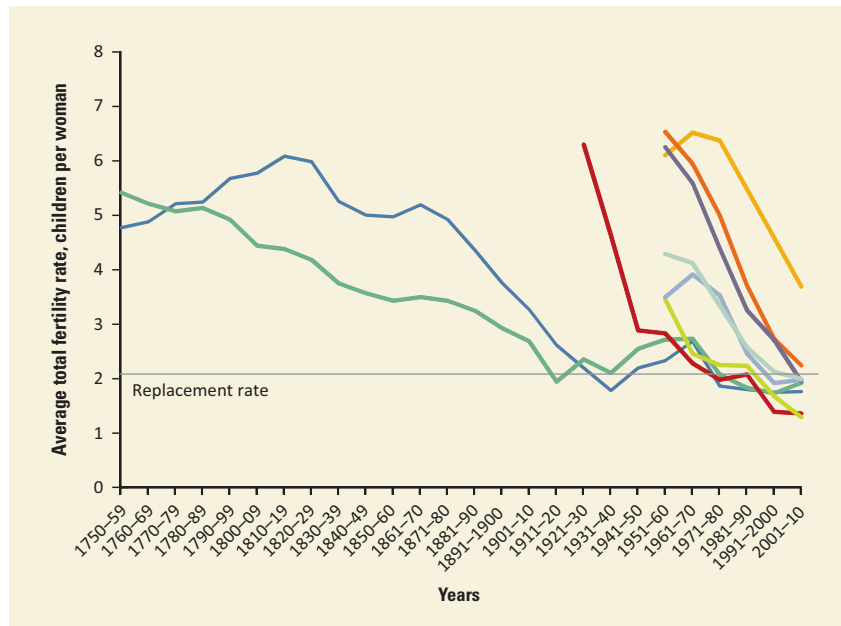
Source: World Bank calculations based on data in World Population Prospects: The 2012 Revision, except England and France prior to 1950 (Chesnais 1998); the Russian Empire in 1897 (Borisov 2001); and Russia for all other years prior to 1950 (Andreev, Darskiy, and Kharkova 1998).

previous decades. For example, the sharp decline in fertility in Central Asia and Turkey means that they will quickly converge with the rest of the region. The average age in Turkey and Central Asia is just over 28 years now but is expected to increase by 7 years over the next three decades. Industrialized European countries began the fertility decline at least a century before other countries, but the fertility transition is now much more rapid (figure O.3).

The sharp adjustments in fertility rates usher in the final stage of a large global demographic transition. It started with a decline in child mortality, which led to exceptionally large young age groups and an unprecedented growth in the global population. The decline in fertility is a delayed response to the survival of so many children, reinforced by rising per capita incomes, increased education of women, and higher labor force participation by women. Ultimately, the populations will likely become stable once again, with a much more balanced age structure. In that sense, aging should be seen as a welcome and necessary normalization rather than as a negative demographic shock. Figure O.4 illustrates the demographic normalization in the young countries of Europe and Central Asia by using population pyramids. This process will happen gradually in all parts of the world, coloring the maps in map O.1 darker over time.[3] The current developments in Europe are indeed a forerunner of things to come elsewhere.

Low Fertility: The Driver of Aging in Europe and Central Asia

As noted, the main reason that the countries of Europe and Central Asia are aging, and so many countries are expected to follow suit, is that fertility has declined. The

FIGURE O.4   Rapid aging is expected in Central Asia and Turkey over 2010–60
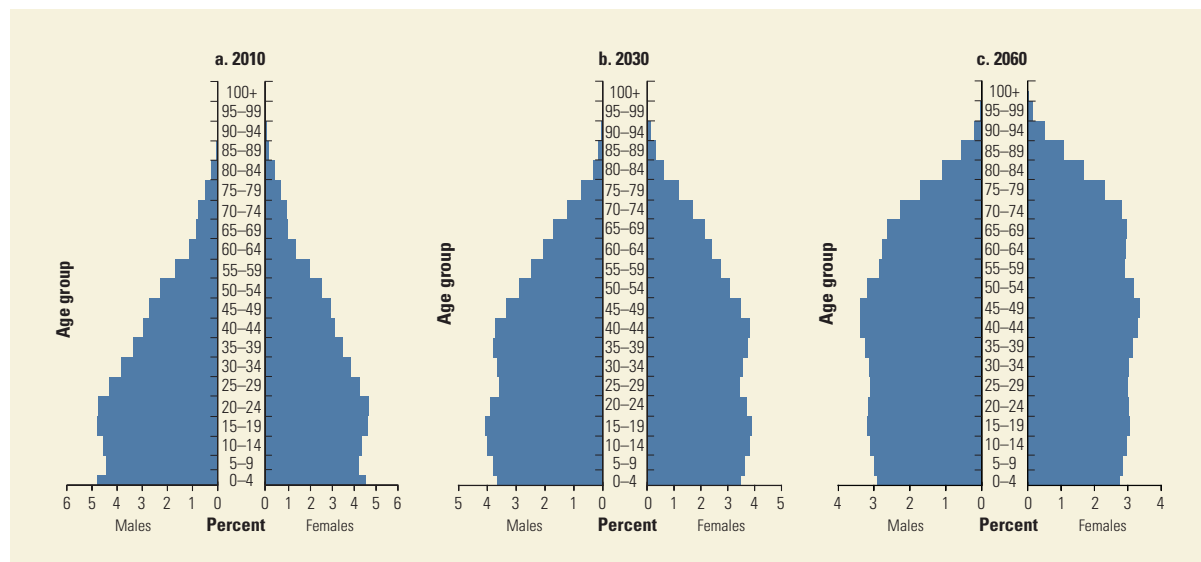
Source: World Bank calculations based on data in World Population Prospects: The 2012 Revision.

fact that people are also getting older because of improvements in health care is, at most, a minor reason. Compared with other regions, Europe and Central Asia has been exceptional because life expectancy has increased by little in many countries, and mortality rates in older age groups have even risen in recent decades. For the whole region, the mortality rates of middle-aged men were higher in 2009 than in 1959. While in France a 71-year-old man in 2009 had the same risk of dying as a 60-year-old man in 1959, for example, Ukraine experienced the opposite development. There, a 56-year-old man in 2009 had the same risk of dying as a 60-year-old man in 1959 (figure O.5).

The predominant reason that the average age in Europe and Central Asia has risen is not that people are growing older but that people are having fewer children. In the region, fertility more than halved between 1950 and 2010. This drove fertility to near the replacement level in Central Asia and Turkey and to a mere 1.4 children per woman, far below the replacement level, in most other countries. This decline has sharply decreased the share of young people and consequently increased the share of old people. Because lower fertility has been such an important driver of the current demographic shift, aging has coincided with slower population growth. The population in the region, with the exception of Central Asia and Turkey, is shrinking slightly, while it was growing during the 1950s at 1.5 percent per year. Consequently, concerns about aging societies center not merely on the rising share of elderly but even more on shrinking populations. From Russia to the Balkans and Romania, policy makers have responded with sometimes expensive but not always effective pronatalist policies. Even in several still-young countries, policy makers have shifted toward pronatalist policies. For example, in Turkey fertility dropped below replacement level in 2010, and policies were introduced in the form of financial transfers and labor market support for young mothers.

MAP O.1 Populations are aging everywhere

a. 1960

IBRD 41566 | MAY 2015

Average age, 1960
- ≤22
- 23–26
- 27–30
- 31–34
- 35–38
- 39–42
- 43–46
- >46
- No data

b. 2010

IBRD 41567 | MAY 2015

Average age, 2010
- ≤22
- 23–26
- 27–30
- 31–34
- 35–38
- 39–42
- 43–46
- >46
- No data

c. 2060

IBRD 41568 | MAY 2015

Average age, 2060
- ≤22
- 23–26
- 27–30
- 31–34
- 35–38
- 39–42
- 43–46
- >46
- No data

Source: World Population Prospects: The 2012 Revision.

a. Women

Country	Age
France	71.2
Poland	67.6
Czech Republic	67.0
Slovenia	65.8
Slovak Republic	65.8
Bulgaria	65.2
Estonia	65.0
Lithuania	63.9
Belarus	63.1
Hungary	63.1
Latvia	62.6
Ukraine	62.5
Russian Federation	60.6

Age of mortality risk in 2009 equivalent to the mortality risk of a 60-year-old woman in 1959

b. Men

Country	Age
France	71.1
Slovenia	68.0
Czech Republic	64.7
Poland	62.2
Slovak Republic	60.3
Bulgaria	60.1
Hungary	59.0
Lithuania	58.2
Russian Federation	57.8
Latvia	57.2
Estonia	56.8
Belarus	56.7
Ukraine	56.4

Age of mortality risk in 2009 equivalent to the mortality risk of a 60-year-old man in 1959

FIGURE O.5

60-year-old men in the Russian Federation, the Eastern Partnership, and the Baltic countries "feel" worse today (2009) than they did in 1959

Source: World Bank calculations based on data of the Human Mortality Database.

Even in other parts of the world, where life expectancy has increased, longevity is not the main driver of aging societies or the expected aging of societies. Overwhelmingly, across the world the decline in fertility is responsible for the older age structures of societies. That is why aging populations have become almost synonymous with stagnant, or even shrinking, populations.

This concern about low fertility and shrinking populations is rather striking. Not very long ago, the concern was about high fertility rates and rapidly growing populations. Many reports in the 1970s provided a convincing analysis of the economic challenges created when cohorts of young people are excessively large. Although the current demographic challenges are very different, the grave concerns raised by these reports help put the current debate in perspective. Two main lessons can be learned from that perspective.

The first lesson is that the current low fertility rate is as much a solution as it is a problem. In a long-term historical perspective, the fast population growth that the world experienced during the second half of the 20th century, when population growth in Europe and Central Asia peaked, was clearly an anomaly. The world had

never experienced such high rates of population growth before. During the 1970s, when reports about the unsustainability of population growth were written, the world population was growing at a pace that implied doubling every 35 years, with the decline in child mortality as one of the main drivers. That could not go on forever. The reduction in fertility, owing to lower child mortality and higher income and educational levels, prevented continuation of unsustainably high population growth.

The second lesson is that fertility and mortality can change dramatically over time as people adjust their behavior to changing economic and cultural environments. Such changes have occurred in past decades and should also be anticipated in future decades. As this report documents, in several countries in the region fertility is increasing again. Although this process will take a long time, this is consistent with the general U-shaped relationship between income and fertility and is especially observable in countries with labor market policies that support working mothers.

Not only can fertility rebound, but also more changes in mortality should be expected. Europe and Central Asia is lagging behind Western Europe in preventive care, as their health systems are excessively dominated by clinical treatment instead of primary care. The region also lags in behavioral shifts toward less smoking and less alcohol consumption. As a result, life expectancy has hardly increased, as many adults still die prematurely from cardiovascular diseases. With appropriate behavioral changes and adjustments in the care system, the region is expected to catch up during the coming decades, when the life expectancy of 50-year-olds should reach the level of their Western European counterparts.

> Compared with other aging regions, Europe and Central Asia has been exceptional because aging has been driven by fertility rather than by old-age mortality decline. Life expectancy has increased by little in many countries, and mortality rates in older age groups have even risen in recent decades.

With a rebound in fertility rates and longer expected lives, the region might very well converge to what Greek mythology called the Golden Age: a stable, harmonious world where humans lived in prosperity and health until a very old age. In such a world, the demographic profile will be more balanced but will be different from the structure to which countries had become accustomed in the previous century: the share of young people in the total population will be lower and the share of old people will be higher.[4]

The demographic transition to a more stable population, however, is not guaranteed and is unlikely to be a smooth process. The demographics in Europe and Central Asia are subject to temporary disturbances and are creating major policy challenges. One example is how the large baby-boom and Sputnik generations[5] are moving through the demographic system. And the recent exceptionally low fertility rates will also have important ripple effects into the future. Moreover, demographic changes at subnational levels are much more pronounced than what is observed in national data. Urbanization and changing economic structures leave shrinking regions behind, which are aging more rapidly than national averages. And then there is the interaction with international migration, for which the effect on the demographic structure is similar to that of domestic migration. Potentially, immigration can mitigate, although not offset, aging in societies, as immigrants are mostly young. However, in many countries (for example, Albania, Armenia, the Baltics, Bulgaria, Georgia, the Kyrgyz Republic, the former Yugoslav Republic of Macedonia, and Moldova), emigration is exacerbating adverse demographic trends. While all of these disturbances to the demographic transition pose serious

challenges, the overall direction is toward a more sustainable demographic structure than countries experienced during the 20th century.

Mixed Economic Consequences

From a demographic perspective, aging could be a positive development, with promising opportunities. But is aging from an economic perspective also a largely positive development, with promising opportunities? This report relies on the analysis of recent data and model-based simulations to answer this question. Aging societies are seriously concerned about slowing economic growth, exploding health care costs for the elderly, insolvent pension systems, large inequalities among old people, and lack of dynamism in labor markets. Young, fast-growing populations have been very successful at generating high growth of gross domestic product (GDP) in recent decades. The aging and stagnating population of Japan has experienced a stagnating economy for the past 25 years. Japan has accumulated large fiscal deficits, has been stuck in a deflationary environment, and seems unable to generate economic growth once again (see box O.2). Does stabilization of the population inevitably lead to stagnant economies?

The answer to that question is no. Economic growth, and especially per capita economic growth, is only to a limited extent directly influenced by demographics (see box O.2). Many factors other than aging are substantially more important in driving economic changes. Technological catching up to Western European countries is important in boosting productivity and per capita income growth. Technological innovation and perverse incentive structures can push up health care costs. High generosity in pension eligibility and benefits during the past decades was much more important than increased life expectancy in threatening the solvency of pension systems: some countries in Europe and Central Asia spend a larger share of GDP on pensions than the already aging and high-income Western European countries do. Although inequality in older age groups tends to be larger than inequality in younger age groups, factors other than aging heavily influence changes in overall inequality.

This report concludes that the economic consequences of aging are much more mixed than sometimes feared. Some of the consequences indeed pose significant challenges, but other economic effects of aging can be positive. In most countries in the region, where aging is already advanced, aging does present considerable fiscal challenges, which many governments are already confronting. Many individuals are already adjusting their participation in the labor force in response to changed pension entitlements and longer lives. Interesting efforts are under way by firms to learn how to take advantage of the specific skills of an older labor force. Although high average age levels still lie in the future for Central Asia, the future is much nearer than many expect, and now is the time to prepare for a very different age structure. Increasing the quality of education and investing in the health of the current young generation would lay the foundation for healthy and active aging. Designing sustainable and equitable pension and health care systems now would provide a safety net for those who need it but also create flexibility and incentives for those who want additional coverage.

BOX O.2 Is Aging to Blame for the Dramatic Economic Slowdown in Japan?

During the 1960s, Japan's average annual growth in GDP exceeded 9 percent. Forty years later, during the first decade of the 21st century, average GDP growth was less than 1 percent. This dramatic slowdown coincided with a profound demographic shift. During the 1960s, the elderly (65 years and older) accounted for 6 percent of the total population. In the recent decade, they accounted for more than 20 percent. These demographic shifts imply that while there were 11 workers for every elderly person in 1960, there are only 2.5 workers per elderly person today. This makes Japan, by most measures, the oldest nation in the world. At the same time, the overall population is no longer growing in Japan and has begun to decline. Some commentators claim that Japan's stagnant population, and within that the declining number of workers, is the main reason for Japan's economic misfortune.[a] If that were true, it would not bode well for growth prospects in Europe and Central Asia. Fortunately, the numbers point to a very different conclusion.

A decomposition of GDP growth shows that at least the direct impact of demographics on Japan's economic slowdown has been limited (see table BO.2.1).

Of the 8.4-percentage-point slowdown in GDP growth, 1 percentage point is linked to slower population growth, while 7.4 percentage points are linked to the slowdown in per capita growth. Of the latter, the overwhelming part is explained by a 6.7-percentage-point slowdown in labor productivity growth. Only 0.7 percentage point of the slowdown was directly due to demographic trends. The direct impact of demographics, despite dramatic shifts in the demographic structure, was limited for two reasons:

- The rising share of elderly in the population has been accompanied by a declining share of youth, from 27 percent during the 1960s to 14 percent during the 2000s. That has mitigated the decline in the share of the working-age population, in the same way that it did in many European countries.

- As often in economics, behavioral responses mitigated the shock. Japan's labor force participation is a good illustration of that mechanism. When the working-age population was increasing during the 1960s, the participation rate declined, but the opposite happened during the 2000s. An increasingly larger share of a shrinking working-age population participated in the labor market. These behavioral adjustments should not be ignored as policy makers anticipate the impact of future demographic changes in Europe and Central Asia. One should not merely extrapolate trends assuming constant behavior.

Japan's high growth during the 1960s was largely a reflection of urbanization and industrialization, with many workers moving out of low-productivity agriculture. That structural change

TABLE BO.2.1 GDP Growth Decomposition, Japan, 1960s and 2000s

	(1)	(2)	(3)	(3)	(4)	(5)	(5)	(6)	(7)	(8)
	GDP (1) = (2)+(3)	Population	GDP per capita	GDP per capita (3) = (4)+(5)	GDP per worker	Share of workers in population	Share of workers in population (5) = (6)+(7)+(8)	Share of working-age population	Labor force participation	Employment rate
1960s	9.2	1.1	8.1	8.1	7.7	0.4	0.4	0.7	−0.4	0.1
2000s	0.8	0.1	0.7	0.7	1.0	−0.3	−0.3	−0.6	0.4	−0.1
Change	−8.4	−1.0	−7.4	−7.4	−6.7	−0.7	−0.7	−1.3	0.8	−0.2

Source: World Bank calculations based on OECD Statistics.
Note: Variables in all the columns are expressed as annualized growth rates.

had run much of its course during the 1970s. By 1990, Japan had reached the limits of technological catching up in manufacturing, while not opening up the services sector for new technological impulses (Ueda 2012; Baily and Farrell 2006). In addition, the burst of the financial bubble at the end of the 1980s and the shortening of the workweek during the 1980s and 1990s may have reduced the growth in output per worker. However, one could also argue that the financial bubble and the changes in the labor market were more the consequence than the cause of the economic slowdown.

How important the *indirect* impacts of demographics on economic performance have been remains an open question. Japan has a long tradition of limited flexibility in the labor market and restrictive immigration laws (Arora, Branstetter, and Drev 2013). As this report argues, labor mobility is critical to sustaining innovation, especially in an aging society. Moreover, Japan's increases in public pension payments and large public debt levels might have become a burden on growth (Hansen and Imrohoroglu 2013). In those two areas, labor market mobility and fiscal policy, perhaps Japan does not serve as a valuable example for Europe and Central Asia. Overall, however, Japan's performance does provide evidence that the direct impact of demographics on economic growth may be limited.

a. See, for example, "The Japan Syndrome" 2010.

Examining the concerns expressed during the past century about the macroeconomic consequences of fast population growth and young populations will lead to a better understanding of the macroeconomic effects of aging. Those concerns came down to the problem of providing a rapidly increasing population with sufficient resources to become prosperous. How can countries accumulate enough capital to support fast economic growth? High population growth requires a higher investment rate to maintain the existing capital intensity of an economy. How can enough education be supplied to large cohorts of young people, even to maintain existing educational levels? How can natural resource constraints be overcome in increasingly densely populated areas?

These concerns were grounded in the problems that countries with young, fast-growing populations were facing.[6] They were often characterized by labor-intensive production, low educational levels, insufficient infrastructure, and severe environmental stress. In that sense, low fertility was more a part of the solution than a part of the problem. In countries with aging, stable populations, less investment is needed to maintain sufficient capital per person. At the danger of an overly simplistic analysis, it is indeed true that the specialization patterns in the older societies of Europe and Central Asia are more capital-intensive than the younger societies of Central Asia and Turkey. And, consistent with the expected pattern, educational levels are also higher in the older part of ECA than in Central Asia. Thus, an important macroeconomic impact of lower fertility and slowing population growth is the possibility for increased human and physical capital per worker, while production per worker tends to increase as production becomes more capital intensive. And there is evidence that that is exactly what is happening in the region.

Increasing production per worker does not mean, however, that income per capita is also increasing. The share of workers in the population might decline as

the share of the elderly, who no longer participate in the labor force, rises. At least until now, this potentially negative impact on per capita income has not materialized. The increasing share of elderly has been offset—and in many countries in Central Europe more than offset—by a declining share of young people, who also do not participate in the labor force. While demographic forces may tend to increase dependency ratios in the future (as the share of elderly increases further and the share of young people stays more or less constant), behavioral responses that result in increased and longer labor force participation can be expected to reduce dependency ratios. On balance, the number of inactive people per worker will not necessarily increase.

This positive macroeconomic impact of lower fertility on per capita incomes could well remain if changes in the saving rate are taken into account. As the elderly tend to dissave—that is, they consume by drawing down their past savings—the economy's saving rate can be expected to decline if the share of elderly increases. However, the simulations indicate that workers, who benefit from higher wage incomes when population growth declines, may increase their savings. As a result, the total drop in savings is lower given the increase in capital intensity caused by lower population growth.

Thus, lower fertility may reduce the size of the population but can increase per capita income by increasing capital per worker. By contrast, aging caused by increased life expectancy, which has already been observed in Western Europe and many countries in East Asia and is anticipated in many countries in Europe and Central Asia as they improve their preventive health care, has different macroeconomic effects. As increased life expectancy does not lead to slower population growth—on the contrary, it temporarily leads to higher population growth—there is, unlike the case of reduced fertility, no automatic tendency toward increased capital intensity of production and increased labor productivity. However, if a rise in life expectancy is anticipated by current workers, then they could, theoretically, save to prepare for longer retirement. That could lead, at least for some time, to increased capital intensity and thus to increased labor productivity if those additional savings are not all invested abroad. However, that positive impact will not last. Once the share of elderly in the population increases, the positive impact will dissipate.

The conclusion of model simulations is that declining mortality rates at older age may ultimately reduce per capita income, despite higher savings by workers and thus higher capital accumulation, if people spend more time in retirement without working longer. However, the story changes completely if people work longer. If the additional life expectancy were proportionally allocated to working time and time spent in retirement, the impact on per capita income would become positive again.[7] And that is exactly what is already happening in many countries in Europe and Central Asia. As life expectancy increases, the labor participation rates of older people also increase and the gap in participation rates between the young and the older age groups is starting to decline (figure O.6). This positive correlation can be a result of many economic and policy factors, but it is important to note that the rise in labor participation means that the ratio of inactive to active population need not increase in aging economies.

Apart from increased participation rates, there are other mechanisms through which effective labor supply will likely increase more than is suggested by pure extrapolation of demographic trends. One such mechanism is that younger age
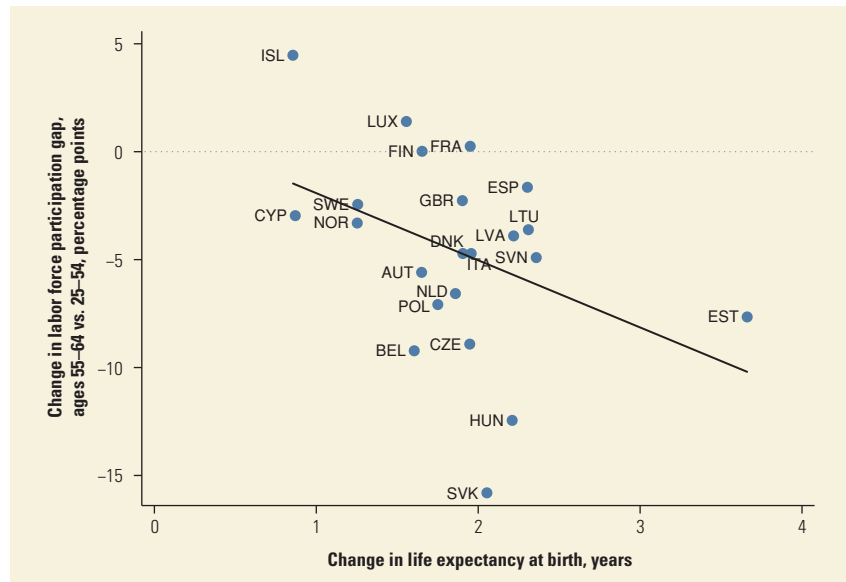
As life expectancy increases, the gap in labor force participation rates between the young and the old narrows, 2005–11

Source: World Bank calculations based on EU-SILC.

groups may be better educated than older age groups. This implies that the increase in human capital could exceed the increase in the number of workers. Figure O.7 illustrates this potential mechanism for the whole of Europe and Central Asia. However, major policy efforts would be required to realize these projections. Currently, in several countries the quality of education is not increasing, even if enrollment rates are rising.

Four Areas of Uncertainty

From a macroeconomic perspective, the aging currently observed in most of Europe and Central Asia and that expected in Central Asia and Turkey could have positive effects. However, the impact of aging on labor force participation and individual productivity will depend critically on attitudes and behaviors that are difficult to anticipate, much less quantify, in model simulations. Among the many issues involved, four are subject to considerable uncertainty and will be reviewed in turn:

• Will the older people of the future be inclined to work longer as they live longer?

• Will the older people of the future be as productive, mobile, innovative, and entrepreneurial as young people?

• Will the rise in the average age of physical and human capital—which could imply outdated education, infrastructure that does not meet current needs, and factories that fail to employ the newest technologies—mean that the total impact of aging is negative, despite the modestly positive effects that can come through the key macroeconomic transmission channels?

• Will an aging society imply a rise in inequality?

The stock of human capital has expanded more than the size of the working-age population in Europe and Central Asia over the past 20 years

— Working-age population
— Stock of years of education
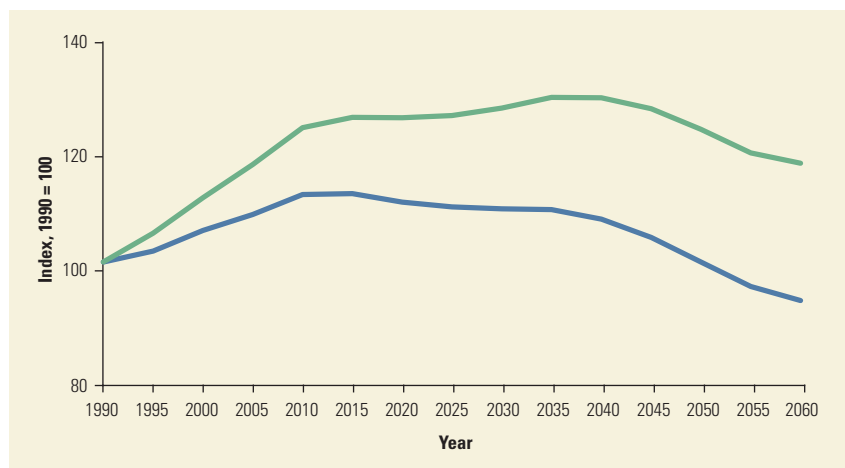
Source: World Bank calculations based on Lutz, Butz, and KC 2014.

Aging and Labor Force Participation

One of the startling conclusions of this report is that dependency ratios need not increase in an aging economy. The conventional definition of dependency ratio has often relied on a fixed chronological age of 65 to distinguish between working and retired. This arbitrary cutoff may no longer be relevant because, as further elaborated in the report, many people above 65 are willing—and expected—to work. This report defines a novel dependency ratio as the number of inactive to active people in the adult population (aged 15 and older), which should better capture the true state of dependency of the economy, that is, how many inactive people that each worker and tax contributor is supporting. If past trends continue, projections of the International Labour Office to 2030 suggest that dependency ratios, with the new definition, will only increase slightly in most of the region (ILO Stats). In the Western Balkans, the dependency ratio is actually projected to decline somewhat. This projection realistically assumes that the positive trend of longer work lives and increased labor force participation, especially of women, that was observed in most countries in the past will continue until 2030.

Beyond 2030, pure demographics point to a worsening of the dependency ratios, especially in the Western Balkans and the young countries. But with continued trends toward greater female labor force participation and longer work lives, the dependency ratio could remain fairly stable or even improve. The scenarios developed in this report show that a female-to-male convergence in participation rates, which would require favorable workplace environments and better work-life balance, would be sufficient to keep dependency ratios more or less constant. This would actually lead to a considerable improvement in the dependency ratio in the young countries of Europe and Central Asia. A convergence to participation profiles as observed in Iceland—a benchmark country with the highest overall participation rates—would actually decrease dependency ratios considerably in all subregions. Combining all these positive developments (admittedly an extreme assumption) could potentially decrease dependency ratios to between a half and a third of today's levels.

In countries in the Organisation for Economic Co-operation and Development (OECD), the time people spend in retirement has risen significantly during the past decades. But more than half of that increase was due to earlier retirement. On average, men retired at age 68.7 and had a remaining life expectancy of about 10.6 years in 1970; in 2012, men retired at age 64.2, with a remaining life expectancy of 18 years. In other words, people nowadays not only live longer, but—as pension systems became more generous—also retire earlier. In OECD countries, the trend is already reversing: since the 1990s, the average effective retirement age has started to increase and people have begun working longer. If this trend continues, gains in life expectancy will indeed be translated into longer work lives. Decreasing the possibilities for early retirement, further increases in statutory retirement ages, and making the retirement age flexible are prerequisites for this.

Aging and Productivity

Is downward pressure on overall productivity likely in an aging workforce, because people become less productive when they age? Again, the evidence provided in this report sketches a mixed picture. What is clear, though, is that as some functions of cognitive performance decline with age, the brain has a remarkable ability to compensate with improvements in other functions. For example, brain scans show that aging brains access less new information than younger brains but that they compensate for that with a much larger amount of experience and knowledge. Moreover, aging also affects personality traits and noncognitive skills, both of which are also highly relevant for labor market outcomes. Conscientiousness, agreeableness, and emotional stability improve with age, while openness and extraversion decline (Wieczorkowska-Wierzbińska 2014).

Finally, the literature provides ample evidence for the declining physical strength of older people, suggesting that older workers are less suitable for physically demanding jobs. At the same time, key strengths can be maintained through regular use. A good example is grip strength: while in the general population, grip strength peaks at the age of 35 and declines quickly thereafter, this might not be true for workers who rely on their grip strength every day. In fact, the grip strength of assembly-line workers has been shown to remain constant until the age of 65 (Spirduso, Francis, and MacRae 1995).

In conclusion, the effects of aging on the brain, the body, and personality are diverse. This begs the question of whether firms can take advantage of these shifts and new strengths. Given that certain skills appreciate with age (such as speech and language), aging economies can capitalize on this comparative advantage and shift toward industries that use the skills more intensively (for example, printing and sales) (Cai and Stoyanov 2014). Using data on international trade and industry-level skill intensity, this report finds evidence that endowments shift with an aging workforce and that firms are taking advantage of these changing skills.

In contrast, and counteracting this positive finding, there is empirical evidence that older people are less mobile, less innovative, and less entrepreneurial. Experience is often job specific and becomes less valuable if workers have to change firms or deal with new technologies. Older workers are less mobile because they have established a family, own a house, or accumulated job-specific benefits. Older people become less entrepreneurial, because risk taking becomes more

costly as they have more to lose. Especially when economic growth requires substantial change, an aging society can become a disadvantage. Governments, firms, and individuals can increase mobility and flexibility by educating young people to lay the foundation for lifelong learning, encouraging both domestic and international migration, making benefits less job dependent (for example, encouraging portable pensions), and increasing mobility in housing markets.

Aging of Capital

Human and physical capital, including infrastructure, may become outdated in an aging society. When the population is no longer growing, or is even shrinking, then the average age of human and physical capital will rise with the average age of people. This could depress productivity if a significant part of technological progress is embedded in new vintages of knowledge and capital. However, it is not easy to uncover empirical evidence of the size of these effects. Moreover, slower population growth provides the opportunity to improve the quantity and quality of education and to increase capital-to-output ratios, which can counteract the effects of an aging capital stock.

Aging and Economic Inequality

The impact of aging on the average income—even after considering the above qualifications—may not necessarily be negative; however, aging also influences its distribution. Many studies have shown that income inequality within older age cohorts is greater than within young cohorts (see, for example, Attanasio, Hurst, and Pistaferri 2014; Deaton and Paxson 1994; Ohtake and Saito 1998). Three mechanisms are responsible for this phenomenon. First, the disadvantages in early years can be exacerbated at old age. Around the world, mortality rates are inversely correlated with education and income, but the differentiation in mortality rates is especially large in Europe and Central Asia. In Central Europe, the Eastern Partnership, and Russia, life expectancy at age 50 for males with tertiary education is around 10 years higher than for males without upper-secondary education. In comparison, that difference is about 6 years in the United States. Not only dying at a younger age, people with lower education and income would also be less healthy in their last years, which may imply higher health care costs that drive many into impoverishment. Second, people gradually accumulate wealth over time, so that the inequality in wealth accumulated at retirement age is much larger than income inequality. That also implies high inequality in income derived from accumulated wealth during retirement. Third, skill premiums rise with age. The combination of education and experience makes people more productive, or at least makes it possible to get promoted into positions with higher salaries. By contrast, experience hardly increases the wages of unskilled workers. That means that the wage gap between skilled and unskilled workers is greater among older workers than among younger workers. For example, in Romania, 25- to 29-year-old tertiary education graduates earn on average 50 percent more than their lower-skilled counterparts. At ages 50 to 64, the difference is expected to rise to more than 70 percent. Nevertheless, with a combination of improved education of the young and social safety nets for the old, this growing divide among older age groups can be mitigated.

A Comprehensive Policy Agenda

The analysis provided in this report indicates that a golden demographic age is a realistic prospect for Europe and Central Asia, at least if all actors adjust appropriately and if they act together on wide-ranging reforms, affecting, among other areas, health care, education, labor markets, and pension systems.

Achieve More Balanced Age Structures

Healthy Aging

Effective interventions to promote healthy aging, in particular preventive measures to reduce cardiovascular disease, are known and relatively inexpensive. The burden of old-age care can be significantly reduced with more focus on prevention. Indeed, the primary prevention of disease through decreasing tobacco use and managing other key risk factors like high blood pressure, poor dietary habits, alcohol use, and obesity, has accounted for around half the benefits seen in the West, with improved treatment for the other half (Smith and Nguyen 2013). In the United States, for each 10 percent increase in spending on local public health interventions, an economic evaluation demonstrated a 3.2 percent drop in deaths from cardiovascular disease, a 1.4 percent drop in deaths from diabetes, and a 1.1 percent drop in deaths from cancer (Mays and Smith 2011). Another example of preventive care is that older people are advised to have an annual influenza vaccination, as they are more at risk of developing complications than younger people. Yet the population coverage of this vaccine is extremely low in Europe and Central Asia, despite evidence showing that vaccination is more cost effective than treatment of the complications from influenza (Peasah et al. 2013). Investments in basic health promotion and medications focused on preventing key noncommunicable diseases have been insufficient in the region. While medications that lower blood pressure and cholesterol are part of outpatient benefit packages in many countries in Europe and Central Asia, they often require a copayment, which has been known to reduce adherence to medication regimes (Sidorenko and Zaidi 2013).

Another issue related to healthy aging is long-term care. Care to meet differing levels of dependency can take on many different forms and can be given in the home, in community centers, or in institutions such as nursing homes. Expanding community-based formal care services would help reduce hospital costs, improve the quality and appropriateness of care services, and lift the care burden for the many informal caregivers, mostly women. In most countries in Europe and Central Asia, care has been mainly provided informally by family members, as a response to a lack of formal care. Switching from informal care to hospital-based care is also not a long-term solution because of its high costs. Many countries will therefore be unprepared when the large baby-boom generation begins entering old age with high levels of dependency and disability. One way to contain costs is to adopt a more comprehensive system with different levels of care ranging from home-based to community-based to institutional care in order to cater to a wide variety of need intensity, with appropriate cost sharing. At the same time, the goal of long-term care should be to maximize the functionality and quality of life of individuals.

Fertility Rebound

Women throughout Europe have fewer children than they want. The number of children that women aged 25–39 have indicated that they intend to have is well above the number they actually have, suggesting that there are barriers to family formation that policy can address.

The experience of some high-income countries shows that the right incentives can encourage a rebound in fertility to replacement rates. In France, the provision of child care services during early life, short maternity leave with earnings-related pay, and extended financial support after childbirth were effective in raising fertility rates. These measures are examples of policies that allow women to reconcile work and motherhood, which can result not only in women having more children but also in increased participation in the labor force. Another example is Iceland, which has two main policies that contribute to high participation rates among women and fertility rates above replacement level. First, maternal leave policies cover not only women but also men, and men's benefits are among the most generous. Second, Iceland has one of the highest rates of coverage of child care in Europe: more than 90 percent of three- to five-year-olds are covered, and parents pay only about 30 percent of the real cost. In contrast, financial transfers at childbirth, such as birth grants, and long maternity leaves, appear to be less effective (Eydal and Ólafsson 2008).

Migration

Increasing net immigration rates could help countries return to more stable demographics in the short run. However, migration is unlikely to change the long-run demographic trends. A more important role of migration is that it can bring necessary mobility in labor markets when populations are no longer growing. Some steps toward a more liberal migration regime have yielded important demographic and economic benefits. These include flexible visa arrangements and better integration policies to attract workers from abroad, integrate them into the formal sector, and increase their contribution to productivity growth. Right now, many countries in Europe and Central Asia have negative net immigration rates. However, rather than controlling emigration, countries can adopt appropriate policies to maximize the gains of emigration, while minimizing their negative effects. For example, facilitation of economic contacts with the diaspora can increase the benefits of emigration for the countries of origin through trade, investment, and remittances.

Optimize the Economic Opportunities

Fiscal Sustainability

Supporting a more balanced demographic structure requires more resources for pensions, child care, health care, and long-term care, which is made more challenging in the context of a shrinking share of the working-age population. Examples from the EU-15 countries show that this challenge can be manageable, given swift and bold actions as part of the broader policy to balance aging. The rules governing pension systems play an important role in determining the size of the

gap between payroll contributions and total pension expenditures, which often has to be filled by public revenues. Without policy changes, pension expenditures would rise significantly if countries covered all priorities: that is, ensuring that all elderly receive at least a basic benefit that would keep them from falling into poverty, protecting the disabled and survivors, and providing additional retirement income for contributors. To offset these steps, the biggest savings can be achieved by reducing the incentives for early retirement and making it attractive to work beyond 65, or to a level where there are about 15 years of remaining life expectancy at the age of effective retirement. Other measures that would reduce costs include means-testing the basic (noncontributory) pension benefit, ensuring that disability benefits are not used simply as a means to achieve early retirement, and reducing the size of noncontributory and survivor benefits.

Aging will not raise health expenditures as much as often expected since health care costs tend to concentrate in the last years of life, regardless of age (Dormont, Grignon, and Huber 2006). The increase in death-related costs on the overall budget is manageable: at the current mortality rates, Central Europe and the Baltics, the Eastern Partnership and Russia, and the young countries of Europe and Central Asia will have to absorb only 0.2–0.3 percent more of the population dying annually. It is difficult to determine what drives health care costs, but if the additional years of life are spent in good health, this report projects that the costs of health care are expected to increase at most by four percentage points in the Slovak Republic by 2060, for example. Rather than aging, the adoption of advances in medical technology is a critical driver of cost pressure in health systems. This is particularly true in many countries in Europe and Central Asia, where the supply of technological solutions generates demand beyond previous levels and cost-control mechanisms are weak. Understanding the cause of cost increases is crucial to designing the right solutions.

These age-related costs, however, should not divert attention from investing in the young generations, which may be more affordable given that the young age groups are smaller. Investing in early childhood development and in the education and health of youth has a significant payoff in stronger labor force participation, higher productivity, and healthier aging in later years.

Longer and More Productive Working Lives

Increased life expectancy can be accompanied by extending working lives, limiting the use of disability and unemployment benefits as a road to early retirement, and increasing flexibility in labor markets to help older unemployed workers find jobs. For clues about what policies keep older people employed, it is useful to look at Iceland, which has the highest employment rates for older people in Europe and among OECD countries (Eurostat). First, the pension system has lower future benefits for workers who retire early, a high retirement age (67 for both men and women over the past three decades), and strong incentives to work even longer. There is no specific early retirement scheme, and unemployment and disability benefits are well managed to avoid abuse (that is, using them as a route to early retirement). Training rates for older workers are among the highest in the world: among workers aged 55–64, 40 percent have participated in informal education.

In addition, employers show favorable attitudes toward older workers. Finally, no formal regulation exists on part-time work, and according to a general provision in collective agreements, part-time workers are to be treated equally to full-time workers on a pro rata basis. Another example is in Germany, where three different public training programs (lasting between six and eight months) for unemployed individuals resulted in increased employment probabilities (by six, seven, and five percentage points, depending on the type of training) and earnings for men aged 50 and above (Rinne, Uhlendorff, and Zhao 2008).

Firms can also help improve the productivity of older workers. Some effective mechanisms include workplace adjustments, reassignment to age-specific tasks, mixed-age working teams, reduced work time, and well-designed lifelong learning. An experiment at BMW's Dingolfing plant in Germany shows that interventions such as physical changes at the workplace, adjustments in work hours, and exercises with a physiotherapist are low-cost but effective ways to raise the productivity of older workers (Schwarz et al. 2014). As for lifelong learning, changes in the demand for skills and rapid population aging in many countries in Europe and Central Asia further underscore the need to develop effective adult education and training systems. So far, there has been limited focus on adult learning in Europe and Central Asia. Participation rates in continuous education in the region are much lower than in the EU-15. Moving forward, countries would need to explore different mechanisms for boosting lifelong learning on both the supply and the demand sides. In particular, these systems need to enhance the relevance of training and capitalize on the skills that are the comparative advantage of older workers. As people pass middle age, the brain gets better at recognizing the central idea and the big picture and, if kept in good shape, can even find solutions much faster than a younger brain. Prior experience and knowledge play a much more powerful role in how older workers learn new skills than in younger individuals. Key features of promising strategies to train older workers include establishing clear links to employers beforehand and competence-based training fully built on recognition of prior learning.

Supporting entrepreneurship at old age can also facilitate the participation of older workers in the labor market. So far, older workers tend to have a limited interest in entrepreneurship. The observed relationship between education and old-age entrepreneurship in Europe and Central Asia may suggest a role for skills training, although more research is required to understand what skills are needed. Another largely unexamined but promising idea is that old age and youth are complements in entrepreneurship, with age contributing through experience, managerial acumen, and market knowledge. This suggests that promoting mixed-age entrepreneurial teams could capitalize on the complementary skills of old and young entrepreneurs, with the older partner acting as a mentor.

Addressing Poverty and Inequality

In all those areas, it is important to look beyond aggregate numbers and address the significant poverty and inequality that exist in many countries of Europe and Central Asia and that may worsen as a result of aging. Lower income and education groups are at a significant disadvantage in health status and mortality rates, which clearly affect their lifetime earnings and accumulated savings. Ongoing pension reforms may also increase income inequality among future retirees. These

reforms should recognize the importance of social safety nets for the elderly, while taking account of the fiscal cost they imply. Health care and long-term care reforms to improve healthy life expectancy would require special attention to the most vulnerable. High levels of inequality in labor income also underline the importance of higher-quality education throughout society, with particular emphasis on disadvantaged children and low-skilled workers in routine jobs or manual labor where skills and demand quickly decline with age.

Adopt a Systematic Approach

As this report shows, adjustments to the challenges caused by aging are already under way in the region. Governments have started pension reforms; older individuals have become more active participants in the labor markets; and trade patterns suggest that firms have already started to take advantage of changing demographics in the workforce. However, isolated changes by different actors might not be enough to confront the challenges of aging and in some cases may be counterproductive.

An important message coming out of this report is that the policy agenda should be comprehensive, not limited merely to challenges facing central governments but including adjustments by municipalities, firms, and individuals. It would be a mistake to solve problems from a narrow perspective. While a pinpointed, isolated action may seem successful, it may create problems elsewhere. A good example is pension reforms. The exclusive focus on fiscal sustainability in pension reforms in several countries in Europe and Central Asia raises concerns about severe poverty among the future disadvantaged elderly. The best solutions take the objectives of the whole society, and of current and future generations, into account. Differences in policy priorities across generations illustrate the challenges in achieving comprehensive policy reform. For example, older voters give low priority to education and environmental protection. And many young people do not want to participate in pension systems, an attitude that should be addressed through provision of clear information, appropriate incentive systems, and adequate default options.

Another example of a too-narrow approach is the limited availability of long-term care at a community level because nobody wants to bear the burden (or the costs) of supporting the elderly in their daily activities. Such a failure shifts the burden of long-term care to health care funding, substantially increasing overall costs. This is an inefficient practice that can be observed throughout the region. Relying on informal care by family members does not work either. It may reduce costs, but it creates other problems by placing too much burden on women. In fact, the "sandwich generation" is a term coined to identify the group of women under pressure to have more children, to be active in the workforce, and to take care of their elderly parents.

The required cardiovascular revolution is yet another example of the need for coordination among many actors. Developed countries have many successful experiences of reducing cigarette and alcohol consumption, of shifts toward primary and preventive care, and of the effective use of early diagnostics. These examples involve changes in individual behavior; restrictions imposed on consumption in restaurants, bars, and public places; and fundamental changes in health care

systems. Countries in the region have many examples to follow for achieving a substantial increase in life expectancy.

Similarly, lifelong learning requires coordinated actions by firms, employees, and the government. It is best organized by employers and employees, but there is a role for the government as well, as lifelong learning should not be targeted only to improved performance in the current job; it should also open up new opportunities to change jobs and change sectors. Further integration of lifelong learning into the educational system for young cohorts could be a promising development.

Thus, in many areas adjustments are needed that go well beyond policy changes by the central government. Countries in Western Europe have developed a number of integrated approaches. Ireland's Office for Older People is one such example. Aging is a process that touches all aspects of society. If the challenges are taken up and the opportunities are exploited by the whole society, then a demographic Golden Age is within reach for Europe and Central Asia.

What Priority for What Country?

Even within a comprehensive approach, the sequencing of policies may be influenced by the specific circumstances of individual countries. Because countries in the region are at fairly different demographic stages and face different age-related economic issues, policy packages need to be individually tailored. A description of country-by-country policy packages is beyond the scope of this report, which is regional in its approach. However, the report highlights those interventions that seem more urgent, by comparing countries across a spectrum of indicators reflecting the demographic and economic issues in aging societies. Seven indicators are included, each requiring different policy actions. These can be grouped into the two following subsets, demographic indicators and economic indicators:

- *Demographic indicators*
  - Total fertility rate, as a measurement of how big the policy challenge is to return to replacement fertility
  - Expected years of healthy life at birth, as a measurement for healthy aging
  - Net immigration rates, as a measurement of how much a country has embraced migration as part of the solution, or to what extent it still hinders a return to normal demographics

- *Economic indicators*
  - The ratio of inactive per active people in the adult population (15+), as a measurement of active aging people
  - The OECD PISA (Programme for International Student Assessment) scores related to scientific subjects as a measurement of the quality of education and future productivity
  - Gross public debt as a share of GDP, as a measurement of the fiscal challenge
  - Poverty among older people (65+) relative to poverty among younger people (15–24 years old).

Finally, the political economy cannot be underestimated. Given that older individuals are more likely to support the status quo (for example, to vote against pension reforms or against increasing spending on education), aging societies may encounter some opposition to the reform efforts. A final indicator then looks at the voter participation of older people (55–64 years old) relative to that of young people (25–34 years old), as a measurement of how much old people may influence policy making.

To gain a sense of how countries are doing on each of these outcomes, the report benchmarks all countries of Europe and Central Asia against each other and against the benchmark countries of Western Europe and the Baltics. The results are presented in table O.1 and expressed as a standard deviation from the average (*z*-score). This table also offers a color coding based on the severity of the challenge. For each country, the challenge is coded orange if for that particular outcome the country is in the upper quartile (biggest challenge), is coded yellow if it is in the middle two quartiles, and is coded green if it is in the lower quartile (least challenge).

Starting from the demographic dimensions, countries in the Western Balkans, Eastern Partnership and Russia, Bulgaria, and the Baltics display especially low life expectancy and fertility. Net emigration is also exacerbating aging in a few of them, especially countries in the Western Balkans. The policy measures previously discussed—such as removing obstacles to having the desired number of children and reforming the health and long-term care systems—should figure high on their priorities list.

The demographic challenges seem less urgent for young countries and countries in Central Europe and the Baltics, but for different reasons. Young countries still have high fertility rates, but their old-age mortality is also high. For Central European and the Baltic countries, it is the reverse. It is also important to note that a high level of fertility may mask two opposite trends. Fertility rates, for example, in Norway and Sweden have been on the rebound, whereas fertility rates in Central Asia and Turkey are relatively high but on a rapid downward trend. This factor may signal serious demographic challenges for the young countries in the near future.

On the economic dimensions, Azerbaijan, Belarus, the Kyrgyz Republic, Moldova, Turkey, Ukraine, and the Western Balkans appear to be affected by high inactivity in their adult populations, low-quality education, and high relative old-age poverty. All these countries would benefit from more focused investments in education and safety nets. Clearly, the policy challenge is a bit more severe for the already aged countries that have to balance policies on both the demographic and the economic side. The young countries in this group (Turkey and those in Central Asia) have more time to set up fiscally sustainable pensions, which could go a long way in reducing relative old-age poverty and at the same time not discourage labor force participation at older ages. The urgency of reform for these countries, however, should not be ignored because they are also the ones with high relative voting participation among the old-age groups. As these countries become older and these age groups grow as a share of voters, they may face more opposition to pension reforms and investment in education.

> **Young countries have more time to invest in education and set up fiscally sustainable pension and health care systems, but the urgency should not be ignored because these countries also have high relative voting participation among the reform-averse old-age groups.**

TABLE O.1 Country Policy Challenges across Eight Indicators (z–score), around 2012

Country	Group	Voting rate (old-young)	Total fertility rate	Healthy life expectancy	Net immigration
Moldova	Eastern Partnership and Russian Federation	−0.54	0.62	1.12	2.04
Bosnia and Herzegovina	Western Balkans	0.49	1.00	−0.15	0.31
Albania	Western Balkans	−0.01	−0.10	0.61	1.20
Serbia	Western Balkans	0.25	0.80	0.61	0.87
Kyrgyz Republic	Young countries	1.00	−2.93	1.62	2.18
Azerbaijan	Young countries	1.68	−0.41	1.12	—
Bulgaria	Central Europe	1.08	0.46	0.36	0.65
Greece	Western Europe	—	0.48	−0.91	−0.05
Belarus	Eastern Partnership and Russian Federation	0.45	0.55	0.86	0.29
Croatia	Central Europe	−0.01	0.53	−0.15	0.51
Georgia	Eastern Partnership and Russian Federation	1.24	−0.15	0.61	2.00
Montenegro	Western Balkans	−0.55	0.15	0.36	0.47
Armenia	Eastern Partnership and Russian Federation	−0.13	0.01	1.37	1.26
Ukraine	Eastern Partnership and Russian Federation	0.24	0.61	1.12	0.28
Russian Federation	Eastern Partnership and Russian Federation	0.42	0.46	1.62	−0.25
Turkey	Young countries	−0.51	−0.67	0.61	−0.06
Romania	Central Europe	0.36	0.71	0.36	0.35
Macedonia, FYR	Western Balkans	−1.01	0.66	0.36	0.37
Lithuania	The Baltics	0.98	0.50	0.61	0.80
Portugal	Western Europe	—	0.91	−0.91	−0.35
Belgium	Western Europe	—	−0.23	−0.91	−0.61
Kazakhstan	Young countries	0.60	−1.51	1.88	—
Slovak Republic	Central Europe	−0.29	0.76	0.10	0.06
Italy	Western Europe	−0.93	0.57	−1.42	−0.68
Hungary	Central Europe	−1.60	0.72	0.36	−0.24
Poland	Central Europe	−0.07	0.71	0.10	0.29
United Kingdom	Western Europe	1.86	−0.31	−0.91	−0.65
Slovenia	Central Europe	−0.05	0.52	−0.66	−0.43
Germany	Western Europe	0.09	0.70	−0.91	−0.18
Austria	Western Europe	−0.42	0.59	−0.91	−0.86
Spain	Western Europe	—	0.53	−1.42	−0.57
France	Western Europe	0.43	−0.50	−1.16	−0.40
Estonia	The Baltics	1.55	0.34	0.10	—
Uzbekistan	Young countries	−1.18	−1.25	1.62	0.65
Ireland	Western Europe	−0.71	−0.55	−0.91	−0.44
Czech Republic	Central Europe	−0.44	0.41	−0.40	−0.93
Tajikistan	Young countries	−0.62	−4.54	1.88	0.98
Netherlands	Western Europe	—	−0.07	−0.91	0.04
Iceland	Western Europe	—	−0.73	−1.16	−0.80
Denmark	Western Europe	—	−0.29	−0.66	−0.60
Latvia	The Baltics	−3.10	0.32	0.61	0.52
Finland	Western Europe	—	−0.23	−0.91	−0.34
Switzerland	Western Europe	0.80	0.46	−1.42	−2.23
Sweden	Western Europe	−1.36	−0.38	−1.16	−1.07
Luxembourg	Western Europe	—	0.15	−1.16	−2.77
Norway	Western Europe	—	−0.40	−0.91	−1.61

Note: z-score expresses each outcome as a standard deviation from the average: that is, for each country, how far the country is away from the average across all countries. For some indicators, the direction is reversed so that the higher the z-score for each outcome, the bigger the challenge of that particular outcome for a particular country. The color coding represents the severity of the challenge along a given outcome: ▮ = an outcome in the upper quartile (biggest challenge); ▮ = an outcome in the middle two quartiles; and ▮ = an outcome in the lower quartile (least challenge). Countries are sorted by the average of all z-scores, from the highest (biggest overall challenges) to the lowest (least overall challenges). PISA = Programme for International Student Assessment; — = data unavailable.

Adult dependency ratio	PISA scores in science	Gross debt as share of GDP	Relative poverty (old-young)	Average score	Group	Country
3.63	—	−0.90	1.49	1.06	Eastern Partnership and Russian Federation	Moldova
2.27	—	−0.30	1.41	0.72	Western Balkans	Bosnia and Herzegovina
0.43	1.82	0.25	0.83	0.63	Western Balkans	Albania
0.89	0.78	0.23	0.48	0.61	Western Balkans	Serbia
−1.08	3.26	−0.17	0.87	0.60	Young countries	Kyrgyz Republic
−0.93	2.34	−1.29	1.51	0.57	Young countries	Azerbaijan
0.74	0.76	−1.11	0.77	0.46	Central Europe	Bulgaria
0.73	0.31	3.06	−0.38	0.46	Western Europe	Greece
0.33	—	−0.48	0.83	0.41	Eastern Partnership and Russian Federation	Belarus
1.05	−0.21	−0.01	1.52	0.40	Central Europe	Croatia
−0.82	—	−0.67	0.54	0.39	Eastern Partnership and Russian Federation	Georgia
1.28	1.54	−0.02	−0.11	0.39	Western Balkans	Montenegro
−0.58	—	−0.47	1.27	0.39	Eastern Partnership and Russian Federation	Armenia
−0.15	—	−0.52	0.96	0.36	Eastern Partnership and Russian Federation	Ukraine
−0.69	−0.11	−1.25	1.65	0.23	Eastern Partnership and Russian Federation	Russian Federation
1.39	0.39	−0.55	1.19	0.22	Young countries	Turkey
0.25	0.91	−0.49	−1.20	0.15	Central Europe	Romania
0.43	—	−0.63	0.53	0.10	Western Balkans	Macedonia, FYR
−0.33	−0.32	−0.41	−1.29	0.07	The Baltics	Lithuania
−0.40	−0.17	2.07	−0.71	0.06	Western Europe	Portugal
0.77	−0.52	1.39	0.43	0.05	Western Europe	Belgium
−1.58	1.21	−1.26	0.88	0.03	Young countries	Kazakhstan
−0.20	0.22	−0.06	−0.61	0.00	Central Europe	Slovak Republic
1.47	−0.28	2.16	−1.30	−0.05	Western Europe	Italy
0.96	−0.28	0.75	−1.12	−0.06	Central Europe	Hungary
0.22	−0.97	0.03	−0.93	−0.08	Central Europe	Poland
−0.52	−0.71	1.03	−0.48	−0.09	Western Europe	United Kingdom
0.03	−0.71	−0.04	0.64	−0.09	Central Europe	Slovenia
−0.24	−0.93	0.79	−0.22	−0.11	Western Europe	Germany
−0.38	−0.54	0.59	0.17	−0.22	Western Europe	Austria
−0.19	−0.32	0.93	−0.77	−0.26	Western Europe	Spain
0.28	−0.39	1.02	−1.34	−0.26	Western Europe	France
−0.49	−1.29	−1.34	−0.73	−0.27	The Baltics	Estonia
−0.43	—	−1.37	—	−0.33	Young countries	Uzbekistan
−0.28	−0.88	1.69	−0.68	−0.35	Western Europe	Ireland
−0.10	−0.58	−0.25	−0.55	−0.36	Central Europe	Czech Republic
−1.15	—	−0.67	1.56	−0.37	Young countries	Tajikistan
−0.83	−0.88	0.35	−0.77	−0.44	Western Europe	Netherlands
−1.73	0.07	1.26	−0.01	−0.44	Western Europe	Iceland
−0.66	−0.36	−0.28	−0.39	−0.46	Western Europe	Denmark
−0.28	−0.45	−0.54	−0.88	−0.48	The Baltics	Latvia
−0.27	−1.38	−0.09	−0.91	−0.59	Western Europe	Finland
−1.19	−0.73	−0.16	—	−0.64	Western Europe	Switzerland
−0.76	−0.08	−0.49	−1.06	−0.80	Western Europe	Sweden
0.04	−0.21	−0.98	−1.36	−0.90	Western Europe	Luxembourg
−0.91	−0.30	−0.75	−1.72	−0.94	Western Europe	Norway

The challenges for countries toward the bottom of the table, including mainly Western European countries but also some countries in Central Europe and the Baltics, are more modest on both the economic and the demographic dimensions. Life expectancy has already expanded, as the cardiovascular revolution has evolved. Educational quality and labor force participation rates are also high, complemented by low debt-to-GDP ratio (except for a few South European countries) and relatively low old-age poverty.

These indicators are in no way comprehensive and, given that they provide only a snapshot of each country's current conditions, may not fully reflect the challenges that lie ahead. Nevertheless, they are indicative of how well a country is positioned to optimize the opportunities that aging brings and to minimize the accompanying negative impacts. Although the Golden Age of a balanced population structure and of healthy, active, and prosperous aging is within reach, it requires focused and coordinated adjustments by all actors in the society.

Notes

1   This highlights the difference between Europe and Central Asia and other aging regions such as Western Europe and East Asia. In 2011, while life expectancy at birth had already reached 82 years in Western Europe and 75 in East Asia, it was only 72 in Europe and Central Asia.
2   Several caveats are warranted. These are not the only relevant indicators that could be included; and the values of the indicators are a snapshot of current situations and do not necessarily predict future challenges.
3.   In the scenario in which mortality rates remain the same and fertility rates return to replacement level, the average age of the world population would be 40 years, very close to the current average age in Western Europe.
4.   But the last century was the exception, with its large shares of young people, and as a result it had unsustainably high population growth.
5.   The "Sputnik generation" refers to the Soviet baby boomers, born in the period following World War II. The term is used in Raleigh (2006).
6.   The discussion in the following paragraphs about the impact of aging (or more stable populations) on economic growth is in line with what the literature often labels the second demographic dividend. The literature refers to a first demographic dividend as the boost that the decline of fertility brings to income growth. As the population born during the high-fertility years enters the labor force and the number of children decreases, the dependency ratio temporarily goes down, so that other things being equal, per capita income grows. The dependency ratio begins increasing again as the old-age mortality is reduced. However, this transition could lead to a second dividend if improved longevity generates incentives to work longer and accumulate more assets. With fewer children to care for, there can be more investments in human capital. These factors will be beneficial to the growth of per capita income (Lee and Mason 2006).
7.   This implies that for every year that people live longer, roughly three months could be spent in retirement and nine months in the active labor force.

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The Demographic Transition in Europe and Central Asia
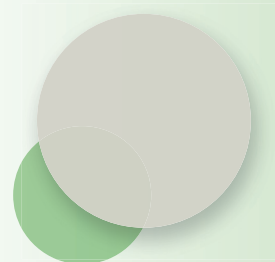
Overview

The average age of the populations of Europe and Central Asia (ECA) increased from 31 years in 1970 to 37 years in 2015, driven by steep declines in fertility (which in many countries has fallen below replacement rates), not by a significant improvement in longevity. Part I of this report reviews the main drivers of population aging. Why is fertility so low in the region? Why is the incidence of disease and disability so high? and, related to that question, Why has life expectancy increased so little? What is the role of migration in the aging of societies? This part sets the stage for the discussion of the economic impact of aging in part II and of policy recommendations in part III.

The Demographic Transition and the "Golden Age"

Population aging in the region represents the final stage of a demographic transition that started in the second half of the 18th century—a transition that is unfolding in many countries across the globe. This transition was initially driven by declines in child mortality that resulted in rapid population growth and young populations. Subsequently, declines in fertility slowed population growth and, in conjunction with improvements in longevity, increased the average age. This process initially moved at a slow pace, disrupted at times by temporary demographic shocks such as the two world wars of the 20th century. However, since the 1960s the decline in fertility has been remarkable, heralding the shrinking of younger age groups. Populations in Europe and Central Asia are older than in most other regions, largely because they are further along in this demographic transition. An important message of this report is that population aging is a natural reaction to the very young and fast-growing populations at earlier stages of the demographic transition.

This historical perspective on the demographic transition does not diminish the pressure that aging places on economic growth, pension plans, and health sys-

tems. However, a second important message of this report is that behavioral adjustments by individuals and firms, coupled with intelligent policy choices, can mitigate these challenges. Behavioral and policy responses can improve the demographics and reduce dependency ratios by increasing opportunities for people to participate in the workforce. Supporting people in their desire to have the bigger families they say they want could facilitate a rise in fertility to the replacement rate. Improved health behaviors will increase life expectancy, reduce disability, and allow longer working lives. Changes in migration flows could increase the availability of workers. The success of these efforts could usher in a "Golden Age" of aging, with stable populations balanced across age groups and individuals living long, healthy, and prosperous lives.

The Effects of Fertility Declines on Aging across the Region

The main reason for the increase in the average age of the populations of Europe and Central Asia is steep declines in fertility (which in many countries has fallen below replacement rates), not a significant improvement in longevity. Thus the rise in the share of the population over 65 reflects a decline in younger age groups, not a significant increase in the number of older people. Aging has also been affected by temporary demographic shocks, including the baby boom that occurred in some countries following World War II and the sharp declines in fertility and increases in the emigration of young people during the economic disruptions that accompanied the transition to market economies.

Central Europe, the Eastern Partnership and Russian Federation, and the Western Balkans have relatively old populations, with the largest age groups in their 20s to their 60s. Fertility rates in many of these countries have fallen below replacement level, and their populations are declining. Turkey and Central Asian countries are much younger, with their largest age groups infants to people in their 20s and populations that are still growing (see table I.O.1). However, fertility has also declined in these countries, and they will experience substantial aging and a slowing of population growth in the coming decades.

Aging is likely to imply a fall in the share of the working-age population (aged 15–64) in the total adult population (aged 15 and over) from 86 percent in 2015 to 75 percent by 2050, with particularly steep drops in the Western Balkans and Central Europe (14 percentage points). The younger countries of Turkey and Central Asia will also experience a decline in the share of the working-age population, but this share will still be 80 percent in 2050, or 18 percentage points higher than the average of the other countries in the region.

The very sharp declines in fertility in the region likely reflect many causes, including women's postponement of childbearing to take advantage of the greater opportunities for education and employment that are typically associated with development; changing cultural attitudes toward family size; increases in some of the costs related to having children; economic shocks that reduce the size or certainty of household income; the availability of modern contraceptives; and the policy and institutional environment surrounding the employment of women. Having a second child is the important driver of fertility in most countries in the region.

TABLE I.O.1 Age Cohorts as a Percentage of the Population in Selected Country Groupings, 2015

Age group	Central Europe	Eastern Partnership and Russian Federation	Western Balkans	Central Asia and Turkey
0–20	20	21	23	35
20–40	30	31	29	33
40–60	27	28	27	22
60+	23	20	21	10

Source: World Population Prospects: The 2012 Revision.

Emerging evidence suggests that whether a woman is in stable employment after having the first child is an important determinant of whether she will have another child. Providing opportunities for part-time employment, subsidizing and increasing the availability of child care, and ensuring stable employment opportunities that accommodate the needs of working parents could support families to have the two children they say they desire while improving the labor market participation of women.

High Rates of Disease and Disability in Europe and Central Asia

The populations of Europe and Central Asia are aging with either limited improvement or outright deterioration in health status. Improvements in life expectancy have lagged far behind most other global regions. In fact, in some countries in the region a 60-year-old man has a lower life expectancy today than he did 50 years ago. Overall, people in Europe and Central Asia are more likely to be living with disease or disability, resulting in shorter life spans, than people in most other regions.

The burden of disability is felt not only by the disabled. The limited availability of formal care in the region means that the bulk of eldercare (as well as child care) is provided by family members, mostly women. The greater responsibility of women for care giving reflects social mores in many countries, as revealed in surveys. The burden of care giving can be a significant constraint on female participation in the labor market.

Limiting the Rise in Dependency Ratios and Improving Health Outcomes in the Region

The measures required to avoid large declines in the workforce and improve health outcomes are neither mysterious nor necessarily very costly. However, they would require a concerted societal effort, in some cases involving comprehensive changes to government policies and radical adjustments in behavior by individuals. The major policy issues involved are reducing major health risks like alcohol use and smoking before people get sick, strengthening preventive health services, improving the trade-off that families face in balancing work and having children, and facilitating migration. We will consider each of these in turn.

Cardiovascular disease accounts for about 40 percent of the years of life lost to premature death in the region. The high incidence of cardiovascular disease reflects both unhealthy lifestyle choices (smoking, drinking, and poor diets) and the lack of the comprehensive preventive services that have proven effective in reducing disease in countries of the Organisation for Economic Co-operation and Development (OECD). These services could be provided at a relatively low cost. For example, the annual cost of a bundle of measures to reduce cardiovascular mortality has been estimated at under US$1 per capita in low-income countries, US$1.50 in lower-middle-income countries, and US$3 in upper-middle-income countries. Coverage of preventive services should focus on reaching disadvantaged populations, which tend to have higher incidence of disease and shorter life spans than richer groups.

Reductions in early deaths and disability can improve the productivity of workers, increase the ability of working-age adults to participate in economic activity, and extend the working lives of older age groups. Given the trends toward better health for older adults that some countries have achieved, dependency ratios should be defined in terms of disability rather than age. Some countries with old but relatively healthy populations, for example, Japan, have lower dependency ratios than many countries with younger populations, if the dependency ratio is measured as the share of the adult population that suffers from disability.

Migration Affects Demographics More in the Long Run

Immigration flows are highly unlikely to be large enough to fully compensate in the long run for expected declines in the workforce, particularly given political sensitivity to increased immigration. Nevertheless, migration can play an important role in mitigating the impact of aging on the economy. Immigrants have contributed significantly to raising the size of the labor force and the levels of employment in some countries in Europe and Central Asia. And while emigration can reduce the working-age population of sending countries, it may also benefit those who are left behind, through remittances, technology transfers, and trade links.

Overall, adjustments by governments, firms, and individuals hold considerable promise for addressing the challenges of aging and the high incidence of disease in Europe and Central Asia. Chapter 1 reviews the extent of aging in the region, shows that aging results mostly from declines in fertility rather than from increases in longevity, and considers the implications of aging for dependency ratios going forward. Chapter 2 reviews the limits on longevity and the relatively high morbidity in much of the region and the burden placed on caregivers (particularly women), and discusses relatively inexpensive health interventions, coupled with behavioral changes, that could dramatically improve health status.

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The Drivers of Aging in Europe and Central Asia

Introduction

This chapter reviews the effects of fertility rates, mortality rates, and migration patterns on aging in the Europe and Central Asia (ECA) region. Population aging is attributable primarily to declines in fertility rather than to improvements in life expectancy, which have lagged behind what most other regions have achieved. The region is moving toward a more balanced age structure, which will imply increases in the ratio of older dependents to the working-age population (that is, the old-age dependency ratio[1]) going forward. Outward migration flows have also contributed to aging in the region, and immigration is unlikely to make a significant contribution to maintaining the size of working-age populations.

The Aging Populations of Europe and Central Asia

The average age of the population of Europe and Central Asia rose from 29 years in 1950 to 37 years in 2015, and the share of the population over 64 rose from 5.8

This chapter uses results from two background papers commissioned for aging work in the Europe and Central Asia Region of the World Bank: "Starting or Enlarging Families? The Determinants of Low Fertility in Europe" (2014) by Angela Greulich, Olivier Thévenon, and Mathilde Guergoat-Larivière; and "Fertility in Turkey, Bulgaria, and Romania: How to Deal with a Potential Low-Fertility-Trap? (2014) by Angela Greulich, Aurélien Dasre, and Ceren Inan.

Nearing the End of a Demographic Transition to Stable or Declining Populations in Europe

For most of human history, high rates of mortality (in part generated by periodic famines, wars, and epidemics) kept population growth low, despite high birth rates. People could not expect to live beyond 25 or 30 years of age (Bogue 1969). The decline in mortality, particularly at early ages, began in northwestern Europe in the second half of the 18th century and then spread to the rest of Europe. Population growth rose to 0.5 percent per year from 1700 to the advent of the Industrial Revolution in 1820 and then to about 1 percent per year (excluding the two world wars) until the 1970s (figure B1.1.1).

FIGURE B1.1.1 Europe's population has stabilized after a period of unprecedented growth
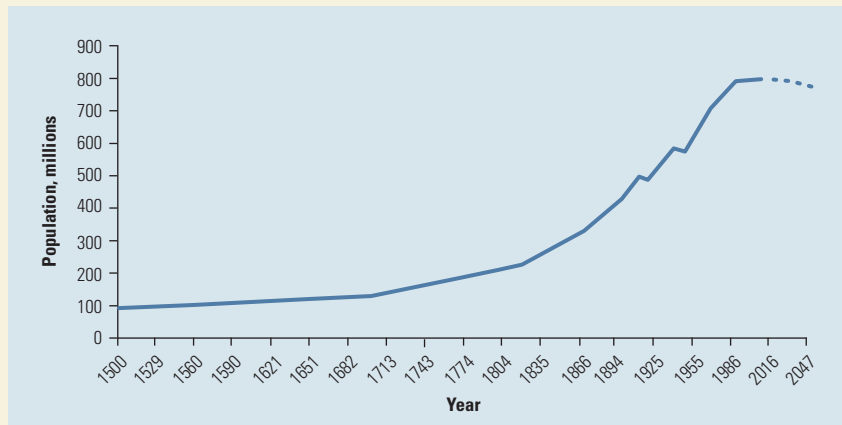
Sources: World Bank calculations based on data in Maddison 2010; World Population Prospects: The 2012 Revision.
Note: The definition of Europe follows that of Maddison.

A model of the different stages of demographic transition was first proposed by Warren Thompson in 1929 to explain the change over time in population dynamics. Preindustrial societies represent the first stage, when a combination of highly fluctuating birth and death rates, punctuated by periodic famines, wars, and epidemics, resulted in little population growth (stage 1 in figure B1.1.2). Europe was the first region to transition from this stage of low population growth that had typified most of human history. However, in the early stage of expanding populations (stage 2 in figure B1.1.2), the demographic structure was bottom heavy because of the large numbers of children and shaped like a pyramid because mortality in later life had not yet improved substantially.

(Continued)

percent to 11.8 percent. Aging reflects the rapid declines in fertility that have sharply reduced the share of younger age cohorts in the total population and not a substantial rise in longevity. By 1990, the fall in fertility in Europe had put an end to the rapid population growth that began in the 18th century (see box 1.1).[2] Europe's population is now expected to decline over the next 40 years, making it the

BOX 1.1 *(continued)*

Most countries moved to a late stage of expanding populations (stage 3 in figure B1.1.2) by the early 20th century, with falling birth rates and a continued decrease in mortality at all ages. The young countries of Central Asia are still in this stage. Finally, in recent decades, births have dropped rapidly in European countries, leading to low population growth (stage 4 in figure B1.1.2). Northwestern Europe moved first to stable population growth in the 1970s, the rest of Europe fol-lowed by the 1990s, and Central Asia is converging rapidly with the rest. For a number of countries, fertility has fallen to well below the replacement rate, and populations have since begun to decline (a possible stage 5 in figure B1.1.2). But a move to shrinking populations is not a given. In France, for example, one of the first countries to begin the demographic transition (in the 18th century), fertility is at the replacement rate and the population has been increasing.

FIGURE B1.1.2 Most European countries are at the late stage of the demographic transition
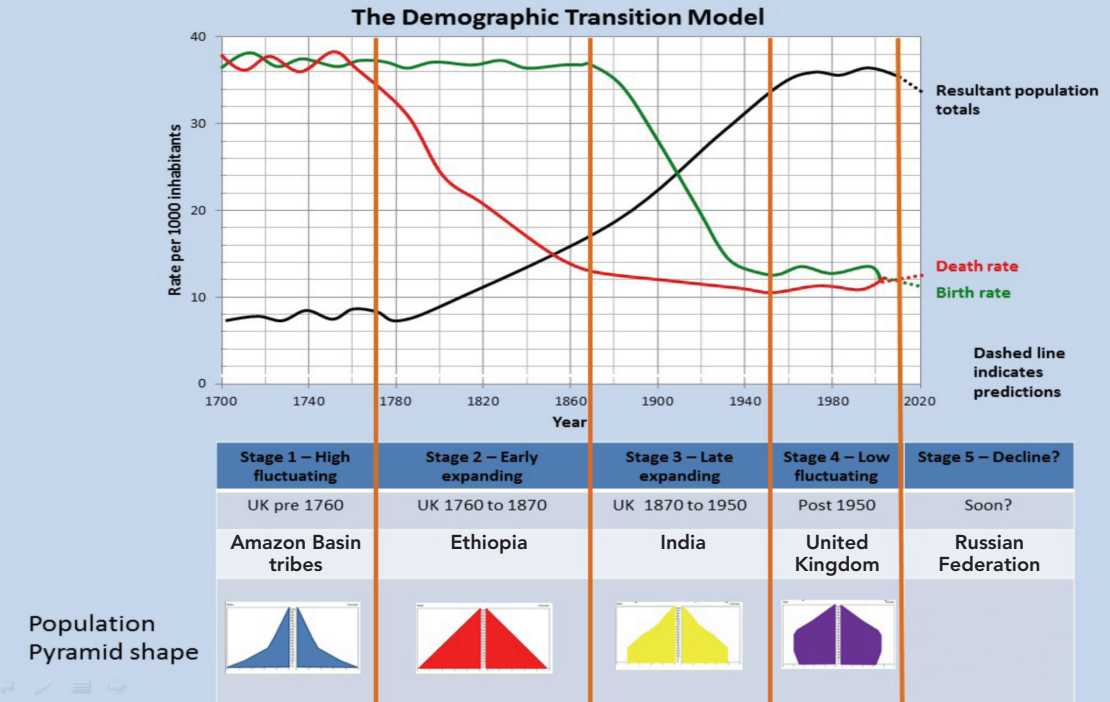
Source: World Bank simulations using data from World Population Prospects: The 2012 Revision.

only region in the world where the population is expected to fall (table 1.1). In Turkey and the countries of Central Asia, populations are much younger than in Europe and continue to increase. Nevertheless, recent and substantial declines in fertility are also driving increases in the average age and slowing population growth in those countries as well.

TABLE 1.1 Global Population Growth, 1500–2060

percent

Period	North America	Latin America	Europe	Africa	Asia
1500–1700	0.0	0.0	0.1	0.1	0.1
1700–1870	2.1	0.7	0.5	0.2	0.4
1870–2012	1.5	1.9	0.5	1.8	1.2
1870–1950	1.7	1.8	0.6	1.2	0.7
1950–70	1.6	2.8	0.8	2.4	2.1
1970–90	1.0	2.2	0.4	2.8	2.0
1990–2012	1.1	1.5	0.1	2.5	1.5
2012–30	0.9	1.0	0.1	2.0	0.8
2030–60	0.4	0.3	−0.1	2.1	0.1

Sources: World Bank calculations based on data in Maddison 2010; World Population Prospects: The 2012 Revision.
Note: The regional grouping follows that of Maddison. The data for 1500–2012 represent actual population; the data for 2012–60 are projections based on the medium-fertility variant.

The Effects of Declining Fertility on Aging and Population Growth

The total fertility rate (TFR) has declined in many regional countries to well below 2.1 children per woman, the replacement rate required to maintain populations at current levels without immigration (figure 1.1). While the timing, intensity, and persistence of the fertility decline vary, in many countries the decline has been dramatic and has occurred rapidly. For example, the shift from an average fertility rate of over five children per woman to below the population replacement rate took two centuries in France but only 34 years in Albania (figure 1.2). The average fertility rate per woman in Central Asian countries was six children in the early 1960s but is fewer than three children today.

> In many countries the recent fertility decline has been dramatic and rapid. The shift from an average fertility rate of over five children per woman to below the population replacement rate took two centuries in France but only 34 years in Albania.

The decline since 1990 has been especially sharp in the Central Asian countries and Turkey, which had the highest fertility rates in the early 1970s. Fertility rates in the Caucasus—Armenia, Azerbaijan, and Georgia—are now all below replacement levels. TFRs have continued to drop significantly in Armenia, Tajikistan, and Turkmenistan over the past decade, while a fertility upturn has occurred in Kazakhstan and the Kyrgyz Republic and, to a lesser extent, in the Russian Federation, Ukraine, and Uzbekistan. Overall, however, the Central Asian countries still have comparatively high fertility rates that exceed population replacement rates.

In addition to the transition from high to low mortality and fertility rates, the current population structure reflects demographic shocks in discrete time periods. Some countries in Central Europe, the Eastern Partnership countries, and Russia experienced an increase in fertility (a baby boom) following the Second World War, although the boom was less pronounced than in Western Europe and the United States. A number of countries did not experience a baby boom; the Baltic states, for instance, exhibited some of the lowest fertility rates in the world in the 1950s and 1960s. A baby boom echo occurred in the 1970s and the 1980s, when the children of the boomers started to have families of their own, and this generation reached peak size in the early 1980s.

In Central Europe and the Baltics, the Eastern Partnership, Russia, and the Western Balkans, the social and economic hardship of the 1990s resulting from the col-

FIGURE 1.1 Total fertility has declined to below the replacement rate in many countries

a. Selected countries at or near the replacement rate, 2012

(y-axis: Average total fertility rate, children per woman; x-axis: Country)

Countries: Tajikistan, Kyrgyz Republic, Kazakhstan, Uzbekistan, Turkmenistan, Turkey, Iceland, Ireland, France, Azerbaijan, Sweden

b. Selected lower-fertility countries, 2012

(y-axis: Average total fertility rate, children per woman; x-axis: Country)

Countries: United Kingdom, United States, Norway, Georgia, Finland, Belgium, Albania, Armenia, Denmark, Netherlands, Montenegro, Lithuania, Russian Federation, Slovenia, Luxembourg, Estonia, Ukraine, Romania, Croatia, Bulgaria, Cyprus, Moldova, Czech Republic, Austria, Latvia, Macedonia, FYR, Malta, Japan, Italy, Germany

c. Lowest low-fertility countries, 2012

(y-axis: Average total fertility rate, children per woman; x-axis: Country)

Countries: Slovak Republic, Greece, Hungary, Serbia, Spain, Poland, Korea, Rep., Portugal, Bosnia and Herzegovina

Legend: 1970 | 2012 | Replacement rate

Source: WDI.
Note: The replacement rate is defined as 2.1 children per woman. Lower-fertility countries had a total fertility rate (TFR) of at least 1.4 children, but below 2.0 in 2012. The lowest low-fertility countries are defined as those having a TFR of around 1.3 children. Countries are ranked in descending order of TFR as of 2012. The data on Cyprus refer to the southern part of the island. Data on Serbia for 1970 refer to 1971.

FIGURE 1.2

The fertility transition in some countries in Europe and Central Asia is occurring much more rapidly than in advanced European countries

— France
— England
— Russian Federation
— Poland
— Ireland
— Korea, Rep.
— Albania
— Turkey
— Tajikistan

a. Total fertility rate

b. Years to reach below replacement rate fertility
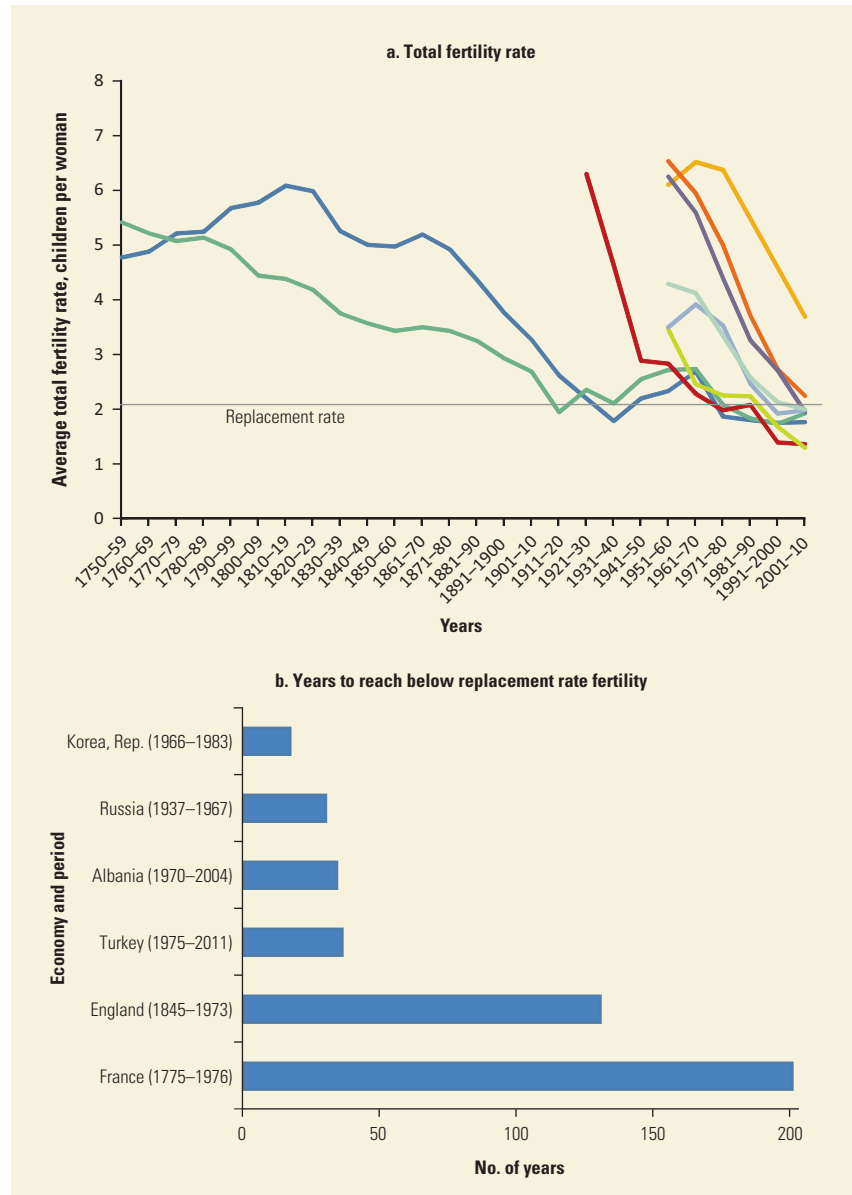
Sources: World Bank calculations based on World Population Prospects data: The 2012 Revision, except England and France prior to 1950 (Chesnais 1998); the Russian Empire in 1897 (Borisov 2001); and Russia for all other years prior to 1950 (Andreev, Darskiy, and Kharkova 1998).
Note: Panel b shows the number of years it takes countries to move from a total fertility rate of 5 to a sustained decline to under the replacement rate of 2.1.

lapse of the Soviet Union reversed the positive fertility trends of the 1980s. The recovery of births that were postponed during the 1990s has been slow.[3] Fertility rates in all countries are below that needed to replace current generations (referred to as the replacement rate). The average TFR in these countries is just above 1.3, while the medium variant of the United Nations Population Division forecasts (commonly used for baseline population projections) assumes that these countries converge toward a TFR of 1.8 by 2040 (see World Population Prospects: The 2012 Revision).

Moving to a TFR of 1.8 would reduce the shrinking of younger generations as it implies 0.9 children per adult or a 10 percent decrease in every generation (if all children survive). In contrast, a TFR of 1.3 implies a 35 percent total decline in every generation (if all children survive), or about a 1.2 percent per year decline in population. Returning to a population structure that is balanced across generations would require that fertility rates recover toward replacement rates. But even if fertility recovers, such a rebalancing would take time. Low fertility now, even if it rises in the future, has a multiplier effect. Fewer children today mean fewer parents in the future.

Why Has Fertility Declined?

Researchers have identified the declines in fertility to below replacement rates as a major driver of population aging and noted that increases in fertility are important to avoiding very large reductions in the population. Understanding why fertility has declined is a first step toward formulating policies to support families who wish to have more children (policy recommendations are addressed in part III of this report). Decisions on whether and when to have children are influenced by myriad factors.[4]

Rising income per capita has been accompanied by a decline in fertility. A shift in preferences from having a large number of children to having fewer children of higher "quality" (with higher human capital) is one explanation (Becker, Murphy, and Tamura 1990; Galor and Weil 2000). Development is associated with improved opportunities in the labor market, and higher wages among women have been found to reduce fertility (Galor and Weil 1996). For example, in England the Black Death led to a delay in the age of first marriages (and thus a decline in fertility), because the high mortality rates increased the availability of land per person, which increased employment opportunities in farming for women (Voigtländer and Voth 2013).

> As women are more educated and participate more in the formal labor market, reconciling work and family life are at the core of women's fertility choices.

The increasing importance of education is associated with a growing tendency for women to postpone having a child until later in life (Blossfeld 1995; Goldstein, Sobotka, and Jasilioniene 2009). Indeed, there has been a sharp decline in fertility rates among women below age 30, which started in many countries almost five decades ago.[5] The effect on family size seems to vary considerably across countries, however. For example, in Nordic countries long-standing support for a balance between work and family life (Hoem, Neyer, and Andersson 2006) appears to have enabled educated women to progressively catch up with their peers; thus, the differences in completed fertility rates—that is, the number of children women have had by the end of their reproductive lives—by level of educational attainment are small, especially in Finland and Sweden (Andersson et al. 2009). Overall, the impact of decisions to postpone child rearing on total fertility varies, since this is often accompanied by a significant increase in fertility among women in their 30s.

Cultural change has also had an impact on fertility decisions, particularly as the secular decline in fertility appeared to happen at the same time in many countries. Women are postponing childbirth because of shifting ideas about the ideal family

size and about the relationship between quality of life and number of children (Becker, Murphy, and Tamura 1990; Galor and Weil 2000).

The rising cost of having children has been an important determinant of the declines in fertility since the early 1970s (for example, see Hotz, Kerman, and Willis 1997). Having children incurs both a direct, visible cost and an indirect, less visible cost (Thévenon and Luci 2012; Willis 1973). The direct costs of children include the additional consumption incurred by households because of the presence of children: housing, food, clothing, child care, education, transport, leisure activities, and so on. Surveys of the literature on the cost of children suggest that a child would account for approximately 15–30 percent of the budget of a childless couple (OECD 2011; Thévenon and Luci 2012). Variations depend on several factors, including the child's birth order, the age of the child, parental educational attainment and income level, and the bargaining power of household members. Housing and education are particularly important items in the expenditures of families with children. The growing cost of housing, the rising number of years spent in education, and the expanding importance attached by parents to education are thus likely to represent a barrier to fertility (OECD 2011). The 2008 economic crisis may have reduced the ability of households to meet these costs and thus may have reduced fertility rates (box 1.2). Households also bear indirect costs if they have children because parents, usually mothers, must invest time in caring for, educating, and raising the children rather than in paid employment. These costs can be measured by the earnings forgone by parents who reduce their working hours or stop work altogether. Full-time leave or temporary reductions in working hours can also incur costs by lowering long-term career prospects.

The availability of modern contraceptives has facilitated the postponement of children and a reduction in family size (Frejka 2008). The use of modern contraceptives reduces the number of unwanted and mistimed pregnancies and births. It is likely that modern contraceptive methods have also facilitated the shift toward smaller families, but they cannot be seen as a principal cause of currently low fertility rates (Leridon 2006).

The Effect of Labor Market Conditions on Fertility

The decline in fertility with increasing economic development has not been uniform. Figure 1.3 shows that, while many of the countries with the highest level of human development have very low fertility rates, in recent years fertility rates began increasing again once a certain threshold was reached (Myrskylä, Kohler, and Billari 2009). The differences in fertility levels among the advanced countries are in large part due to differences in family policies and the institutional environment for the labor market, particularly as these affect the employment of women (see box 1.3 for a comparison of France and Germany).

Recent studies have emphasized the importance of labor market conditions for fertility in advanced countries. Long working hours make juggling work and care commitments more difficult and have been found to affect fertility rates negatively (Luci-Greulich and Thévenon 2013; Schmitt 2012). In contrast, part-time employment opportunities have had a positive effect on fertility rates in Organisation for Economic Co-operation and Development (OECD) countries, especially among women with higher educational attainment (Adsera 2011; d'Addio and d'Ercole

BOX 1.2 **Have People Had Fewer Children because of the 2008 Economic Crisis?**

Fertility generally declines in economic downturns (for a review of the literature, see Sobotka, Skirbekk, and Philipov 2011). Evidence on the impact of previous economic recessions suggests that spells of unemployment seem to affect the timing of births, but not the size of families (Adsera 2005; Kravdal 2002). The rise in unemployment during the recent economic crisis has created economic uncertainties that may cause households to put off having children. The consequences can be short term if births are simply postponed or longer term if the downturn persists and is not followed by a catch-up in fertility.

Fertility responses to economic downturns differ by gender and socioeconomic status (see OECD 2011 for a review of empirical results). The largest decline in birth rates is likely to be associated with poorly educated, low-skilled men. Available evidence for previous economic shocks in Germany and Sweden suggests that women with high levels of educational attainment are most likely to postpone childbirth, especially if they do not already have children; less well educated women often maintain or increase the rate of entry into motherhood (Hoem 2000; Kreyenfeld 2010).

In the decade before the recent economic crisis, the trend in many countries was for fertility to increase. Partly this has been explained by the diminishing impact on annual fertility of women delaying having children until later in life. From 2000 onward, the rise in the age of women at childbirth slowed, and women started to have the children they had delayed (Goldstein, Sobotka, and Jasilioniene 2009; Bongaarts and Sobotka 2012). Recent changes in fertility rates suggest, however, that the observed rise in total fertility rates reversed in some countries. In Europe, the crisis was accompanied by a fall in fertility in countries that were severely affected, such as Greece, Latvia, and Spain. In contrast, in Iceland, Ireland, and Romania, fertility increased somewhat in the crisis period.

One explanation for this difference is that the crisis has had a stronger impact on fertility in countries where younger people were disproportionately hit by unemployment, while in other countries family policies played a role in diminishing the impact of the recession on fertility. Goldstein et al. (2013) find a strong association between fertility and unemployment in the central, eastern, and southern countries of Europe. The greatest effects occur among the youngest age cohorts and in first births, which makes sense because unemployment rates have jumped drastically among young people, who also can postpone childbearing the most easily. Whereas fertility rates declined markedly in Latvia in 2009, fertility in the other Baltic states showed no major downturn. One possible explanation is that generous parental leave schemes were introduced in the latter shortly before the economic crisis. Fertility in countries with a high level of welfare and family support, such as France, Norway, Slovenia, and the United Kingdom, has been more resilient in the face of the recession.

The evidence on recent changes in fertility does not allow a conclusive assessment of the impact of the crisis, as a decline in fertility during the crisis may simply reflect the postponement of births. Thus, a few more years will be required before the impact of the recent crisis on fertility can be properly judged. But what is clear is that the crisis has been more prolonged than past downturns in the most severely hit countries and thus could have more drawn-out implications for fertility.

2005; Del Boca, Pasqua, and Pronzato 2009). The likelihood of being in full-time employment was 1.5 times greater or more among childless women than among mothers aged 20–44 in Austria, Hungary, the Netherlands, Poland, Spain, and the United Kingdom in the 1990s and up to around 2005 (Thévenon 2009). The likelihood of working part-time increases with the number of children in every country, but especially in the Netherlands, where the vast majority of employed women work part-time. Greulich, Dasre, and Inan (2014) find that the provision of child

FIGURE 1.3

A U-shaped relation is emerging between fertility and level of development

● 1980
▲ 2013

Sources: HFA-DB; WDI.

care coverage has a significant and positive effect on the likelihood of having a second child, while the length of leave schemes and the amount of total cash transfers (family benefits, leave benefits, and income tax rebates) have no significant effect. Luci-Greulich and Thévenon (2013) emphasize that increases in fertility with economic development would be supported by institutional changes that improve parents' opportunities to combine work and family life. Myrskylä, Kohler, and Billari (2011) argue that an increase in fertility in advanced countries is conditional on gender equality: countries ranking high in development (as measured by health, income, and education) but low in gender equality continue to see declining fertility.

Employment status appears to have some effect on whether women have a second child, which is the major difference between low- and high-fertility countries (see box 1.4). Being employed during the months before potential conception is found to significantly increase the probability of having a second child for women aged 15–49, in comparison to both unemployed and inactive women (Greulich, Dasre, and Inan 2014).[6] Taking into account interaction effects, being in stable employment is positively correlated to child arrival, particularly for women who have a partner who is also in stable employment. These results are stronger for high-fertility countries, such as Denmark, France, the Netherlands, Norway, and Sweden, but do not hold in some lower-fertility countries, such as Latvia, Lithuania, the Slovak Republic, and Slovenia, that have high full-time employment rates, low fertility rates, and a low average probability of a second child. In these lower-fertility countries, the low probability of a second child may be explained by institutional barriers, such as family policies (parental leave or child care, for instance). Women who already have one child may decide against a second for fear of a fall in income after the birth of the second child. Or for families with insufficient incomes, the direct cost of having an additional child in itself may be a constraint.

BOX 1.3 Why Fertility Is Higher in France Than in Germany

Despite similar income per capita and recent history, Germany has a significantly lower fertility rate than France, 1.36 versus 2.03, which is near the replacement level (see table B1.3.1). An explanation of this disparity may lie in the more precarious position of German women, particularly mothers, in the labor market. German women face more difficulty in reconciling work and family life. Once they have children, German women are more likely to drop out of the labor market or work part-time. In France, by contrast, the gap in the employment rate between childless women and women with one or two children is fairly small.

Traditionally, German tax and expenditure policies have tended to provide only limited support for working mothers. German spending on family support programs is relatively high (Thévenon 2011), including generous lump-sum grants and tax reductions for married couples, but dual-earner couples with young children have tended to receive only limited support. Child care costs can be deducted for tax purposes, but only to a small extent. In general, child care facilities for children aged 0–3 have been limited in Germany. Fewer

than 18 percent of under-three-year-olds were enrolled in formal care services in 2010, although an ambitious plan to develop child care facilities was adopted in 2010 and helped raise public child care coverage to 29.3 percent of under-three-year-olds (Rainer 2013). For children aged 3–6, there is a system of mostly privately operated kindergartens, but, as with the majority of schools for children aged 6–18, they are often closed in the afternoon. Because of the limited availability of child care facilities, women have faced sizable barriers to full reintegration into the labor market after childbirth (Luci-Greulich 2011).

Recent reforms in Germany have aimed at helping women return to the workforce after having children and have reduced the opportunity cost for employed women to have children. This is important, given the low fertility rates of educated women in Germany. Nearly a third (31 percent) of tertiary educated women in the former West Germany have no children, and on average they have 0.7 fewer children than women who have not completed secondary school (Bujard 2012). In 2007, to encourage parents to combine work and

TABLE B1.3.1 Relationship between Work and Family Life, by Gender, France and Germany, 2011–12

Indicator	France	Germany
Total fertility rate	2.03	1.36
Employment, women 20–64 years of age		
Overall rate, %	65.0	71.5
Part time, % of total employment	30	45
Full time, % of total employment	70	55
Average hours of usual employment per week	34.6	30.5
Difference in employment rates of women and men (aged 20–49) with and without a child	−5	−18
Formal part- or full-time child care, by age group of the child, % of the relevant child population		
Ages 0–2	45	25
Ages 3–6	97	90
Gender pay gap, average gross hourly earnings among women, % of corresponding earnings among men	14.7	22.2
Gender pension gap, women relative to men, pensioners 65+, %	39	44
Women at risk of poverty or social exclusion, % of 55+ female population	17	22

Sources: Based on data in EU LFS; WDI.
Note: The data year depends on the indicator: EU LFS data are for 2011–12; WDI data are for 2011.

(Continued)

BOX **1.3** *(continued)*

family life, Germany reformed the parental leave system following the Norwegian/Swedish model. In the Norwegian/Swedish model, maternity leave benefits are linked to a woman's prebirth earnings, with high replacement rates. This contrasts with the pre-2007 reform scheme in Germany of flat transfers that did not compensate those with relatively high prebirth earnings. Instead of a flat monthly means-tested transfer targeted to lower-income families over the 24 months after birth, parents now receive a net wage substitution of 67 percent (to a maximum of €1,800 a month) for 12 months. In addition, fathers are explicitly encouraged to take at least two months of leave. Raute (2014) assessed the effects of the changes in parental leave benefits on fertility by taking advantage of the large differences in parental leave benefits across education and income groups and found a positive and statistically significant effect of a rise in benefits on fertility. These results were driven mostly by women in the middle and upper end of the education and income distribution. This suggests that earnings-dependent parental benefits may have a role in increasing the fertility rates of highly educated, higher-income women. Another 2013 reform was the introduction of the right for every child between the ages of one and three to have a place in day care.

While German female employment rates are actually above the European Union (EU) average, the majority of women with children are working part-time or in other precarious work arrangements (mini-jobs). These are associated with low incomes, limited career options, and insufficient social security. Difficulties in combining a professional career with family life not only reduce fertility rates but also contribute to widening the inequalities in Germany, because these difficulties result in economic dependence among women and poverty among single-parent families and elderly women.

In France, women are generally more successful in combining work and family life, and family, social, and labor market policies are more centralized than in Germany. The promotion of equality between men and women is seen as a universal goal that applies to all policy domains. Gender equality in work and family life is encouraged through a well-developed system of public child care and subsidized nannies, child minders, and all-day schools. Ongoing reforms relate to parental leave, family tax splitting, and the differences in costs of home-based versus center-based child care (Thévenon 2013). As a result, the majority of women, including even women with young children, work full-time or part-time but generally for longer hours than women in Germany (part-time work in France usually involves a four-day week).

In Germany—particularly the more conservative former West Germany—the imbalance between work and family life among women reflects broader social differences in attitudes toward combining child rearing and work. Evidence from voting patterns in a 2004 Swiss referendum on a maternity and parental leave system (subsequently established) reveals the effects of cultural norms on the development of family support systems. Universal paid maternity leave received 9.2 percentage points more votes in Romance-language border towns than in German-language border towns (Eugster et al. 2011). Cultural attitudes can differ substantially even between closely neighboring countries and communities.

Overall, these results suggest that stable employment among women does not raise the probability of a second child on its own: the relationship with a partner and the institutional context are also important. For some countries—particularly those with lower income levels—the general economic conditions facing families play an important role in whether people can afford to increase the family size. But for many higher-income countries, the key barriers to having a second child are difficulties associated with reconciling work and family life. The development of

BOX 1.4 **Do Decisions on Having a Second Child Determine Variations in Fertility across Europe?**

An empirical investigation of individual fertility behavior in Europe has been carried out using the European Union Statistics on Income and Living Conditions (EU-SILC) to determine whether the fertility rates in the lowest-fertility countries are caused by barriers to starting a family or barriers to greater family size (see Greulich, Thévenon, and Guergoat-Larivière 2014).[a] Figure B1.4.1 shows the share of women aged 39–45 with 0, 1, 2, or 3 or more children in the 28 countries covered. Several results stand out. First, the incidence of childlessness is not remarkably higher in low-fertility countries than in high-fertility countries. There are, however, exceptions. For example, childless women represent a considerable share of women in Austria, Germany, Italy, and Spain and a growing share among women born after 1960 in Central European and Baltic countries (especially Hungary, Poland, and Romania). Second, the share of women having only one child is about twice as high in low-fertility countries as in high-fertility countries. Third, in high-fertility countries such as Denmark, Finland, Iceland, Norway, and Sweden about 70 percent of women aged 39–45 have two or more children, but in low-fertility countries such as Austria, Bulgaria, Germany, Italy, Latvia, Portugal, and Romania the share is only around 50 percent. This suggests that there are barriers to having a second child in most low-fertility countries. Indeed, the probability of transitioning from the first to a second child is about 20 percentage points lower in these lower-fertility countries than in France or the high-fertility Nordic countries.

FIGURE B1.4.1 Having two children was most common for women aged 39–45 in Europe, 2008
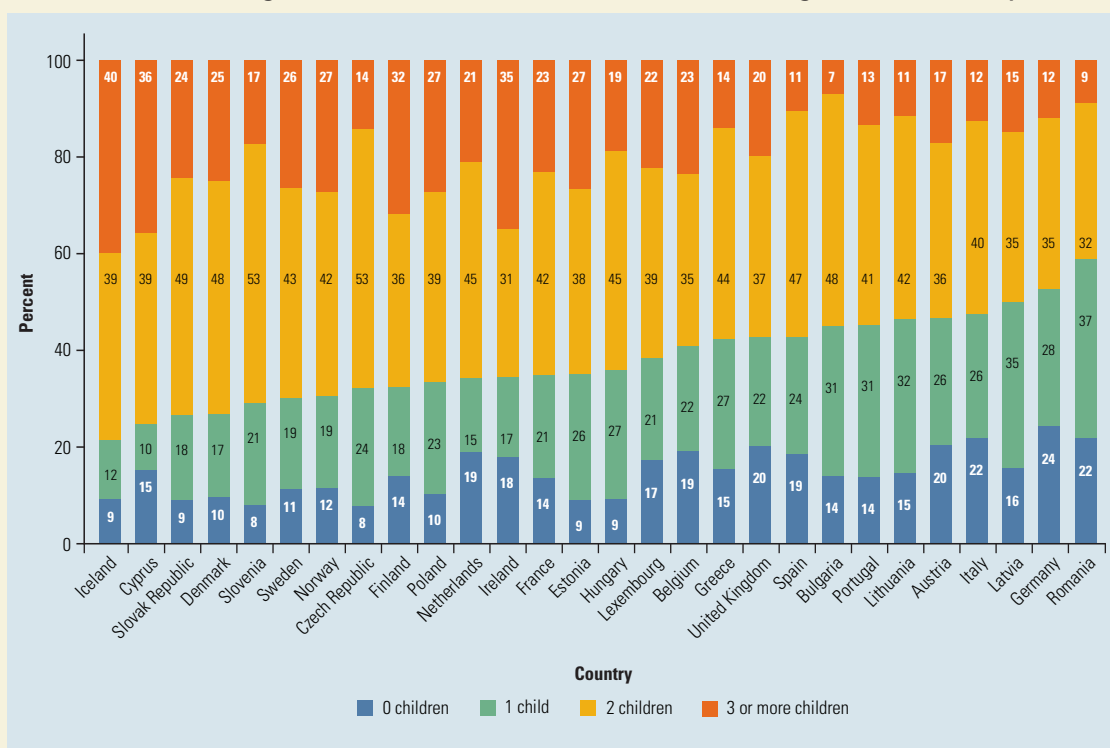
Source: EU-SILC.

child care services tends to reinforce the positive impact of stable employment on women's decisions to have a second child. Moreover, the positive interaction between the development of child care services and stable employment suggests that reconciliation issues between work and family life are at the core of women's fertility choices. Countries in which child care structures are well developed tend to combine the integration of women into the labor market with a higher probability that women will have a second child.

The link between fertility and labor market participation is relevant for older European countries, but, as opportunities increase for women to join the formal labor market, it is also likely to become a feature for the young countries in the region. In a background paper for this report, Greulich, Dasre, and Inan (2014) conduct an analysis of the socioeconomic determinants of child arrival in Turkey using longitudinal data from the European Union Statistics on Income and Living Conditions (EU-SILC) covering the years 2006–11, where individuals are followed up for a maximum period of four years. Female participation in the labor market is relatively low in Turkey, at 30 percent. The findings of the analysis show varying results depending on level of education. For educated women (with at least a primary diploma), being in stable employment has a significant and negative effect on childbearing, regardless of birth rank. Employment is more negatively correlated with child arrival for a third child in comparison to a second or first child. But being employed does not significantly reduce the probability of child arrival for uneducated women or for women who work in agriculture as family workers and who work informally. What is behind this result? The more children an educated woman has in Turkey, the less likely she is to work. The opportunity cost of having a child for an employed, well-educated woman is then high, particularly in the absence of significant government support. In contrast to highly educated women, less educated women working in subsistence activities are less likely to exit employment due to having a child. Of course, education and type of employment could also be capturing nonobservable characteristics like cultural norms or access to family planning. But this analysis suggests that fertility may continue to fall in the young countries of Central Asia and Turkey without stronger efforts to support the integration of mothers into the labor force as they become more educated and are more likely to be in the formal labor market.

Since the 1960s, the Europe and Central Asia region has added only 10 years to average life expectancy, the smallest gain across all global regions.

The Slower Improvement of Life Expectancy in Europe and Central Asia

Since the 1960s, the Europe and Central Asia region has experienced the smallest gains in life expectancy of all global regions (figure 1.4). Since 1960, people in this region have added only 10 years to average life expectancy, whereas life expectancy has increased by 18 years in Latin America and the Caribbean—another middle-income region with a rapidly aging population—and by more than 27 years in East Asia and the Pacific. A person born in Europe and Central Asia in 2011 can expect to live 72 years, a full 10 years less than a counterpart in the EU-15 countries. This divergence is even starker if better performers such as Turkey and
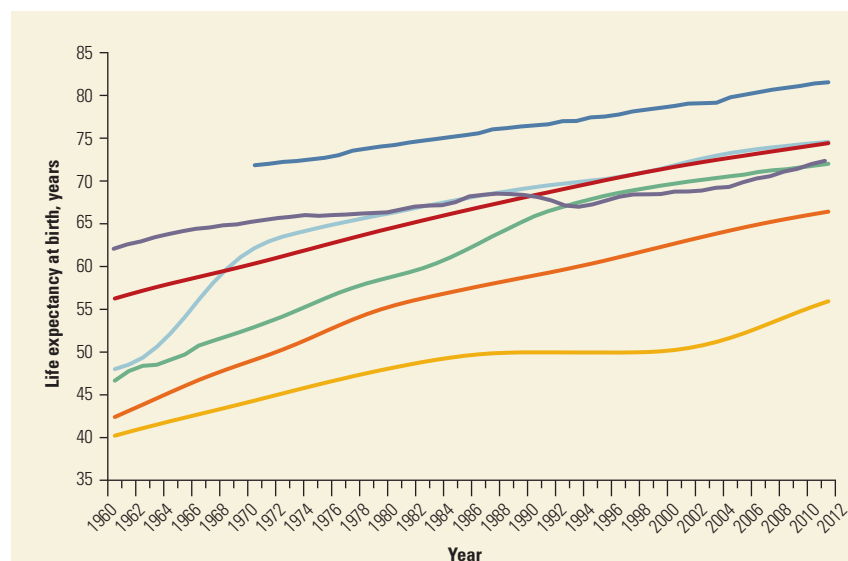
Legend:
- EU-15
- Europe and Central Asia
- Latin America and the Caribbean
- East Asia and Pacific
- Middle East and North Africa
- South Asia
- Sub-Saharan Africa

Sources: WDI; HFA-DB.

the Western Balkans are excluded from the regional average. In essence, although the number of older people is rising in the region, many people's lives are shorter than they could be.

Gains in male life expectancy have been particularly limited in Belarus, Bulgaria, the Czech Republic, Hungary, Moldova, Poland, Romania, Russia, the Slovak Republic, and Ukraine (the group defined as Eastern Europe by the United Nations' World Population Prospects, which is used here as it has the longest time series for cross-country comparison). The gap in male life expectancy between Eastern Europe and Southern Europe grew from five years in 1950–55 to 13 years in 2005–10 (figure 1.5). In contrast, Western Europe—Austria, Belgium, France, Germany, Luxembourg, the Netherlands, and Switzerland—achieved the highest male life expectancy, on average 77 years at birth, in 2005–10. In 1950–55, Central Asia—Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan—had an average male life expectancy of 50 years, as did Latin America and the Caribbean; East Asia was even lower, at 46 years. However, Central Asia failed to keep up with the gains of these other areas. By 2005, men in Latin America and the Caribbean had gained 21 years and in East Asia 28 years, compared with only 12 years in Central Asia. As in Eastern Europe, life expectancy of men in Central Asia stagnated during the transition to a market economy that began in 1990.

In contrast to global trends, mortality in middle age has hardly improved in the region and indeed has become worse for men in their mid-40s to early 60s (see figure 1.6, where higher values indicate greater declines in mortality, and lower values signify smaller declines in mortality).

Middle-aged men (45–59 years) in the region were dying at higher rates in 2010 than in 1970. Moreover, mortality among 60- to 79-year-old men has barely changed over the past 40 years, compared with a consistent 30–40 percent decline worldwide. While adult women fare better than men at all ages except for the oldest (80+ years), they are still not reaping the rewards of the longer average lives

FIGURE 1.5

Life expectancy of men in Eastern Europe has diverged from the better performers in Europe

Northern Europe
Western Europe
Southern Europe
Eastern Europe
Central Asia
Eastern Asia
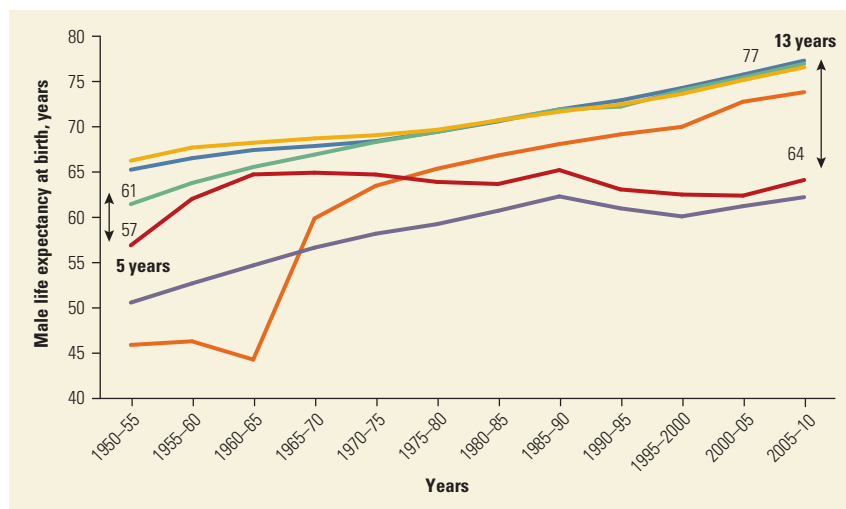
Source: World Population Prospects: The 2012 Revision.
Note: The figure shows male life expectancy at birth by United Nations level-2 regional classifications. This grouping is different from the country grouping used by this report. The divergence in years between life expectancy in regions may differ from whole-number calculations due to rounding. Eastern Europe comprises Belarus, Bulgaria, the Czech Republic, Hungary, Moldova, Poland, Romania, the Russian Federation, the Slovak Republic, and Ukraine. Northern Europe includes Denmark, Estonia, Finland, Iceland, Ireland, Latvia, Lithuania, Norway, Sweden, and the United Kingdom. Southern Europe consists of Albania, Bosnia and Herzegovina, Croatia, Greece, Italy, FYR Macedonia, Malta, Montenegro, Portugal, Serbia, Slovenia, and Spain. Western Europe includes Austria, Belgium, France, Germany, Luxembourg, the Netherlands, and Switzerland. Central Asia includes Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan. Eastern Asia includes China, Japan, Mongolia, the Democratic People's Republic of Korea, and the Republic of Korea.

that have occurred in all other regions, with the exception of Sub-Saharan Africa, where gains were reversed due to the HIV epidemic.

Large differences in mortality rates that persist over significant periods of time have important implications for the age structure of the population. For illustration, figure 1.7 shows estimations of how Ukraine's population would appear today if it had experienced the same reductions in mortality as France since 1950. Overall, if Ukraine had experienced the same mortality reductions, its labor force would be 19 percent larger today.

Longevity varies widely across population groups. In Europe and Central Asia, women live longer than men, and people in richer socioeconomic groups also live longer. Poorly educated men in many countries enjoy considerably fewer life years than the rest of the population. International evidence shows that countries with the least inequality in life spans are those that enjoy the longest average life expectancies (Christensen et al. 2009). To catch up with the EU-15, countries in the region would have to focus on increasing average life expectancy among less advantaged population segments.
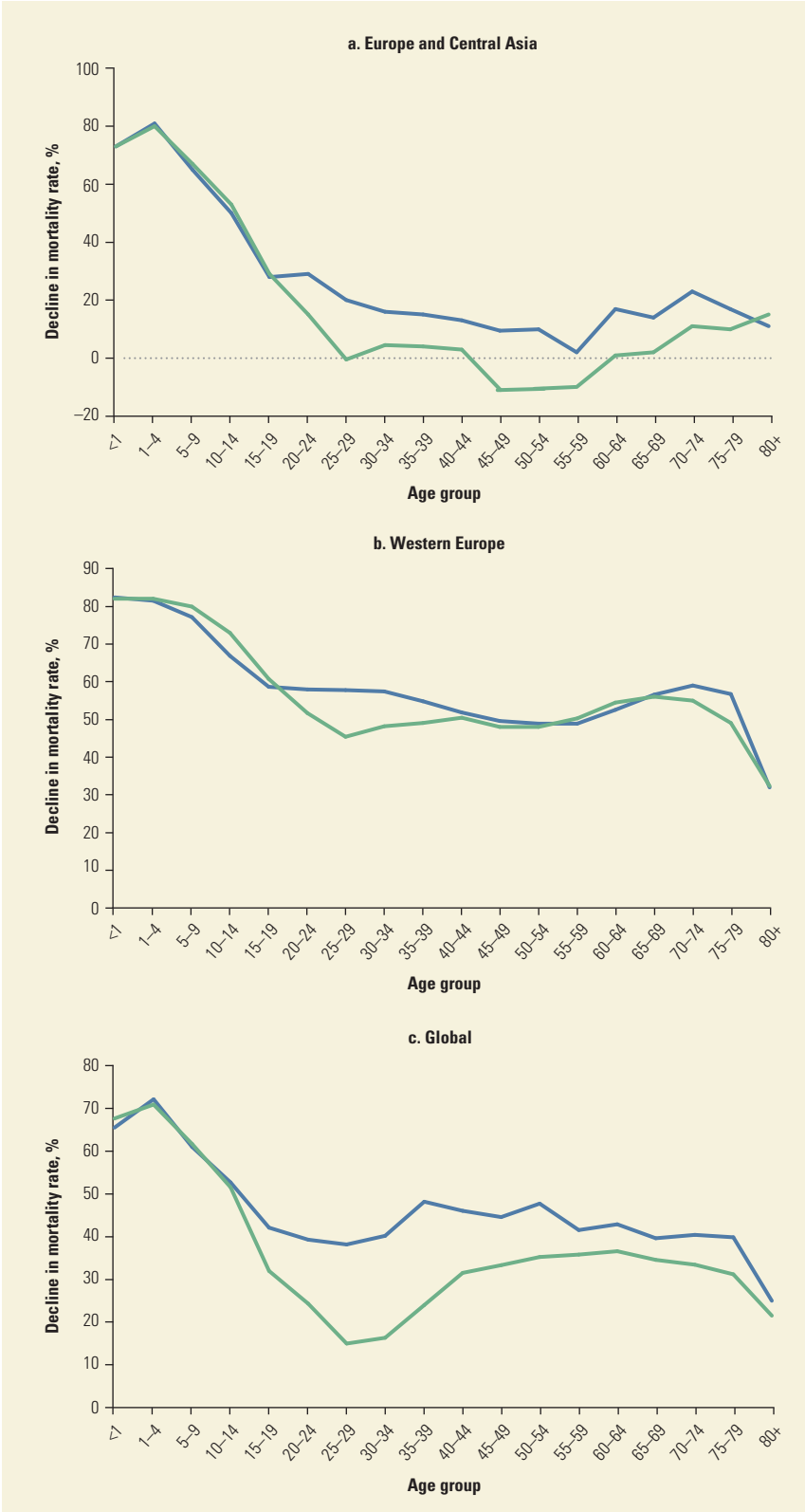
FIGURE 1.6

The midlife mortality crisis continues in Europe and Central Asia, 1970–2010

— Women
— Men

a. Europe and Central Asia

b. Western Europe

c. Global

Sources: Institute for Health Metrics and Evaluation 2010; Global Burden of Disease Study 2010.

What a difference 60 years make: Ukraine's population structure in 2010 if mortality had declined as in France from 1950

■ Male, actual
■ Female, actual
□ Size of age cohort in 2010 if Ukraine had experienced a decline in mortality as in France after 1950
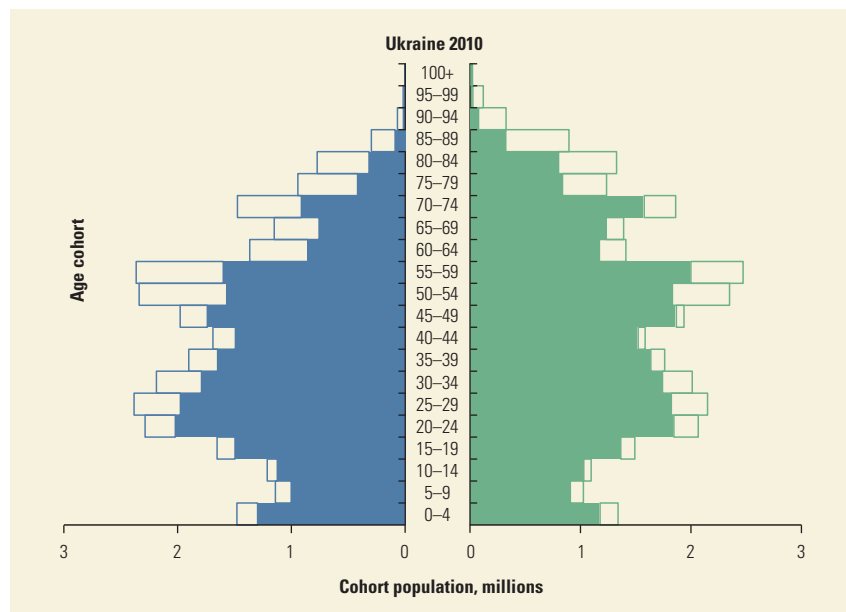
Source: World Bank calculations based on World Population Prospects: The 2012 Revision.

The Contribution of Migration to Aging in Some Countries

Most countries in Europe and Central Asia exhibit high rates of emigration (figure 1.8). For example, in Albania, Georgia, and Moldova, the number of emigrants represented more than 10 percent of the population in 2000–10. This level of emigration is also high relative to other regions, such as Latin America. In contrast, Russia has been a net receiver of migrants.

Migration flows are contributing to aging in Central Europe and the Baltics (figure 1.9a). Migration in the region follows two distinct patterns: most migrants from Central Asia, the Eastern Partnership, and Russia move within this group of countries, while migrants from Central Europe and the Baltics move mostly to Western Europe. Migrants from each subregion are more likely than the people they leave behind to be part of the working-age population (figure 1.9b).

For example, significant emigration from Central Europe and the Baltics in 2000–10 resulted in a severe shrinkage in the size of younger age cohorts. Conversely, immigration is making Western Europe younger: the age structure of migrants born in Central Europe and the Baltics and now living in Western Europe is more concentrated at younger ages than the age structure of individuals born and living in Western Europe. The same patterns emerge from an analysis of the effects of migration from Central Asia on the age structure of Russia.[7]

Migration is playing an important role in shaping the population structure in many countries in Europe and Central Asia (figure 1.10). In Central Europe and the Baltics, emigration sped up following EU accession and the opening up of some labor markets in 2004. Latvia has experienced the largest population decline in the

FIGURE 1.8 Europe and Central Asia is currently a region of emigrants

Source: World Population Prospects: The 2012 Revision.
Note: The data are derived from a variety of sources, including border statistics, administrative records, surveys, and censuses, that may differ in quality and accuracy.

FIGURE 1.9 Migrants from Europe and Central Asia are making rich countries younger (a) and poor countries older (b)

a. Natives vs. foreign-born

Population living in Western Europe, but born in

— Turkey   — Eastern Partnership, Russian Federation, and Central Asia   — Central Europe and the Baltics   — Western Balkans

■ Western Europe native population

b. Nonmigrants vs. migrants

Western Balkans

Eastern Partnership, Russian Federation, and Central Asia

Central Europe and the Baltics

Turkey

■ Nonmigrants   — Migrants to Western Europe

Source: World Bank calculations based on DIOC.

region in recent years, a fall of over a fifth since 1990, and about 60 percent of this decline was due to emigration.[8] The recent financial crisis provided additional impetus for younger segments of the population to leave. Whether emigration will continue at these rates is an open question.

FIGURE 1.10 Migration played a role in population decline in many Central European countries
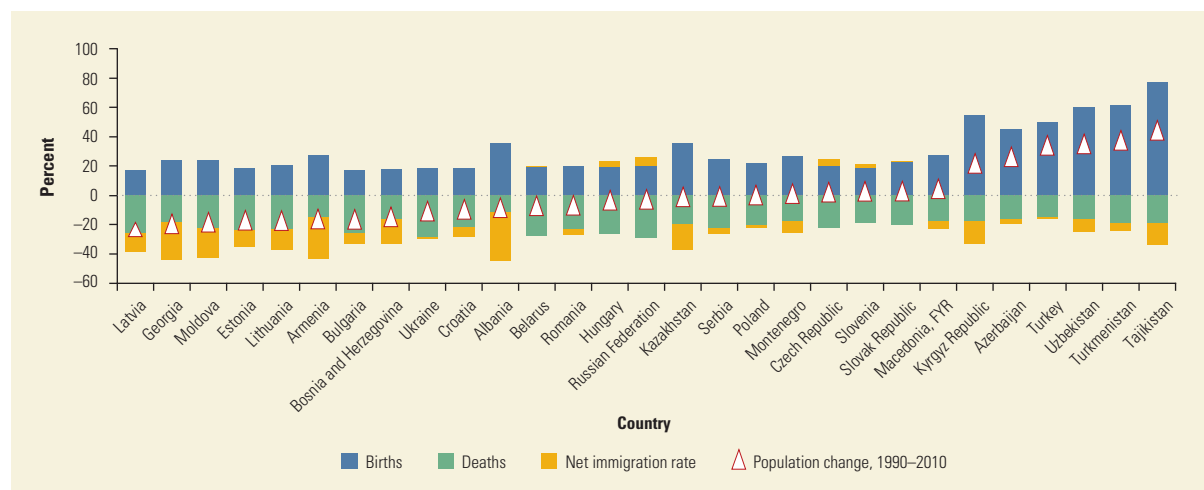
Source: World Bank calculations based on World Population Prospects: The 2012 Revision.

Migration flows could potentially be a powerful instrument for offsetting the effects of aging on the economy. If the constraints on immigration were relaxed, workers would relocate from low- to high-productivity economies, and efficiency would increase. Empirical studies show that the welfare gains from the elimination of restrictions on labor mobility are enormous.[9] In these models, a large share of the estimated welfare gains arises from the higher incomes that the new migrants earn in the destination countries, compared with what they would have earned in their countries of origin. Remittances from emigrants, coupled with technology transfers and trade links provided by migrant networks, mean that sending countries can also reap substantial benefits from emigration.

The contribution of immigrants to regional economies may be greater than indicated by their number. Employment and labor force participation rates have been, respectively, four and five percentage points higher on average among foreign-born individuals than natives in Central Europe and the Baltics and in Turkey since 2000 (figure 1.11). Nonetheless, there is substantial heterogeneity across economies. While immigrants perform better than natives in most of Central Europe and the Baltics and in Turkey, the opposite is true in Russia. The better labor market performance of immigrants in Central Europe and the Baltics is driven to a large extent by the characteristics of the migrants: they are more likely to be men and to possess a college degree and are less likely to be enrolled in school than natives. In fact, controlling for these observable characteristics, researchers find that migrants perform worse than natives not only in labor force participation and employment rates but also in wages.

Evidence from Europe shows that immigration does not seem to have a large negative impact on the employment or wages of natives. Indeed, Docquier, Özden, and Peri (2010) find that immigrants to Western Europe from 1990 to 2000 had skills that were complementary to those of natives and hence contributed to increasing wages and reducing inequality among natives. The massive movements of workers from east to west after the 2004 and 2007 EU enlarge-

FIGURE 1.11 Migrants are more likely to be active and employed than natives, circa 2000–10

a. Employment rates

b. Labor force participation rates

Natives ■ Migrants ■ Natives (average) ——— Migrants (average) ———
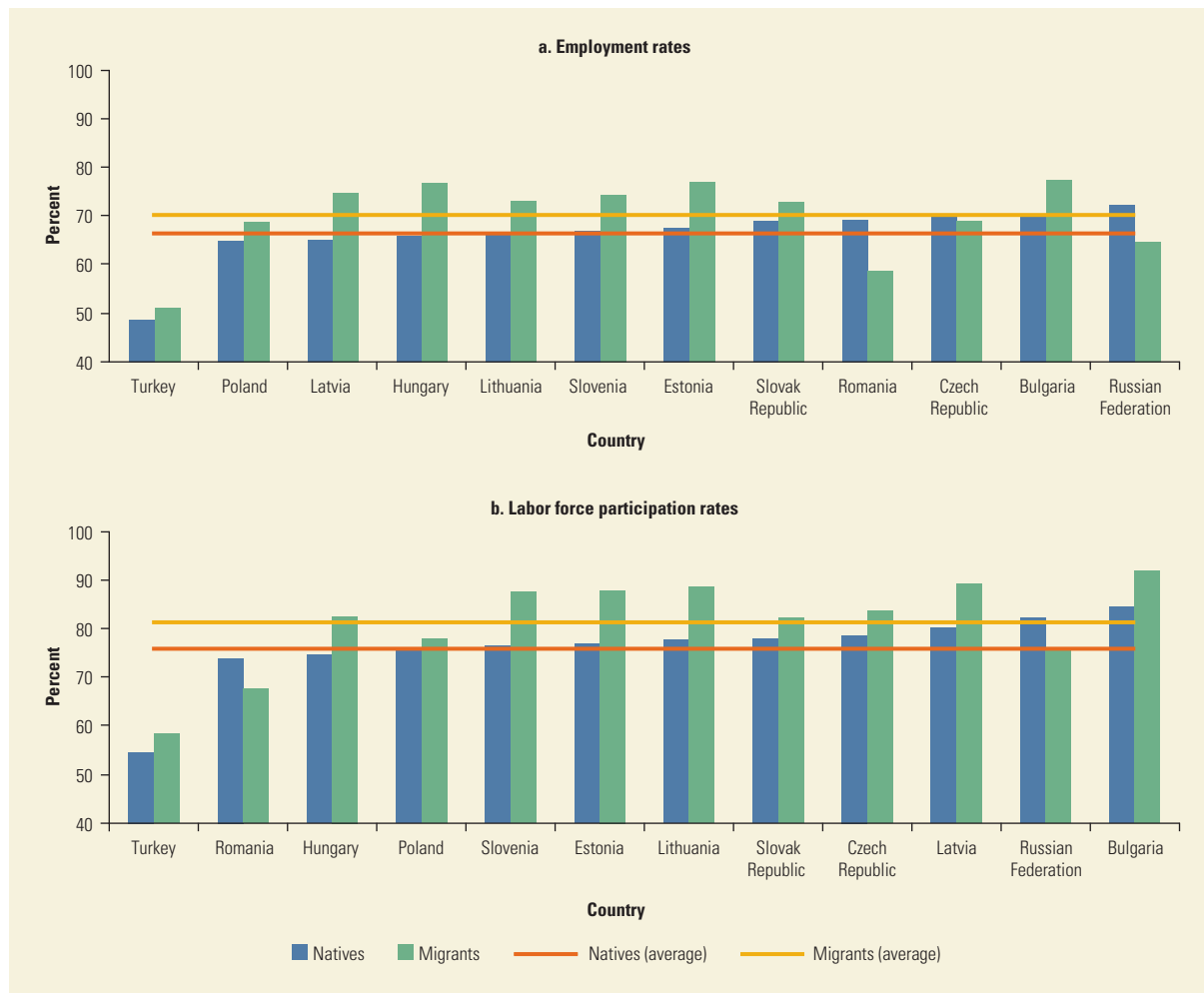
Sources: Data for the Russian Federation: RLMS–HSE (database); for Turkey: Labour Force Statistics, TurkStat, Ankara, http://www.turkstat.gov.tr /Start.do; for all other countries: EU LFS.

ments do not appear to have had a major impact on the labor markets of receiving economies.[10]

While emigration can affect the labor markets of sending economies by shrinking the working-age population, it may also benefit those who are left behind. Emigration may decrease the returns to complementary inputs (such as capital or workers with different skill levels) but increase the returns to nonemigrating workers with similar skills. Evidence on Lithuania and Moldova—where emigration is, in relative terms, among the largest in the world—shows that a rise in emigration has a positive, albeit small, effect on the wages of nonmigrants (Bouton, Paul, and Tiongson 2011; Elsner 2013). This experience is similar, although smaller in magnitude, to the rise in wage rates in Europe as a result of the mass emigration to the Americas in the late 19th and early 20th centuries (box 1.5). College graduates in

BOX 1.5 Lessons of the Age of Mass Migration

More than 50 million Europeans emigrated during the age of mass migration from 1850 to 1930. The vast majority left for the New World, where the scarcity of labor and the abundance of natural resources widened the wage gap with the Old World. Others chose a new home within Europe. Emigration during this period was driven by high and rising rates of natural population increase, real wage gaps, and migrant networks (Hatton and Williamson 1992). In certain decades during this period, countries such as Ireland, Italy, and Norway were losing an average of about 1 percent of their populations each year because of emigration. Meanwhile, immigration significantly contributed to increasing the populations of Argentina, Australia, Canada, and the United States.

Unlike today, the higher fertility rates and lower life expectancy of this period meant that aging populations in the Old World were not a concern. On average, the share of 65-year-olds in the population was only 5 percent in 1870 and increased by only two percentage points over the next 40 years. However, emigration seems to have had a large impact on total dependency ratios in the Old World. Indeed, the difference between the growth rate of the active population and the growth rate of the dependent population in the Old World during this period can be fully explained by emigration flows (Williamson 1998).

This era of open borders was accompanied by an economic convergence across countries that had never before been witnessed. Among nations receiving and sending migrants, economic indicators such as real wages, gross domestic product (GDP) per capita, and GDP per worker tended to improve more in economies that had been lagging in 1870 than in their initially more well-off counterparts. Taylor and Williamson (1997) estimate that mass migration was, by far, the main factor responsible for the process of economic convergence during this period. Emigrants from the Old World con-

tributed to a rise in wage rates that was relatively much greater in the sending economies than in the receiving economies, and they provided a factor of production to sustain economic growth in the receiving economies.

As the convergence continued, real wages in Europe were catching up with those in the New World, which tended to keep more potential migrants at home and thereby maintain lower emigration rates. Then, the age of uncontrolled mass migration ended because of war and the emergence of restrictions on immigration in receiving countries (the landmark event was the introduction of immigration quotas in the United States in the 1920s). Consequently, the rapid economic convergence significantly slowed over the next 40 years (Taylor and Williamson 1997).

Nowadays, the countries of Western Europe are among the favorite destinations of migrating workers in search of better opportunities, including workers from Europe and Central Asia. The long-term experience of Western Europe provides two important messages for countries in the region today. First, emigration can be beneficial for those who move, but also for those who are left behind who can benefit from increases in real wages. Second, immigration flows are volatile; changing attitudes in receiving countries, economic upheavals, and conflict can lead to abrupt changes in the ability and willingness of migrants to seek out new lives. In the United States, the anti-immigrant sentiment started to take hold in the latter half of the 1800s, when the main source of immigrants began changing from wealthier parts of northern Europe to poorer areas of Central, Eastern, and Southern Europe. However, the effort to enact laws to restrict immigration required a quarter-century. In the end, it was exogenous forces—economic downturn, war, a rash of labor unrest—that helped close the door (Goldin 1994).

most Central European and Baltic economies generally experienced a positive, though small, increase in wages as a result of emigration during the 1990s. In contrast, less well educated workers witnessed a decline in wages and employment (Docquier, Özden, and Peri 2010).

Toward More Balanced Age Structures over the Next Half-Century

Rapid drops in fertility across age groups, baby booms, limited improvements in longevity at middle age, and upticks in emigration among younger age groups have led to large differences in size across age cohorts in the region. In the Eastern Partnership countries and Russia, the cohorts born between 1956–65 and 1981–90 are larger than other age groups (figure 1.12), while cohorts born in the 1980s are particularly large relative to other subregions (table 1.2). By contrast, the relatively young countries of Turkey and Central Asia reflect the bottom-heavy age structure typical of the high fertility of the earlier transition stage: 56 percent of the population is under 30 years of age. Of course, individual countries have divergent demographic histories, so this dating may not be appropriate for all countries. In Romania, for example, the Ceauşescu regime's policies aimed at increasing the population resulted in a rise in births over 1967–89.

The substantial imbalances in the Eastern Partnership countries and Russia are expected to ripple through the population structure in the next 50 years. By 2060, if fertility were to recover, the age structure would be more balanced, with roughly similar population shares in all age cohorts, with the exception of the very old (figure 1.12). A similar evolution is expected for Turkey and Central Asia, although their relatively young populations in 2010 would mean that by 2060 their middle-aged groups would have a somewhat larger share of the population than in Central Europe and the Baltics and the Western Balkans (figure 1.13).

The region's aging societies will face changes in needs generated by age groups of different sizes going forward. For example, the shrinking of student

FIGURE 1.12 The larger cohorts aged 20–29 and 45–54 of Eastern Partnership countries and the Russian Federation in 2010 will transition through the population structure
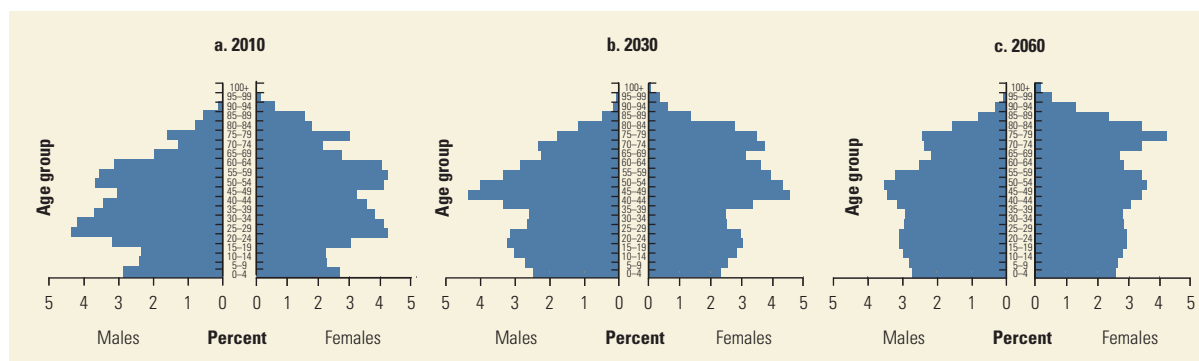
Source: World Bank calculations based on World Population Prospects: The 2012 Revision.
Note: Data are the sum of the population of the country group, and thus the outcome is dominated by the Russian Federation, the most populous country.

TABLE 1.2 Dates of Birth of the Largest Age Cohorts, by Subregion, 2010

Age in 2010	EU-15, Northern and Central Europe	EU-15, Southern Europe	Western Balkans	Central Europe and the Baltics (plus Cyprus and Malta)	Eastern Partnership and Russian Federation	Young countries
0–4						2006–10[a]
5–9						2001–05[a]
10–14						1996–2000[a]
15–19			1991–95			1991–95[a]
20–24			1986–90		1986–90[a]	1986–90[a]
25–29			1981–85	1981–85	1981–85[a]	1981–85[a]
30–34		1976–80	1976–80	1976–80	1976–80	
35–39	1971–75	1971–75[a]		1971–75		
40–44	1966–70	1966–70[a]				
45–49	1961–65	1961–65			1961–65	
50–54	1956–60			1956–60	1956–60	

Source: World Bank calculations based on World Population Prospects: The 2012 Revision.
Note: Age cohorts are considered among the largest if they exhibit the greatest deviation from a hypothetical population structure that is equally balanced across all age cohorts. The young countries include Turkey and Central Asia.
a. The age cohort is particularly large relative to the corresponding age cohort in other subregions.

FIGURE 1.13   Rapid aging is expected in Central Asia and Turkey over 2010–60
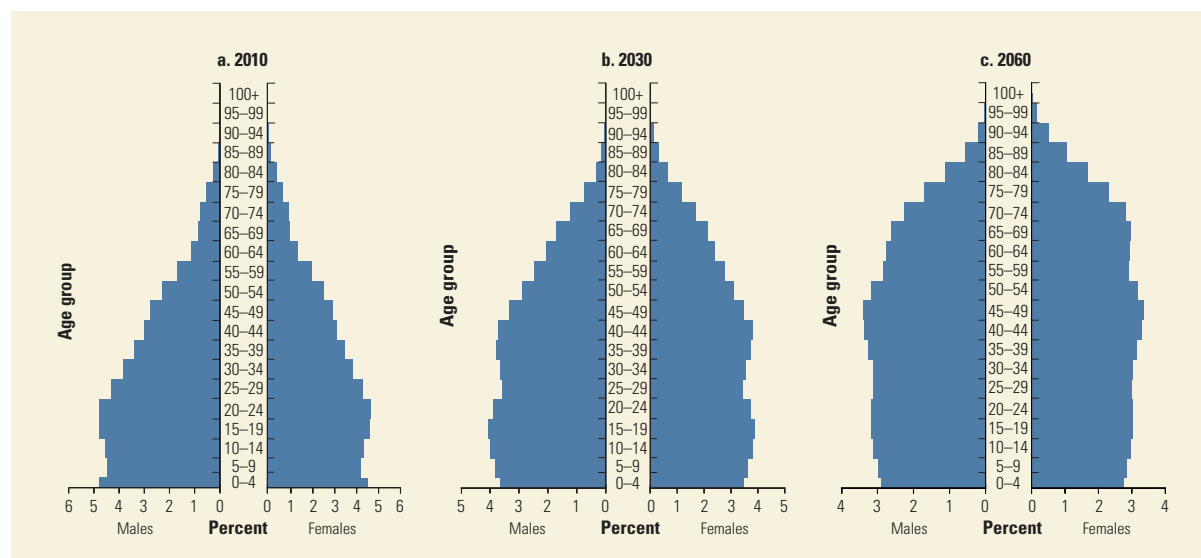
Source: World Bank calculations based on World Population Prospects: The 2012 Revision.

populations has allowed countries to cut back on education infrastructure. Likewise, a surge in deaths for a transitional time period would imply increasing demand for health services. A wave of people reaching pension age at the same time would place additional demands on public budgets, which requires planning (see the discussion on the fiscal consequences of aging in chapter 3). But these waves of larger age groups are part of the transition to a more balanced population structure and so are expected to be temporary. The transition period will be long, however.

The Possible Increase of Dependency Ratios due to Aging

One implication of the transition to more balanced age structures will be increases in dependency ratios. The most often cited population forecasts, the medium-fertility variant of the United Nations Population Division projections (see box 1.6), illustrate the challenges facing the region. These projections assume a recovery of fertility in many countries to the levels of the 1980s.

This assumption reflects the experience of some advanced countries, where fertility rates have begun to rise, but this is not a given. The recovery in fertility started relatively early in some countries—France, for example—and has been particularly steep since the start of the new century in Finland, Iceland, and the United Kingdom.

While mortality rates in the region are assumed to fall, convergence toward the higher longevity in advanced countries is not expected to accelerate dramatically.[11] In the United Nations' projections for Eastern Europe (which includes Belarus, Bulgaria, the Czech Republic, Hungary, Moldova, Poland, Romania, the Russian Federation, the Slovak Republic, and Ukraine), life expectancy is assumed

FIGURE 1.14 **Europe and Central Asia is converging quickly to the high share of population aged 65+ in the EU-15**
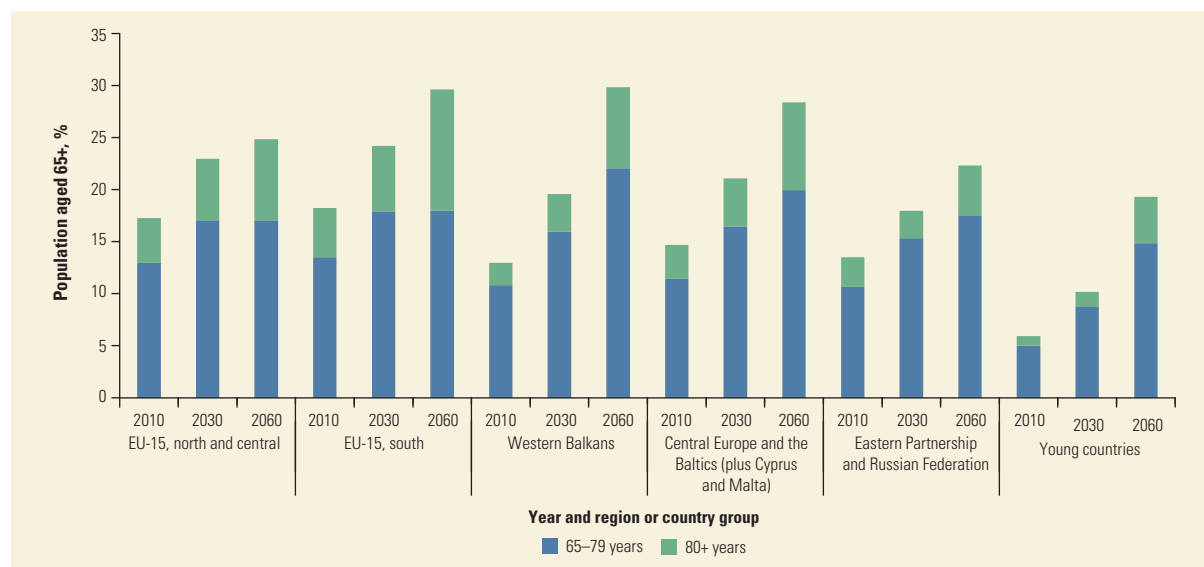
Source: World Bank calculations based on World Population Prospects: The 2012 Revision.

to increase from 70 years in 2010–15 to 72 years in 2025–30 and to 76 years in 2055–60. The gender gap is projected to narrow slightly, from 11 years in 2010–15 to 9 years by 2055–60. Thus, men in Central Europe and the Baltics are still projected to live much shorter lives than men in Northern Europe: the projections assume that life expectancy at birth among men will increase from 65 years in 2010–15 to 72 years in 2055–60; this compares to a rise from 78 to 84 years in Northern Europe over the same period.

The aging of Europe and Central Asia's population is expected to accelerate in coming decades, as the 65+ age group becomes larger in all countries (figure 1.14). By 2030, the share of this group in the population is expected to expand by a third in the Eastern Partnership and Russia, by 40 percent in Central Europe and the Baltics (plus Cyprus and Malta), by 50 percent in the Western Balkans, and by over 70 percent in the young countries of the region. The oldest old population—individuals 80+ years of age—is expected to remain small throughout the region, but these shares are also expected to grow.

The rise in the share of the population aged 65 and over will be accompanied by a decline in the share of people of working age (here set at 15–64 years) throughout the region. While the decline is not expected to be as pronounced as in Western European countries, the relative size of the working-age population is projected to shrink quickly in all subregions of Europe and Central Asia; see figure 1.15.

The difference between the forecasts for the evolution of dependency ratios between Western Europe and Europe and Central Asia can be seen in figure 1.16, which compares the increase in the old-age dependency ratio in France and Russia. In France, the postwar baby boom has resulted in a relatively large increase in the number of older people in 2010–15, while the growth of the old-age depen-

FIGURE 1.15
The working-age population is projected to contract substantially in many countries in Europe and Central Asia

Young countries

Western Balkans

Eastern Partnership and Russian Federation

Central Europe and the Baltics (plus Cyprus and Malta)

EU-15, south

EU-15, north and central
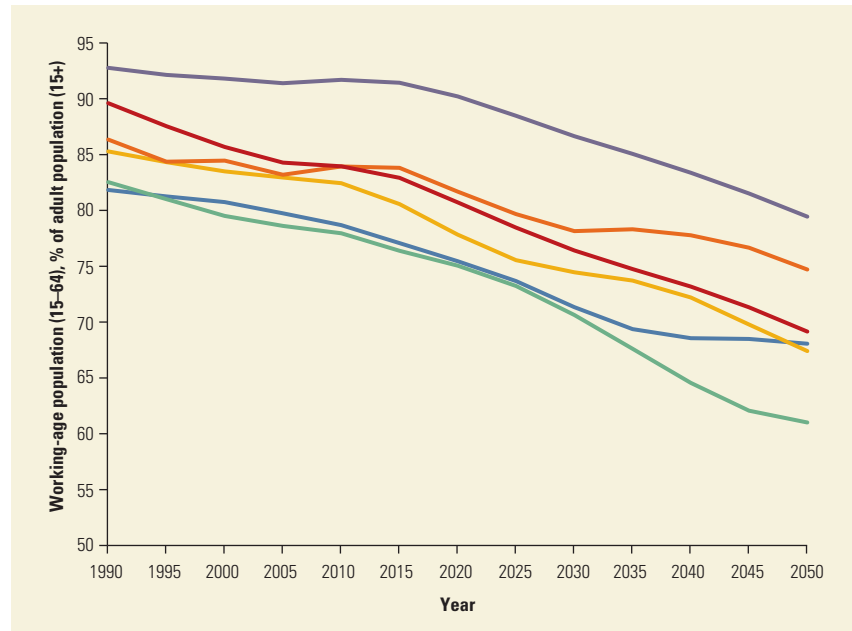
Source: World Bank calculations based on World Population Prospects: The 2012 Revision.

FIGURE 1.16
France's large postwar baby boomers bring a large rise in the 65+ age group from 2010 to 2015; the Russian Federation's share of the elderly will fluctuate over the next 45 years

Source: World Bank calculations based on World Population Prospects: The 2012 revision.
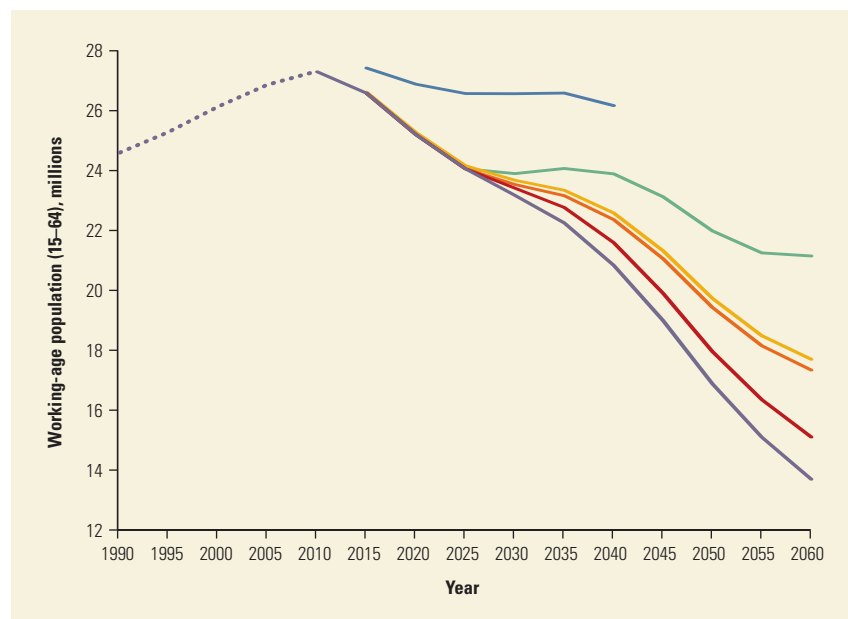
A fertility rebound is critical to reviving the working-age population in Poland

Legend:
- Low fertility, high immigration
- High fertility
- Medium fertility, zero immigration
- Medium fertility
- Constant fertility
- Low fertility

Sources: The low-fertility with high immigration (immigration = 0.5% of the population per year) scenario and the medium-fertility with zero immigration scenario: World Bank calculations; all other scenarios: World Bank calculations based on World Population Prospects: The 2012 Revision.

dency ratio is expected to decline going forward. By contrast, in Russia old-age dependency ratios are expected to fluctuate sharply over the next 45 years.

These forecasts may not provide a reliable indicator of the rise in the share of the dependent population relative to workers. As noted in chapter 3, policy interventions and adjustments by firms and individuals could expand labor force participation among women and the older age cohorts. Thus, dependency ratios defined strictly by age may provide a pessimistic view of changes in the share of workers in the population. The decline in the working-age population, however, could be even greater than anticipated in the above forecasts if fertility in the region fails to increase. Indeed, fertility rates in some advanced countries, for example Germany, Japan, and the Republic of Korea, have remained extremely low. Moreover, population growth may be affected by adverse shocks, as demonstrated by the sharp drop in fertility during the transition to the market economy after the Soviet era and the large emigration that accompanied EU accession in many countries in Europe and Central Asia.

Poland provides a useful illustration of the impact on the forecasts of the working-age population of different assumptions for fertility (figure 1.17). Under the high-fertility scenario, which assumes that Poland reaches the replacement rate by 2020–25, the working-age population would stabilize. With the medium-fertility assumption (which assumes a rise in the TFR from 1.34 over 2005–10, to 1.66 over 2020–25, and to 1.8 over 2055–60), the working-age population would decline by 36 percent from 2010 to 2060, while with low fertility the decline is 50 percent.

Ideally, the burden of disease and disability should be reflected in measurements of the share of the dependent population. Therefore, rather than using a fixed chronological definition of age to calculate the dependency ratio, Sanderson

TABLE 1.3 Disability-Adjusted Dependency Measures in Selected Countries, 2005–50
percent

	Sanderson and Scherbov (2010)			
	2005–10	2025–30	2045–50	
Czech Republic	8	9	10	
France	9	10	11	
Hungary	21	22	23	
Japan	10	12	13	
Slovak Republic	18	20	23	
	World Bank calculations			
	2010–14	2025–29	2045–49	2055–60
Belgium	32.6	33.5	39.1	40.7
Czech Republic	14.8	16.8	17.8	20.5
France	12.1	12.9	15.2	15.7
Hungary	16.4	18.0	18.5	20.2
Slovak Republic	15.4	17.2	18.5	21.2
Spain	29.8	29.5	36.3	42.1

Sources: Sanderson and Scherbov (2010) calculations use the 2009 European Union Statistics on Income and Living Conditions (EU-SILC) survey. World Bank calculations use the European Health Interview Survey (EHIS) and World Population Prospects: The 2012 Revision.
Note: The adult disability dependency ratio is defined as the number of adults who are at least 20 years of age and who have disabilities, divided by the number of adults who are at least 20 years of age and who do not have disabilities.

and Scherbov (2010) propose the use of the share of the adult population that has a limited ability to perform the functions of daily life. One such measure is the adult disability dependency ratio, which is defined as the number of adults who are at least 20 years of age and who have disabilities, divided by the number of adults who are at least 20 years of age and who do not have disabilities. By this measure, richer countries with higher shares of older people are shown to have lower dependency ratios. For example, Japan has the highest share of people in the 65+ age group (35 percent) and a relatively low adult dependency ratio (10 percent) (table 1.3). In contrast, Hungary has more than double the share of dependent adults because of disability (21 percent). The high levels of disease and disability rates in Europe and Central Asia, discussed in chapter 2, imply that this adjustment has important implications for measuring the dependency ratios in the region. Another approach is to calculate a cognitive age that is a more accurate reflection of the productivity of a person than his or her chronological age (Skirbekk et al. 2013). When doing that, it shows that some of the chronologically oldest countries turn into the youngest ones with regard to cognitive age.

Migration Unlikely to Make a Significant Contribution to Limiting the Rise in Dependency Ratios

Given recent migration trends, most countries in Europe and Central Asia are unlikely to attract sufficient immigrants to offset the anticipated decline in the working-age population during the next 10 years (figure 1.18).

Most countries in the Western Balkans and in Central Europe and the Baltics would need to reverse the profile of migration flows and become net receivers of

FIGURE 1.18 Current migration flows in Europe and Central Asia are not enough to offset the future decrease in the working-age population
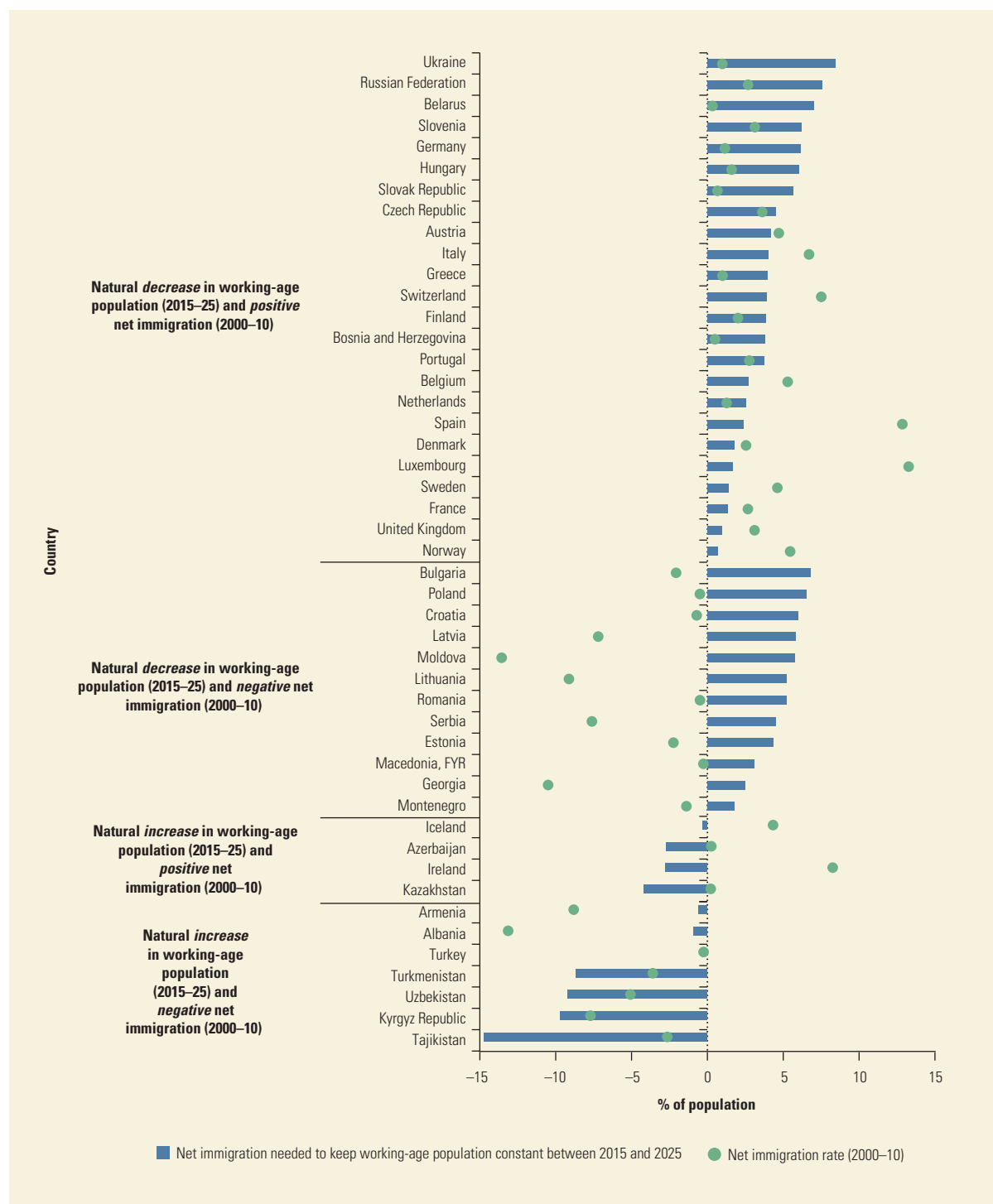
Source: Based on World Population Prospects: The 2012 Revision.
Note: The natural decline in the working-age population between 2015 and 2025 is derived from population projection data under the zero migration scenario. The net immigration needed to keep the working-age population constant assumes that migrants are in the 15–64 age group, which is a realistic assumption given the migration patterns in Europe and Central Asia.

BOX 1.7   Do Immigrants Raise Local Fertility Rates?

In many advanced countries, recent immigrants tend to have higher fertility rates than natives. However, given that recent migrants often constitute only a small share of populations in European countries, their effect on total fertility rates (TFRs) is often small. The last column of table B1.7.1 provides an estimate of the net contribution of immigrants to TFRs in European countries (McDonald 2010; Sobotka 2008). While the TFRs of immigrants are higher than the TFRs of the native population, the overall effect on birth rates ranges from only −0.03 to 0.13 children per woman. In most cases, the impact of immigrants with higher fertility on national fertility rates is small because immigrants represent a small share of the population of childbearing age. In addition, in most countries where the issue has been studied, fertility among recent immigrants declines to native levels within a decade of migration (Garssen and Nicolaas 2008; Schoorl 1995; Toulemon and Mazuy 2004). Thus, any positive net contribution gradually fades.

TABLE B1.7.1 **The Effect of Immigrant Women on Total Fertility Rates, Various Economies and Years**

children per woman

Economy	All women	Native nationals	Immigrant women	Net contribution
Denmark				
1998	1.75	1.68	..	0.07
1999–2003	—	1.69	2.43	—
2004–08	—	1.82	1.90	—
2008	1.89	1.91	..	−0.03
England and Wales				
1996	1.74	1.67	..	0.07
2007	1.92	1.79	2.51	0.13
France				
1991–98	1.72	1.65	2.50	0.07
Netherlands				
1996	1.53	1.47[a]	2.19	0.06
2008	1.77	1.78[a]	1.77[b]	−0.01
Norway				
2007	1.90	1.85	..	0.05
Sweden				
2008	1.91	1.85	2.09	0.05

Sources: McDonald 2010; Sobotka 2008.
Note: .. = negligible; — = not available.
a. Second-generation immigrants (that is, women born in the Netherlands who have at least one immigrant parent) whose mothers were born in the Netherlands are not included.
b. Second-generation immigrant women are included.

migrants rather than net senders to offset this process. While Belarus, Russia, and Ukraine have experienced positive net immigration flows during the past 10 years, similar levels during the next 10 years would not be sufficient to counteract the declines in the working-age population. And while recent immigrants tend to have higher fertility rates than natives (at least in advanced countries), in general the number of recent immigrant women is too small to have an appreciable impact on fertility rates, while the fertility behavior of immigrant women tends to resemble

native women over time (box 1.7). In contrast, some countries in Central Asia are expected to experience a substantial increase in the working-age population, although the maintenance of emigration flows at current levels may partially offset the gains.

Relying on immigration to offset population aging appears even less promising if viewed over a longer time horizon. According to a report prepared by the United Nations (2001), to keep the old-age dependency ratio constant between 2000 and 2050, Russia would need 5 million immigrants per year (a total of 257 million immigrants). Such numbers seem far from feasible if one considers that, between 2000 and 2010, Russia received fewer than 400,000 immigrants a year. Similarly, if fertility remains at currently low levels in Poland (TFR of 1.34), then net immigration flows would have to equal 0.5 percent of the population each year to maintain the working-age population at current levels by 2060. Given that Poland has experienced considerable net emigration in the past and that the wage differential between Poland and the higher-income EU countries remains high, such large net immigration rates are unlikely.

Nevertheless, sharp changes in net immigration flows are possible. Some of the countries that have received large net inflows of immigrants since 2000, such as Ireland and Spain, quickly transformed into net senders when the financial crisis hit labor markets severely. In contrast, Kazakhstan (as other countries in Central Asia) entered the new century experiencing large net emigration, but then shifted to being a net receiver of migrants as workers responded to an improving economy and declines in unemployment. Thus, an improvement in economic prospects could make some contribution to limiting the aging of populations.

Notes

1. The old-age dependency ratio is the ratio of older dependents, people older than 64, to the working-age population, defined as those aged 15–64.
2. Maddison (2010) is the source used, and given the lack of availability of data for all countries, his regional groupings are reported here, which differ from those used elsewhere in the report.
3. Frejka and Zakharov (2012) estimate that only 20 percent of the postponed births in Russia were accounted for by the cohort of women of the 1960s that entered their most reproductive years in the late 1980s and early 1990s.
4. The fertility analysis draws largely on a background paper produced for this report; see Greulich, Thévenon, and Guergoat-Larivière (2014).
5. A few countries deviate from this general pattern, as age-specific fertility rates continue to decline among all age groups; these include Japan, the Republic of Korea, and Mexico but also Albania, Armenia, Azerbaijan, the Kyrgyz Republic, and Tajikistan.
6. Greulich, Dasre, and Inan (2014) use the European Union Statistics on Income and Living Conditions (EU-SILC), which contains data for 27 European countries (Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, the Slovak Republic, Slovenia, Spain, Sweden, and the United Kingdom). The longitudinal version is a four-year rotational panel covering the years 2003 to 2011.
7. See *Aging and Prosperity in the Russian Federation* (World Bank, forthcoming).
8. This basic decomposition of the change in population disregards the impact of immigration on fertility and therefore downplays the importance of immigration. On aver-

age, in Latvia families with the largest demographic potential are more likely than others to emigrate (Hazans 2014).

9. Static studies have estimated that these gains exceed the current levels of development assistance and foreign direct investment to developing countries and even approach the level of worldwide GDP (Hamilton and Whalley 1984; Moses and Letnes 2004). Using a dynamic model and accounting for the effects of migration on education and fertility, Delogu, Docquier, and Machado (2013) find that the efficiency gains from open borders amount to 20 percent and 50 percent of the world average level of GDP per worker in the short and long term, respectively.

10. Several empirical studies have found very small or nonsignificant effects of immigration flows on the employment rate and wages in the United Kingdom and Ireland (Kahanec 2013). In Germany, immigrants from the new EU members affect the labor market outcomes of non-EU migrants rather than those of natives (Brenke 2011).

11. Life expectancy at birth by gender is used as the basis for projections; mortality is expected to follow a declining trend after 2010. Unlike the fertility assumptions, there is only one life expectancy variant used for the population projections. Where available, recent empirical information on trends in the age patterns of mortality are used to extrapolate future mortality trends.

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2

Improving Health Outcomes in the Transition to the "Golden Age"

Introduction

This chapter discusses the high incidence of disease and disability in the Europe and Central Asia (ECA) region, the challenges that need to be overcome to achieve a healthy aging population, and the implications of demographic developments for caregivers. Compared to populations in other regions, those in Europe and Central Asia are more likely to be living with disease and disability, and health status has actually deteriorated in some countries over the past 50 years, particularly for men. The lack of formal care for both the disabled and children places a high burden on family caregivers, most of whom are women. The main drivers of premature death in the region are cardiovascular disease and cancer. A greater focus on preventive care (in conjunction with behavioral changes) and efforts to reduce the inequality of service provision could dramatically improve health outcomes.

Lengthy Disability for People in Europe and Central Asia

While it is difficult to examine trends in the less well-off countries of the region because of a lack of comparable data, evidence shows that the region's middle-

FIGURE 2.1

Europe and Central Asia experiences more disability than other regions

⊢—┤ 95% uncertainty interval
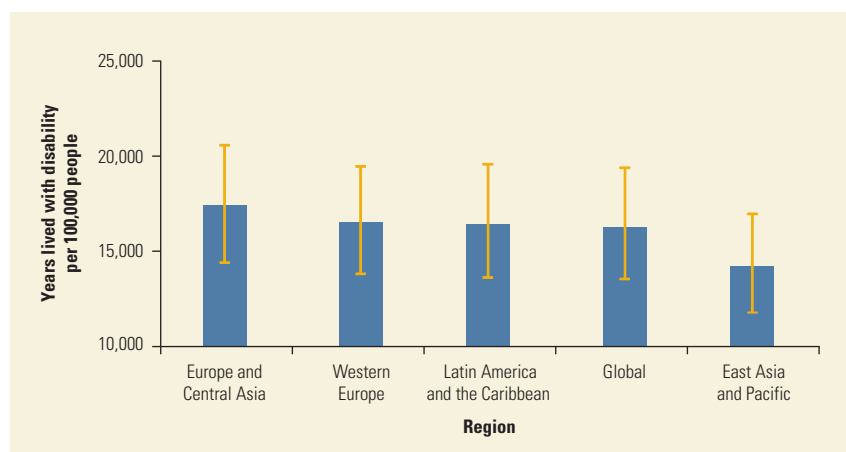
Source: Global Burden of Disease Study 2010.
Note: Years lived with disability indicates years of life lived with any short-term or long-term health loss, adjusted for severity. See http://www.who.int/quantifying _ehimpacts/publications/en/9241546204chap3.pdf.

aged population is heading into older age with a greater burden of disability than the corresponding age groups in other regions (figure 2.1). Overall, disability among the middle-aged population rose across the region between 1990 and 2010 (Data Visualizations). It is likely that this burden is not shared equally across populations but is concentrated among more socioeconomically challenged segments.

In contrast to conventional life expectancy, which considers all years of life equally, health-adjusted life expectancy estimates the number of healthy years an individual is expected to live by subtracting the years of ill health from overall life expectancy. Years of ill health are weighted according to severity from 0 (perfect health) to 1 (dead). The estimates of loss of health then quantify different states of health using disability weights. For instance, suffering from the severe long-term consequences of a stroke is attached a disability weight of 0.539.[1]

One year of healthy life expectancy therefore indicates one full extra year of life lived in perfect health and free from disability or illness. Essentially, it is the proportion of a person's remaining life at a given age that they can expect to live in good health, taking into account age-specific mortality, morbidity, and health status.

Healthy life expectancy at age 50–54 provides a measure of the quality of life of the older population. The difference between life expectancy and healthy life expectancy can be interpreted as the average number of years afflicted by poor health (see figure 2.2 for this comparison in the 50–54 age group among men and among women).[2] At 50, men in Japan can expect to live eight more years free of disability than men in Kazakhstan, and Japanese women can expect nearly six years more than Tajik women. Women spend more years in good health than men in all countries of the region, and this gender gap is greater than in the more developed EU-15 countries. Thus, women in Belarus can expect to live over five more years in good health than men in Belarus, while the gap is only a year and a half in the Netherlands. These data must be interpreted cautiously, because of the difficulty of obtaining internationally comparable measurements of health status and

FIGURE 2.2   **Men have fewer healthy years of life at age 50 than women in Europe and Central Asia and men in other regions**

a. Men

Japan
Slovenia
Serbia
Czech Republic
Bosnia and Herzegovina
Turkey
Montenegro
Albania
Croatia
Azerbaijan
Poland
Macedonia, FYR
Slovak Republic
Estonia
Armenia
Romania
Georgia
Tajikistan
Bulgaria
Lithuania
Uzbekistan
Hungary
Latvia
Turkmenistan
Moldova
Kyrgyz Republic
Ukraine
Russian Federation
Belarus
Kazakhstan

15 17 19 21 23 25 27 29 31
Years of life remaining

b. Gender gap

Bosnia and Herzegovina
Macedonia, FYR
Netherlands
Montenegro
Tajikistan
Serbia
Uzbekistan
Albania
Turkey
Azerbaijan
Croatia
Czech Republic
Korea, Rep.
Slovenia
Bulgaria
Turkmenistan
Romania
Moldova
Slovak Republic
Hungary
Poland
Kyrgyz Republic
Ukraine
Armenia
Latvia
Russian Federation
Kazakhstan
Estonia
Lithuania
Georgia
Belarus

1 2 3 4 5 6 7 8 9
Additional years for women compared to men

■ Life expectancy at age 50–54   ■ Healthy life expectancy at age 50–54

Source: Global Burden of Disease Study 2010.
Note: In figure 2.2a, countries are displayed from highest to lowest life expectancy. Japan is shown for comparison purposes, as the country with the highest life expectancy. Figure 2.2b shows the differences between female and male life expectancy. Countries are displayed from the smallest gender gap in life expectancy to the largest. The Netherlands is shown for comparison purposes, as the country with the lowest gender gap in healthy life expectancy.

because the methods used to extrapolate from the limited available data can produce estimates with more similar ranges than those that may exist in real life.[3]

Declines in the Health of the Older Population in Some Countries since 1959

In many countries in the region, a man in 2009 was not in better health than a man in 1959. Indeed, in the Eastern Partnership, the Baltic states, and the Russian Federation, a man was worse off in 2009 than his predecessors a half-century ago. This

FIGURE 2.3

60-year-old men in the Russian Federation, the Eastern Partnership, and the Baltic countries "feel" worse today (2009) than they did in 1959
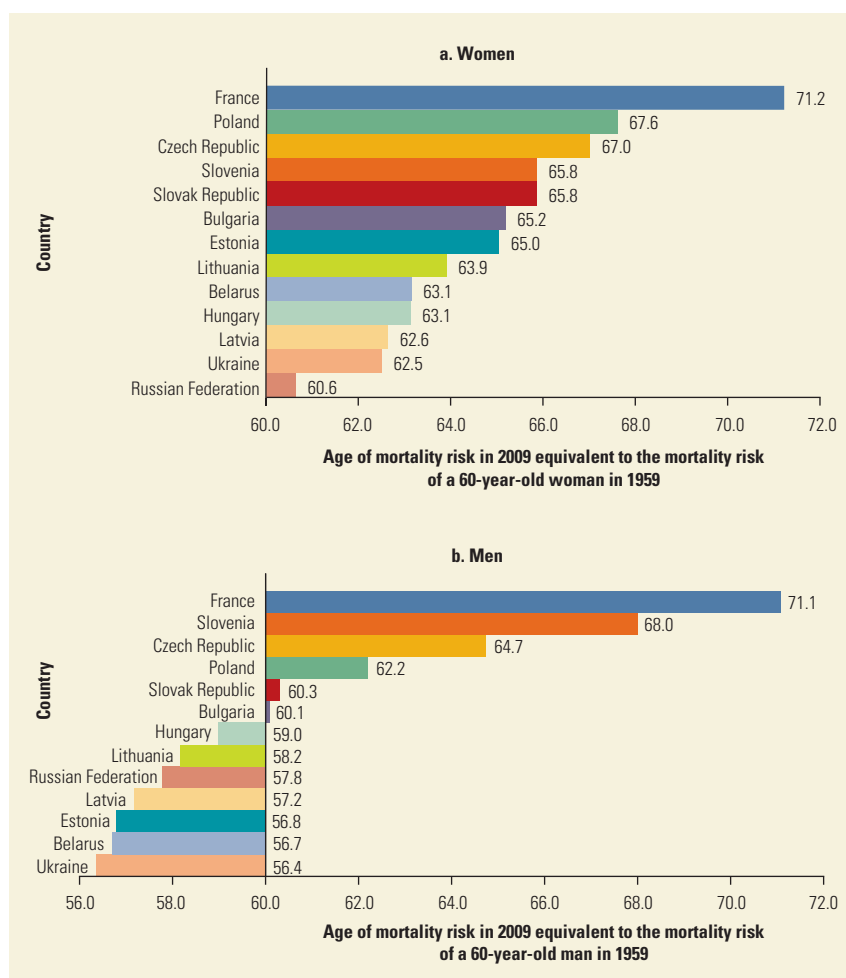
Source: World Bank calculations based on the Human Mortality Database.

decline contrasts with most high-income countries, where life expectancy has been lengthening almost linearly, without deceleration, over the past 165 years (Christensen et al. 2009).

One way to compare changes in health status across countries is to assess how old an individual would have to be today to face the same mortality risk as an individual at a particular age in an earlier time. For example, in the United States, a man aged about 69 years in 2009 would have the same mortality risk as a man aged 60 years in 1959 (Milligan and Wise 2012). This measurement provides one perspective on the change in health status and life expectancy over the period. A man in France aged 71 years in 2009 has the same risk of dying as a 60-year-old in 1959, indicating a substantial improvement in health status over the past 50 years (figure 2.3). By contrast, a man in Ukraine aged 56 years in 2009 has the same mortality risk as a 60-year-old in 1959, indicating an actual decline in health status over the period. Women are in a better position in all the countries shown in figure 2.3, living longer than their counterparts in 1959, although still lagging behind relative to the gains achieved in richer countries.[4]

Not only have people in the region not enjoyed the same gains in life expectancy as other regions, but also they are more likely to be living with disease and disability. The concern is that rapidly aging populations in the region will carry a legacy of middle-aged mortality and poor health from their earlier years to older age, and thus the elderly in the next two decades will be vulnerable to illnesses in old age. While some of the disease burden can be explained by period-specific effects such as the social upheavals of the transition to the market economy in the 1990s and the economic hardship of the early years of the first decade of the 2000s, it is probable that, without urgent policy action and behavioral change, many other risk factors will continue to affect younger cohorts (Leon, Walt, and McKee 2000; Stuckler, King, and McKee 2009). Nonetheless, a 70-year-old in 25 or 50 years will not inevitably have the same health status as a 70-year-old today. The region has the potential to follow the lead of the EU-15 in enhanced prevention and treatment strategies to reduce the incidence of disability.
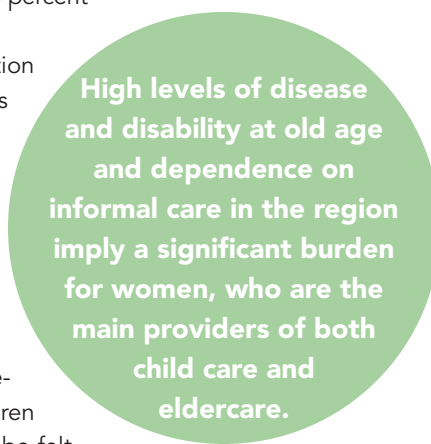
Women's Unequal Burden of Caring for the Dependent

The high levels of disease and disability outlined above have sober implications for the region's caregivers. The limited availability of formal services in the region means that the bulk of eldercare, as well as child care, is provided informally (figure 2.4), often by female family members. According to the Survey of Health, Ageing and Retirement in Europe, among individuals 50 years of age or older who report experiencing some level of limitation in performing daily activities, 10–25 percent receive care, but fewer than 2 percent receive formal care (figure 2.5).

A comparable representation of child care—early childhood education and care and preprimary school enrollment—shows large variation across countries (figure 2.6a). Young countries such as Tajikistan and Turkey still exhibit low levels of child care and preprimary education coverage, while aging countries such as Belarus and Ukraine show a much greater participation of children in early education and care. Nonetheless, children over the age of three are more likely to be in formal education and care services than younger children, who are largely cared for by their parents (figure 2.6b).

The responsibility for informal care (noninstitutional and unpaid home-based care by a relative) falls disproportionately on women for both children and the elderly. While a sense of filial obligation toward a parent may be felt equally by daughters and sons, daughters are more likely to act upon it. Women's longer life expectancy and their generally lower labor market attachment and earnings potential (partly as a result of their child care role) result in their higher propensity to become caregivers. Mothers are typically called on to be the main child care providers, and grandmothers often help or replace mothers in carrying out this function when the mothers need support. Daughters and daughters-in-law are called to be eldercare providers, and their daughters often help their mothers in carrying out this function.

Ciani (2012) suggests that the decision on who should supply informal care for the elderly is frequently made before the need arises. For example, adults who opt

> **High levels of disease and disability at old age and dependence on informal care in the region imply a significant burden for women, who are the main providers of both child care and eldercare.**

Figure 2.4 Informal care dominates in countries in Europe and Central Asia
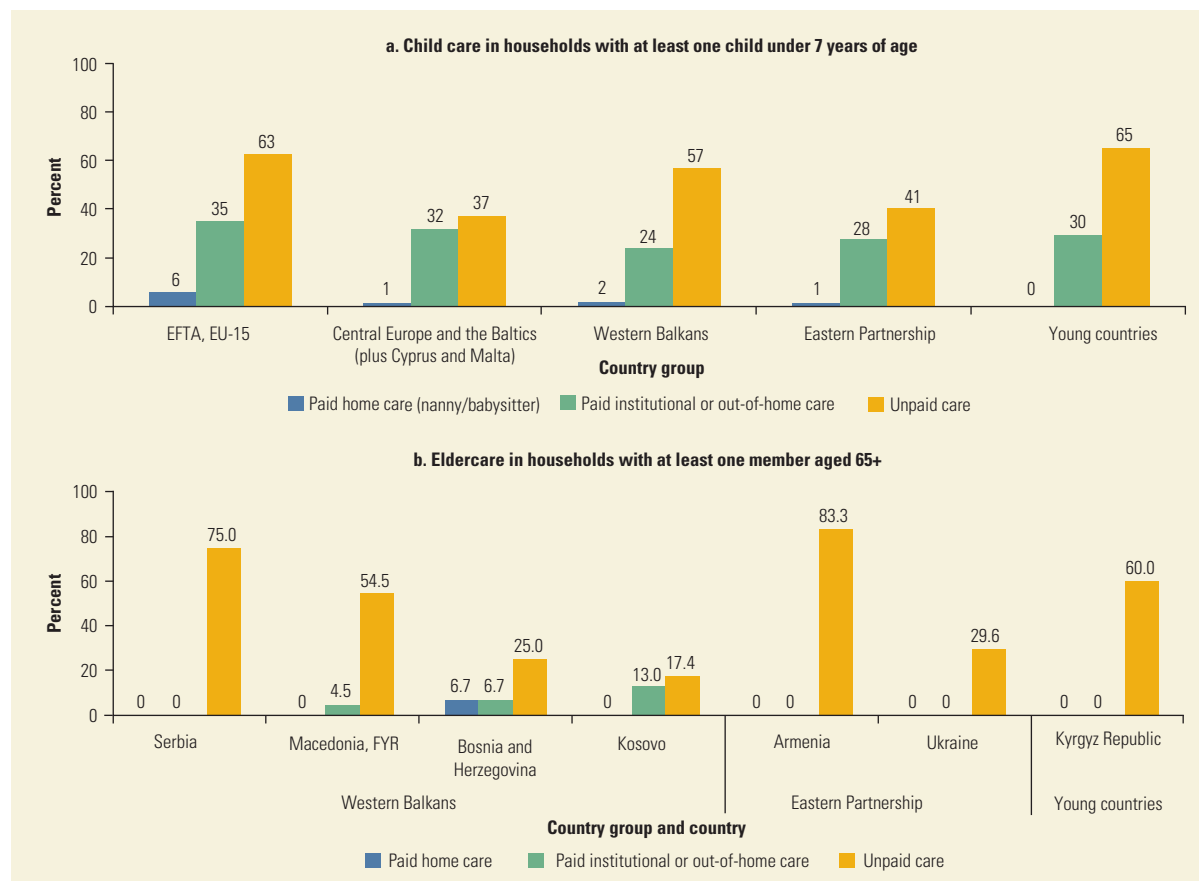
a. Child care in households with at least one child under 7 years of age

Legend:
- Paid home care (nanny/babysitter)
- Paid institutional or out-of-home care
- Unpaid care

b. Eldercare in households with at least one member aged 65+

Legend:
- Paid home care
- Paid institutional or out-of-home care
- Unpaid care

Sources: Levin et al. 2015; calculations based on own data collection in selected countries and on GGS.
Note: Child care refers to participation in preprimary early childhood education or other forms of child care for children prior to beginning primary education.

Figure 2.5 Older adults with disabilities have some access to formal care

Legend:
- Nonformal care
- Formal care
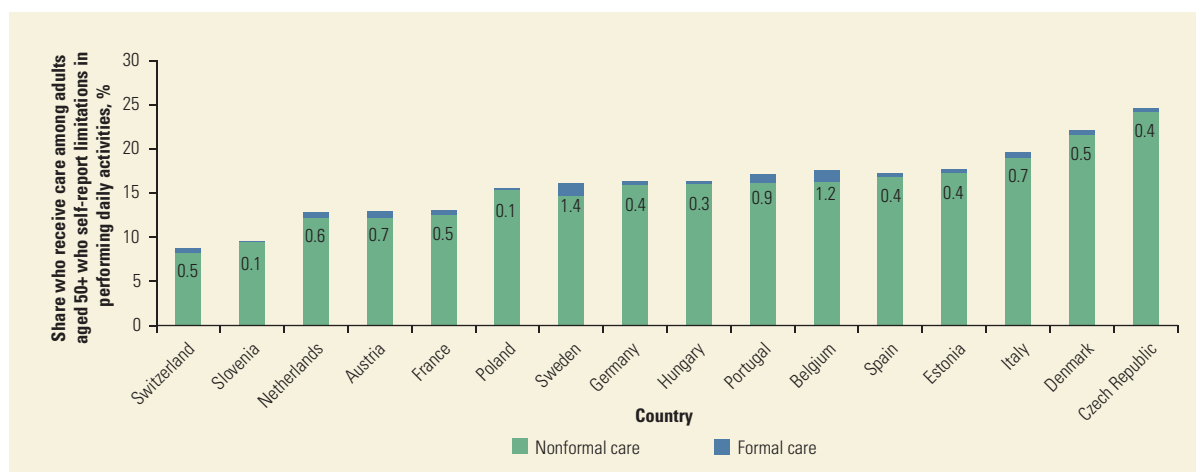
Source: Levin et al. 2015, based on SHARE Project.
Note: Numbers in bars indicate size of blue area, which reports the share receiving formal care.
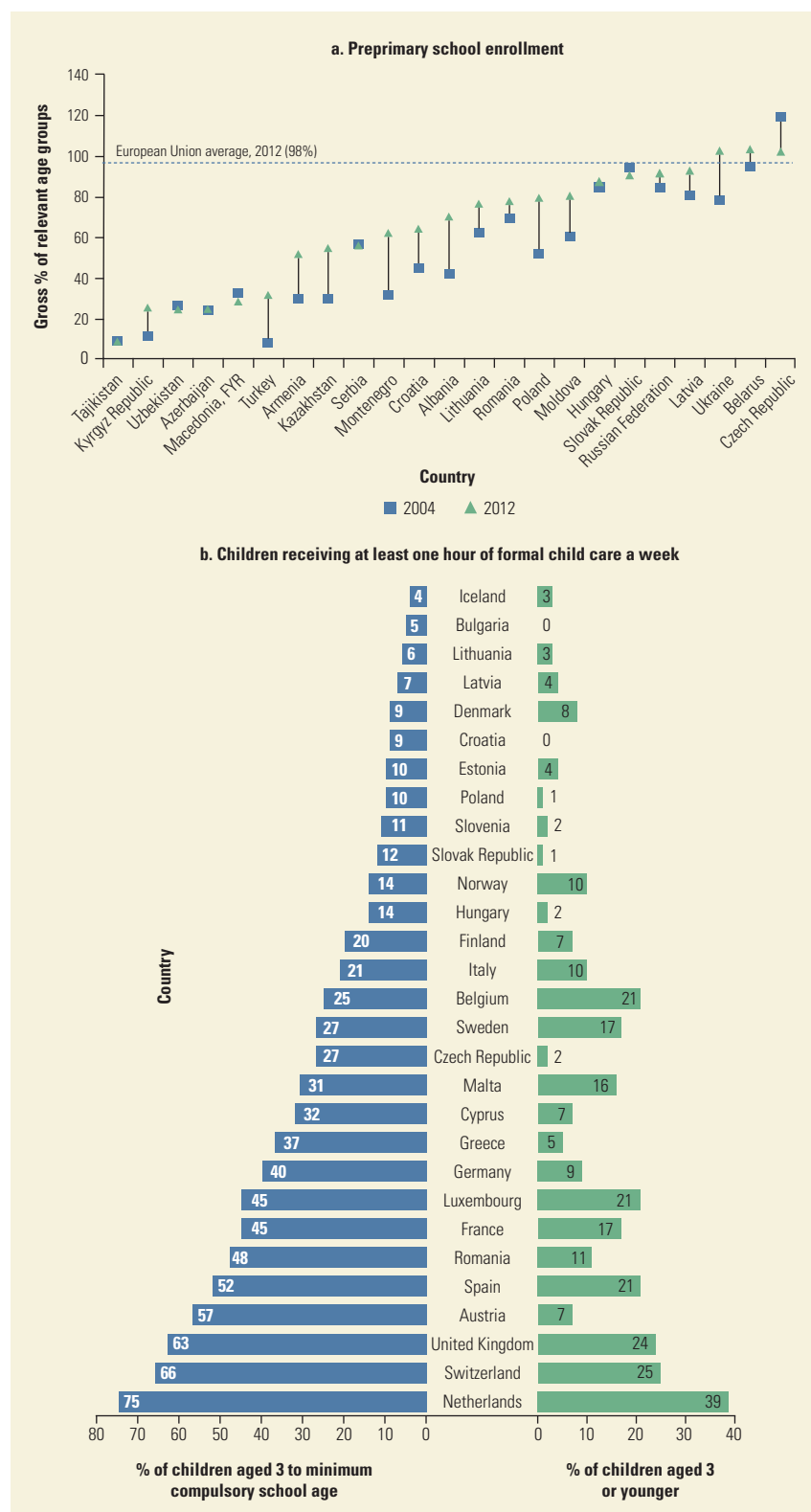
FIGURE 2.6

Child care coverage is lower in countries in Europe and Central Asia than in other regions

a. Preprimary school enrollment

Gross % of relevant age groups

European Union average, 2012 (98%)

Tajikistan, Kyrgyz Republic, Uzbekistan, Azerbaijan, Macedonia, FYR, Turkey, Armenia, Kazakhstan, Serbia, Montenegro, Croatia, Albania, Lithuania, Romania, Poland, Moldova, Hungary, Slovak Republic, Russian Federation, Latvia, Ukraine, Belarus, Czech Republic

Country

■ 2004   ▲ 2012

b. Children receiving at least one hour of formal child care a week

Country

% of children aged 3 to minimum compulsory school age	Country	% of children aged 3 or younger
4	Iceland	3
5	Bulgaria	0
6	Lithuania	3
7	Latvia	4
9	Denmark	8
9	Croatia	0
10	Estonia	4
10	Poland	1
11	Slovenia	2
12	Slovak Republic	1
14	Norway	10
14	Hungary	2
20	Finland	7
21	Italy	10
25	Belgium	21
27	Sweden	17
27	Czech Republic	2
31	Malta	16
32	Cyprus	7
37	Greece	5
40	Germany	9
45	Luxembourg	21
45	France	17
48	Romania	11
52	Spain	21
57	Austria	7
63	United Kingdom	24
66	Switzerland	25
75	Netherlands	39

Sources: Levin et al. 2015; for 2.6a, World Bank calculations based on WDI; for 2.6b, World Bank calculations based on EU-SILC.

to remain geographically close to their parents before the latter retire may, in effect, be choosing to care for their parents and forgoing potentially better labor opportunities in other areas.[5] Patterns in relocation among older people also imply that emerging care needs are a factor encouraging them to move closer to other family members or cohabitate with adult children who could supply informal care, particularly in the absence of the public provision of home care or long-term care (Litwak and Longino 1987; Pezzin, Kemper, and Reschovsky 1996; Smits, Van Gaalen, and Mulder 2010; Speare, Avery, and Lawton 1991).

The extent to which eldercare and child care are provided formally is shaped by normative, household, market, and institutional factors. Even in contexts with substantial availability and use of formal care, the welfare state does not crowd out family solidarity; instead, families complement formally provided care by specializing in supplementary tasks.

Social norms in the region impose a high expectation that intergenerational support will be available if it is needed, particularly focusing on women as caregivers for both children and the elderly. For example, based on survey responses, many people believe that the welfare of preschool-age children suffers if mothers are working (figure 2.7a). And younger generations exposed to more flexible norms and higher levels of female labor force participation do not always express less stringent views on these issues across all countries. Notably, the data identify a more conservative cluster of nine countries—Armenia, Bulgaria, Georgia, Kosovo, the Kyrgyz Republic, Lithuania, Poland, Russia, and Ukraine—in which more than half the respondents both above and below 50 years of age associate the employment of mothers with negative outcomes for children. At the other end of the spectrum is a more liberal cluster—Estonia, Norway, and Serbia—in which 20 percent or fewer of respondents make this association. More generally, respondents in the Eastern Partnership and Russia appear to have the most conservative opinions about women's involvement in child care duties, and respondents in the EU-15 and the European Free Trade Association have the most liberal ones, while the Western Balkans fall somewhere between.

The prevalence of informal care reflects social norms; limited availability of affordable, high-quality, formal care; and women's opportunity costs of time.

There is evidence that social norms related to eldercare are less specific to gender. In all countries sampled during the fieldwork and through the Generations and Gender Programme, agreement with the statement, "When parents are in need, daughters should take more caring responsibility than sons" was below 50 percent except among older respondents in Kosovo and the Kyrgyz Republic (figure 2.7b). However, respondents in other countries in Europe and Central Asia were more likely than respondents in most EU-15 and European Free Trade Association countries (except Italy) to agree with the statement, implying that a higher burden of care is placed on daughters in those countries.

The more limited availability of accessible, affordable, high-quality options in formal child care and eldercare also explains the greater prevalence of informal care in the region. Capacity to meet demand is a major constraint. Holding norms and social policies constant, how much informal care is provided and who provides it depend on total household income and the opportunity costs of time across household members. The care of other household members is the main form of

FIGURE 2.7 Social norms place a high expectation on women as caregivers
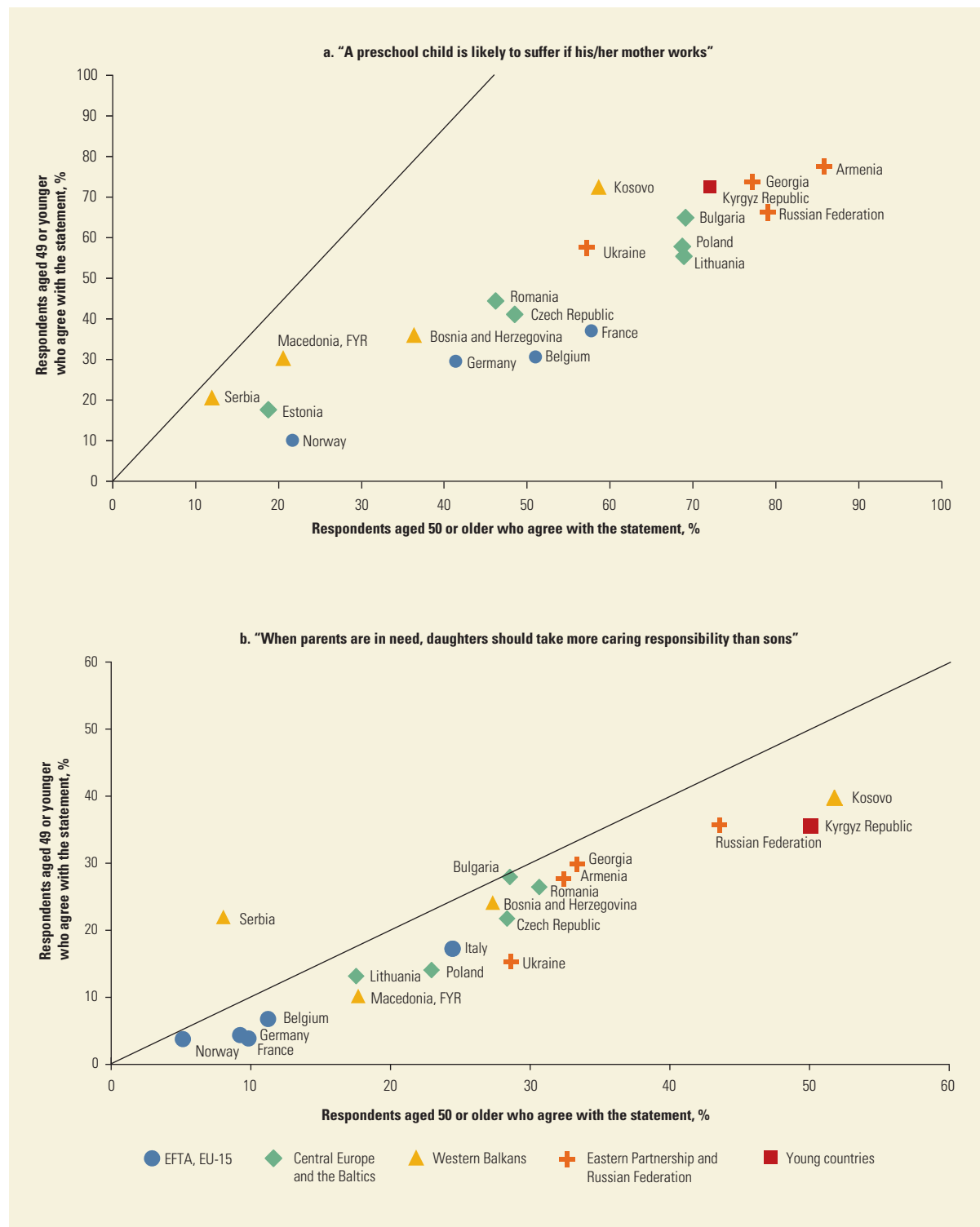
a. "A preschool child is likely to suffer if his/her mother works"

b. "When parents are in need, daughters should take more caring responsibility than sons"

Legend: EFTA, EU-15 · Central Europe and the Baltics · Western Balkans · Eastern Partnership and Russian Federation · Young countries

Sources: Levin et al. 2015; calculations based on own data collection in selected countries and on data in GGS.

care supplied by people living with other family members. Empirical analysis carried out for this report finds that women are more likely to choose formal child care if they are faced with other demands on their time (such as paid employment) and if they have less access to informal child care providers (for example, the presence of other care providers in the household and the presence of a partner) (Levin et al. 2015).

Patterns in the responsibility for care, including for children and elders, change over the course of a woman's life cycle. Women are consistently more likely than men to engage in care, implying that, despite their lower involvement in paid work, women are more likely than men to engage in some form of work at every point of the day (Levin et al. 2015) (figure 2.8).

In a background paper for this report, Buber-Ennser (2014) investigated the factors that influence the provision of care by grandparents in 23 European countries using data from the Survey of Health, Ageing and Retirement in Europe (SHARE) and the Generations and Gender Survey (GGS) for 2004–12.[6] Across all the European countries studied, grandfathers and grandmothers are found to provide high levels of child care. But the prevalence and the intensity of grandparental child care vary substantially. The lowest shares are found in Lithuania, Portugal, Romania, and Spain. Prevalence of grandmothers' care is high in Belgium, Denmark, France, Ireland, and the Netherlands and highest in Russia and Sweden.

> A combination of increased longevity and delayed onset of fertility has given rise to the "sandwich generation": people who are expected to provide care simultaneously to multiple generations, normally their parents and their children or grandchildren.

Sociodemographic characteristics related to the availability and needs of the providers and the recipients of informal child care are relevant. The provision of any grandparental child care is significantly lower in the age group 70–79, both among grandmothers and grandfathers. It is younger grandparents in their 50s and 60s that are more likely to provide care. The propensity of providing any grandparental child care is significantly correlated with being in good health. Employment has no statistically significant effect on the provision of grandparental help among women but is relevant for the provision of care by men in the age group 60–69 years. A competing care demand, such as the presence of a coresident partner, the distance to a grandchild, and the age of the child, also affects the provision of grandparental care. Living together with a grandchild is the most important predictor for whether a grandparent provides child care. Coresidence with an elderly person is more frequent in Southern Europe and in Central Europe and the Baltics, where it is more frequent for the elderly to live with adult children than in Western European benchmarks.

Support for elderly parents is the most frequent informal care flow from younger to older generations. Levin et al. (2015) investigate the exchange of social and economic support between different generations, focusing particularly on care. A summary of their results follows. Of the households surveyed in the supply-and-demand assessment conducted in seven countries, a majority of the respondents (of which two-thirds were women) were eldercare providers, and elder mothers were the majority of eldercare receivers, results consistent with survey data for other countries in the region. Women who provide eldercare are more likely to be older themselves: care for parents increases with the age of the child who is the care provider. This is the reverse of the case in which care is provided to other fam-

FIGURE 2.8 Women are more likely than men to give care

a. General activity, Estonia, 2010

Legend:
- Paid work, men
- Care, men
- Household production, men
- Paid work, women
- Care, women
- Household production, women

b. Work, Estonia, 2010

Legend:
- Total work, men
- Unpaid work, men
- Total work, women
- Unpaid work, women

c. General activity, Moldova, 2011/12

Legend:
- Paid work, men
- Care, men
- Household production, men
- Paid work, women
- Care, women
- Household production, women

d. Work, Moldova, 2011/12

Legend:
- Total work, men
- Unpaid work, men
- Total work, women
- Unpaid work, women

e. General activity, Serbia, 2010/11

Legend:
- Paid work, men
- Care, men
- Household production, men
- Paid work, women
- Care, women
- Household production, women

f. Work, Serbia, 2010/11

Legend:
- Total work, men
- Unpaid work, men
- Total work, women
- Unpaid work, women

Sources: Levin et al. 2015, based on Statistical Database Update; Time Use (database) 2012.

FIGURE 2.9 European grandmothers are the "sandwich generation"
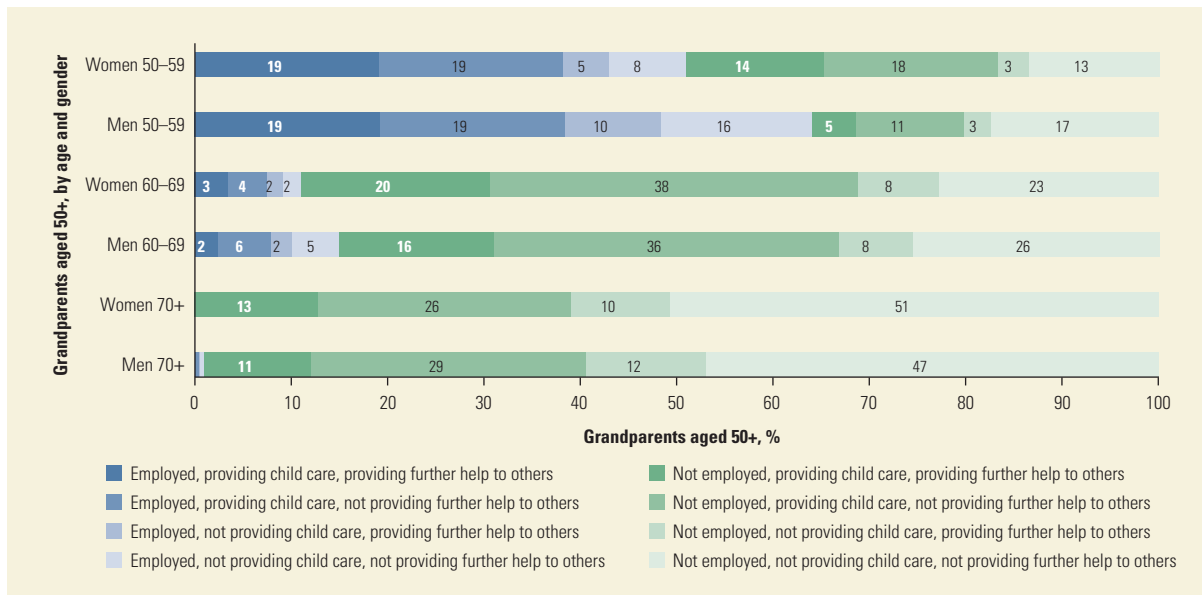
Source: Buber-Ennser 2014, based on SHARE Project. Data are taken from SHARE Wave 4 for Austria, Belgium, the Czech Republic, Demark, Estonia, France, Germany, Hungary, Italy, the Netherlands, Poland, Portugal, Slovenia, Spain, Sweden, and Switzerland, and from Wave 2 for Greece and Ireland.
Note: N = 19,090, grandparents aged 50+, each with at least one grandchild under the age of 16 years.

ily members, such as children, when care for the family member tends to decline with the age of the care provider. Respondents who were not in the labor force were more likely to be eldercare providers, and respondents who also provided child care were less likely to provide eldercare. Besides the gender of the recipient, age, health, and marital status correlate with the greater likelihood of receiving social support for eldercare and the greater intensity of that support. Parents in bad health are more likely to receive support across all countries.

Population aging—specifically, the combination of increased longevity and the delayed onset of fertility—has given rise to the "sandwich generation": people who are expected to provide care simultaneously to multiple generations, normally their parents and their children or grandchildren (figure 2.9). Married women who are out of the labor force, and better-educated women earning greater incomes, are at the highest risk of becoming trapped in a care sandwich (Albertini 2014).

The recent decline in fertility, and thus in the share of children in the population, does not imply a declining demand for child care in the region. Despite lower birth rates, the demand for child care services will remain significant as families choose to have more children and countries encourage greater female labor force participation and productivity. There is mounting evidence that providing women with a favorable environment for combining work and motherhood is a prerequisite to increasing fertility in aging European societies (Greulich, Dasre, and Inan 2014). Moreover, there is unfilled demand for these services in many countries (for example, Russia), caused (at least in part) by the relative neglect of child care institutions

during the fertility decline associated with the transition to the market economy in the 1990s. The availability of good quality, affordable child care options is thus an essential ingredient in efforts to enable women to have more children and to start having children earlier.

Cardiovascular Disease and Cancer, the Principal Causes of Premature Death in the Region

The factors that contribute to a shorter or a longer life are varied and complex. Genetics, early childhood experiences, nutrition, education level, the environment, personal behaviors, and access to medical care all play a role. However, in analyzing the causes of illness and death in the region and in comparisons with the EU-15, one important factor dominates: heart disease (figure 2.10).

Between the 1950s and the 1970s, the health outcome gap between Europe and Central Asia and the EU-15 was narrowing. After 1970, health improvements started to stagnate in Europe and Central Asia, and the transition to the market economy, in particular, triggered a dramatic deterioration in health outcomes. Meanwhile, in the OECD (Organisation for Economic Co-operation and Development), growing knowledge about the treatment and prevention of heart disease led to the widespread implementation of measures to reduce its prevalence and severity, a development known as the cardiovascular revolution. In contrast, the risk factors associated with cardiovascular disease—especially smoking, alcohol consumption, and poor diets—were having an increasingly negative effect on health in many countries of Europe and Central Asia, where relevant new health technologies were being applied more slowly than in the EU-15 (Vallin and Meslé 2001).
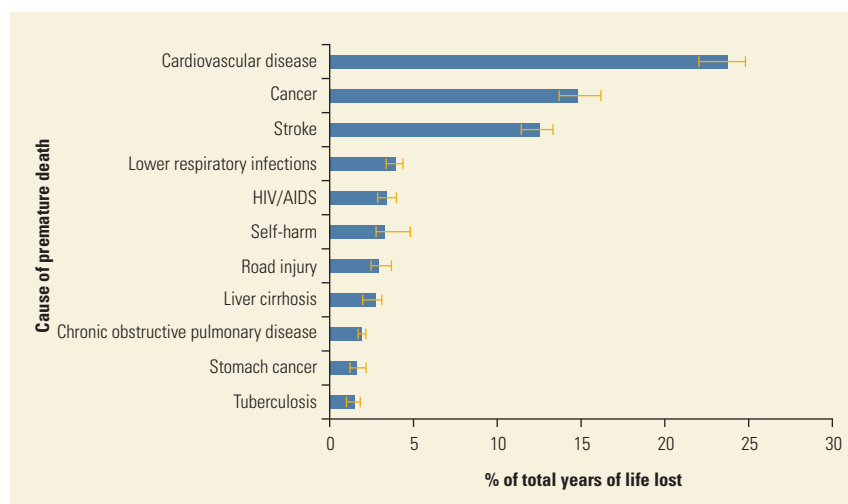
FIGURE 2.10

Europe and Central Asia loses more years of life to cardiovascular disease than to any other cause

⊢——⊣ 95% confidence interval for each cause of death

Source: Global Burden of Disease Study 2010.
Note: For each death from a specific cause, the number of years lost have been estimated based on the highest life expectancy in the individual's age group.

Today, with the exception of Turkey and the Western Balkans, cardiovascular disease in men accounts for more than half the life expectancy gap (above age 50) between the region and the EU-15 and 75 percent of the corresponding gap for women (Cutler, Deaton, and Lleras-Muney 2006; Smith and Nguyen 2013) (figure 2.11). This epidemic of heart disease has had a massive impact on the health of populations in the region. While many factors are contributing to the current health problems of these populations—from the less favorable conditions in the region in the 1920s and 1930s, to the greater prevalence of external causes such as injuries from traffic accidents—the largest factor in the disparity between the region and the EU-15 is the prevention and management of cardiovascular disease, which should therefore be a key target of policy (Brainerd 2010; Kesternich et al. 2012; Smith and Nguyen 2013).

Cardiovascular disease, and its associated risk factors— smoking, alcohol consumption, and poor diets—is having an increasingly negative effect on health in many countries in the region and accounts for a significant share of the life expectancy gap between the region and the Western European benchmarks.

The importance of cardiovascular disease to morbidity and mortality in the region can be seen in the impact of the major causes of death on the accumulated gains or losses in life expectancy at birth over a 40-year period in two countries: France and Ukraine. In Ukraine, the cumulative effects of worsening mortality from cardiovascular diseases alone led to nearly four years of lost life expectancy among men and two years among women between 1966 and 2006 (Meslé, Vallin, and Phrozhkov 2012). In contrast, France has reaped the benefits of the cardiovascular revolution: the gains in life expectancy from 1996 to 2006 through the reduced mortality associated with cardiovascular disease amounted to almost four years among men and five years among women.

Cancer also is an important reason for premature death in the region. Globally, new cases of cancer are projected to rise from 14 million to 22 million annually in the next two decades, threatening to overwhelm health systems and slow human development.[7] Europe and Central Asia will be disproportionately affected because of the combination of aging populations, cancer-promoting behaviors, less favorable survival rates from cancer relative to the EU-15, and poorly equipped cancer detection and prevention programs.[8] Many of the countries in the region, particularly in Central Asia, will face a very substantial rise in the incidence of cancer among the 65+ age group if efforts to enhance prevention do not improve (figure 2.12).

The focus should be on improving prevention. Populations in the EU-15 are up to five times more likely to have received screening for some of the most treatable forms of cancer (breast, cervical, and colon) than populations in Europe and Central Asia (Smith and Nguyen 2013). Treatment alone cannot address the human and economic costs of cancer. Innovative cancer drugs are one of the main drivers of rising health costs, but greater expenditure has not been matched by better outcomes in the region (Chalkidou et al. 2014). The cost of the current model of cancer treatment is rapidly becoming unaffordable even in high-income countries. Action to prevent cancer is essential to maintaining the sustainability of health spending in the region against the backdrop of rapidly aging populations. Effective, low-cost preventive measures include tobacco and alcohol regulation, vaccination programs, improved diets, and exercise.

FIGURE 2.11

Cardiovascular disease is the leading cause of the life expectancy gap between Europe and Central Asia and the EU-15

■ Cardiovascular disease
■ External causes
■ Infections
■ Cancer
■ Other

Source: Smith and Nguyen 2013.
Note: The figure presents an age-, gender-, and cause-specific breakdown of the life expectancy gap between Europe and Central Asia and the EU-15.

FIGURE 2.12

In many countries, cancer will rise dramatically in the population aged 65 and older by 2035
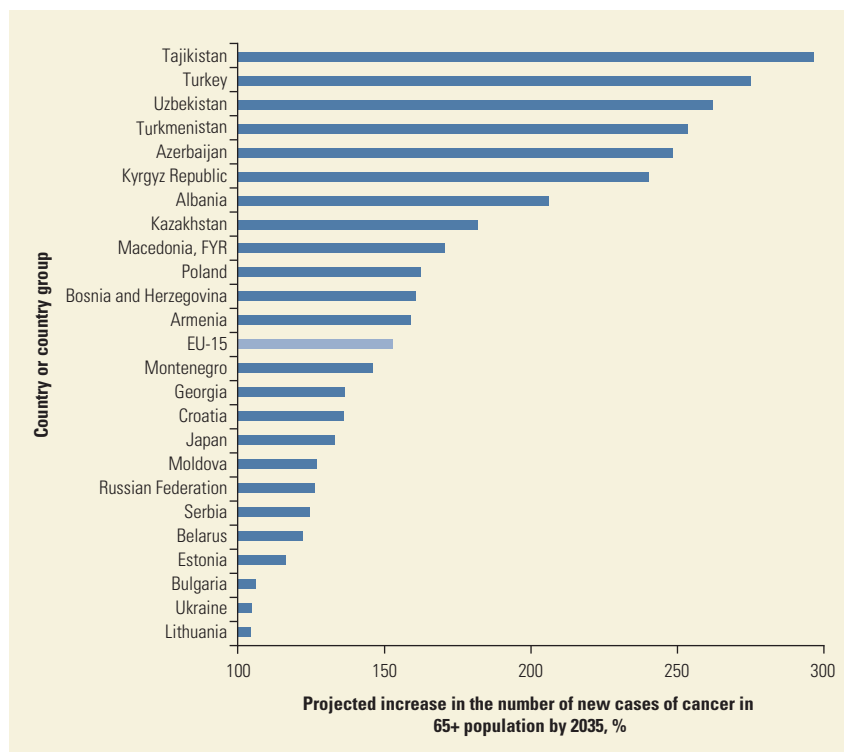
Sources: Globocan 2012; World Population Prospects: The 2012 Revision.
Note: Projections are based on 2012 incidence data and population projections. The number of new cases of cancer is projected to decline by 4 percent in Latvia, which is not shown, in 2012–35.

Achieving More Healthy Aging in the Region

Living longer and healthier lives is possible for people in Europe and Central Asia, if they can achieve the same gains as the populations in neighboring countries in recent decades. Much of the excess morbidity and mortality in the region has been driven by cardiovascular and other noncommunicable diseases, a problem that can be mitigated.

Making sure that any additional years of life are healthy is important for its own sake, but also for economic growth. An aging population in good health may be more likely to remain in the labor force and incur less health care expenditures. Three competing scenarios have been proposed for the trajectory of health outcomes as populations age. The first is a compression in morbidity, whereby populations experience longer and healthier lives (Fries 1980, 2003; Fries, Green, and Levine 1989). In this scenario, people spend a larger share of their lives free of disease and disability through better medical care and primary prevention strategies. Serious disease and disability and the associated financial burden are largely postponed until the end of life. The second scenario involves an expansion in morbidity (Gruenberg 1977; Kramer 1980; Olshansky et al. 1991). The same advances in medical care, particularly in secondary prevention strategies, mean that the sick and frail are less likely to die of their diseases, but they may survive longer

with chronic disease and disability. The last scenario, dynamic equilibrium, combines elements of the compression and the expansion of morbidity (Manton 1982). People are less likely to contract disease and are also less likely to die of disease. Better preventive and medical care slows the incidence and progression of chronic diseases so that the sick live longer with mild to moderate disease rather than moderate to severe disease. Essentially, life expectancy gains are balanced by health status improvements, and the years spent in good health increase. Which of these scenarios will best describe the future of the region will have enormous implications for the ability of the active population to support the inactive (see the discussion of disability-adjusted dependency ratios in chapter 1).

The evidence on the occurrence of these scenarios in richer countries is unclear, partly due to the difficulty in comparing indicators of morbidity and disability across countries. The growing consensus on OECD countries is that, while the incidence of severe disability has decreased substantially, less severe disabilities have become more common; however, overall, people are in better health (Christensen et al. 2009). Part of this success may be explained by more timely diagnoses and treatment so that chronic diseases are less disabling over the remaining span of an individual's life. Along with improvements in living conditions and less poverty among the elderly, social and cultural norms may also have shifted so that disability is no longer so closely associated with disease (Christensen et al. 2009; see also Matthews et al. 2013 about the reduced prevalence in dementia across 20 years of historical change).

While reductions in mortality depend on a multitude of social, environmental, and economic factors, substantial gains can be accumulated through relatively inexpensive policy interventions. For example, the annual cost of implementing a bundle of measures to reduce cardiovascular mortality has been estimated at under US$1 per capita in low-income countries, US$1.50 in lower-middle-income countries, and US$3 in upper-middle-income countries, a cost that is dwarfed by the potentially greater productivity of a larger, healthier labor force (WHO 2011). The experience in the EU-15 demonstrates that the cardiovascular revolution is possible; moreover, it is vital to the future productivity and growth of Europe and Central Asia.

Addressing Inequality of Health Outcomes

The largest share of the burden of cardiovascular disease is being borne by groups at the lower end of the socioeconomic welfare spectrum. The EU report on health inequalities concludes that current regional inequalities in mortality based on income levels are largely explained by inequalities in noncommunicable diseases and that the most pronounced inequalities are in cardiovascular disease (European Commission 2013). Leinsalu et al. (2009) find that inequalities in mortality rates across educational groups rose from 1990 to 2000 in Estonia, Hungary, Lithuania, and Poland and that in Estonia and Lithuania this rise was caused by a large increase in mortality among groups with lower educational attainment. Under further investigation, cardiovascular disease and external causes (such as suicide) emerged as the biggest contributors to this widening gap in total mortality.

FIGURE 2.13

Excess mortality among the less educated in the Russian Federation is due mainly to cardiovascular disease, 2011

- ■ Infections
- ■ Ill-defined causes
- ■ Respiratory disease
- ■ External causes
- ■ Digestive diseases
- ■ Cancer
- ■ Cardiovascular disease
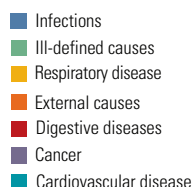
Source: Ivanova et al. 2014.

Ivanova et al. (2014) find that both total mortality rates and deaths due to cardiovascular disease among 55- to 69-year-olds in Russia were much higher for groups with lower educational attainment (figure 2.13).

This finding fits with evidence from more well-off countries that preventive programs tend to be taken up by people in higher socioeconomic groups, leaving the burden on lower socioeconomic groups relatively untouched (Capewell and Graham 2010; Wallach-Kildemoes et al. 2013).

Improved prevention could significantly increase the number of years lived in good health, increase the pool of potential workers, and raise the productivity of these workers. The economic benefits involved could be substantial. In OECD countries, health improvement, together with enhanced productivity, could generate a relative reduction of 5 percent in the costs of long-term care (OECD 2011).

Premature death in the region is strongly related to the incidence of cancer and cardiovascular disease. And high rates of disease and disability not only impair the welfare of the person afflicted but also increase the burden of care on other family members, particularly women. Relatively inexpensive interventions that focus on disease prevention, coupled with behavioral changes by individuals, could greatly improve health status in the region.

Notes

1. Years of ill health are estimated by summing estimates of years of healthy life lost due to disability (YLD) across a comprehensive set of disease and injury causes. The estimates

of YLD draw on analyses carried out for the Global Burden of Disease 2010 study (see Murray et al. 2012). The disability weights and prevalence estimates are documented in WHO (2013). To estimate YLDs for a particular cause in a particular time period, the number of incident cases in that period is multiplied by the average duration of the disease and a weight factor that reflects the severity of the disease on a scale from 0 (perfect health) to 1 (dead):

$$YLD(c,s,a,t) = I(c,s,a,t) \times DW(c,s,a) \times L(c,s,a,t)$$

where $I(c,s,a,t)$ = number of incident cases for cause c, age a, and sex s; $DW(c,s,a)$ = disability weight for cause c, age a, and sex s; and $L(c,s,a,t)$ = average duration of the case until remission or death (years).

2. Internationally comparable measures of health status are less widely available than mortality statistics. Data on life expectancy and health-adjusted life expectancy were obtained from the Global Burden of Disease Study 2010. Disability levels can also be measured through large-scale surveys, such as the European Union Statistics on Income and Living Conditions (EU-SILC) and the European Health Interview Survey (EHIS), that rely on consistent data instruments and adjust for cultural differences in attitudes toward health and disability, thus aiding cross-country comparisons. However, the Global Burden of Disease Study data are used in this chapter to enable comparison across all countries in the region.

3. Studies of health trends are difficult to use in comparisons because indicators of disease and disability are often defined differently across countries, and survey design may be modified between rounds, making it complex to interpret trends across countries and over time.

4. See Global Burden of Disease Study 2010.

5. Rainer and Siedler (2009) find similar results among siblings in the United States. Stern (1995) posits that family members make the decision about the provision of long-term care well in advance of the need.

6. The following 23 countries are the focus of the study on grandparent care: Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Estonia, France, Georgia, Germany, Greece, Hungary, Ireland, Italy, Lithuania, the Netherlands, Poland, Portugal, Romania, Russia, Slovenia, Spain, Sweden, and Switzerland.

7. See Globocan.

8. This is particularly so with respect to types of cancers with better prognoses (De Angelis et al. 2013).

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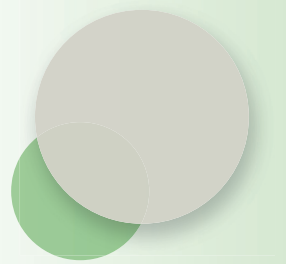
Overview

Population aging affects the economy in many ways, and although its consequences can be profound and widespread, they are not all detrimental. Societies and their economic systems, individuals, and firms face challenges, but they can also adapt. Especially during the long transition to demographic equilibrium, policy is needed to tackle the challenges, to support adaptation, and to help economies seize opportunities. Indeed, movement toward a stable population age structure can bring opportunities in addition to challenges and, if realized, many economic benefits.

Aging and the Economy: Challenges and Opportunities

Concerns about the economic impact of population aging arise from several observations. These may be divided into three sets: (1) the macroeconomic impact; (2) the impact on labor markets; and (3) the impact on poverty and inequality. First, the macroeconomic impact reflects the fact that active adults contribute most of the output produced in a country. In per capita terms, this output will become smaller if it is shared with a progressively larger group of dependent older people. At a certain point, there may not be sufficient resources to maintain the living standards of this older group, especially if increasing fiscal expenditures on health care, long-term care, and pensions must be financed through the contributions and taxes paid by increasingly smaller younger age groups. Working adults also contribute the most to the pool of savings. As the size of this group shrinks, savings will

decline, and, because a sizable group of older people will be selling assets (dissaving) to finance their consumption, the price of assets may fall, reducing the value of wealth for everyone. These are the central arguments of the rising challenge of the old-age dependency ratio often advanced in macroeconomic discussions of population aging.

Second, population aging could affect labor markets because the average age of workers rises, and older workers may be less productive than younger ones. They have been trained through a different educational system; the quality of their human capital might be lower; and, even if they have acquired experience, it is often not useful in new, expanding sectors. Indeed, older workers tend to be less mobile; they are also less entrepreneurial and generally less flexible. Moreover, the hiring policies of firms may be biased against older, possibly less productive but more expensive workers. As a result, as societies age, not only output per capita but also output per worker may decline.

And third, older societies may become more unequal. Because the difference between the wages of skilled and unskilled workers increases with age, an ever bigger cohort of older people may become polarized into one group that is skilled and active and is earning large incomes and another group that is unskilled, drops out of the labor market at earlier ages, and receives low salaries. Similarly, retirees whose pensions are generated in a defined-contribution system or derived from private savings accounts will be split into a rich group and a poor group. These intragenerational inequalities will be transmitted to the next generation through inheritance, as the more fortunate skilled workers accumulate substantially greater wealth than the less fortunate unskilled workers. As a result, in an aging society the middle class can become hollowed out.

These are all valid concerns in many aged and rapidly aging societies. A strand in the literature on aging takes them seriously and describes them with an alarmist tone (Bloom and Sousa-Poza 2013). Recent popular and academic books have titles such as *Agequake* (Wallace 1999), *Gray Dawn* (Peterson 1999a, 1999b), and *Workforce Crisis* (Dychtwald, Erickson, and Morison 2013) (for a contrarian view, see Pearce 2010). The approach in most of this literature is simple and, because of its simplicity, clear and convincing. It consists of presenting scenarios wherein age-specific levels or ratios of human capital, labor participation, and savings are kept constant (at current levels or following past trends), while the population is growing old. In such scenarios, as old-age dependency ratios rise, output per capita rapidly drops; intergenerational transfer systems become either unsustainable or inadequate; and, more generally, declining welfare becomes inevitable.

Even with their appealing simplicity and apparent inescapability, the projections of impending doom due to population aging are probably overstated, as was the case of the predictions of Malthus (1798) and all of his successors (for example, the Club of Rome and the World Bank in the 1970s; see Meadows et al. 1972; King 1974). Another strand of the literature (for example, see Bloom, Canning, and Fink 2010; Bloom, Canning, and Sevilla 2001) argues that these pessimistic views are not warranted when two important points are fully and properly considered: (1) the interactions between labor and other factors of production; and (2) behavioral responses to changes in a population's demographics.

While this second strand of the literature agrees that changes in the population age structure can significantly affect the economic performance of a country, it also argues that it is worker access to other factors, such as human and physical capital and technology, that determines the productivity of a population and its welfare. The reports of the 1970s, a period during which world population was projected to double every 35 years, rightly pointed to the enormous investments that were needed to keep up with swelling populations. In such a situation, (old-age) dependency rates are low, but providing enough capital to the large and growing number of workers entering the labor market can be a challenge. By contrast, lower investment rates are needed when the labor force is growing slowly or even shrinking. Similarly, in a slow-growing population it becomes easier to increase per student expenditures on education or, in other words, to increase investment in human capital. In the end, what matters for welfare is output per capita, but this depends on both the dependency ratio and the output per worker. If workers, though fewer in number, can be endowed with more human capital and can access more physical capital, their increased productivity may counterbalance higher dependency ratios.[1]

This opportunity to boost human and physical capital, and ultimately productivity, for the smaller young age groups is being transformed into reality in some countries but not in all of them. Successful countries are those able to navigate the complex political economy of older societies where the strong political power of older people will favor keeping high and often unaffordable old-age benefits rather than investing in education (more on this in part III, chapter 6).

With regard to inequality, while polarization in older societies can be a challenge, a shift in the capital-to-labor ratio can also bring an increase in real wages and thus a redistribution of income from holders of capital (normally middle-aged or older generations) to workers (normally young generations). Here again, this potentially equalizing shift needs to be balanced by preserving the right incentives for investors, and a host of policies dealing with financial markets have to be considered. The point here is that aging brings some opportunities and not just challenges.

A shift in the age structure generates behavioral changes that are deeper and more complex than those acknowledged by the literature based on static projections. This literature recognizes that behavior, particularly labor market participation and saving decisions, varies along the life cycle. On average, the young invest in their education and do not actively participate in the job market. Later, they work and accumulate savings to fund their retirement. In the final phase of their lives, they do not work, and they use their savings for consumption. According to this approach, in an aging society most people are in the final phase of the life cycle, are inactive, and are spending down their savings; therefore, the argument goes, the economy will suffer because there are proportionally fewer people at work and fewer people saving to finance investment.

Research has shown that, while the life-cycle approach is useful, individual behavior is more complex. In particular, individuals will alter their behavior because they foresee the potential for welfare to decline with age. Individuals will foresee the greater need for retirement income, while also recognizing that

healthier, longer lives will allow them to work longer. The possibility of lower pension income because of worsening government budget balances may encourage people to work until an older age. Greater longevity and the desire to leave an inheritance may encourage more saving. Moreover, even if the life-cycle framework remains a powerful explanation of saving behavior at different ages and of aggregate savings in countries with varying age structures, recent papers emphasize that age is only one of many determinants of saving decisions (Ang 2009; Attanasio and Weber 2010; Chamon and Prasad 2010; Deaton and Paxson 2000; Loayza, Schmidt-Hebbel, and Servén 2000).

In sum, considering behavioral responses is important for two reasons: building more realistic scenarios for the future evolution of labor force participation and saving rates and, ultimately, for macroeconomic growth; and for fine-tuning policies. However, it should also be noted that behavioral adjustment takes time and the intensity of the behavioral response is uncertain, for empirical evidence shows that people tend to be more myopic than often assumed in economic models. This is another reason for policy action, both in the long term and during the transition period.

The Economic Impact of Aging in Europe and Central Asia

This second part of this report deals directly with these issues for the region of Europe and Central Asia. It is organized around the three sets of observations listed above. Its main messages can be summarized as follows:

- *Aging does not necessarily reduce income per capita.* From a macroeconomic perspective, the report shows that, even if the old-age dependency ratio were to increase in the future, gross domestic product (GDP) per capita could still rise. This is because aging leads to increases in the amount of capital available to each worker, which, in turn, augments labor productivity (this assumes that other aging-related influences on productivity are unchanged). Support for this claim comes from the data for the region. In the region's most rapidly aging countries, production has been specializing in capital-intensive activities.

- *Dependency ratios do not necessarily deteriorate with aging.* Projections based on behavioral changes already observed in some aging societies—in particular, increasing labor force participation among older workers and women—reveal that dependency ratios will not deteriorate dramatically. This is especially true if one redefines *dependency ratios* in a way that abandons the notion that the "working age" ends at age 65 and instead uses the ratio of inactive to active people in the entire adult population. What is more, there is considerable potential in encouraging greater labor force participation across the entire life cycle. In this regard, the report highlights the crucial role of public pensions in determining the retirement decisions of older workers. The greater generosity of pensions in past decades has led to a significant drop in effective retirement ages; together with longer life expectancy, this has resulted in a much longer

time in retirement. However, this trend is now reversing, and recent pension reforms have contributed to a considerable rise in effective retirement ages.

- *The average age of the workforce in the region will increase, but the average productivity of the workforce will not necessarily fall.* A detailed analysis of the labor market shows that aging in the region is being accompanied by the greater participation of older workers, especially since the mid-1990s, and that this increase is shifting the age composition of the labor force. However, the larger share of older workers is not leading to lower average productivity. On the macro level, the new, smaller age groups entering the labor market are endowed with more and better human capital, which, to some extent, compensates—or even overcompensates—for the loss of the larger, less well educated older groups exiting the labor market. Data on the region show that the stock of human capital has continued to grow since the transition and is projected to remain mostly constant. Indeed, because of aging and smaller young age groups, there is a window for policy makers to raise human capital per person without increasing overall expenditures on education.

  On the micro level, the skills of older workers are not so much declining as shifting. The human brain has an extraordinary ability to compensate for declines in certain cognitive functions with improvements in others, taking advantage of the stock of accumulated experience among older people. In addition, older people have clear advantages in certain areas of personality and noncognitive skills. Firms are responding to this shift in skills by taking advantage of the new endowments of an aging workforce, exporting more goods that intensively use skills that improve with age and importing more goods that rely on skills that decline with age. Firms must therefore not only shift to new products and industries but also proactively adapt production processes and human resource policies. Some successful examples include the provision of training—especially on-the-job training—to older workers, investing in worker health, adjusting workplaces to an older workforce, and assigning age-specific tasks to match the capabilities of older workers (Bloom and Sousa-Poza 2013; Göbel and Zwick 2012; Lovász and Rigó 2013). Other studies present evidence against the widespread belief that a larger share of older employees is associated with lower productivity and find instead that the creation of mixed-age working teams is beneficial to the productivity of all workers (Göbel and Zwick 2012; Gordo and Skirbekk 2013; Mahlberg et al. 2013).

- *Short- to middle-term fiscal tensions will challenge governments in the region; however, behavioral changes as well as continued reforms that are not directly related to aging will help address these challenges.* Demographic pressures are only one factor in the worsening of fiscal balances; the tax code and the design of benefits may have an even greater impact on changes in government accounts. Pensions are a good example: the unsustainability of pension systems derives not only from population aging but also from generous benefit levels that encourage early retirement and hence long retirement periods; as a result, pension systems—undoubtedly a remarkable achievement and highly effective in preventing old-age poverty—are under strain. Similar arguments can be

made about health care systems. Behavioral changes that result in greater labor participation and greater savings (as previously highlighted) will contribute to the overall adjustment.

- *Managing poverty and inequality trends may be a challenge*. With fewer younger people to take care of the elderly within the family, some older people may find themselves without financial and social support. Ongoing pension reforms leading toward a fully funded model are important to ensuring fiscal sustainability but may leave some low-wage earners without sufficient savings for old age. Another potential source of increasing inequality is linked to the gap between the wages of skilled and unskilled workers, which increases with age. Older workers, becoming more and more numerous in an aging society, could be polarized into two groups, one with high skills and greater earnings and one with low skills and meager wages. This trend may affect pension benefits, as these become more closely linked to contributions and earlier wages or to private saving schemes. Furthermore, families with breadwinners that are well educated and enjoy significant increases in wages as they gain experience will be able to accumulate abundant wealth and pass it on through inheritance, thereby perpetuating inequality. Aging societies may see a decline in the size of their middle class.

Aging in Europe and Central Asia provides an interesting quasi-experimental setting since the reduction in fertility occurred before and in isolation from the reduction in old-age mortality. A great deal can be learned from studying aging in the region because these two issues are quite different in their economic consequences and in the policies needed to remedy the negative effects or enhance the positive ones. Although the share of the elderly expands in both cases, a reduction in old-age mortality has a more rapid and permanent impact on the population share of the older age groups (unless mortality reverts to the initial, higher levels), while fertility affects this ratio through a delay and only temporarily (even if fertility remains constant at the new, lower level). The phasing and transient versus the permanent nature of these age-related changes are important for welfare.

Note

1. Whether low investment (and savings) is the main constraint to growth can still be debated. The point here is that, all else being equal, a country with higher population growth requires a higher investment rate, which is an additional burden relative to a country with no population growth.

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The Macroeconomic Impact of Population Aging

Introduction

The macroeconomic consequences of population aging are broad and substantial. Aging does not cause short-term fluctuations but has a lasting effect on medium- to long-term trends in an economy. This is because demographic shifts, such as the age structure of a population, tend to be slow and become apparent only after decades. Macroeconomic variables influenced by aging include income and growth, factor supplies (labor participation and capital accumulation), and government balances. This chapter discusses all of them and is organized around three groups of questions:

- *Income and growth*. Does aging imply a decline in gross domestic product (GDP)? Do higher dependency ratios mean lower income per capita? How does aging affect the aggregate structure of an economy? Are productivity and growth reduced?

The chapter uses results from the following background papers commissioned for aging work in the Europe and Central Asia Region of the World Bank: "Overlapping Generations Model to Analyze the Economic Impact of Aging" (2015) by Maurizio Bussolo, Georgi Panterov, and Maciej Bukowski; "Macroeconomic and Fiscal Implications of Demographic Aging in Europe and Central Asia" (2015) by the Macroeconomics and Fiscal Management Global Practice; "Fiscal Policy in the Aging Societies" (2014) by Zeljko Bogetic, Harun Onder, Anil Onal, Emilia Skrok, Anita Schwartz, and Hernan Winkler; and "Demographic Change and Retirement Behavior in Europe" (2015) by John Giles, Johannes Koettl, and Yang Huang.

- *Labor participation and savings.* Are smaller labor forces and shrinking saving supplies unavoidable? Or will individuals, especially older ones, adapt to longer lives by changing their decisions on saving and labor force participation?

- *Government balances.* Does aging imply a severe deterioration in fiscal balances, or are there mechanisms for adaptation?

Note that these three sets of questions—as well as the underlying macroeconomic trends—are all interrelated: changes in economic growth affect saving as well as government revenues; likewise, pension reforms, while helping reduce fiscal strain, also affect the incentives to participate in the labor market and to save. An analytical framework that takes into account all the direct and indirect links between aging and income, growth, labor participation, savings, and government balances is therefore needed to address these questions persuasively.

In this report, as in many of the numerous studies of this topic, we use a dynamic overlapping generations (OLG) model (a summary description is provided in annex 3A to guide the analysis). This general equilibrium model is highly stylized and represents a country with economic structure and demographic trends similar to those of an aging country found in the region. The description of the economic impact of aging relies on the results of the model as a starting point, and its findings, while informative, need to be qualified and adapted when focusing on specific countries.

The major advantage of using this analytical framework is that it highlights the importance of individuals' responses to a changing environment and policies. As longevity increases, workers anticipate longer lives and adapt by saving more and working until older ages. Likewise, they react to changes in the pension systems. Uncertainty remains on the magnitude of these responses, but assuming unchanged age-specific participation and saving rates when the population age structure shifts is too strong of a restriction. And, worse, such a rigid assumption may produce results that generate misleading policy recommendations. For example, consider the fiscal impact of pension reform. Generous pension benefits can significantly reduce labor force participation at older ages, although this relationship varies by gender and skill level. While cuts in pension benefits and tightening of eligibility criteria are often recommended to increase labor force participation and reduce fiscal pressures, they can also result in leaving the unskilled, and often less healthy, without any safety net. Governments seeking to support them face a new long-term fiscal problem.

The chapter is organized around the three sets of questions previously mentioned and, while the links between aging, growth, saving, labor participation, and fiscal balances are highlighted, for the sake of clarity, the discussion addresses each of the three questions separately. Both a description of the expected outcomes based on the overlapping generation analytical framework as well as empirical evidence are used to address the questions.

The Diverse Effects of Aging on Income and Growth

Welfare depends on income per capita rather than on the absolute size of an economy.[1] In other words, a shrinking population and a smaller overall GDP do not

necessarily imply a worsening of welfare. Aging in the region during the past 30 years has resulted mostly from a drop in fertility, while the mortality rate has remained fairly stable. By contrast, the next 50 years is most likely to be characterized by increases in life expectancy and a stabilization and perhaps a reversal of fertility rates. From a demographic point of view, the main differences between aging related to fertility versus aging related to longevity are that the increase in old-age dependency is temporary in the first while permanent in the latter (see box 3.1) and that the size of the population (or its growth rate) decreases in the first while it actu-

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BOX 3.1 The Impact of Aging on Dependency Rates due to a Decline in Fertility versus a Decline in Mortality

The overlapping generations (OLG) model is used to explore the economic impact of aging through two simulations—declines in fertility and increases in longevity, the two major drivers of demographic change. Note that the subject of the first simulation—declines in fertility—has affected most countries in the region over the past few decades. The second simulation considers the macroeconomic impact of a decrease in old-age mortality, which the region could achieve over the next few decades. References to these simulation results appear repeatedly in the next subsections in discussion of the impact of aging on (1) income and growth; (2) savings and labor force participation; and (3) government balances (the simulations are also used in the discussion of distribution in chapter 5).

Reductions in fertility and in old-age mortality both result in population aging. However, they change the age structure of the population at different speeds, intensities, and, most important, durations.

Use of data from the Russian Federation makes the fertility simulation realistic and measures the impact of the 35 percent decline in fertility that Russia experienced during 1980–2010. For the mortality simulation, a slightly stronger improvement is assumed than the one used in United Nations forecasts.[a] In these, life expectancy (at birth) increases by about 10 percent in the next 40 years, rising from 67.2 years in 2010 to 73.1 years in 2050.[b]

The impact of a reduction in fertility on the age structure is depicted in figure B3.1.1a. The figure shows the share of various age groups in a population in the steady state, that is, in a situation in which there are no shocks and the age structure is stable

(admittedly, a state that no country has reached but that is still useful as a benchmark), and 20, 40, 60, and 80 years from the start of the change in fertility.

In the fertility reduction simulation, a significant drop in the population share of young cohorts and a correspondingly mild increase in the share of the elderly would be observed 20 years after the start of the demographic change. Over time, the shares of young individuals and of the elderly slowly return toward the steady state. Initially, fewer newborns enter the population. However, once fertility has stabilized in the steady state and the initially fewer individuals have gone through the full life cycle, the population, albeit smaller, will again reach a stable age structure. Conversely, in the old-age mortality reduction simulation, almost no change is detected among young cohorts initially, while a rise is registered among the elderly (figure B3.1.1b). In the long run, the share of the elderly becomes permanently larger.

The difference in the medium- and long-term consequences of a decline in fertility versus a decline in old-age mortality is evident if the old-age dependency ratio is plotted (figure B3.1.2). In the fertility reduction simulation, the dependency ratio increases until the younger, smaller cohorts reach reproductive age and then decreases again as these cohorts replace older, larger cohorts. This temporary, though not brief, change in age structure is similar to that generated by the transitioning of a baby-boom cohort.[c] In the increased longevity simulation, the dependency ratio rises as the rate of old-age mortality declines, initially because the elderly live longer and then as more and more of the surviving middle-aged individuals begin enjoying longer lives. Because the change in old-age

(Continued)

mortality is permanent, the rise in the dependency ratio is also permanent.

Thus a reduction in fertility causes a temporary change in the age structure, while an increase in longevity results in a permanent change. These differences influence how the economy responds and should be taken into account in the design of policies.

FIGURE B3.1.1 **The change in the population age structure differs depending on whether the aging is due to reductions in fertility or to old-age mortality**

a. Fertility scenario

b. Old-age mortality (or longevity) scenario

— Steady state — 20 years after — 40 years after — 60 years after — 80 years after
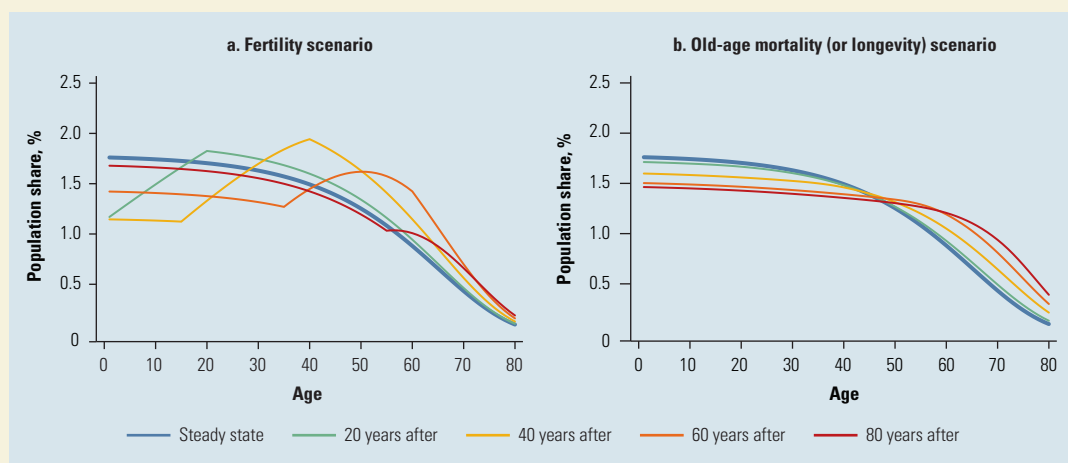
Source: Overlapping generations (OLG) model developed for this study.
Note: The two charts show the relative size of each age group from age 0 to 80—first, in the steady state and then several years after the shock—to demonstrate how population structure is affected at different points in time.

FIGURE B3.1.2

A decline in old-age mortality increases the dependency rate permanently

— Fertility simulation
— Mortality simulation
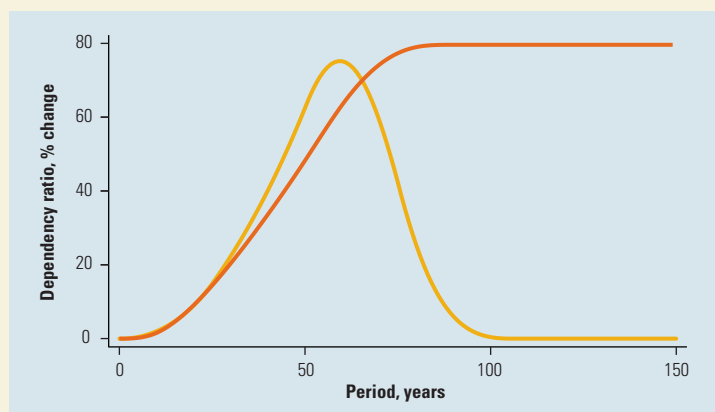
Source: Overlapping generations (OLG) model developed for this study.

a. See World Population Prospects: The 2012 Revision.
b. In this scenario, it also rises about 10 percent in the first 30 years but keeps expanding and reaches a 17 percent increase in 40 years.
c. The entry of baby boomers into economic activity reduces the dependency ratio, but, after the last (youngest) boomer passes through, there will be relatively fewer younger people and, as time goes by, the dependency ratio will increase. This imbalance will continue after the baby boomers start reaching retirement age; it will recede only when the baby boomers die off (assuming there is no other change in fertility or mortality).

ally increases in the latter. However, the two sources of aging (fertility and old-age mortality) do not have substantially different effects on per capita income.

A decline in the fertility rate reduces the supply of labor, and therefore the size of the economy, while an increase in longevity increases the supply of labor and overall output (figure 3.1).[2] While a shrinking population and a decreasing size of the economy trigger negative visions for the future of a country, the focus should be on the well-being of its citizens. GDP per capita actually rises in both simulations (figure 3.2). In the simulation with a decline in fertility (the one with a shrinking population), GDP per capita expands by almost 6 percent compared to the steady-state level in about 40 years and then slowly returns to the steady-state level in the long run (after the impact of the initial decline in fertility has been exhausted, or about 80 years—not shown in figure 3.2). Similarly, GDP per capita increases in the simulation with a rise in longevity, and, as in the other simulation, the increase will taper off in the long run when the economy again reaches its steady state.

What are the macroeconomic mechanisms explaining these results of increasing GDP per capita? To answer that, one needs to consider how aggregate saving and investment change with both a decline in fertility and an increase in longevity (see box 3.2 for a simple theoretical model of this relationship).

The decline in fertility reduces population growth, which implies a decline in GDP growth. However, given that individuals are not changing their saving decisions and aggregate savings are not, at least initially, reduced, the investment rate can remain high and capital per worker can rise. In other words, the reduction in the number of new (young) workers means that investment needs will be lower or that, if the investment rate remains constant, the capital-to-labor ratio will increase.[3] A higher capital-to-labor ratio means that output per worker increases, and this rise more than offsets the higher dependency rate (figure 3.3). The result is a higher GDP per capita (as shown in figure 3.2). In the long run, the increase in the share of the elderly population reduces the rate of saving. The decline in savings, and thus investment, reduces the capital-to-labor ratio, and GDP per capita

FIGURE 3.1   **Fertility and mortality reductions have opposite medium-term impacts on GDP**
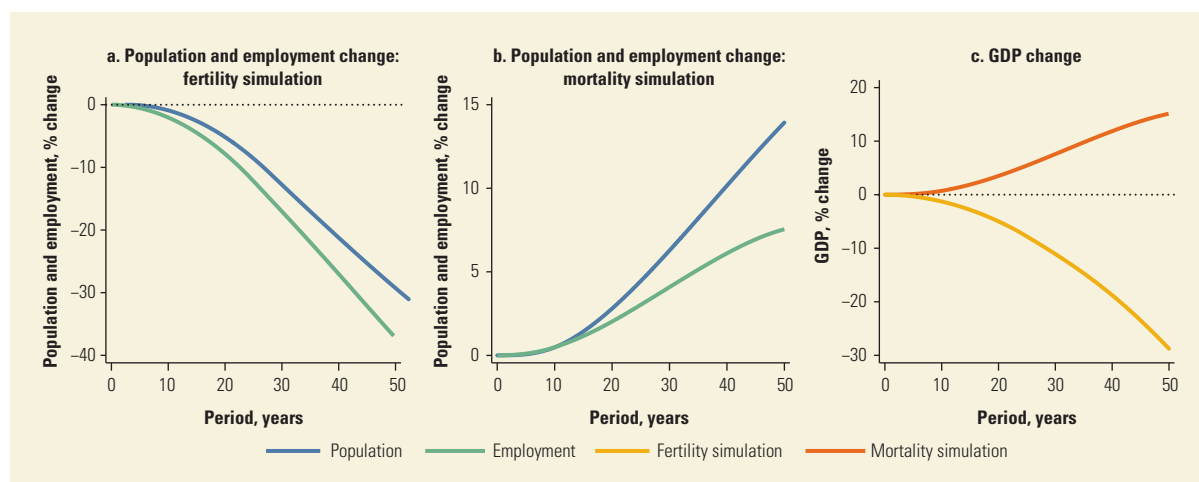
Source: Overlapping generations (OLG) model developed for this study.

FIGURE 3.2

In the medium term, aging can increase GDP per capita

— Fertility simulation

— Mortality simulation
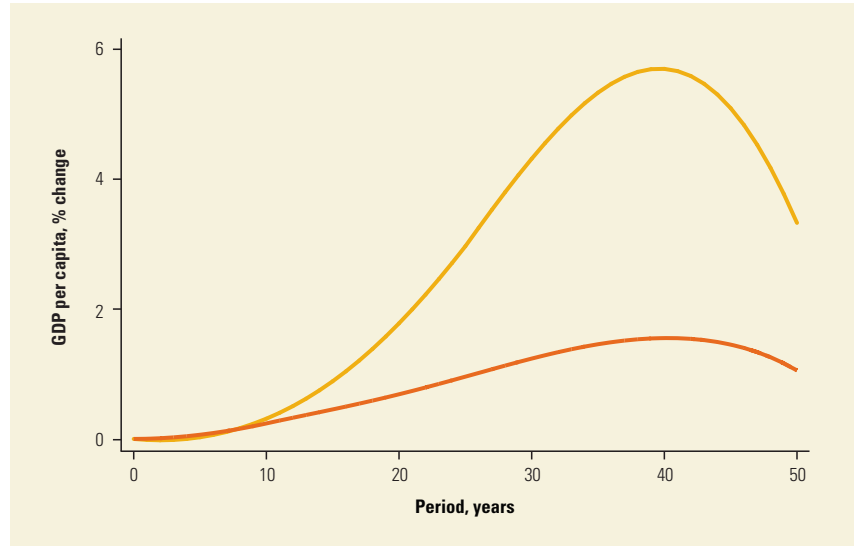
Source: Overlapping generations (OLG) model developed for this study.

BOX 3.2   A Simple Model of Savings and Investment

The following equations illustrate a core macro-economic mechanism operating in the overlapping generations (OLG) model. This mechanism is embedded in equation (B3.2.4), which shows that the investment rate (I/Y, where I is aggregate investment and Y is total income or GDP) is related to the capital intensity of the economy (or the capital output ratio K/Y), the growth rate (g) and the depreciation rate (δ):

$$K_i = K_{t-1}(1-\delta) + I_{t-1}. \qquad \text{(B3.2.1)}$$

$$\frac{K_t}{Y_t} = \frac{K_{t-1}(1-\delta)}{Y_{t-1}(1+g)} + \frac{I_{t-1}}{Y_{t-1}(1+g)}. \qquad \text{(B3.2.2)}$$

$$(1+g)\frac{K}{Y} = (1-\delta)\frac{K}{Y} + \frac{I}{Y}. \qquad \text{(B3.2.3)}$$

$$\frac{I}{Y} = (g+\delta)\frac{K}{Y}. \qquad \text{(B3.2.4)}$$

Equation (B3.2.4) can be derived easily from a simple dynamic model, as demonstrated by equations (B3.2.1) to (B3.2.3). In brief, equation (B3.2.1) is the evolution of the capital stock (K): for year t, the capital stock is equal to the depreciated capital stock of the previous year plus investment. Equation (B3.2.2) is the same as (B3.2.1), where both sides have been divided by the income (or output) of year t. Equation (B3.2.3) shows the long-term, or the steady-state, relation among the same variables (basically dropping the time subscript and rearranging terms).

Equation (B3.2.4) then says that, given a long-term capital-output ratio, the faster the growth, or the larger the depreciation, the higher has to be the investment rate. This is the relation that raised concerns among economists and policy makers in the 1960s and 1970s. It was felt that very high investment rates were needed to sustain high growth rates in the face of the rapid population growth in many developing countries. Without adequate saving (domestic or foreign), these investments were unattainable and growth would have suffered. But in the current situation of a lower rate of population growth (and g is lower in an economy with a lower population growth), a lower investment rate can be enough to sustain a constant capital-output ratio. Or, as argued in the main text, if the investment rate is not reduced, the economy can become more capital intensive, and this can ultimately increase productivity.

FIGURE 3.3 By increasing capital-to-labor ratios, aging boosts labor productivity
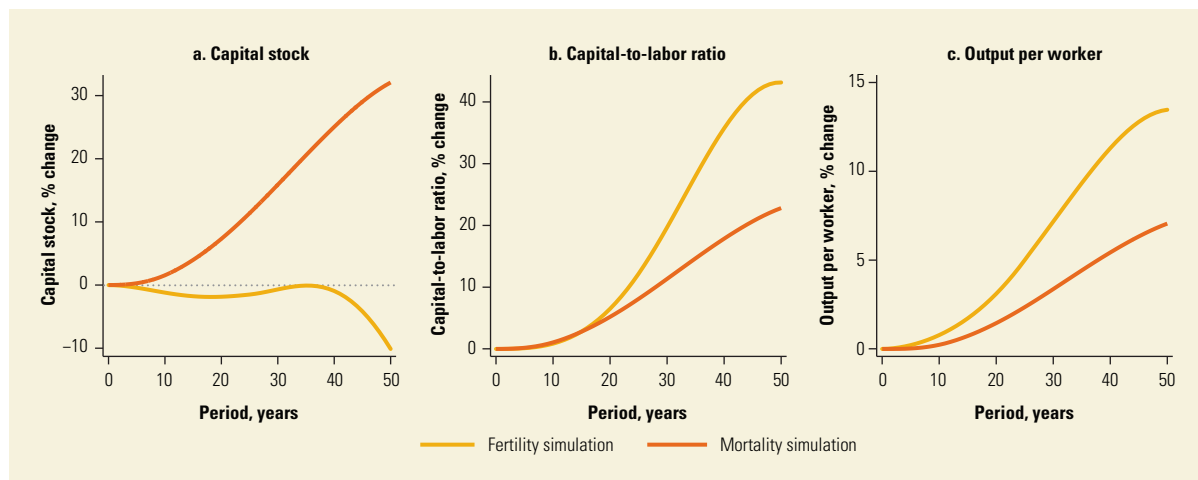
Source: Overlapping generations (OLG) model developed for this study.

returns to the steady-state level. The same macroeconomic mechanisms operate in the case of greater longevity. In this case, however, population and employment are increasing. Nevertheless, the capital-to-labor ratio also rises in the short to medium term, because the stock of capital expands even more rapidly than the number of workers (figure 3.3). This happens because forward-looking individuals increase their labor force participation and savings in anticipation of longer life spans and thus longer time in retirement (a more detailed description of the change in saving and labor force participation decisions is given in the next section). In the long run, the capital-to-labor ratio, and therefore output per worker, is higher than in the steady state. However, population and the dependency ratio are also increasing, to the point that GDP per capita will converge again to the steady state.

In summary, reduced fertility entails a shrinking population and smaller output, while increased longevity results in a larger population and a larger economy. Nevertheless, both scenarios have a positive impact on output per capita in the short to medium term, as increases in the capital-to-labor ratio drive increases in output per worker, which translates into higher GDP per capita despite larger dependency ratios. In the long run, GDP per capita returns to the steady-state level.

This story, while useful to focus attention on per capita variables and to highlight the importance of behavioral changes (saving and participation decisions), omits many additional mechanisms that are influencing real economies. Three are particularly relevant, especially for their impact on these behavioral changes and the capital-to-labor ratio: (1) productivity; (2) the institutional arrangements for social security and pensions; and (3) international capital markets.

Aging can affect productivity by increasing the average age of workers, their level of education, and the age of machinery. The simulated reduction in fertility would generate an increase of about 5.5 years in the average age of the

population and a 5 percent a year rise in the average age of workers.[4] Some analyses indicate that this may have a negative impact on intersectoral mobility and the overall productivity of the labor force, although the evidence is mixed. As shown in detail in chapter 4, older workers may experience a decline in some cognitive functions, but they can compensate with improvements in other cognitive and noncognitive functions. Their skills and knowledge tend to be less current than those of younger workers, but they have more experience and are better able to use their skills. Older workers may also be less mobile across sectors and less entrepreneurial, but, if firms adjust the tasks allotted to older workers and the workplace environment, their productivity may not decline. The impact of aging on workers' abilities depends greatly on the specific circumstances of the sector, the type of occupation, and the country.

The average educational attainment of the labor force, and therefore productivity, can expand even as the population ages if the new, younger cohorts are better educated than the older cohorts exiting the labor market. If the intergenerational gap in educational attainment is large and in favor of the young, aging may actually not have much effect on the overall supply of human capital in the economy (see figure 4.4 in chapter 4 for more details).

> **Aging does not necessarily reduce income per capita. As people live longer they also work until older ages. And with slower population growth, it can become easier to increase capital-to-labor ratios and boost worker productivity.**

At lower levels of investment, the capital stock is renewed more slowly. Thus, the average age of the machinery used in production rises, which can reduce productivity. The simulations provide only limited evidence for this effect. The average age of machines increases during the first three decades after the demographic change, but only marginally. Even during later periods, when the decline in investment is greater, the average age of the capital stock does not rise very much. All these additional aging-related impacts on productivity are possible and discussed in more detail in chapter 4, but for now they are not considered. This means that aging—in our stylized analytical framework—exclusively affects the level of GDP per capita, not its (steady-state) GDP growth rate.

Institutional factors that shape incentives for labor force participation and savings are important determinants of how aging affects real economies. For example, whereas a defined-contribution pension system fosters greater savings in an aging society, a defined-benefit pension system reduces the incentives to save among workers. As a result, capital per worker is more likely to increase under the former. Similarly, regulation of the retirement age is an important determinant of savings. A mandatory retirement system, in which individuals are forced to leave the workforce earlier than they would prefer, hurts the economy by reducing the number of workers. However, mandatory retirement could also provide more incentives for workers to save (if workers are forced to retire before they want to, they may increase savings to fund a longer retirement), which, in turn, would increase the supply of capital and thus labor productivity and income. Therefore, increasing the retirement age has two counteracting effects on incomes. A more detailed discussion on these issues is provided in box 3.5 in a later section.

The described mechanisms linking aging with capital deepening do not consider international capital flows. However, in an integrated global economy, where countries are at different stages of the demographic transition, saving and the accumulation of capital are affected by international capital flows. In a world with

free capital movement, aging countries, where capital is growing relatively more quickly than labor and returns to capital may be under pressure, should experience outflows (or current account surpluses), while younger countries should experience inflows. Other factors—institutions and financial sector development—also affect these international financial flows and counterbalance the influence exerted by demographic forces. However, the general result is that the capital deepening in an aging economy open to international financial flows may be lower than that of a closed economy.[5]

Empirical evidence provides some support for the predictions of the model, in particular that capital-to-labor and capital-to-output ratios tend to rise with aging. Consistency between real-world data and the model predictions provides some indication, albeit hardly conclusive proof, that the causal link—in particular, behavioral responses—operating in the model is at work in the real world. This is because the model is highly stylized and omits the institutional arrangements mentioned above and many other details. The model is a kind of laboratory where each exogenous variable can be changed in isolation from the others, and thus the attribution of effects is straightforward. By contrast, in the real world fertility and mortality, as well as many other influences on capital and output, change simultaneously.

Empirical evidence illustrating the impact of aging on the capital-to-labor ratio is provided by the observation that aging economies specialize in the production of capital-intensive products. Trade theory predicts that countries tend to shift their production toward sectors that use intensively the factors with which they are more abundantly endowed and import the remainder. Assuming that all else is the same, countries experiencing aging are therefore expected to boost their exports of capital-intensive goods relative to the imports of such goods, while the opposite is predicted for countries that remain younger. Such shifts are noticeable in the sectoral structure of the trade patterns of countries in the region. Figure 3.4 shows a positive correlation between aging and the capital intensity of trade.
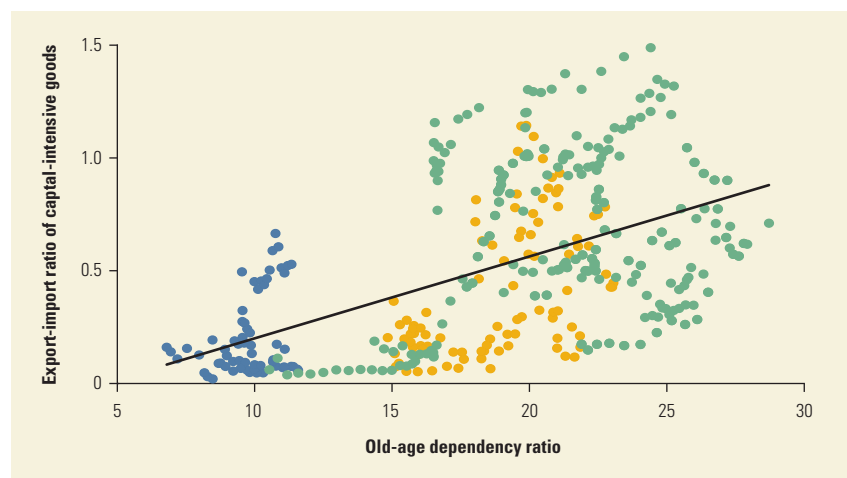
FIGURE 3.4

Aging countries tend to specialize in capital-intensive production

- Central Asia and Turkey
- Central Europe, the Baltics, and Western Balkans
- Eastern Partnership

Sources: For old-age dependency ratio, World Population Prospects: The 2012 Revision; for export-import ratio, UN Comtrade.

The Effect of Aging on Savings and Labor Force Participation

Individuals adjust their behavior if they expect to live longer. Both models and empirical data show that increases in longevity change decisions on savings and labor participation, and these changes have important implications for the economy, such as the capital-to-labor ratio and the dependency ratio. These behavioral adjustments may therefore mitigate some of the challenges of aging.

First of all, increased life expectancy is likely to induce a rise in life-cycle savings to finance consumption during the anticipated longer time in retirement. Higher savings will tend to increase investment and growth over the long run, thus improving the ability of societies to sustain pension expenditures. Bloom, Canning, and Graham (2003) find a positive relationship between rising life expectancy and saving rates. Other studies find that, over the life cycle, new generations tend to save more than their parental or grandparental cohorts did at the same ages (Deaton and Paxson 2000). These higher saving rates of successive cohorts may reflect their own rising life expectancy, as well as the enhanced probabilities of the survival of their children, who give rise to bequest motives.[6]

These behavioral responses to a decline in mortality are illustrated by the model-based mortality simulation discussed above, in which individuals adjust their economic decisions to longer life expectancy (figure 3.5). A reduction in old-age mortality generates an increase in savings.

As for the case of the growing capital intensity of aging economies, some empirical evidence supports the model prediction that an improvement in longevity will increase savings. In the region, a change in life expectancy between 2005 and 2011 was positively associated with changes in the household saving rates (figure 3.6).

In addition to accumulating higher savings, individuals who live longer tend to work to an older age. Bloom, Canning, and Graham (2007) and Kulish, Smith, and

FIGURE 3.5
Longevity brings increases in saving
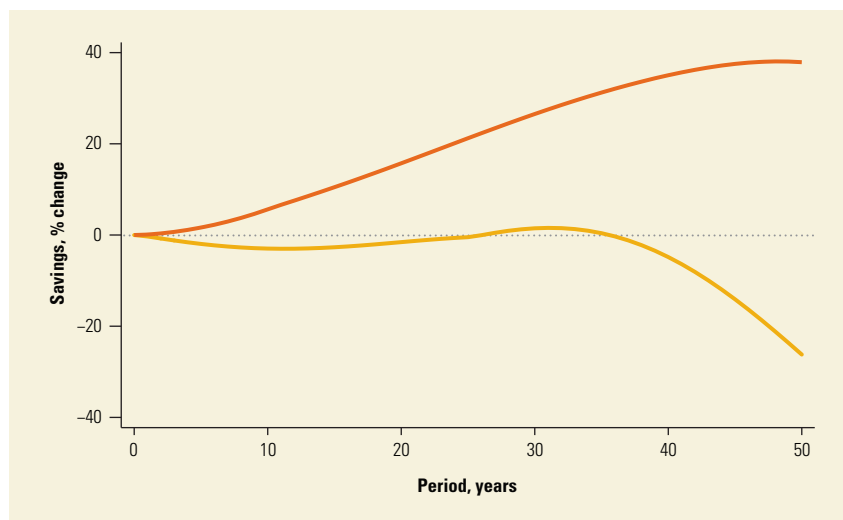
Source: Overlapping generations (OLG) model developed for this study.
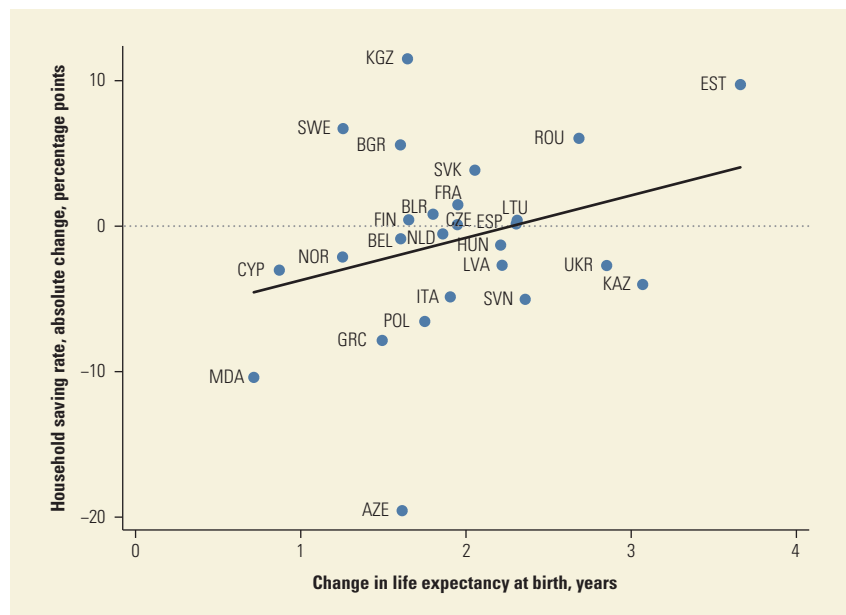
FIGURE 3.6
As life expectancy increases, so do saving rates, 2005–11

Sources: World Bank calculations based on National Accounts Main Aggregates Database; WDI.
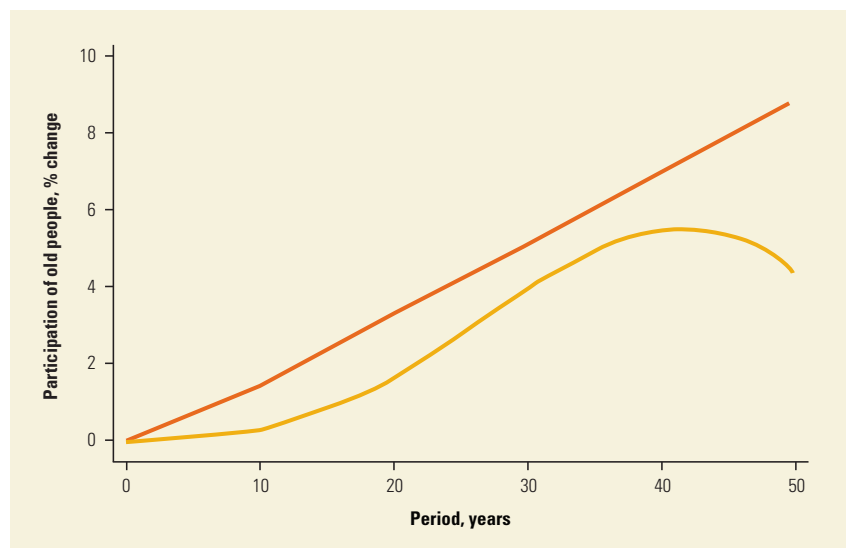
FIGURE 3.7
Voluntary participation in the labor market of old people increases with the aging of a society, Poland

— Fertility simulation
— Mortality simulation

Source: Overlapping generations (OLG) model developed for this study.

Kent (2006) provide evidence that individuals have a desire to increase both the number of working years and the number of years in retirement proportionally in response to a rise in life expectancy. In the OLG model simulations previously described, the labor force participation of older workers increases steadily after a rise in longevity (figure 3.7).

Although gains in life expectancy since 1970 have not fully translated into longer working lives in the developed countries, this trend now appears to be reversing (box 3.3). Data on the Europe and Central Asia (ECA) region also show that

BOX 3.3 The Rise of Employment at Older Ages in the OECD

On average, men in countries in the Organisation for Economic Co-operation and Development (OECD) retired at age 68.7 and had a remaining life expectancy of about 10.6 years in 1970; in 2012, men retired at age 64.2, with a remaining life expectancy of 18 years (figure B3.3.1). Thus, people are now not only living longer but also retiring earlier than in 1970, which has almost doubled the average number of years spent in retirement. Early retirement was encouraged by the increased

generosity of pension systems, which was sustainable during the favorable demographic developments of past decades but now seems unsustainable. However, this trend is already reversing in the OECD. Since the late 1990s, the average effective retirement age has been rising, and people are working longer. If this trend continues, the gains in life expectancy will be translated into longer working lives. An increase in the statutory retirement age across countries is essential to achieving this.

FIGURE B3.3.1

As longevity increases, so does the age at which people retire

- Age of labor force exit, women
- Life expectancy at labor force exit, women
- Age of labor force exit, men
- Life expectancy at labor force exit, men
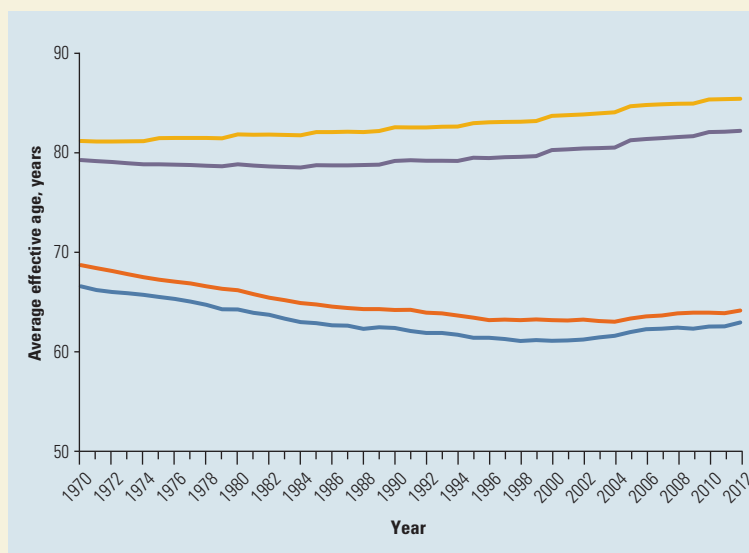
Source: OECD 2013.
Note: Average of OECD (Organisation for Economic Co-operation and Development) countries.

economic participation tends to increase with longevity, confirming once more the prediction of the stylized model. This may also mean that the decline in the labor force associated with an aging population and the resulting demands on pension expenditures are likely to be smaller than many observers fear.

Given the relevance of the links between aging and labor force participation, the next four subsections explore these in more detail. The first describes the evolution of labor participation in the region, showing that it has increased for older groups but also that this effect is different across countries, gender, and skill levels. The second considers the incentives to retire versus continuing working at older ages, with a discussion of the role of pension benefits and retirement age. The third subsection highlights the difficulties of reentry into the labor market for older individuals who lose their jobs or had retired early. In light of all these behavioral responses, a final subsection shows how dependency ratios, defined using the fixed chronological age of 65, do not seem appropriate. A novel indicator for dependency,

defined as the ratio of inactive to active adults (age 15 and above), is estimated, and a series of simple projections show that this new dependency ratio, in contrast with the usual one, may actually remain constant or even decrease in the future.

The Recent Evolution of Labor Force Participation

Countries in ECA display substantial variation in labor force participation rates, which also vary widely by age cohort and gender. Figure 3.8 suggests that, in the Eastern Partnership and Russian Federation, and Central Europe and the Baltics, the labor force participation rate in 2010 was 80 percent or higher among men in their late 20s and remained above this threshold through at least age 50. Women

FIGURE 3.8   **Labor force participation peaks at middle age with variation across countries**
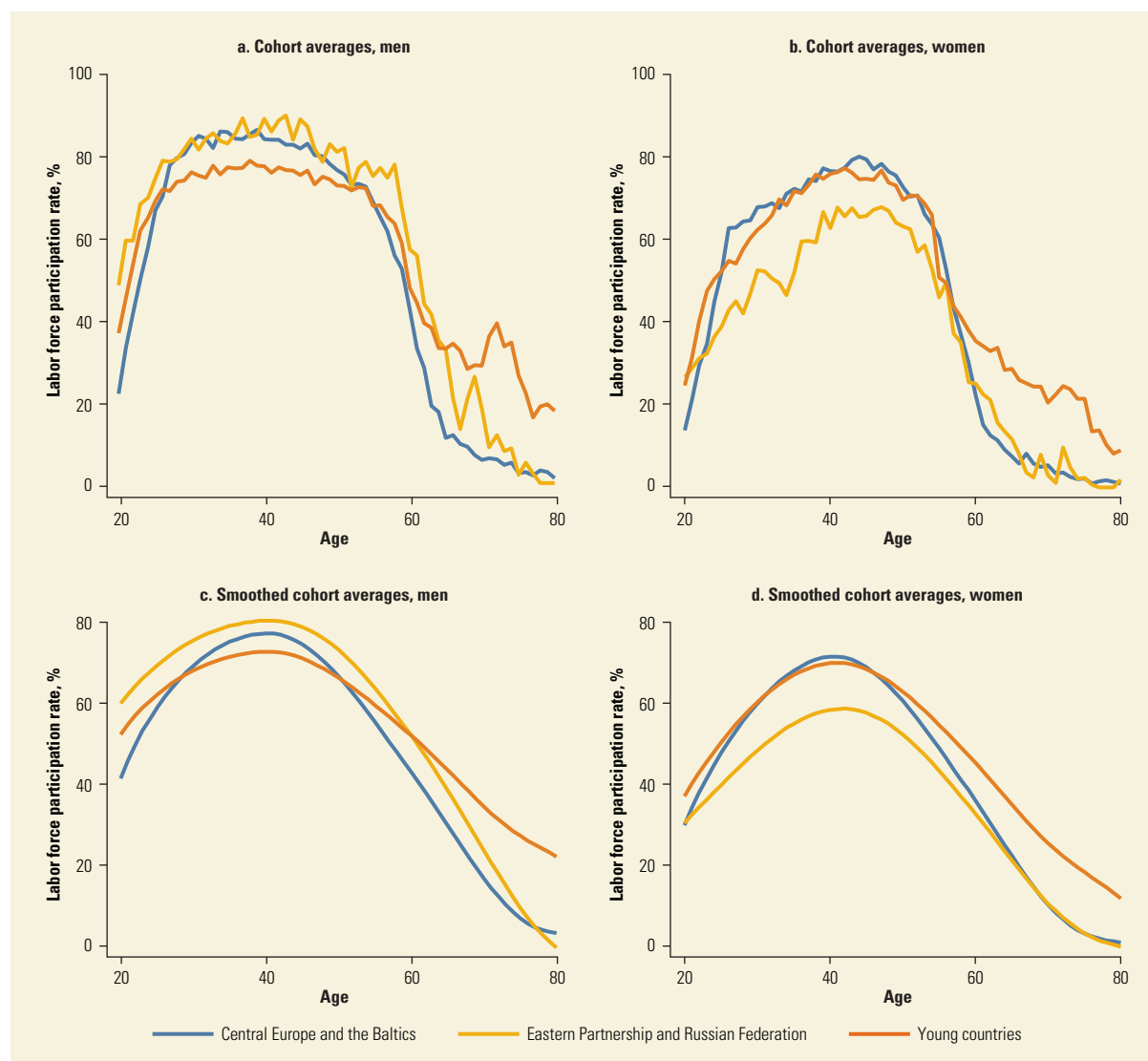
Source: Giles, Koettl, and Huang 2015, using data from EU LFS.
Note: Due to data availability, "Central Europe and the Baltics" does not include Croatia; the "Eastern Partnership and Russian Federation" includes only Armenia, Georgia, Moldova, and Russia; and "young countries" includes only Tajikistan and Turkey.

show a gradual increase in labor force participation until their early 40s and lower levels of labor force participation than men in all age groups. Women's labor force participation is greater in Central Europe and the Baltics than in the Eastern Partnership and Russian Federation, especially among the younger age groups.

At the older end of the distribution, labor force participation among men and women drops off sharply near pension-eligible ages. The decline is evident one or two years earlier among women, reflecting the fact that the pension-eligible ages are somewhat lower for women in many countries. In the younger countries of Tajikistan and Turkey, fewer men are engaged in productive activity, but more men and women are working at older ages. This reflects higher rates of self-employment and less access to formal pension support in these countries.

Apart from short-term influences such as the financial crisis, variations in labor force participation across the age distribution may be driven by significant differences across age groups in the content of formal education and in the incentives that people encounter for investing in skill development over their working lives. Workers with more years of formal schooling were more likely to be employed across the age distribution (including workers at pension-eligible ages) in 2010 (figure 3.9). Individuals with more formal education may learn new skills more readily and be more adaptable to change, but they are also more likely to work in white-collar occupations that are less physically demanding (further discussed in chapter 4).

Age is becoming less important for labor force participation in Central Europe and the Baltics. Figures 3.10 and 3.11 compare trends in labor force participation rates of the 56–60 age group and of prime-aged 31- to 35-year-olds from 2002 through 2012, among high school and tertiary graduates, for Central Europe and the Baltics (along with comparisons with Western European countries).

Panels c and d in each figure show trends in the differences in employment rates between the younger and the older age groups in the two regions. Showing estimates separately by level of formal education highlights the role potentially played by cohort effects associated with both earlier educational investments and potential restructuring approaches during economic transitions that were aimed differently at individuals with high school or tertiary education.

The employment rate of high school graduates aged 56–60 has increased among both men and women in Central Europe and the Baltics and Western Europe (figure 3.10a, b). The gap in employment between older and younger high school graduates remains higher in Central Europe and the Baltics than in Western Europe but has dropped to roughly 20 percent for both men and women, from 32 and 40 percent for men and women, respectively, since 2002 (figure 3.10c, d). The recent increases in activity among older cohorts are not driven by changes in self-employment activities, since high school graduates aged 56 to 60 in 2010 are less likely to consist of workers who were separated from employment during the transition in Central Europe and the Baltics during the 1990s and may thus now have stronger attachments to the workforce.

There is little evidence of a significant rise in the labor force participation of well-educated older men in Central Europe and the Baltics (figure 3.11a), although previous levels are already high. Employment rates among men in the 56–60 age group are only 15 percentage points below those among the 31–35 age

FIGURE 3.9 Age and educational attainment influence employment
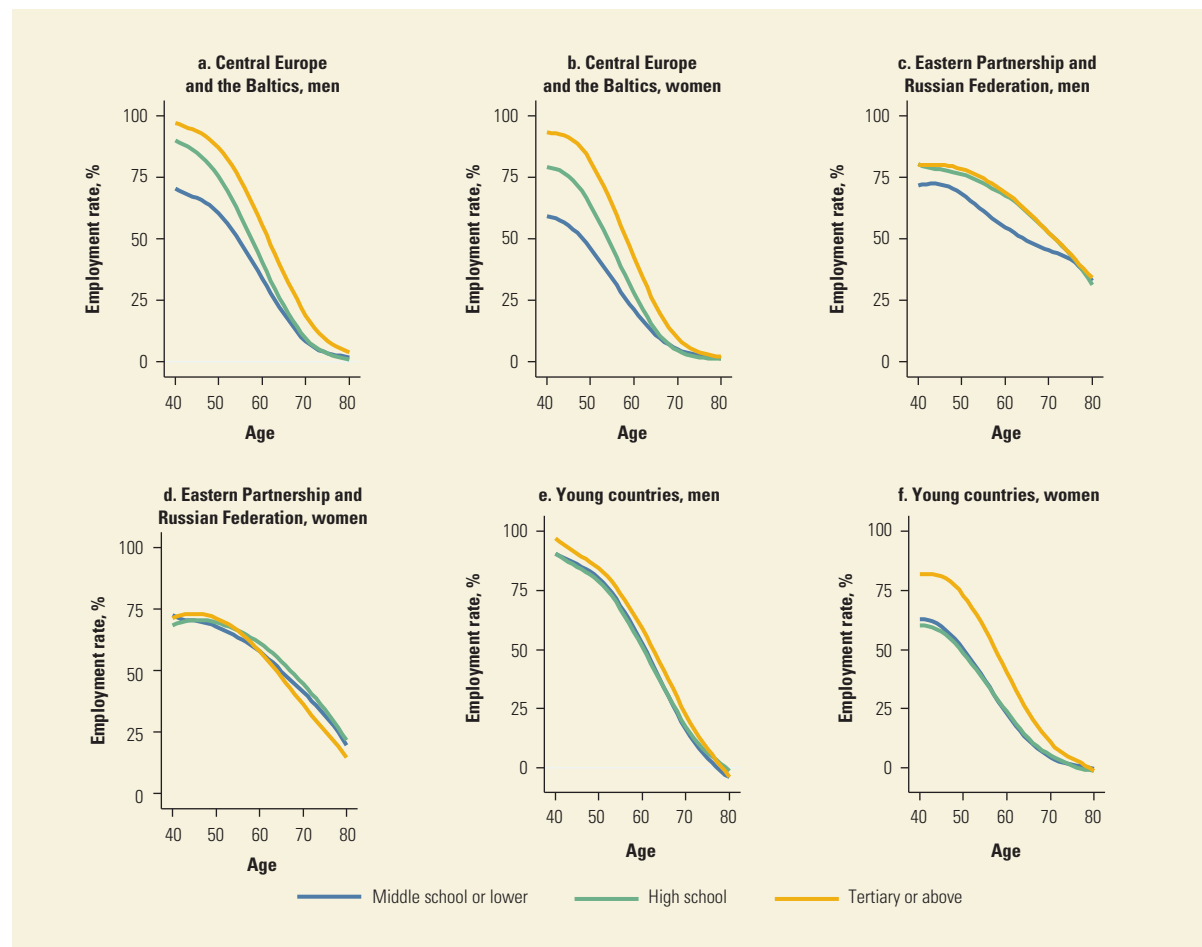
Source: Giles, Koettl, and Huang 2015, using data from EU LFS.
Note: Due to data availability, "Central Europe and the Baltics" does not include Croatia; "Eastern Partnership and Russian Federation" includes only Georgia and Russia; and "young countries" includes only the Kyrgyz Republic and Turkey.

group (figure 3.11c). Older women with tertiary education (figure 3.11b), by contrast, have sharply increased their labor force participation, to the point that the gap between women aged 56–60 and women aged 31–35 is under 10 percent (figure 3.11d). This increase is similar to the situation in Western European countries, reflecting economic activity among better-educated women that reaches into older ages. Indeed, across Europe, the gap between employment rates among women with tertiary education who are close to retirement and younger cohorts was under 10 percent in 2010.

The Incentives to Remain Employed at Older Ages

In Central Europe and the Baltics, as in Western Europe, the receipt of a pension or other public support is strongly correlated with exit from work. As the share of an age cohort with potential access to longer-term support through pensions or

FIGURE 3.10 Age is becoming less important for employment of secondary school graduates
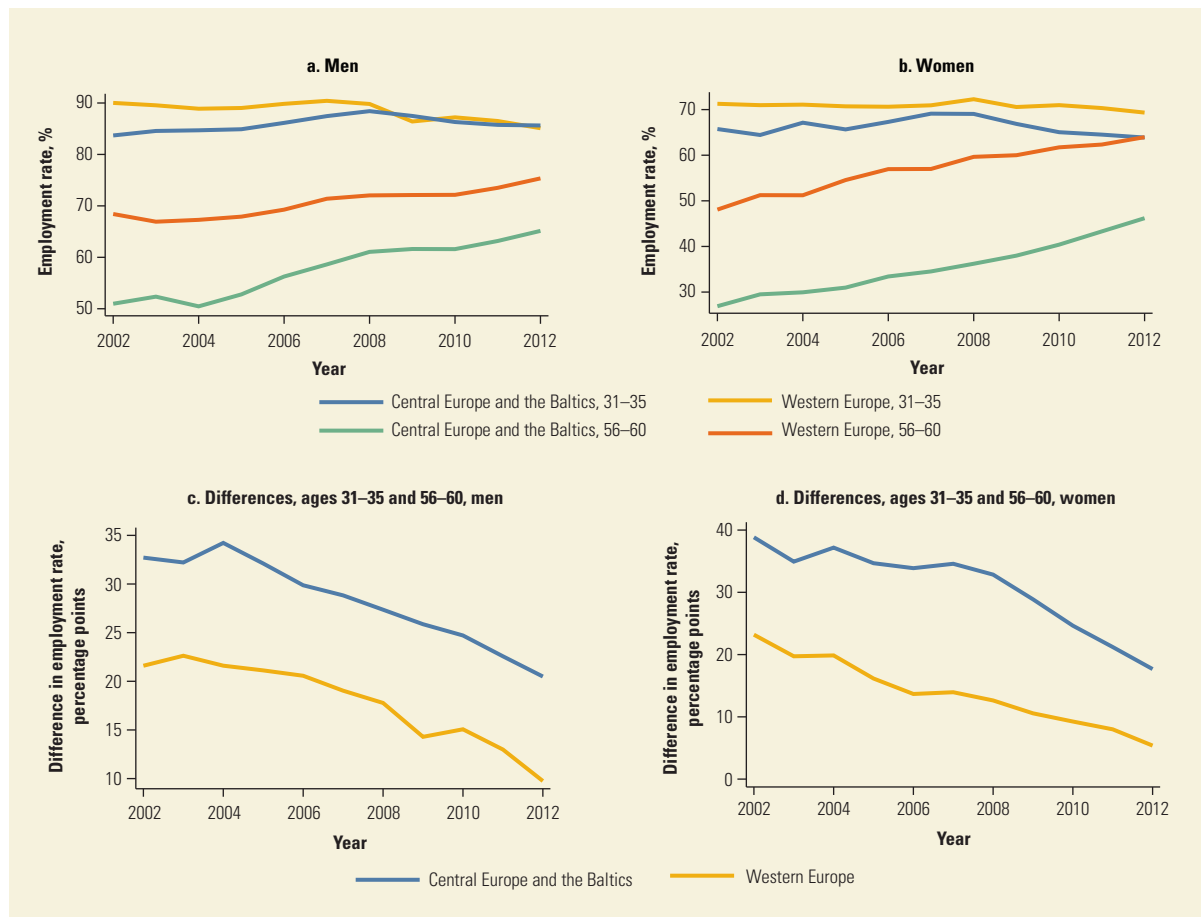
Source: Giles, Koettl, and Huang 2015, using data from EU LFS.
Note: Refers to employment rates among secondary school graduates.

other public assistance increases, the employment rate tends to decline (figure 3.12). To a greater extent than in Western Europe, the data from the Survey of Health, Ageing and Retirement in Europe (SHARE) suggest that exit from work at younger ages in Central Europe and the Baltics may be strongly associated with the receipt of other public support (unemployment insurance, disability insurance, and veteran war pensions). Thus, in Central Europe and the Baltics, more women than men receive pensions before age 60, which may contribute to their earlier exit from work.

Evidence from Organisation for Economic Co-operation and Development (OECD) economies suggests that the age of pension eligibility, as well as key parameters influencing benefit generosity, is strongly associated with labor force participation at older ages. Macroeconomic and microeconomic studies find that the effects of pension systems on participation are significant, while some macroeconomic studies have stressed that preferences for leisure and firms' preferences for younger workers may be important as well.[7]

FIGURE 3.11 Among the tertiary educated, the gap in employment between young and old is closing even faster, especially for skilled women
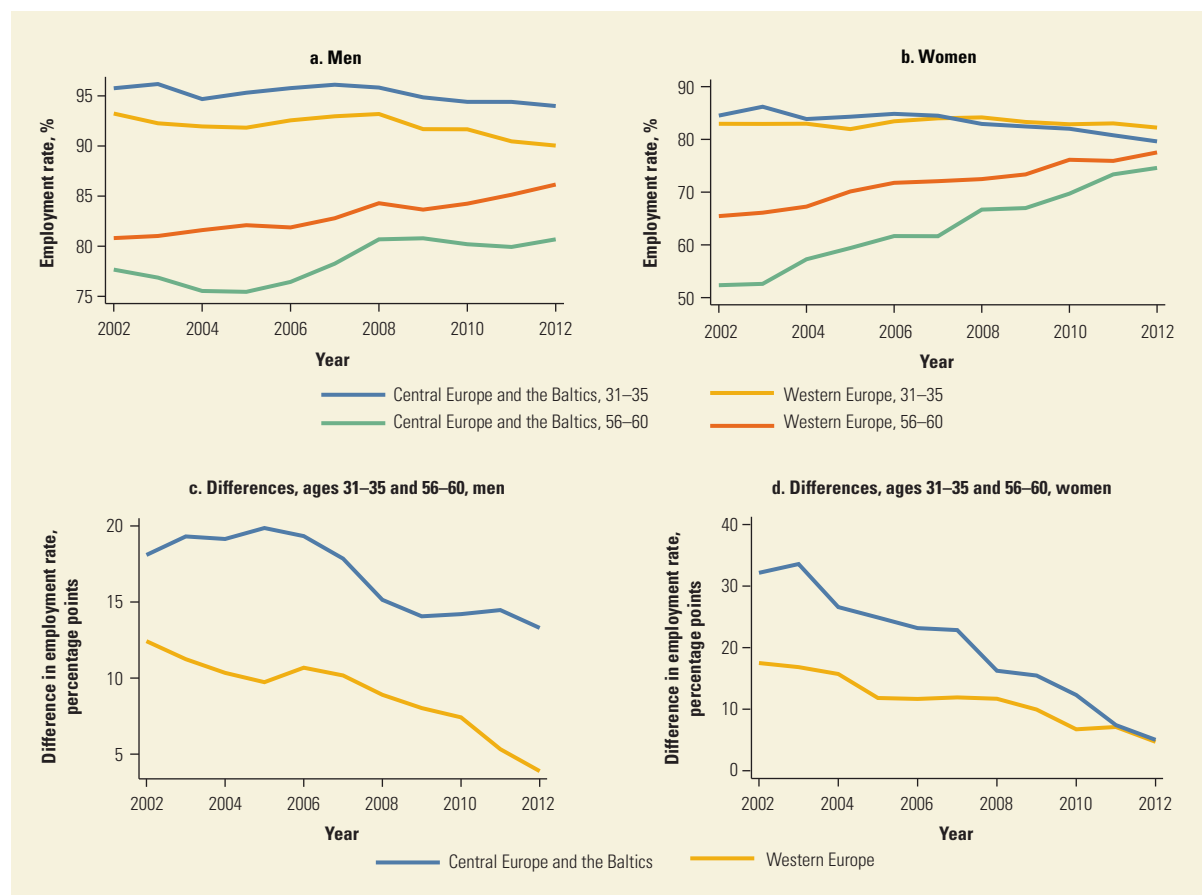
Source: Giles, Koettl, and Huang 2015, using data from EU LFS.
Note: Refers to employment rates among tertiary graduates.

Evaluating evidence from a research team spanning 12 OECD economies, Gruber and Wise (2002) conclude that reforms delaying benefit eligibility would reduce the share of men aged 56–65 who are out of the labor force by 23–36 percent. These findings are broadly consistent with results using changes in the age of eligibility to establish the causal effect of pension eligibility on retirement.[8] In Norway, two-thirds of pensioners would still be working at 63 if the pensionable age were 64 instead of 62, while in Spain raising the retirement age from 60 to 61 had a significant impact on the retirement decisions of the affected workers, as well as on the firing decisions of employers (García-Pérez, Jiménez-Martín, and Sánchez-Martín 2013; Vestad 2013). A pension reform in Austria that raised the early retirement age delayed retirement pension claims and boosted employment probabilities by 9.8 and 11.0 percent among men and women, respectively. Not all individuals affected by the increase in the minimum age for early retirement ages remained in the labor force; some simply delayed taking benefits (Staubli and Zweimüller 2013).

Employment rates tend to decrease among those receiving pensions, 2011

■ Receiving old-age and early retirement pensions

☐ Receiving other pensions

— Working, total

a. Central Europe and the Baltics, men

b. Central Europe and the Baltics, women

c. Western Europe, men

d. Western Europe, women
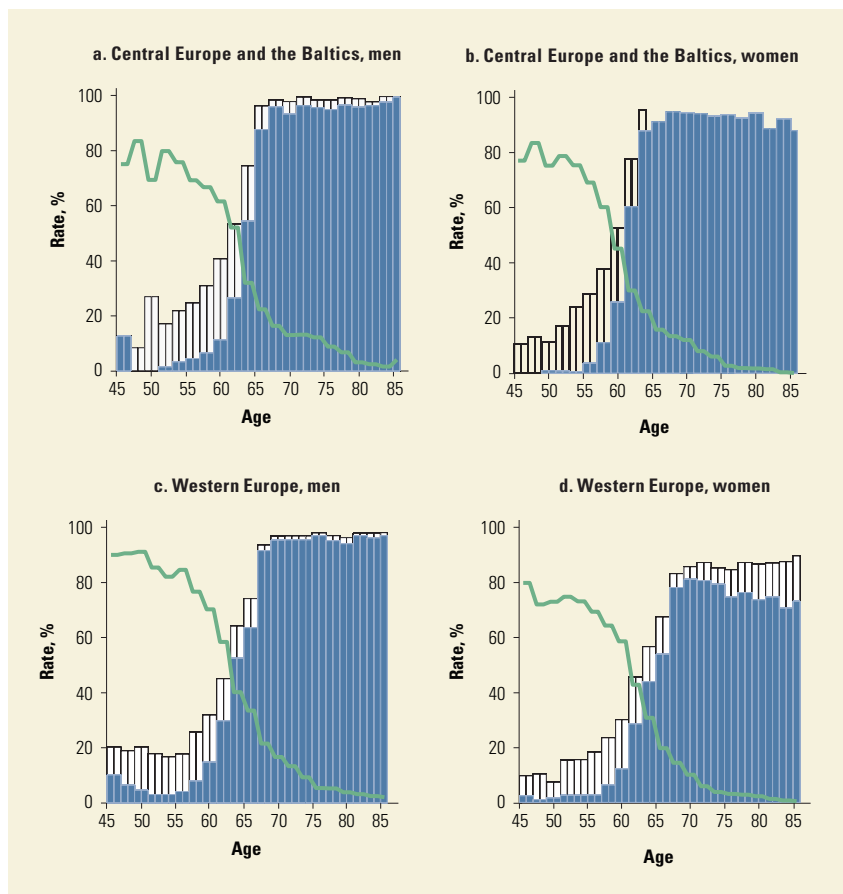
Source: Giles, Koettl, and Huang 2015, using data from the SHARE Project.
Note: Due to data availability, "Central Europe and the Baltics" includes the Czech Republic, Estonia, Hungary, Poland, and Slovenia.

The literature suggests that changing the value of benefits in pension schemes can also affect labor force participation and labor supply. Assuming that leisure is a normal good (that is, the amount of leisure desired increases with income), reforms that reduce expected benefits may encourage later retirement, while increases in pension generosity may encourage earlier retirement. However, there is no reason to believe that increases and decreases in pension generosity will have symmetric effects on labor supply. Anticipated reductions in social security wealth in the United States did not lead to an increase in labor supply, although if changes are less fully anticipated, they may have a more significant effect (Krueger and Pischke 1991). Hanel (2010) finds that a reduction in benefits contributed to a 10-month delay in retirement in Germany. An unexpected doubling of the legal minimum pension in Ukraine, by contrast, raised the probability of retiring at the statutory retirement age from 28 to 33 percent.

To understand why individuals may choose to work at older ages, background studies for this report have examined how the likelihood of employment at older ages varies with the characteristics of workers, their spouses, and families and the receipt of pensions or other public support (box 3.4 describes the methodology used in this analysis).

Regression Analysis of Correlates between Employment and Worker Characteristics at Older Ages

Without information on common policy changes across the region that may be used to measure the impact of policy changes across countries, Survey of Health, Ageing and Retirement in Europe (SHARE) data can be used to examine variables that are correlated with labor force participation and hours of work.[a] This exercise can provide insight into the factors that may be influencing work at older ages. It examines how the likelihood of employment at older ages varies with the characteristics of workers, their spouses, and families and the receipt of pensions or other public support. Because the receipt of a pension reflects a decision, these correlations may be related to the feasibility of retiring and other unobservable characteristics (for example, ability). These estimations should be viewed as providing descriptive evidence. The estimations include measures of health status and proxies for wealth and family characteristics that are least likely to introduce additional bias.

As a framework for understanding the retirement and labor supply decisions of the elderly, assume that individuals (or households) maximize utility subject to a family budget constraint, which is a function of wealth, income, available time, health status, and the nonlabor income of household members. The labor supply (or employment) of individual i, L^s_i, as in

$$L^S_i = f(W^h_i, I^w_i, I^{nw}_i, H_i, T_i, X_i, V_j) \qquad (B3.4.1)$$

is a function of household wealth, W^h_i, income from the work of all household members, I^w_i, income unrelated to current work, I^{nw}_i, health status, H_i, an individual's time endowment, T_i, and X_i, a vector of individual and household characteristics reflecting preferences, which include the own-age and demographic characteristics of household members. Given the likely variation in opportunities and returns to labor across countries, the estimations control for potential unobserved country-level characteristics affecting labor supply with a vector of country indicators, V_j.

Identifying the effects of each of these variables is complicated by three factors that introduce bias into the estimates: some are imperfectly observed; there are functional relationships among important variables (for instance, health status may affect income through productivity, available time, and available household wealth); and the labor supply of an elderly individual may be simultaneously determined by the labor supply decisions of other family members, particularly a spouse. To reduce such bias, reduced-form models are used through proxies for longer-term determinants of (permanent) income and wealth.

First, housing wealth is used as one proxy for household wealth (W^h_i). Unlike liquid components of wealth, housing wealth varies less with current shocks to income and health that simultaneously determine labor supply.[b] Second, the current labor income (I^w_i) of a household is also systematically related to own and family member labor supply decisions. Since the educational attainment of the elderly is likely to be associated with the lifetime earnings and accumulated wealth of the household, the educational attainment of respondents can be used as a proxy for wealth.

Health status also affects productivity and the ability to earn income through its impact on the capacity for work. The elderly who are ill or suffer physical limitations may be unable to provide much labor for farm activities, and thus health status is proxied by self-assessments of the ability to perform the activities of daily living (ADLs) and the instrumental activities of daily living (IADLs). ADLs are basic self-care tasks, such as eating, using the toilet, dressing, bathing, walking, and lifting items. IADLs reflect somewhat more complex tasks, including managing finances, handling transportation (driving or navigating public transit), shopping, preparing meals, using the telephone and other communication devices, managing medications, and handling housework and basic home maintenance.

In sum, the complete set of proxies for W^h_i are, in the reduced form, quadratics in educational attainment, age, and measures of the health status of respondents (the ADL and IADL z-scores, described in a subsequent paragraph). Because some older workers may find that their time is best used for the provision of care for relatives and that this may influence employment decisions, the estimations also include numbers of grandchildren and living parents, respectively, of the household head and spouse.

BOX 3.4 *(continued)*

Models of employment are estimated using SHARE data, which provide comparable information on labor supply and the health status and education of both the respondent and spouse across the participating countries in Europe, including five from Central Europe and the Baltics. A reduced-form labor supply model is first considered:

$$L_i^S = \beta_1 E_i + \beta_2 E_i^2 + \beta_3 Pen_i + \beta_4 Pen_{-1}$$
$$+ ADL_i' \beta_5 + X_i' \gamma + V_j + u_i, \quad (B3.4.2)$$

where labor supply, L_i^s, is a binary indicator of whether individual i worked for one hour or more during the previous week. It is expected that higher values for the educational attainment of the elderly, E_i, will be associated with higher wealth and savings and, because leisure is a normal good, may be negatively related to elderly labor supply.[c] Similarly, it is expected that access to one's own pension income, Pen_i, and the pension income of one's spouse, Pen_{-i}, will be negatively related to employment.

The health of older workers and the elderly is measured using the responses to a set of ADL and IADL questions.[d] The responses to the ADL and IADL questions are used to construct two z-scores, each based on whether the respondent has any difficulty performing a specified activity. The within-country z-scores are calculated as follows: (respondent count − average count)/(standard deviation of count). Increases in each of these two z-scores reflect declining physical ability and worsening general health status.

Declining health is expected to have a negative impact on work activity, particularly among workers in occupations in which physical strength and mobility are important (Bound 1991). Finally, the controls include a vector of individual and household characteristics, X_i, which includes age and age-squared and are associated with own productivity and with the numbers of grandchildren and elderly adults in the household, which are associated with preferences for employment, and the ln (1 + per capita value of the household dwelling) as a proxy for household wealth.

Within the retirement literature in the United States, recent research has focused on the important roles of spousal employment and spousal health status in labor supply and retirement decisions. First, the retirement decisions of husbands and wives may be interdependent. Structural models suggest that the labor supply decisions of older couples reflect preferences for shared retirement (Blau 1998; Gustman and Steinmeier 2004). Second, work decisions may be affected by the health status of a spouse. One may plausibly observe an added-worker effect, whereby a deterioration in a spouse's health leads to increased labor supply so as to ensure income against the associated earnings loss, or, alternatively, one may find that spousal care needs will require exit from the labor force (see Coile 2004; McGeary 2009). To gauge the potential importance of these factors in Europe, the following model is estimated:

$$L_i^S = \beta_1 E_i + \beta_2 E_i^2 + \beta_3 Pen_i + \beta_4 Pen_{-1}$$
$$+ ADL_i' \beta_5 + ADL_{-i}' \beta_6 + \beta_7 \breve{E}_{-i} + X_i' \gamma + V_j + u_i, \quad (B3.4.3)$$

where L_{-i}^s is an indicator of whether a spouse is employed, and ADL_{-i} is a measure of spousal health status. Because the labor supply decisions of husbands and wives are likely to be determined jointly and have a dynamic relationship with health and changes to health and employment, these models should be viewed as purely descriptive, but nonetheless informative of the extent to which joint labor supply decisions may affect the timing of retirement.

Source: Giles, Koettl, and Huang 2015.
a. See SHARE Project.
b. Venti and Wise (2004) show that housing wealth is not treated as a liquid asset in the United States.
c. Of course, an individual with more education may also be able to earn significantly higher returns, and thus the coefficient on education will reflect the net effect of returns and accumulated wealth on employment.
d. Bound (1991) cautions that general health status questions are likely to be correlated with unobservable individual characteristics and that they may suffer from justification bias. Several studies have suggested that proxies constructed from ADLs do not suffer from such serious bias (for instance, Dwyer and Mitchell 1999). Bound, Stinebrickner, and Waidmann (2010) caution that financial wealth may affect ADL outcomes and that even proxies developed from ADLs may lead us to underestimate the negative effects of poor health on labor supply.

The results of the analysis suggest that pension receipts—old-age pensions and other public support—are significantly and negatively associated with labor force participation for both men and women (table 3.1). This relationship is consistent with other evidence from Europe and the OECD. Deterioration in the ability to live independently—as measured by instrumental activities of daily living (IADLs) such as the ability to perform housework, manage money, take medication, and so on—is also associated with the exit from work. This association is less significant for activities of daily living (ADLs), such as eating, personal hygiene, and basic mobility. In Western Europe, deteriorations in ADLs and IADLs are associated with a lower likelihood of working. In Central Europe and the Baltics, the presence of older family members (in the 60–80 and the 80+ age groups) is associated with a reduced likelihood of working, suggesting that care responsibilities reduce labor force participation. This effect is stronger on women's than men's labor supply (see chapter 2). There is also strong evidence that men and women are more likely to be working if their spouses are working. This correlation is consistent with the preference for joint retirement that is observed elsewhere in the retirement literature and suggests that, in countries in which the retirement age is lower for women than for men, raising the age of benefit eligibility for women would lead to later retirement among both men and women.

TABLE 3.1 Effects of Pension Eligibility and Health Status on Employment of the Elderly, Selected Countries in Central Europe and the Baltics, 2011

Variable	Eastern		Southern		Northern	
	Men	Women	Men	Women	Men	Women
Household members under age 6, number	−0.053*	−0.027	−0.190**	−0.025	0.010	0.006
	(0.032)	(0.023)	(0.088)	(0.050)	(0.058)	(0.052)
Household members aged 60–80, number	−0.058***	−0.075***	−0.011	−0.015	−0.014	0.007
	(0.012)	(0.010)	(0.022)	(0.019)	(0.019)	(0.014)
Household members aged 80+	−0.026	−0.046***	−0.049	−0.053**	−0.007	0.047***
	(0.016)	(0.013)	(0.031)	(0.022)	(0.024)	(0.017)
ADL z-score (with difficulty)	0.008	−0.005	0.020*	0.002	−0.016***	−0.007
	(0.006)	(0.004)	(0.011)	(0.009)	(0.006)	(0.005)
IADL z-score (with difficulty)	−0.034***	−0.019***	−0.033***	−0.008	−0.027***	−0.021***
	(0.006)	(0.004)	(0.011)	(0.009)	(0.006)	(0.005)
High school and above	0.133**	0.169***	−0.063	0.067	−0.133	−0.026
	(0.064)	(0.051)	(0.076)	(0.098)	(0.285)	(0.065)
Eligible for old-age and early retirement pension	−0.458***	−0.315***	−0.430***	−0.287***	−0.347***	−0.380***
	(0.022)	(0.017)	(0.030)	(0.021)	(0.031)	(0.029)
Other public support	−0.442***	−0.267***	−0.430***	−0.280***	−0.334***	−0.353***
	(0.021)	(0.013)	(0.031)	(0.022)	(0.026)	(0.023)
Spouse working	0.061***	0.053***	0.030	0.002	0.065***	0.043**
	(0.016)	(0.018)	(0.034)	(0.037)	(0.020)	(0.017)

Source: Giles, Koettl, and Huang 2015, using data from the SHARE Project.
Note: ADL = activity of daily living; IADL = instrumental activity of daily living. Suppressed covariates include age; age squared; married; number of household members between 6 and 12, 12 and 18, and 18 and 60; less than primary education; primary school; middle school; log of housing wealth; spouse ADL and IADL z-scores; and country fixed-effects. Other public support includes disability, unemployment, survivor, and war pensions. Central Europe and the Baltics is divided into three groups: Eastern: the Czech Republic and Poland; Southern: Slovenia; and Northern: Estonia.
Significance level: * = 10 percent, ** = 5 percent, *** = 1 percent.

Limited Reemployment after Job Loss or Retirement

Extending the working life may be facilitated if older workers who are out of work, whether because of retirement or unexpected job loss, are able to find new employment. However, it may be difficult for older workers to find new work, because employers may have a bias against hiring older workers. Alternatively, older workers who lose their jobs may be less willing to seek out new employment, because they can collect unemployment insurance, disability insurance, or formal pension support. Using the SHARE Sharelife retrospective survey conducted in 2009, figure 3.13 shows the share of individuals who eventually find new work after an involuntary job loss. Men aged 54 and under in Central Europe compare favorably to men in Northern Europe in the ability to find work after job loss, but large percentages of those who have lost jobs after age 55 remain permanently out of work.

The involuntary loss of a job is more likely to lead to permanent exit from work for older than for younger workers. Studies around the world, including in Europe, suggest that older workers are less likely than younger workers to find another job (Chan and Stevens 2001; European Commission 2012; Frosch 2006; Giles, Park, and Fang 2006; Hutchens 1988; Johnson and Mommaerts 2011). And among older workers, the length of unemployment is more important than among younger workers in explaining the probability of remaining unemployed (Arulampalam, Booth, and Taylor 2000). This phenomenon is highlighted in figure 3.14, which shows the probability that a worker will work in the next year following an involun-

FIGURE 3.13 A large share of old workers who lost jobs remains permanently out of work
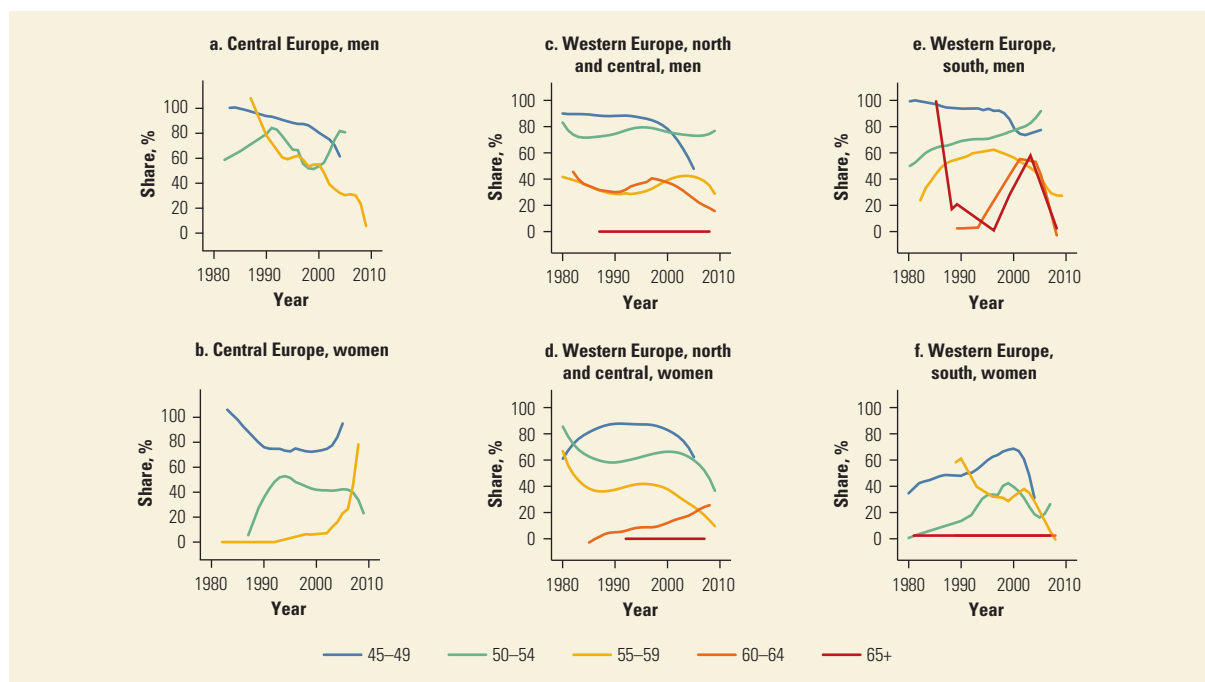
Source: Giles, Koettl, and Huang 2015, using data from the SHARE Project.
Note: The y-axis shows the share of individuals who eventually find new work after an involuntary job loss. "Central Europe" includes the Czech Republic and Poland; "Western Europe, north and central" includes Austria, Belgium, Denmark, France, Germany, the Netherlands, Sweden, and Switzerland; "Western Europe, south" includes Greece, Italy, and Spain.

FIGURE 3.14 The probability of working again a year after a job loss is much higher for younger individuals
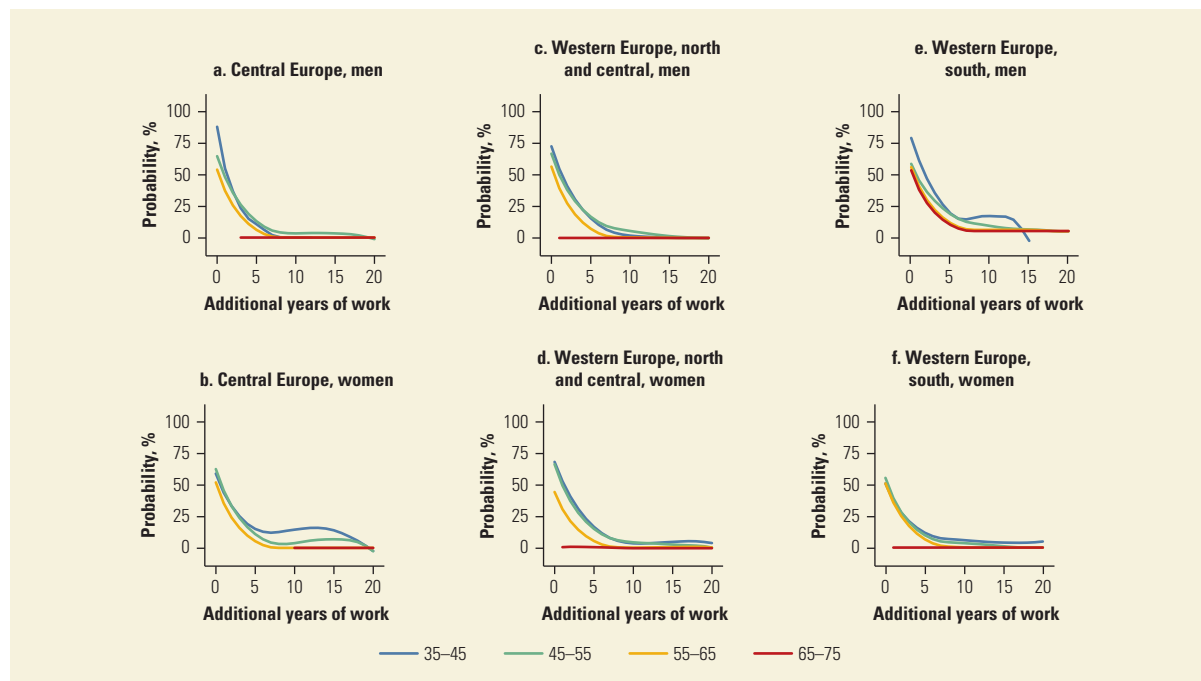
Source: Giles, Koettl, and Huang 2015, using data from the SHARE Project.
Note: "Central Europe" includes the Czech Republic and Poland; "Western Europe, north and central" includes Austria, Belgium, Denmark, France, Germany, the Netherlands, Sweden, and Switzerland; "Western Europe, south" includes Greece, Italy, and Spain.

tary layoff. Nearly 100 percent of these men aged 35–45 in Central Europe will be working one year later, but only 50 percent of laid-off men aged 55–65 will be. The probabilities among women are lower at both ages: women aged 35–45 and 55–65 in Central Europe who are involuntarily laid off face probabilities of finding work within a year of 60 and 50 percent, respectively.

One reason that older workers who are laid off face difficulties in finding employment is that their skills may already be out of date (Edin and Gustavsson 2008; Wickrama and O'Neal 2013). Moreover, recent research suggests that cognitive decline may occur more quickly among older workers after the exit from work (Börsch-Supan and Schuth 2013; Rohwedder and Willis 2010). Therefore, the "scarring" effect of unemployment, whereby skills deteriorate when individuals are out of work, may be greater for older than for younger workers. Because this effect is likely recognized by potential employers, it provides another explanation for why laid-off older workers face longer periods of unemployment than laid-off younger workers. Moreover, potential future employers frequently view unemployment in general as a negative signal (Eriksson and Lagerström 2006; Manning 2000). Whether because of assumptions about skills or other dimensions of worker quality, older workers who are out of work may be considered more negatively as potential hires than their employed peers or than younger unemployed workers.

The older unemployed are not a homogenous group, however. Evidence from France, Spain, and the United Kingdom suggests that the bias against hiring older

FIGURE 3.15 Reemployment after involuntary job loss is more difficult for less educated older individuals
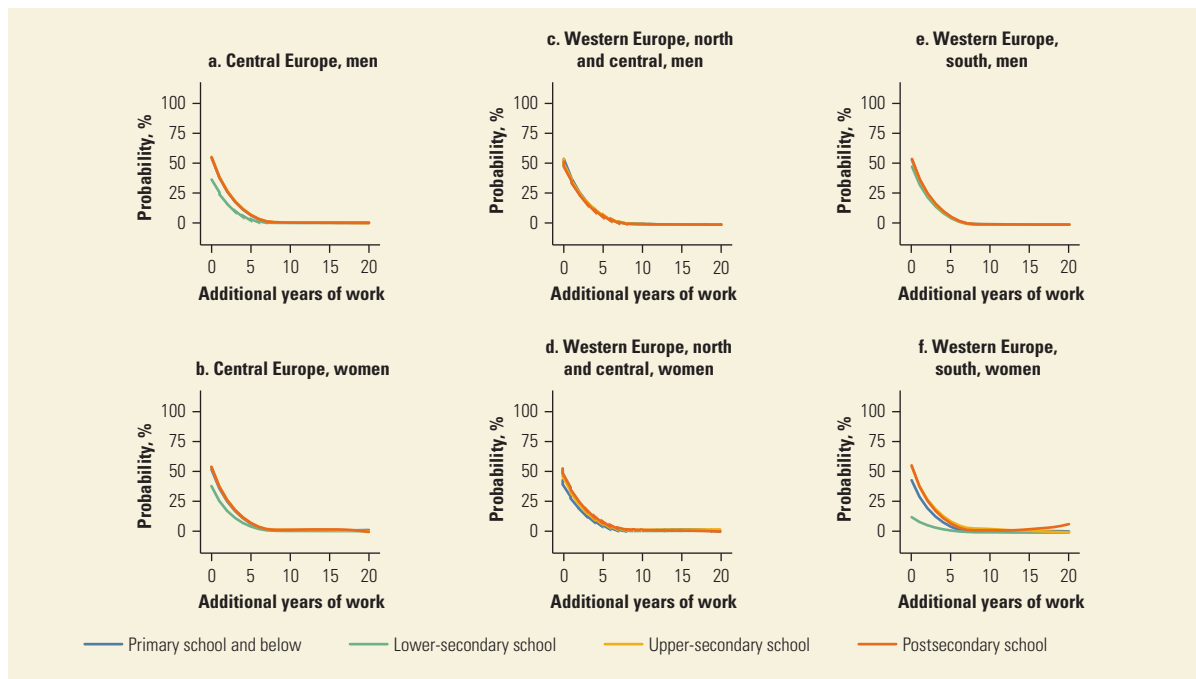
Source: Giles, Koettl, and Huang 2015, using data from the SHARE Project.
Note: "Central Europe" includes the Czech Republic and Poland; "Western Europe, north and central" includes Austria, Belgium, Denmark, France, Germany, the Netherlands, Sweden, and Switzerland; "Western Europe, south" includes Greece, Italy, and Spain.

workers is strongest for lower-skilled jobs (Riach and Rich 2006, 2007, 2010). Thus, older workers with higher levels of educational attainment may have fewer problems in finding new work. Indeed, SHARE retrospective survey data show that older men in Europe with higher education are reemployed more quickly than those with lower education (figure 3.15). Men who have completed upper-secondary or tertiary education in Central Europe (the Czech Republic and Poland in this data source) are more likely to reenter work within a year, and their advantage over less well educated adults increases with time out of work. Similar, but less pronounced, results are observed among men in more developed areas of Europe.

Returning to work after retirement is quite rare in Europe and Central Asia. Evidence from the 2008–09 SHARE Sharelife retrospective survey suggests that it is quite unusual for workers over 55 to retire and then subsequently find new employment. In Western Europe (north and central), roughly 7 percent of retirees aged 55–59 start new jobs after retirement, although this share declined somewhat with the onset of the financial crisis in 2008 (figure 3.16). By contrast, work after retirement at these ages is negligible in the two Central European countries included in the retrospective survey (the Czech Republic and Poland). Thus, working life may be extended by eliminating the obstacles to returning to work after formal retirement. Indeed, because early retirement is often an alternative to being laid off into unemployment, paying special attention to activating such retirees might be important.

FIGURE 3.16 The share of people starting a new job after retirement is very low
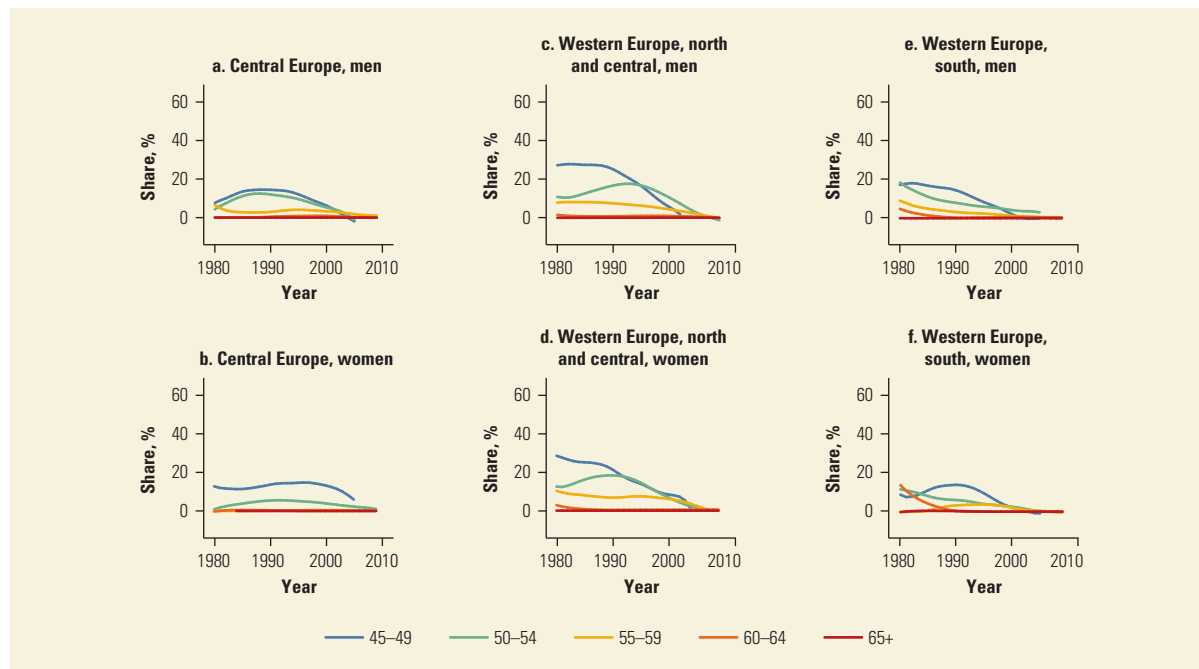
Source: Giles, Koettl, and Huang 2015, using data from the SHARE Project.
Note: "Central Europe" includes the Czech Republic and Poland; "Western Europe, north and central" includes Austria, Belgium, Denmark, France, Germany, the Netherlands, Sweden, and Switzerland; "Western Europe, south" includes Greece, Italy, and Spain.

In conclusion, just like in the high-income OECD countries, there are encouraging trends toward longer work lives in Central Europe, but barriers to the employment of older workers remain. The most important variable in the decision to retire or continue working is clearly access to a pension, which makes the availability of early-retirement provisions an important impediment to longer work lives. Once workers retire, they rarely come back into the labor market. An exception seems to be the tertiary-educated workers, for whom the likelihood of continued work after retirement is much higher. Older workers who have lost a job face the greatest challenge in finding employment; the potential for discrimination by prospective employers might warrant policy intervention to encourage the reemployment of older workers. The most effective means of increasing the employment of older workers, however, is to encourage employers to adjust to an aging workforce by investing in their current employees, modifying workplaces, creating mixed-age working teams, and the like. These and other interventions will be discussed in chapter 4, which focuses on the implications of an older workforce for productivity.

Rethinking Dependency Ratios

Addressing the barriers to employment at older ages could ensure that dependency ratios do not increase, despite population aging. The main concern about

aging societies is that the ratio of the population that is not working (and possibly, therefore, consuming public services and benefits such as health care and pensions) to the working population (the group that is paying taxes and making contributions) may increase. This section defines a novel dependency ratio as the ratio of inactive to active adults (age 15 and older), rather than the more commonly used definition of the ratio of those aged 65 and older to those aged between 15 and 64, for two reasons. First, the ratio of inactive to active people better captures the fiscal implications of aging, because it measures more precisely how many tax- and contribution-paying people are available to support how many inactive people. Second, the cutoff age of 65 to distinguish between working and non-working people seems somewhat arbitrary, particularly as health improves and as people above the age of 65 are willing—and expected—to work.

Without any change in behavior after 2030, the ratio of inactive to active people in Europe and Central Asia would deteriorate significantly. However, there is also ample room to counteract this trend. Figure 3.17 depicts the past and projected evolution of the dependency ratio by subregion between 1990 and 2060, according to the scenarios described in annex 3B. Dependency ratios in most subregions deteriorated from 1990 to 2010. The deterioration was greatest in the countries of the Western Balkans, where the ratio rose from 0.83 inactive per active person in 1990 to 0.94 in 2010, meaning that there was almost one inactive person for each person working (or looking for work) in these countries. Central Europe and the Baltics and the young countries did better, as the dependency ratio rose from 0.63 in the 1990s to 0.83 until 2005, but then declined somewhat by 2010. The Eastern Partnership and Russian Federation had the lowest dependency ratios, which increased from 0.51 in 1990 to 0.63 in 2010, possibly because of the shorter life expectancy among men. By contrast, the European Free Trade Association (EFTA) and the EU-15 saw dependency ratios drop beginning in the 1990s, from 0.79 to 0.74, reflecting a slow, but steady, rise in the effective retirement age, among other factors.

> **The old-age dependency ratio has a fundamental weakness: its current definition counts everyone who is older than 64 as an "old-age dependent." Yet this will simply not be true in the future.**

If the positive trend of longer working lives and greater labor force participation (especially among women) observed in most countries continues (based on the projections of ILO 2013), dependency ratios will rise only slightly through 2030, to around 0.80 in Central Europe and the Baltics and the young countries and to 0.69 in the Eastern Partnership and Russian Federation. In the Western Balkans, the dependency ratio is actually projected to decline slightly, to 0.90.

Forecasts of dependency ratios become even more uncertain as the forecast period extends beyond 2030 but illustrate the large impact that changes in behavior can have on dependency rates over time.[9] If participation profiles across age and gender were to remain constant after 2030, so that the trend of rising labor force participation comes to a halt, the dependency ratios would deteriorate quickly. Under this assumption, where changes in demography are the only influence on changes in dependency ratios, the dependency ratio would climb to as high as 1.26 inactive per active person in the Western Balkans, around 1.00 in Central Europe and the Baltics and the young countries, and 0.80 in the Eastern Partnership and Russian Federation. In comparison, the dependency ratio would rise to 0.89 in EFTA and the EU-15.

FIGURE 3.17 The ratio of inactive to active people can be strongly affected by changes in behavior and policy

Sources: World Bank calculations based on ILO 2013, ILOSTAT, and World Population Prospects: The 2012 Revision.
Note: The data are based on past estimates of participation rates in 1990–2010, projections of the International Labour Organization for 2015–30 based on past trends, and scenarios for 2031–60 developed by the World Bank for this report.

In contrast, with continued changes in behavior favoring longer working lives, the dependency ratio could remain fairly stable or even improve. Either a convergence of female participation rates to male participation rates or an extension in working lives by 10 years between 2030 and 2060 would be sufficient to keep dependency ratios more or less constant. The former would actually lead to a considerable improvement in the dependency ratio in the young countries. A convergence to participation profiles observed in Iceland—a benchmark country with the highest participation rates among older workers—would decrease dependency ratios to less than 0.60 in all subregions. Combining all these positive developments, admittedly an extreme assumption, would cut dependency ratios to between a half and a third of what they are today.

The demographic impact of aging on the ratio of the inactive to the active may be much smaller than often assumed by approaches based on the fixed chronological age of 65 and that do not take into account behavioral changes. Past trends toward greater labor force participation, as shown previously, particularly among women and older workers, have already helped mitigate the negative impact of aging on dependency ratios. If these trends continue and if the change in behavior can be reinforced or even accelerated, there is no reason to believe that the sheer number of inactive people will overwhelm those who are working.

The Links between Aging and Public Finances

As in the case of savings and labor participation, the implications of aging for public finances depend critically on behavioral responses and policy adjustments. This section describes the channels of transmission between demographic change and fiscal outcomes, first on the revenue side and then on the expenditure side. In each section, it discusses the relative strengths and weaknesses of public finances in light of the changing demographics in different countries. Finally, in the third subsection, a case study for Bulgaria is used to provide an integrated analysis for projecting the fiscal pressures arising from an aging population and to show how behavioral and policy-based responses could help mitigate some of these implications.

Demographic aging affects the size and composition of both fiscal expenditures and revenues. The effects operate through a complex array of transmission channels. First, an aging population changes the size of an economy as well as its saving and consumption profiles (the northeast arrow in figure 3.18), which in turn affects the size and direction of change in fiscal revenues. Second, the demand for public goods and services changes with a changing age structure and income levels (the northwest arrow in figure 3.18). Public expenditures respond to the changing demand because governments have explicit and implicit commitments to public education, old-age pensions, and health care benefits. The net effect of aging on fiscal balances is determined by the interplay of these two channels. However, country-specific characteristics, such as the institutional environment, play a big role in determining the relative magnitudes of each channel (box 3.5 provides the example of how pension rules can affect the impact of aging on the real economy).
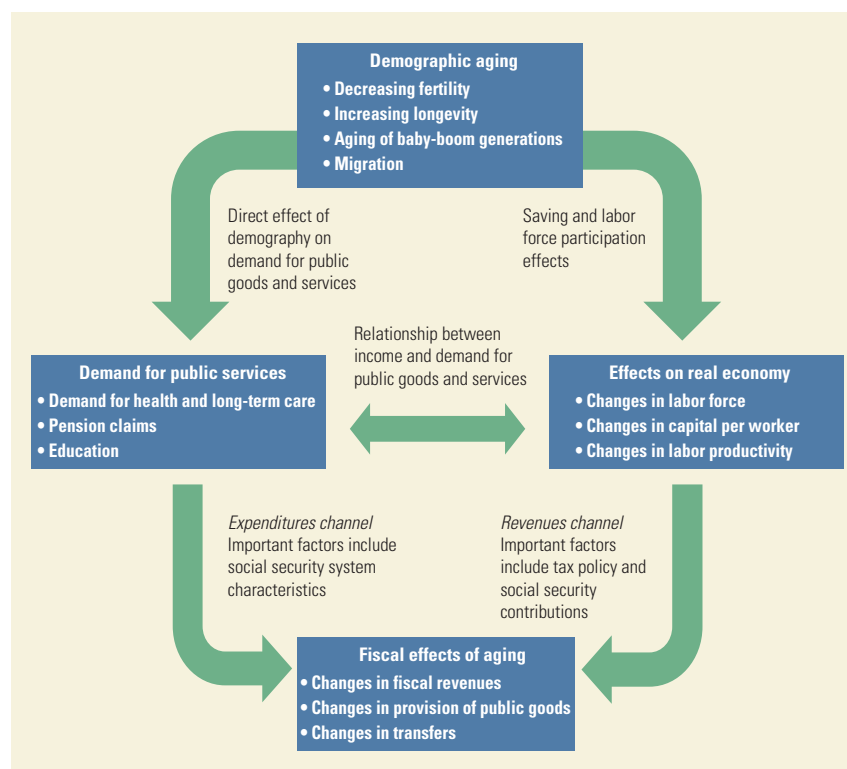
Dependence on public transfers differs sharply at different ages. While the earnings of most individuals vary greatly across the life cycle (earnings increase during their careers as they build experience and assets and then fall in older ages as they reduce their workload and consume their assets), consumption varies by much less (see figure 3.19a and 3.19c for the examples of Germany and Slovenia, respectively).[10] As a result, consumption typically exceeds labor earnings for both the very young (ages 0 to 19) and the elderly (65 and over), with the difference in part financed by public transfers. For example, individuals aged 65 and over relied on public transfers for 69.4 percent of consumption expenditures in Germany and 79.9 percent in Slovenia. By contrast, individuals aged 20 to 64 made a net contribution to public finances of 33.1 percent in Germany and 35.9 percent in Slovenia (see figure 3.19b and 3.19d, respectively). Obviously, the role of public transfers in financing the consumption of the elderly depends on the prevalence of a public transfer program, such as old-age pensions. For example, while the share of public transfers exceeds 100 percent of old-age consumption in Sweden, it falls below 10 percent in countries like India, Indonesia, and Thailand, where there is no welfare state.

Felix and Watkins (2013) show that the composition of consumption expenditures differs across age groups as well. While average spending for food and shelter remains reasonably stable across age groups, other spending categories show more variation with age. In particular, the share of expenditures on health care increases with age more than other categories. A more detailed discussion on the relationship between demographic aging and public provision of different

How Do Social Security Systems Influence the Effect of Aging on the Real Economy?

Institutional factors can have a significant impact on the relationship between population aging and economic outcomes. One example is the pay-as-you-go (PAYG) social security system (see table B3.5.1). Dedry, Onder, and Pestieau (2014) show that, under a PAYG system with defined benefits, a decrease in fertility may reduce savings, leading to a reduction in per worker output and, thus, in per capita income. This is mainly because in a defined-benefit system a reduction in fertility leads to an increase in social security contributions while hold-ing the old-age retirement benefits constant. This, in turn, reduces the disposable income and savings of working-age individuals. In contrast, a defined-contribution system magnifies the positive effect of a decrease in fertility on per capita incomes. In this case, a decrease in fertility leads to a reduction in old-age pensions, while holding the contribu-tions fixed. In response, individuals save more to smooth their consumption over their lifetime, fur-ther increasing the amount of capital per worker (capital deepening).

TABLE B3.5.1 The Impact of Aging on Capital per Worker under Different Unfunded Pension Systems

	Standard case	Defined contribution	Defined benefits	Defined annuities
	Mandatory early retirement			
Decrease in fertility	↑	↑	↑↓	↑↓
Increase in longevity	↑	↑↓	↑↓	↑↓
	Optimal retirement			
Decrease in fertility	↑	↑	↑↓	↑↓
Increase in longevity	↑	↑↓	↑↓	↑↓

Source: Dedry, Onder, and Pestieau 2014.
Note: A standard (Diamond) case is defined by the absence of a social security system and work in old age in an overlapping-generations model, which was used by the MIT economist Peter Diamond.

Similarly, introducing a PAYG system can change the effect of an increase in longevity on capital per worker. In a standard (Diamond) case, where individuals do not work in old age and there is no unfunded social security system, an increase in longevity boosts capital per worker because people save more to finance their consumption over a longer life span (see section in this chapter on aging and income). However, with a PAYG pen-sion system, a longer life could mean more pension benefits at the expense of future contributors (this is what happens in a defined-annuity system). This could, in turn, reduce future generations' dispos-able income and savings and reduce capital per worker.

Finally, retirement age regulations also have important implications for savings and output. A mandatory retirement age regime, where workers are forced to retire sooner than they would prefer, reduces the number of workers at a given point in time, and it forces young generations to save more. Both of these effects contribute positively to capi-tal deepening and thus to labor productivity in the standard case. However, introducing an unfunded pension system could weaken, or possibly reverse, these effects. Nevertheless, with increasing lon-gevity, a mandatory retirement regime is more likely to foster capital deepening. This is a "second best" situation where one distortion (PAYG) makes the second one (mandatory retirement) desirable.

FIGURE 3.19 **The elderly finance most of their consumption from public transfers**
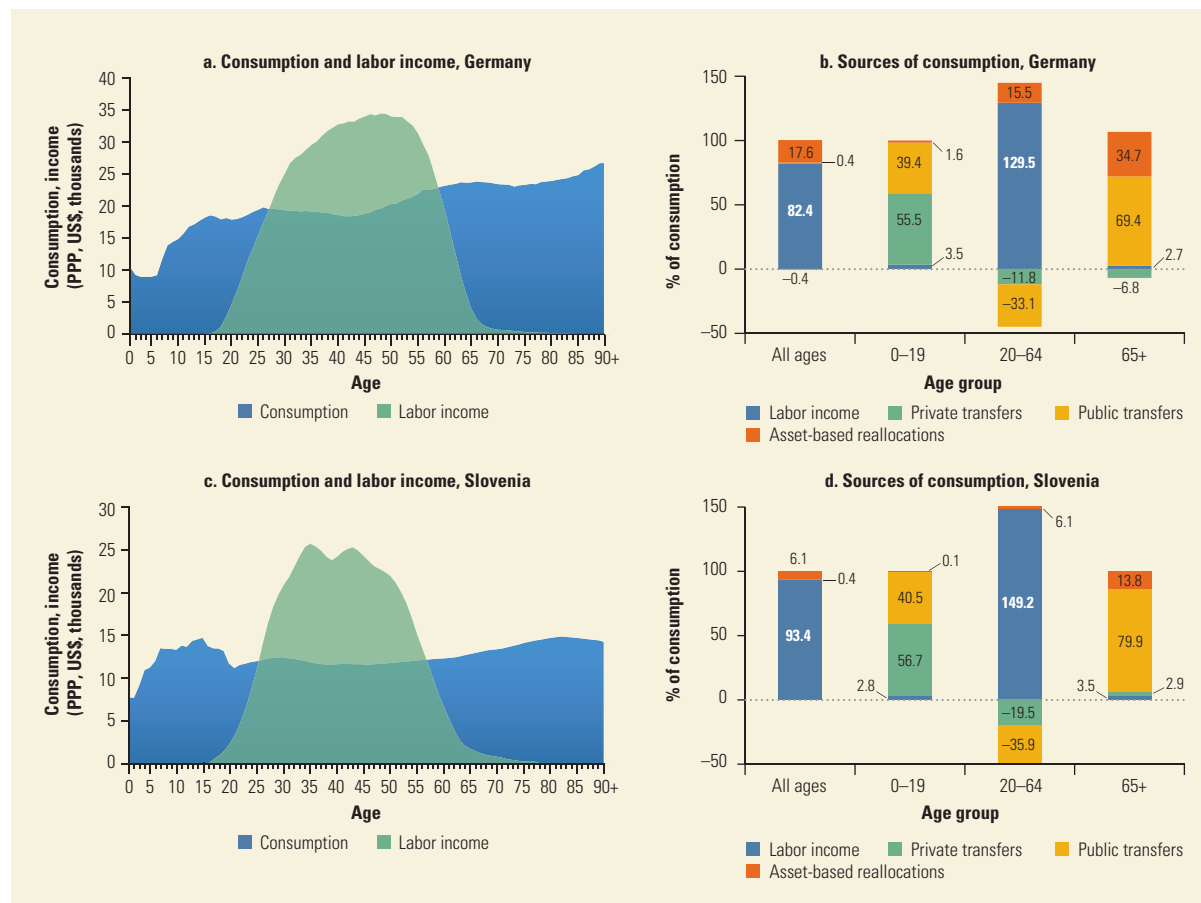
Source: World Bank calculations, using data from National Transfer Accounts.
Note: PPP = purchasing power parity.

goods and services such as education and health care will be provided in the following sections.

Demographic aging can also affect the demand for public goods and services indirectly, by changing per capita income. Increases in income typically raise the demand for certain types of public goods, such as education, parks and recreation, police, and health care services but also decrease the demand for others, like social programs and redistribution. Overall, a large literature concludes that the net effect is typically positive, so that the demand for public goods and services increases with income.[11] In ECA, a simple comparison of incomes with the size of public expenditures confirms this point: a 10 percent increase in per capita income is associated with a 0.8 percentage point increase in the share of public expenditures. Therefore, aging affects the demand for public goods and services not only directly by changing the numbers of beneficiaries but also indirectly by changing their income (this effect is shown by the east-west arrow in figure 3.18).

The impact of demographic aging on fiscal outcomes depends on the institutional characteristics of each country. For example, to what extent are revenues sensitive to changes in the size and composition of tax bases? And to what extent does the institutional setup render the government likely, or willing, to match the increased demand for public goods and services? The following subsections will show how different country characteristics could aggravate or, on the contrary, help mitigate, some of the fiscal pressures likely to arise from population aging.

Demographic Aging and Fiscal Revenues

Aging affects fiscal revenues through many channels. Most directly and significantly, an increase in the share of the elderly in the population affects the base of taxes on consumption and income. Since older people tend to consume a larger share of their income, consumption taxes could provide a strong source of revenues in an aging economy (Auerbach 2012). Aging due to an increase in longevity, however, may also change consumption patterns. In particular, working-age individuals may increase their savings (reduce their consumption) to prepare for an increase in the number of years in retirement. Thus, the net effect of aging on consumption is ambiguous. In Japan, for example, aging is considered to be a major determinant of decreasing savings over the past several decades.[12] This implies that the rise in consumption due to the increasing share of the elderly population has had a larger impact on aggregate consumption than any increase in the savings of working-age individuals.

Aging may also affect revenues from a tax on capital income. Aging can result in a rise in the capital-to-labor ratio from a decrease in the number of workers and an increase in savings (see above). The increase in the capital-to-labor ratio reduces the marginal productivity of capital and increases the marginal productivity of labor. How capital income, and thus the fiscal revenues generated from taxes on capital income, responds to these changes depends on the extent to which the country is integrated into the global economy. In a closed economy, where the price of factors (for example, the return on capital and the wage rate) is determined within the country, the impact on capital income is ambiguous. The decline in the marginal productivity of capital will reduce the rate of return on capital, but the increase in capital per worker (capital deepening) will tend to increase capital income. On net, the change in capital income will depend on the elasticity of substitution between capital and labor. By contrast, in an open economy the return on capital does not change in response to capital deepening in a single country, so that capital deepening unambiguously implies an increase in capital income and thus a larger tax base.

Some perspective on how changes in savings and the capital-to-labor ratio may affect fiscal revenues in ECA can be gained by examining the current sources of revenues. In ECA, those revenue sources that are heavily influenced by aging, including taxes and social security contributions, range from a maximum of 40 percent of GDP in Hungary to a minimum of 15 percent in Azerbaijan (figure 3.20a).

On average, tax revenues amount to 21.8 percent of GDP, and social security contributions amount to 8.2 percent. With the exception of Azerbaijan and Russia,

FIGURE 3.20 **The revenues that are influenced by aging vary greatly across countries in Europe and Central Asia**
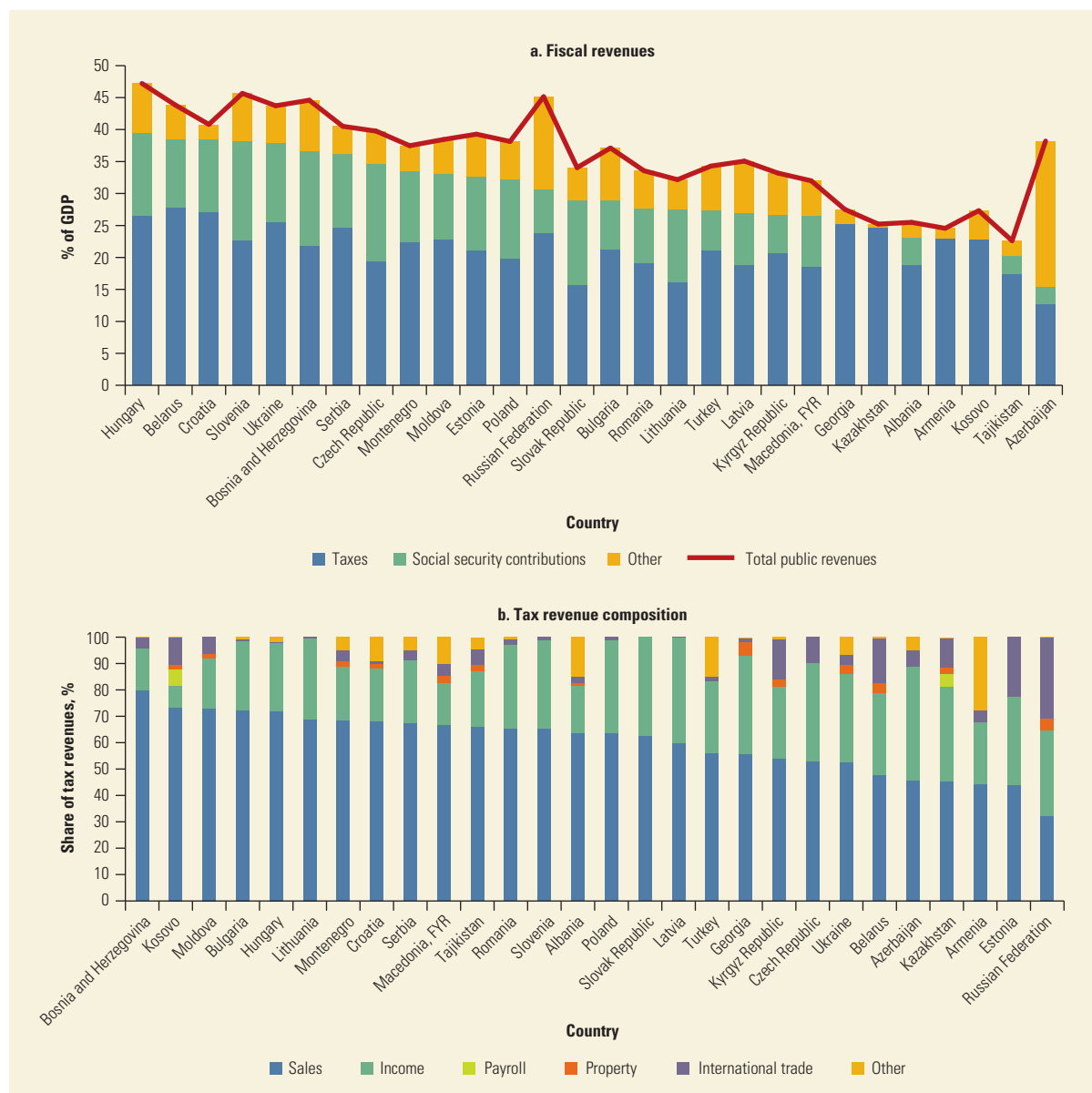
Source: World Bank calculations, using data from ECA Fiscal Database.

where fiscal budgets rely heavily on natural resource revenues, other revenues average a modest 5.6 percent of GDP.

There is some evidence that older populations within ECA tend to have higher tax revenues. For example, the ratio of tax revenues to GDP in the young countries of Central Asia as well as in Armenia and Georgia are below the regional average. However, this may reflect their relatively low income levels, and other country-specific characteristics like a taste for small government, rather than low dependency ratios. A simple regression analysis performed for this study, which controls

for the impact of income on the tax-to-GDP ratio, finds that a 1 percentage point increase in the old-age dependency ratio is associated with a 0.7 percentage point increase in potentially age-related tax revenues in GDP.[13] A plausible explanation for this rather unexpected result is that policies tend to respond to changes in demography. As populations get older, more tax revenues are needed to provide for the increased demand for public goods and services. Therefore, higher tax revenues could reflect a higher tax collection effort in societies with greater average age.

As demographic aging potentially changes the capital-to-labor and consumption-to-income ratios, it is also important to investigate the tax revenue composition of the ECA economies. Figure 3.20b ranks the countries by their reliance on sales taxes for fiscal revenues. The share of sales taxes in total tax revenues reaches a maximum of about 80 percent in Bosnia and Herzegovina and a minimum of 32 percent in Russia. Central Asian economies, with the exception of Tajikistan, as well as Armenia and Georgia, cluster on the low side of the distribution.

> As aging potentially changes the capital-to-labor and consumption-to-income ratios, it will affect fiscal revenues and their composition. Tax policies may need to change, but governments should consider the trade-off between efficiency and equity.

It does not appear, however, that aging is strongly related to the share of sales tax revenues in total taxes. A simple regression exercise performed for this study shows that, after controlling for the level of income, a rise in the old-age dependency ratio has a positive, and weakly significant, effect on the share of sales taxes in total tax revenues. However, once regional dummies are introduced, this positive effect becomes insignificant. In short, a cross-section analysis of ECA economies does not reveal any meaningful relationship between age distribution and composition of tax revenues in the region.

Such cross-section analyses, which compare countries at a particular point in time, can provide only limited insight into the relationship between aging and fiscal revenues. One issue is that the relationship between aging and fiscal revenues may reflect country-specific factors that cannot be adequately accounted for in a simple regression analysis. For example, many countries may have both high fertility rates and a preference for small government and limited redistribution through social security systems. In this case, a positive relationship between aging and tax revenues would reflect preferences for the size of government rather than a causal relationship between aging and tax revenues. Thus, a cross-sectional, positive relationship between aging and tax revenues does not necessarily imply that aging in any given country will generate lower fiscal revenues.

The analysis has so far focused on the effects of changing demographics on tax bases while holding the tax policy fixed. The next question is whether it would be possible, or desirable, for governments to adjust tax rates in order to benefit from changing tax bases in an aging economy. For example, if the average age of the population is expected to rise, would it make sense to increase the tax rate on consumption to raise revenues? The answer to this question reflects a well-known dichotomy in economic policies: the trade-off between efficiency and equity. Auerbach and Kotlikoff (1987) show that changes in the tax system have both growth and redistribution implications. Other things being equal, shifting from an income-tax–based fiscal revenue regime to consumption taxes can increase capital formation over the long run, which increases income. However, such a shift also

pushes the tax burden onto older generations. Thus, if old generations are at risk of poverty, this shift may not be desirable from a social perspective even though it leads to greater accumulation of capital. In comparison, shifting from a capital income tax to a labor income tax has the opposite effects. First, this shift benefits primarily the old, who tend to rely more on capital income than working-age individuals do. Second, it reduces the incentives to save and thus reduces the long-term formation of capital. Overall, these two cases show that the desirability of tax reform is not a trivial issue. In the end, a shift from one tax system to another will be determined by the relative emphasis put on the size of the pie (efficiency) and how the pie is distributed (equity) in different societies.

Demographic Aging and Public Expenditures

Demographic aging tends to increase the demand for public expenditures for old-age pensions and health care services. Again, governments face a difficult trade-off between promoting economic efficiency, which requires relatively low tax rates, and meeting unfunded commitments to the elderly, which may require high taxes on working-age individuals. Moreover, government's ability to make immediate adjustments in the claims of the elderly can be limited by legal commitments. For example, changes in pension rules may be difficult to achieve, even if such changes are desirable for both equity and efficiency considerations. Thus, other things being equal, an increase in the share of the unproductive population is likely to increase the resources allocated for the elderly.

Pensions account for a large share of spending on social protection. Payroll contributions are typically the primary source of financing for pensions, although the entire revenue cannot always be used to directly finance pensions (for example, if payroll contributions also finance unemployment benefits). Social security contributions make up about 10 percent of GDP on average, much less than the social protection spending in most countries (figure 3.21). This means that general government revenues are often needed for partial funding of social benefits, including pensions.

Allocations of public expenditures to pensions are relatively high in many ECA countries. In 2010, the average country spent about 21 percent of its public expenditures on pensions, with this figure ranging from a maximum of 28 percent in Serbia to a minimum of 11 percent in Azerbaijan (figure 3.22). Interestingly, some of the Central European countries spend a larger share on pensions than the high-income Western European countries spend. For example, Croatia, Poland, and Romania—with more than a quarter of the general budget allocated to pension transfers—spend a greater share of the budget on pensions than all Western European countries except Italy.

Pension expenditures in many ECA countries are set to rise going forward. Bogetic et al. (2014) project that the largest increases in pension spending from 2010 to 2060 are forecast for Central European countries like the Czech Republic, Romania, the Slovak Republic, and Slovenia, as well as some currently young economies like Azerbaijan and Turkey. By contrast, a number of currently high-spending countries, including Bosnia and Herzegovina, Croatia, Poland, and Serbia, are expected to reduce their pension transfers as a share of total expenditures. Bogetic et al. (2014) emphasize that these countries already have relatively old populations

FIGURE 3.21 Social security contributions are often less than social protection spending, 2011
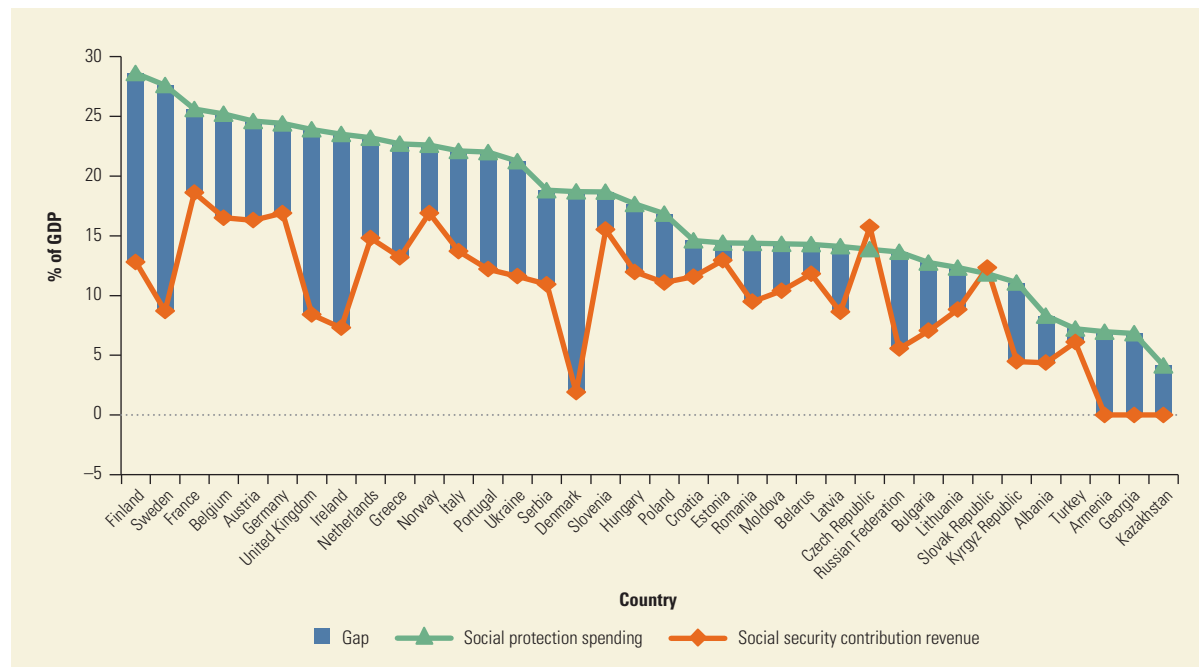
Source: Schwarz et al. 2014.

FIGURE 3.22 Allocations of public expenditures to pensions are relatively high in many countries
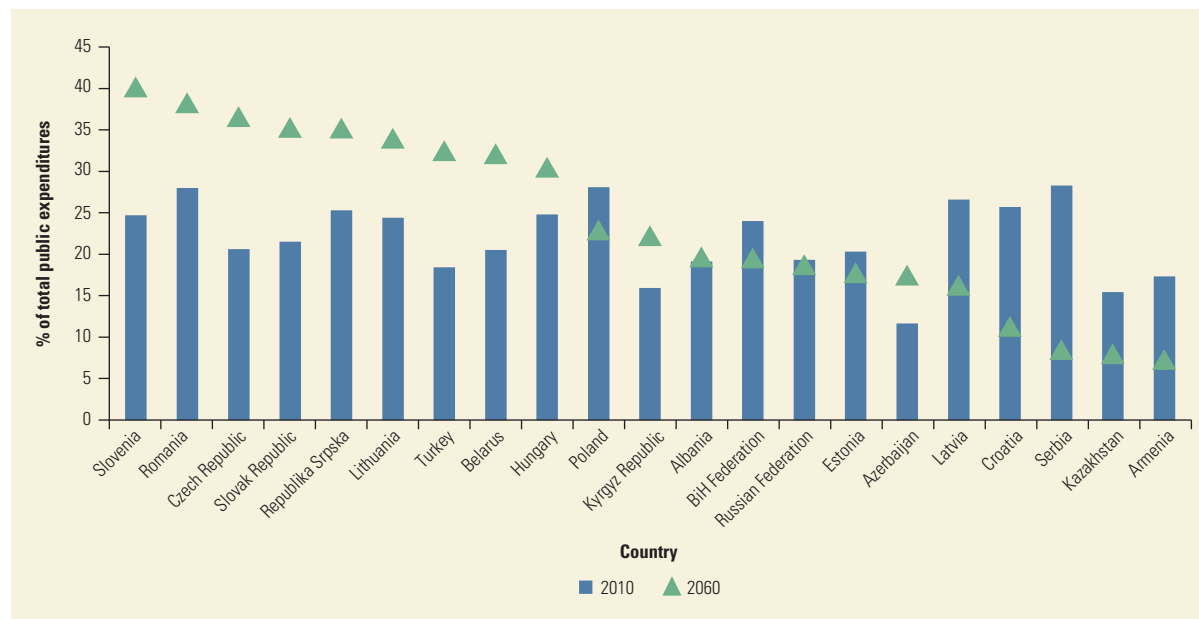
Source: Bogetic et al. 2014.
Note: For countries in the European Union, data on pension spending as a percentage of GDP from the European Commission (2012) were converted to shares of general government expenditures using International Monetary Fund numbers for general government spending. For non-EU countries, the World Bank's PROST (Pension Reform Options and Simulation Toolkit) model projections for pension spending are used, based on the working-age population projections from World Population Prospects: The 2012 Revision, with the same conversion to shares of general government spending. The Federation of Bosnia-Herzegovina (BiH Federation) and Republika Srpska, which, together, make up the country of Bosnia and Herzegovina, have separate pension systems and are treated as separate data points in the figure.

TABLE 3.2 Characteristics of Pension Systems

Country	Universal	PAYG	Mandatory savings
Albania	No	DB	No
Armenia	No	DB	No
Azerbaijan	No	DB/NDC	No
Belarus	No	DB	No
Bosnia and Herzegovina	No	Points	No
Bulgaria	No	DB	Yes
Croatia	No	Points	Yes
Czech Republic	Yes	DB	No
Estonia	Yes	Points	Yes
Georgia	Yes	No	No
Hungary	No	DB	No
Kazakhstan	Yes	No	Yes
Kosovo	Yes	No	No
Kyrgyz Republic	No	NDC	Yes
Latvia	No	NDC	Yes
Lithuania	No	DB	Yes
Macedonia, FYR	No	DB	Yes
Moldova	No	DB	No
Montenegro	No	Points	No
Poland	No	NDC	Yes
Romania	No	Points	Yes
Russian Federation	No	NDC	Yes
Serbia	No	Points	No
Slovak Republic	No	Points	Yes
Slovenia	No	DB	No
Tajikistan	No	DB	No
Turkey	No	DB	No
Turkmenistan	No	NDC	No
Ukraine	No	DB	No
Uzbekistan	No	DB	No

Source: Schwarz et al. 2014.
Note: DB = defined benefit; NDC = notional defined contribution; PAYG = pay as you go.

and high emigration rates, both of which help explain the reduction in pension spending in the future.

The rules governing pension systems play an important role in determining the size of the gap between payroll contributions and total spending on pensions. Some measures, such as increasing retirement ages, strengthening links between contributions and benefits (through the notional accounts or point systems),[14] and reducing the generosity of indexation postretirement, are expected to contribute to spending decreases. A comparison of country pension characteristics (see table 3.2) with the estimates in figure 3.22 reveals that pension spending is expected to fall as a share of total public expenditures in countries that have adopted notional accounts, like Latvia and Poland. Benefits are indexed to life expectancy at retirement and earnings growth so that they fall with the expected rise in life expectancy and the expected low growth of the real wage bill (due to shrinking number of contributors).

Nevertheless, some factors may counteract the effects of these measures to reduce pension spending. If life expectancy increases by more than the rise in retirement, the duration of retirement would go up. As wages tend to rise more rapidly than the general price level in growing economies, systems that index

benefits to inflation will result in a steady decline in individual benefits relative to wages over time. This, however, may not reduce overall benefits if new pensioners with higher benefits keep entering the system. In addition, cuts in benefit generosity are socially unsustainable and politically unpopular, and many countries opt for more gradual changes or offset the cuts with ad hoc pension increases, which undermines the projected spending declines. A deterioration in the relative income of pensioners may also discourage people from contributing to the system (Schwarz et al. 2014). Thus, reforms that increase the sustainability of pension systems should also be evaluated in the light of political and social considerations.

Public expenditures on health care and long-term care are also greatly influenced by population aging. However, assessing the impact of aging on these expenditures is a daunting task, largely because of the lack of consensus on what drives health care costs. On the one hand, demand for health services and long-term care tends to increase with age. Older people tend to consume more health care, because illnesses, chronic diseases, and hospital visits become more frequent in old age. For example, in Bulgaria, people in their 70s have the largest hospital costs per person (figure 3.23a).[15] Thus, as the share of the elderly increases in the population, public expenditures on health care could be expected to rise.

This analysis, which we refer to as the "pure demographic" approach, does not take into account two important considerations. First, the pure demographic assessment assumes that changes in the cost of health care reflect only changes in income and in the number of people in different age groups. However, a number of studies indicate that health care costs are associated mainly with proximity to death rather than with age (see, for example, Dormont, Grignon, and Huber 2006). Therefore, an increase in longevity would not necessarily increase health care costs if the additional years in one's lifetime are spent in good health. Second, health care costs may also be driven by technological advances in medical science. New treatment options may boost per capita health care expenditures at a rate faster than income growth.

Figure 3.23b shows the estimates for fiscal pressures arising under different scenarios for calculating health care costs in Poland. The *pure demographic scenario* reflects only the effects of an increase in the share of the elderly population and of income growth on future expenditures and revenues. *The healthy longevity scenario* assumes that future gains in life expectancy translate fully into increased years of good health. The *cost pressure scenario* assumes the growth of health care costs is 1.5 percentage points higher than the growth of GDP per capita through 2050. Finally, the *cost containment scenario* assumes that public expenditures on health care are driven by technological advances but that governments are able to limit the growth of health care spending to 0.5 percent above the growth of real GDP per capita up to 2050. Jabłonowski and Müller (2014) evaluate the degree of cost pressures of these different scenarios in terms of the sustainability gap, a term used to define the future imbalances in proportion to current incomes.[16] Overall, the healthy longevity scenario provides the most conservative estimates for the sustainability gap, at 53 percent of GDP. In comparison, the cost pressure scenario generates the largest sustainability gap, at 365 percent of GDP. The forecasts for the sustainability gap for the pure demo-

FIGURE 3.23 Public expenditures on health care are also affected by factors other than demographics

a. Hospital costs in Bulgaria, 2010

b. Health care scenarios in Poland, 2050

c. Health care expenditures in selected countries
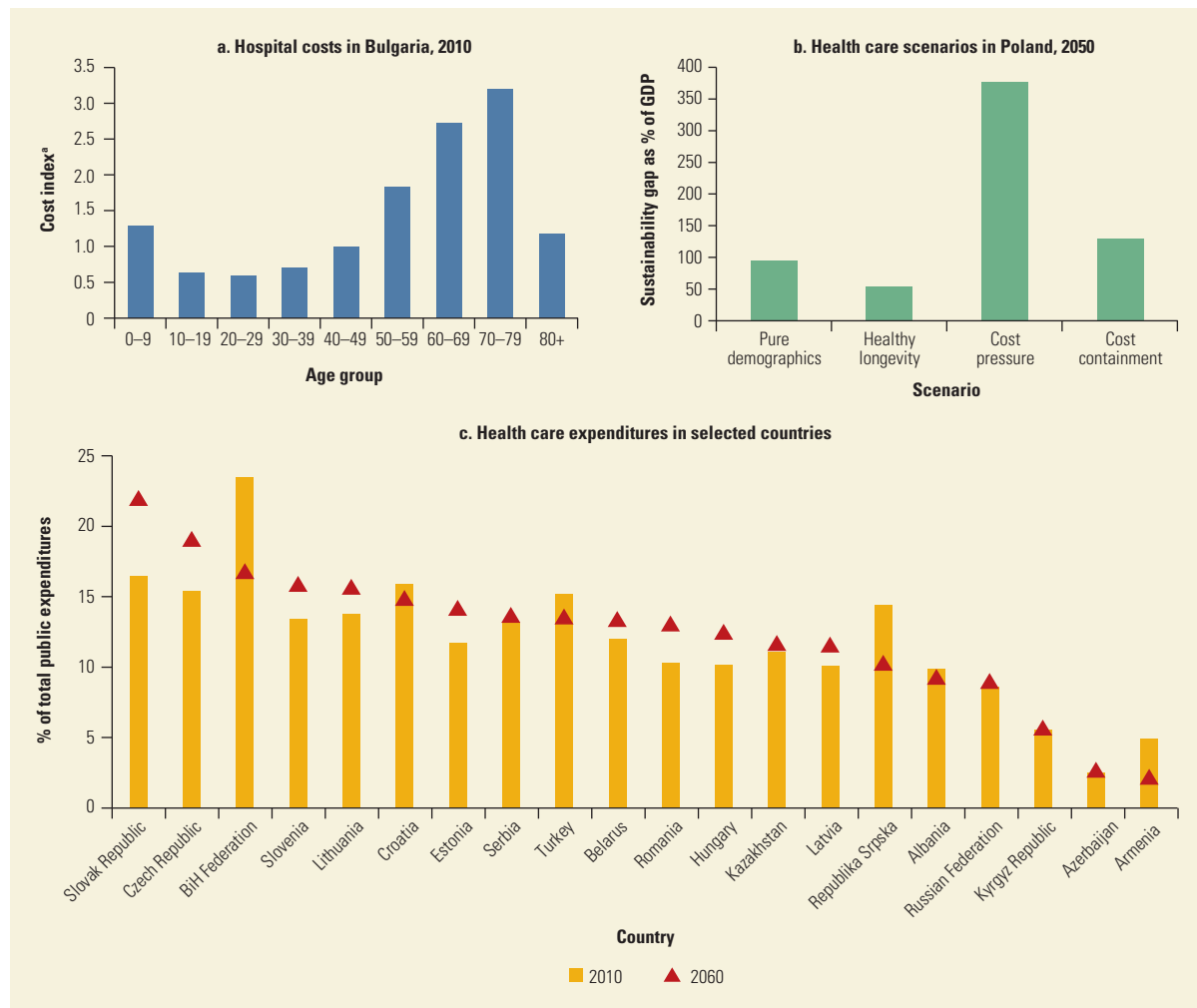
Sources: World Bank 2013a; Jabłonowski and Müller 2014; Bogetic et al. 2014.
a. Hospital cost per 40- to 49-year-old = 1.

graphic and cost containment scenarios are 94 percent and 140 percent, respectively.

Figure 3.23c presents the forecasts for the increase in health care expenditures from 2010 to 2060 for the region by using the healthy longevity approach. The Slovak Republic exhibits the largest increases (by an average of 4 percent of total public expenditures), while Albania, Armenia, Bosnia and Herzegovina, Croatia, and Turkey are expected to reduce the fiscal burden of health care expenditures (by an average of 2.5 percent of public expenditures). However, as discussed above, these estimates assume that technological improvements in medical sciences do not increase health care expenses. Therefore, health care costs are likely to increase more rapidly than forecast in this scenario.

Two other important effects of aging on public expenditures should be noted. First, population aging is likely to increase expenditures on long-term care. The share of the population that requires long-term care is likely to rise with aging. In addition, as the working-age population falls, individuals who might have left the labor force to become caregivers will feel more pressure to keep working. Thus, responsibility for the provision of long-term care is likely to shift from families, who currently provide the bulk of long-term care in ECA (see chapter 2), to become part of the implicit liabilities of government.

Second, the effect of population aging on public expenditures for education could either aggravate or partly mitigate the fiscal stress imposed by increases in pension and health care expenditures. On the one hand, if fertility declines, as is expected in the young countries of Central Asia, then the number of students requiring education will fall. This would have a dampening effect on public expenditures for education through pure demographic channels. On the other hand, efforts to boost the labor force participation of older workers could involve an expansion of training programs. Elderly workers will require greater flexibility and the ability to adapt to new technologies, so that they can more easily change careers over a longer working life as demand shifts. Moreover, children and youth may need better education to prepare them for a longer working career. Overall, it is unclear whether future education spending will fall because there are fewer children or even rise because there may be a greater need for both retraining and higher quality in education.

Putting Together the Pieces: An Example of Aging and Fiscal Balances in Bulgaria

Population aging affects public revenues and expenditures through multiple channels. A comprehensive analysis of all these influences for ECA as a whole is beyond the scope of this report. However, to show the joint impact on public finances of these multiple influences and, even more important, to highlight the relevance of behavioral adjustments, a detailed example for the case of Bulgaria is presented here.[17]

Bulgaria is in the middle of one of the most remarkable demographic transitions in the world. Its population rose gradually from 7.3 million in 1950 to 8.8 million in 1990 and decreased thereafter, to about 7.5 million in 2013 (figure 3.24). The United Nations Population Division projects that the population will fall to 5.5 million by 2050, the highest rate of decrease for any country in the UN projections.

The reduction in population has been driven mainly by rapidly decreasing fertility rates, stagnant life expectancy, and high emigration. The fertility rate steadily declined from 2.3 per woman in 1960 to 1.09 in 1997, which is the lowest fertility rate ever recorded for a European country in peacetime (World Bank 2013a). The fertility rate has since recovered to 1.5, still well below the replacement rate. Life expectancy at birth rose by only four years (from 70 to 74) over the past five decades and remains one of the lowest in Europe. Finally, emigration has contributed to aging, reducing the total population by 6 percent since 1990. Overall, these factors have resulted in a rise in the old-age dependency ratio from about 0.1 in 1950 to 0.27 in 2010 (see figure 3.24).

Bulgaria is experiencing one of the most remarkable demographic transitions in the world

Legend:
- Ages 0–14
- Ages 15–64
- Ages 65+
- Dependency ratio (right-hand side)

Chart: Historical / Projections. Left axis: Population, millions (0–10). Right axis: Old-age dependency ratio (0–0.7). Horizontal axis: Year 1950–2050.
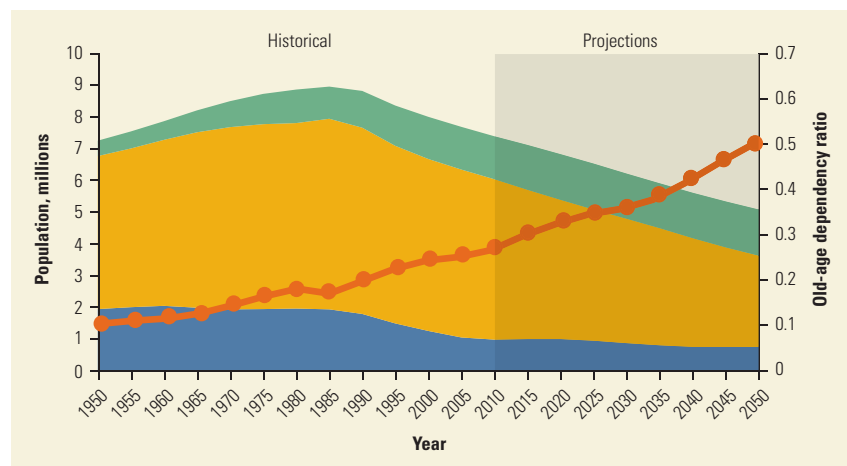
Source: World Bank 2013a, using data from World Population Prospects: 2012 Revision.

The aging of Bulgaria's population—coupled with assumptions about labor force participation by age cohort, growth, and the sensitivity of fiscal outcomes—results in an initial decline in age-related public expenditures as a share of GDP, followed by some increase in the long term. However, the limited increase in expenditures by 2050 is driven by a reduction in education expenditures due to a decline in the number of students, while expenditures on health care and pensions increase sharply as a share of GDP. This expenditure pattern results in a small, but persistent, primary deficit throughout the forecast period and a sharp rise in the debt burden (the base case projections are described in annex 3C).

Changes in policy to encourage greater labor force participation, coupled with behavioral changes in response to increasing life expectancy, could reduce the fiscal pressures from aging. The medium fertility variant of the UN population forecasts anticipates that life expectancy at the age of 60 will rise by three years from 2010 to 2050. Increasing longevity could induce longer work lives, and thus labor force participation of the elderly could increase going forward.

An alternative scenario explores the consequences of a rise in the mandatory retirement age and related behavioral adjustments to increased longevity. One way of building such a scenario is to assume that labor force participation rates for all age groups and both genders in Bulgaria will reach the rates in countries with high labor force participation rates such as Iceland, Norway, Sweden, and Switzerland. The rise in labor force participation in this scenario (figure 3.25a) greatly slows, although it does not fully erase, the decline in employment driven by population aging. As a result, employment in the high labor force participation scenario exceeds that of the baseline by about 20 percent in 2050 (figure 3.25b).

Overall, higher labor force participation results in higher incomes and lower age-related public expenditures than in the base case. Per capita GDP in 2050 is 20 percent higher than the baseline (figure 3.25c). Public expenditures on health care are slightly higher than the baseline, because of the more rapid growth in GDP and the assumption of an income elasticity of the demand for health care that slightly exceeds 1. However, budget transfers to the pension fund as a share of

FIGURE 3.25 Higher labor force participation will improve employment, GDP, and the fiscal position

a. Labor force participation

x-axis: Age group (15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–69, 70–74)
y-axis: % of population (0–100)

— 2012
— 2050, baseline
— 2050, high labor force participation

b. Employment

x-axis: Year (2012–2050)
y-axis: % difference (0–25)

— Employment rate: % difference, high scenario vs. baseline

c. GDP growth rates and levels

x-axis: Year (2012–2050)
left y-axis: GDP per capita growth, % difference (0–0.8)
right y-axis: GDP per capita level, % difference (0–20)

--- GDP per capita growth: Difference, high scenario vs. baseline
— GDP per capita level: Difference, high scenario vs. baseline

d. Primary balance

x-axis: Year (2012–2050)
y-axis: Percentage point difference (−0.05 to 0.20)

— Difference, high scenario vs. baseline

e. Debt burden

x-axis: Year (2012–2050)
y-axis: Percentage point difference (−9 to 1)

— Difference, high scenario vs. baseline

Source: World Bank 2013a.

GDP fall by about 18 percent by 2050, as higher labor force participation means a rise in the number of contributors and a decline in the number of beneficiaries. In addition, higher levels of employment mean that real wages grow somewhat slower than in the baseline despite more rapid growth in GDP per capita. As pension benefits are indexed to real wages, the slower growth in real wages in the higher labor force participation scenario results in a more limited rise in pension expenditures. As expected, increasing labor force participation also brings about an improvement in the overall fiscal position. The primary deficit declines slightly in the higher labor force participation scenario, while GDP growth increases, so that the debt burden in 2050 falls from 51.3 percent in the baseline to 43.7 percent (figure 3.25d, 3.25e).

Overall, these results suggest that behavioral adjustments and policies aimed at increasing labor force participation can play a significant role in limiting the fiscal pressures arising from population aging, as well as improving living standards and generating more resources for education and health care. This win-win characteristic does not hold for some other policy tools available to the government.

Annex 3A: Brief Description of the Overlapping Generations Model

Overlapping generations (OLG) models mimic an economy in which multiple generations, at different stages of their life cycle, contribute to economic activity by supplying labor, saving, and investing and also interact with firms and government. The seminal contribution to the vast literature applying this type of model is Diamond (1965). Ever since, the same modeling principles have often been used to study the economic effects of aging, reforms of pension systems, and taxation of inheritance, among other economic issues. An early example in the context of a policy reform is Auerbach and Kotlikoff (1987). Several studies have also used the OLG model to assess the economic consequences of population aging in closed economies in the context of social security system reform; see, for example, Huang, İmrohoroğlu, and Sargent (1997); De Nardi, İmrohoroğlu, and Sargent (1999); and Abel (2003). Following this tradition, an 80-cohort OLG model was built for this report to study the economic effects of population aging. This short annex presents the main features of the model. A fuller description and an application to Russia is found in Bussolo, Panterov, and Bukowski (2015).

Firms

A representative firm produces a single good used both in consumption and investment. The firm owns the capital in the economy and hires labor from the population. The firm is a profit maximizer and optimally combines capital and labor during production of its output, which is then sold and generates revenues. Out of the revenues, the firm pays for the labor costs incurred during the production process and invests to accumulate more capital for future production. Profits are distributed proportionally among the shareholders, who are the consumers in the economy.

Consumers

There are 80 age cohorts of varying sizes populating the economy at any given period. Each cohort in the model can be thought of as a representative forward-looking agent of a certain age. Agents derive utility from consumption and leisure. Choice between the two is determined through the optimization of an intertemporal (lifetime) utility function that satisfies the budget constraint. There is no inheritance in the model, so that consumers are required to exhaust their accumulated savings by the end of their life.

Each agent in the model receives a labor income that depends on the current wage (determined by the firm), labor supply (determined from the agent's utility optimization), and the human capital with which the agent is endowed (determined exogenously and varying by age group). The labor income is used to pay for current consumption and to save for future consumption. Savings are in the form of firm shares, which represent claims on the firm's future profits. Agents can also reduce their savings if they want to increase their consumption (this is what typically happens in the later stages in life). All agents retire at the mandatory retirement age after which their income is derived from pensions, other transfers, and sales of assets.

Government

Government in the model collects taxes and pays pension benefits. The government taxes labor income, and its revenues are distributed between payments to the retirees and other transfers (a residual used to balance the government accounts). The pension system is a mandatory pay-as-you-go system. The government in this model runs balanced budgets by adjusting the residual transfers in every period.

Equilibrium, Steady State, and Transition

Aggregate savings and income in the economy as well as the per capita values of labor supply, incomes, consumption, and savings for the different age groups are the main endogenous variables generated by the model. Its main parameterization consists of consumers' preferences, production technology, and the age profile of human capital.

Given this parameterization, the model produces a steady-state solution where every agent has optimized its utility (and for firms their profits). However, the model is especially useful for studying deviations from the steady state and the dynamic effects generated by an exogenous shock to the economy. In particular, it is used to study the aging of the population derived from either a reduction of the fertility rate or an increase in longevity. The model then traces the effects of aging on wages, savings, inequality, and other variables of interest. The dynamic nature of the model allows an examination of how long it takes the economy to return to the steady state or, in other words, how persistent the shocks can be.

Annex 3B: Population Aging and the Labor Force

Effects of Unchanged Behavior on Dependency Ratios

The main text argues that behavioral changes in response to improved longevity, in particular higher savings and labor force participation, will enable countries in the region to improve the sustainability of their benefits systems. This annex explores some of the drivers of changes in labor force participation in aging societies and the implications for dependency ratios.

Assuming that labor force participation and education across gender and age groups continue on the current trajectory through 2030 and remain unchanged thereafter, ECA—particularly the older countries of Central Europe—are bound to lose a significant share of their labor force over the next 40 years.[18] At the same time, the share of inactive people, especially those in retirement, would significantly increase, raising serious fiscal concerns. If fewer and fewer people work, pay taxes, and make contributions, while more and more people are dependent on public services such as health care and benefits, including pensions, how can these public services be sustained? If the labor force participation stays as is, dependency ratios—here measured as the ratio of the inactive to the active in the population aged 15 and older—will deteriorate considerably.

If participation rates across age groups and gender remain unchanged after 2030, the labor force in ECA will shrink by about 22 million workers between 2010 and 2050. The biggest decline will occur during the 2020s, when the younger labor force, aged 15–39, is expected to shrink by more than 17 million workers (figure 3B.1). This period will be followed by large declines in the prime-aged labor force, aged 40–64, during the 2030s and 2040s. The total projected decline of 22 million workers hides key changes in the age structure of the labor force. The younger part of the labor force will actually decrease by over 28 million workers, but this loss in younger workers is somewhat counterbalanced by an expansion in
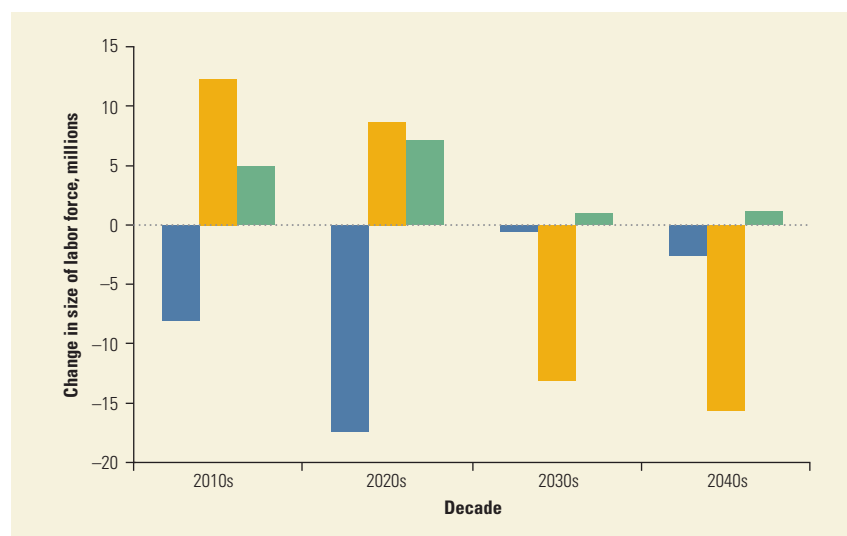
FIGURE 3B.1
The size of the labor force in Europe and Central Asia is expected to shrink with aging

■ 15–39
■ 40–64
■ 65+

Sources: World Bank calculations based on ILOSTAT Database and World Population Prospects: The 2012 Revision.

the older labor force, aged 65 and older, by over 14 million workers during the same period. In short, the assumption of unchanged behavior after 2030 involves a considerable decline in the number of workers and substantial aging of the labor force.

There are important differences in how the demographic transition will affect the labor force across subregions in Europe and Central Asia, assuming that the behavior of labor force participants remains unchanged after 2030 (figure 3B.2). Central Europe and the Baltics and the Eastern Partnership and Russian Federation face severe declines in the labor force over the next 35 years. The declines in the younger labor force in these countries are still accelerating and will reach a peak during the 2020s. This period will be followed by large drops in the prime-aged labor force during the 2030s and 2040s. Central Europe and the Baltics will experience an expansion in the oldest labor force throughout the forecast period, while the oldest labor force is not expected to expand in the Eastern Partnership countries and Russia (in part because of worse health status and lower life expectancy). Overall, the labor force is expected to decline through 2050 by 8 million workers in Central Europe and the Baltics and 30 million workers in the Eastern Partnership and Russian Federation.

The Western Balkan countries are at an earlier stage of the demographic transition. These countries are expected to start losing large numbers of younger workers starting in the 2020s, which will translate into a big drop in the number of prime-aged workers during the 2040s. The labor force of the young countries is expected to grow considerably across all age groups until the 2030s. Only during the 2040s will this growth come to a halt.

By contrast, the more developed countries of the European Free Trade Association and the EU-15 are furthest along in the demographic transition; they are expected to experience a large but slowing drop in the share of younger workers in the labor force during the 2010s and 2020s. At the same time, their oldest labor force is expanding already and will grow even more during the 2020s. During the 2030s and 2040s, when the largest overall declines in the labor force are expected to occur, these countries will experience large decreases in the prime-aged labor force, while the younger and older parts of the labor force will remain mostly unchanged. Nonetheless, because of the expected sizable expansion in the older labor force up to the 2020s, the overall impact on the size of the labor force in these countries will be relatively modest: there will be only about 5 million fewer workers by 2050.

The Effect of Changes in Behavior on the Working Population

Behavior should not be taken as given. Changes in behavior that affect labor force participation, which in part may occur in reaction to improvements in longevity but can also be encouraged by policy reform, could limit, or even reverse, the anticipated loss of workers and subsequent increase in the population share of inactive people. Recent data already show a reversal in the declining trend in the effective retirement age that had been observed all over Europe beginning in the 1970s. In fact, since the 1990s, employment rates among workers older than 55 have been rising. It appears that, after the exceptional years of expanding populations that

FIGURE 3B.2 Aging and the related reduction of the labor force will be different across country groups in the region
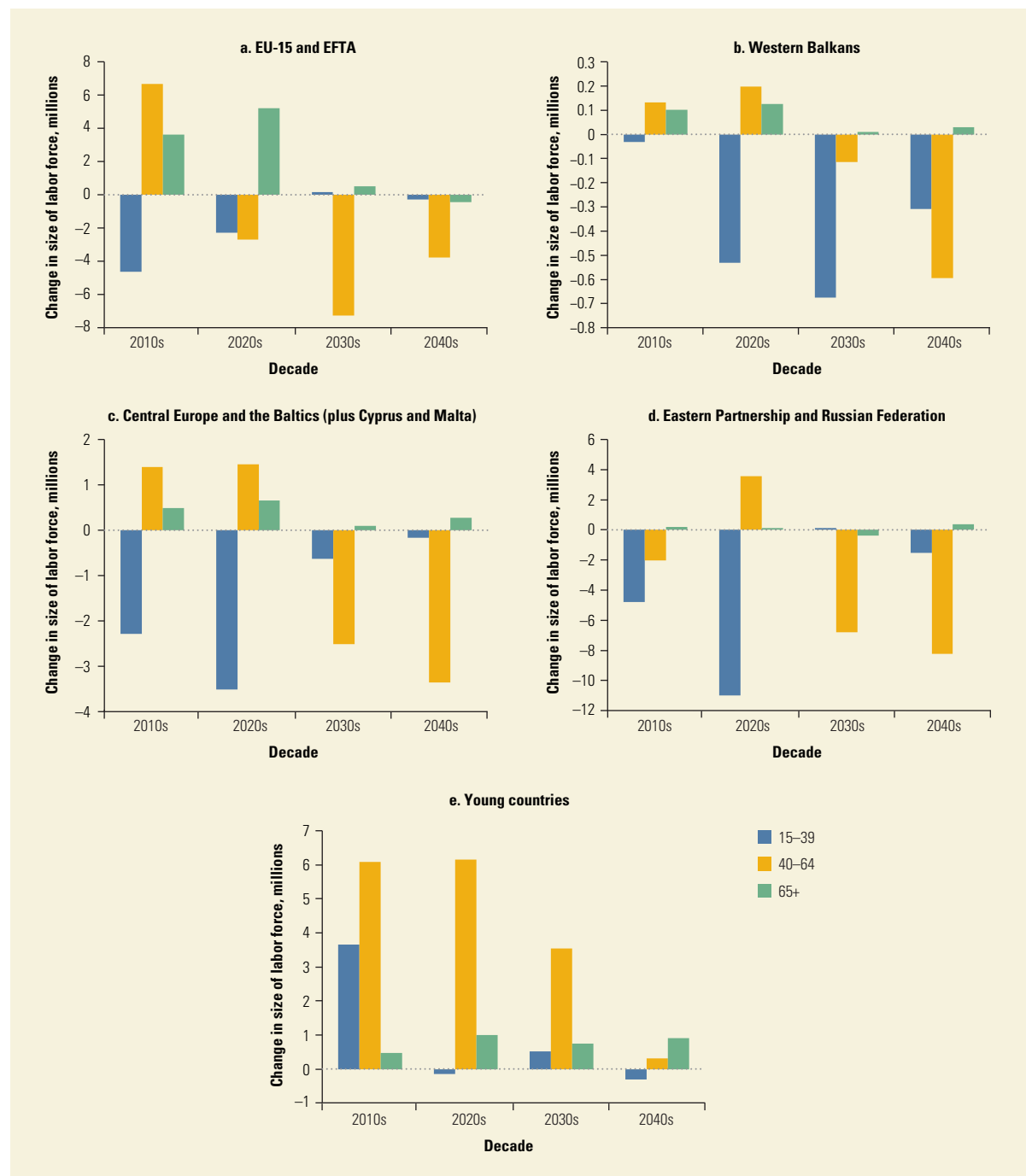
Sources: World Bank calculations based on ILOSTAT Database and World Population Prospects: The 2012 Revision.

allowed governments to make pension benefits more generous through early re-tirement options, there is now a return to a more normal span in the working life that is in tune with increasing life expectancy. In the future, 75 could indeed become the new 65, redefining the working age in line with longer lives and
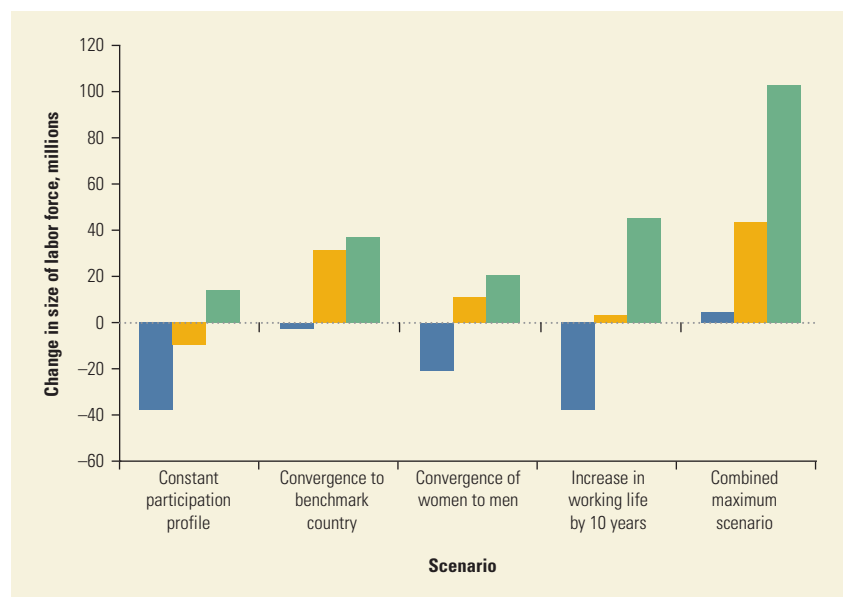
Sources: World Bank calculations based on ILOSTAT Database and World Population Prospects: The 2012 Revision.

improved health. Thus, a narrowing in the labor force and growth in the inactive population are not a given, if aging societies manage to translate longer life expectancy into longer working lives.

Nevertheless, the nature of the demographic transition means that the increase in the number of workers due to behavioral changes will be found largely among older age groups, while the biggest decline will be among younger workers. This aging of the labor force underlines the importance for older workers of the desirable characteristics usually found among younger workers: a good education, dynamism, an eagerness to learn, and innovation. Thus, improving the quality of education and skills development at all ages of life is critical to cushioning the potential impact of aging on the economy.

Extending the working lives of older age groups could markedly increase the size of the labor force over the next 35 years, albeit at the cost of a substantially older labor force. Figure 3B.3 shows how the total labor force of the region would change under various scenarios. In the first scenario, which assumes that recent trends in labor force participation profiles continue until 2030 but remain unchanged thereafter, the total labor force in ECA declines by 22 million. The other four scenarios assume substantial behavioral changes:

- If participation profiles by age and gender in each country converge toward the profile of Iceland today, by 2050 there would be almost no drop in the younger labor force, and the prime-aged and older labor force would expand considerably.

- If the profiles of female labor force participation were to converge toward those of men in each country, the labor force would rise by about 10 million workers. The drop in the younger labor force would still be large, and the expansion of

FIGURE 3B.4 Projected changes in the size of the labor force strongly depend on how people adapt and will vary across the subregion, 2010–50

Sources: World Bank calculations based on ILOSTAT Database and World Population Prospects: The 2012 Revision.

the prime-aged and older labor force would be less pronounced than in the previous scenario.

- If working life were to be extended by 10 years between 2030 and 2050 in each country, the drop in the younger labor force would remain unchanged relative to the first scenario (with a constant labor force participation rate). However, the expansion among older workers would more than offset the drop in the younger labor force.

- Finally, as a thought experiment, the combined maximum scenario presents the potential rise in the labor force if, by 2050, men and women were participating in the labor force as men do in Iceland today, but with an extension of the working life by 10 additional years. Under such an optimistic scenario, the labor force at all age levels would increase, including by more than 100 million workers in the 65+ age group.

The change in labor force participation varies widely across subregions (figure 3B.4 on the previous page). In all five scenarios, the labor force in the young countries (Turkey and Central Asia) would increase. However, in every scenario except the most optimistic one, the labor force in Central Europe and the Baltics, the Eastern Partnership and Russian Federation, and the Western Balkans would fall, and the younger and prime-aged labor force (ages 15–64) would fall sharply. Thus, increases in the number of older workers are essential to preventing significant declines in the labor force across the region. The only way to avoid both a fall and a substantial aging in the labor force would be through a large rise in immigration by younger workers (see chapter 1). By contrast, the more developed countries in the EU-15 and EFTA would experience a rise in, and a substantial aging of, the labor force in every scenario except that assuming no change in behavior.

Annex 3C: Aging and Public Expenditures in Bulgaria in the Base Case Scenario

The first step in analyzing the interaction between Bulgaria's demographic changes and their likely implications for macroeconomic and fiscal outcomes is to understand how the size of the labor force will evolve. To this effect, a detailed analysis of labor force participation rates across age and gender was carried out. In the baseline scenario, participation rates are assumed to increase until 2020 and remain constant for each age group and both genders after that.

The medium-term increase in the participation rate is motivated by a legislated reform at the time the analysis was prepared. The retirement age for men was increased from 63 to 63 and four months and for women from 60 to 60 and four months. As a result, the labor force participation rates of men and women between 60 and 64 were projected to increase from 41.5 percent to 51.2 percent and from 18.4 percent to 23.3 percent, respectively. Figure 3C.1a shows the results for labor force and employment projections, where the initial unemployment rate of about 12 percent is assumed to reach its long-term potential level of 5 percent by the mid-2030s.

In addition to the changes in the labor force, projections for GDP growth are shaped by a two-factor system. First, capital per worker is determined by the principle of equality of risk-adjusted returns in an open-economy environment. This argument is based on the observation that capital flows in and out of Bulgaria have been significantly higher than the ones in Central Europe and the Baltics and EU averages, as shown by Onder, Pestieau, and Ley (2014). Moreover, the risk perceptions that create a wedge between the returns to capital in and out of Bulgaria are assumed to fade away gradually as the income level rises. Second, growth rates of total factor productivity are assumed to stabilize at the long-term value of 1.2 percent, which is marginally more optimistic than the projections provided by the European Commission (2012). This rate facilitates Bulgaria's gradual convergence of productivity with the rest of the European countries. Figure 3C.1b shows that GDP growth is projected to reach 2.6 percent in 2016. It then decreases gradually to about 1 percent in the early 2040s and continues to decline to 0.7 percent by the end of the projection horizon. In comparison, per capita GDP growth reaches a peak of 3.3 percent in 2016 and gradually slows to about 1.5 percent by 2050.

A decomposition exercise shows that both the growth of total factor productivity and additions to capital stock contribute significantly to the growth of per capita GDP over the projection horizon (figure 3C.1c). Although the working-age population decreases throughout the projections, recovery from high unemployment rates in the beginning of the projections leads to an initial increase in the employment ratio. As a result, the change in the employment ratio contributes positively to growth. This shows that the short-term and long-term economic dynamics of an aging society may differ substantially.

Figure 3C.1d shows the evolution of age-related public expenditures. Health care expenditures as a share of GDP rise throughout the projection period, climbing from 4.1 percent in 2012 to more than 5.1 percent by 2050. This increase is driven by two factors. First, a pure demographic effect pushes the expenditures up as public health care expenditures per person are higher for the elderly. Second, health care is assigned an income elasticity of demand slightly greater than 1 (1.15) in order to incorporate the possibility that health care costs are correlated with access to frontier technology. Thus, economic convergence would eventually mean that Bulgaria's public health care expenditures as a share of GDP will also eventually catch up with other European countries. Transfers from the general budget to the pension fund, which are projected by the PROST (Pension Reform Options Simulation Toolkit) tool of the World Bank, closely follow the dynamics of contributor and beneficiary numbers: a small decrease from about 6.1 percent of GDP in 2012 to about 4.9 percent in the medium term, followed by an increase to about 5.6 percent by the end of the projection horizon. Finally, public education expenditures decline from 4.6 percent of GDP in 2012 to 3.2 percent by 2050, following the decrease in student numbers.

Bulgaria's demographic transition is expected to lead to relatively small but persistent primary deficits (figure 3C.1e). With the exception of a small improvement in the middle of the projection horizon, primary deficits remain between 0.5 and 1 percent of GDP in each year. A Monte Carlo simulation shows that the spread around expected values remains within a ±0.6 percentage point band, with

FIGURE 3C.1 Without adjustments, the economic and fiscal situation is expected to deteriorate

a. Labor force and employment

Legend:
Unemployment
Baseline labor force
Baseline employment

b. Growth rates

Legend:
GDP
GDP per capita

c. Contributions to per capita GDP growth

Legend:
Total factor productivity
Employment ratio
Capital stock
Human capital
Population

d. Age-related public expenditures

Legend:
Pension fund transfers
Health care
Education

e. Primary balance

Legend:
99%
95%
90%
75%
Mean

f. Debt burden

Legend:
99%
95%
90%
75%
Mean

Source: World Bank 2013a.

a 90 percent degree of confidence.[19] As a result of protracted primary deficits and accompanying debt dynamics, the debt-to-GDP ratio increases from its current level of about 18 percent to about 51 percent by 2050 (figure 3C.1f). The spread around the expected value is about ±5 percentage points in 2050. Although it remains within the 60 percent limit defined by the Maastricht Criteria, these debt levels imply a substantial deterioration of fiscal space in Bulgaria.

Notes

1. The size of the economy may affect welfare, in part because some activities may enjoy increasing returns to scale, so that a larger market would boost productivity. That issue is not considered here.
2. These two shocks do not have mirror-image effects on employment. Even if the population were to increase and decrease by the same absolute amount in the two scenarios, the age structure of the population would shift differently across the scenarios. Correspondingly, the changes in employment would not be the same (in absolute values) in a fertility reduction or an improved longevity scenario.
3. This can be generalized to investments in education. With smaller cohorts of students, a contraction in education spending does not result in a reduction in education expenditure per student.
4. This is in line with the data. For example, if one applies the stylized OLG model to the case of the Russian Federation, one would find that over the last 17 years of observable data (from 1994 to 2012), the average age of workers in this country rose by about one year.
5. For more details on this topic see World Bank (2013b). A large literature, taking into account international links (trade and capital flows), reassesses the impact of cross-country demographic changes on various economic issues. Using models similar to the one of this report, several studies analyze the viability of social security systems (Aglietta et al. 2007; Attanasio, Kitao, and Violante 2006, 2007; Börsch-Supan, Ludwig, and Winter 2006; Fehr, Jokisch, and Kotlikoff 2003). Others (for example, Krueger and Ludwig 2007) study the impact of demographic forecasts on the distribution of wealth and welfare in OECD countries. Other studies adopt an ex post approach. For example, using calibrated life-cycle models, Domeij and Flodén (2006), Feroli (2003), and Henriksen (2002) find that changes in demographics explain a large part of historical current accounts.
6. Compared with this earlier work, the later findings of Bloom, Canning, and Graham (2007) also account for the differences in incentives across pension systems and social security arrangements. They estimate that, in countries with universal pension coverage and retirement incentives, an increase in life expectancy by 10 years is associated with a rise in the saving rate by about four percentage points. This positive effect disappears, however, in countries with pay-as-you-go systems and high replacement rates (50 percent or more of earnings).
7. Johnson (2000) finds that only 11 percent of the decline in the labor force participation rates of U.S. men aged 60–64 from 1920 to 1990 can be attributed to increases in old-age insurance. Duval (2003) finds that changes in implicit tax rates and retirement ages explain only a third of the decline in labor force participation among older men in the OECD over the past three decades and concludes that demand-side factors must also be important.
8. Because of concerns that unobserved individual characteristics might influence both earnings ability and reservation wages, one might worry about drawing causal interpretations between pension receipt and retirement.

9. These scenarios are based on the medium fertility variant of the UN population projections (see box 1.6 in chapter 1). Each scenario has the same assumptions for fertility and mortality but varies the assumptions for labor force participation rates.

10. Data represent 2003 for Germany and 2004 for Slovenia. Estimations are provided for a limited number of countries, and typically for a single year, by the National Transfer Accounts. Similar patterns of consumption and labor income are observed all across the sample.

11. Starting with Bergstrom and Goodman (1973), this literature provides estimates for the income elasticity of private demand for publicly provided goods and services. Bergstrom and Goodman found these elasticities to be positive for both municipal and policing services (the only categories that were analyzed) in all U.S. states and greater than one in some of them.

12. Braun, Ikeda, and Joines (2009) estimate that aging is responsible for 2–3 percent of the 9 percent decrease in Japan's national savings between 1990 and 2000. They anticipate that savings will remain depressed due to aging in the forthcoming decades.

13. Introducing regional dummies (1 for Central Asia and Armenia and Georgia, 0 for others) weakens, but does not eliminate, the positive effect of old-age dependency on the share of age-related fiscal revenues in GDP. In this case, a 1 percentage point increase in the old-age dependency ratio leads to a 0.4 percentage point increase in the share of tax revenue in GDP.

14. Notional accounts mimic a defined contribution plan where pension benefits depend on contributions and notional investment returns that are set by the government. In a points system, in contrast, the pension benefits are calculated by weighting the contributions with the "cost of the pension point," which is chosen by the government. In both cases, the policy variables allow adjustments in pension benefits to ensure the sustainability of the social security system.

15. Goryunov et al. (2013) use a similar distribution based on data from Sweden to project health care expenditures in Russia.

16. The sustainability gap measures public liabilities in relation to the base year GDP. It considers both the outstanding debt at the time of projections and future public debt (implicit debt) while holding underlying debt policies constant going forward.

17. This discussion reflects a study requested by the Bulgarian minister of finance in October 2012 (World Bank 2013a). Technical details for the simulation model are described in Onder, Pestieau, and Ley (2014).

18. The labor force projections and scenarios follow a methodology developed by Koettl (2008) and subsequently applied and refined by Gill and Raiser (2012) and Schwarz et al. (2014).

19. The Monte Carlo simulation employs total factor productivity growth shocks that are identically and independently distributed over time, with a zero mean and 0.75 percentage point standard deviation.

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4

The Effects of Aging on Productivity: Diverse, Not Alarming

Introduction

The age structure of the workforce affects aggregate productivity in many ways. One channel is through the effect of age on the productivity of workers in firms. But there is more to growth in aggregate productivity than what happens within existing firms. First, the movement of labor from less productive to more productive firms—for example, to industries that have gained from shifts in technology or global competition—can be a source of overall productivity growth. Second, aging may affect workers' ability to generate new ideas for products, production processes, and firm management (from within or outside firms), which are also important sources of productivity growth. Finally, aging may affect the ability of workers to become entrepreneurs, and new firms are a source of innovation and competitive pressure on incumbents. The evidence suggests that the impact of aging on the dynamic channels of mobility, innovation, and entrepreneurship are more significant and, where such channels are weak, more worrying than the effect of worker age alone on a firm's productivity.

It is also possible that age does not determine an absolute productivity advantage or disadvantage, but rather suggests a pattern of comparative advantage across activities. The old may be better than the young at certain things, but worse at others. New research on the effects of aging on international trade suggests that this is the case. If so, understanding the latent comparative advantage of aging and how to harness this potential will be important.

Many of the potential effects of an aging workforce are not captured by changes in productivity as individual workers age. Measurements of the productivity of an inventor or entrepreneur, for instance, do not capture all of his or her positive effects on the productivity of others. If the aging of a workforce affects rates of invention or entrepreneurship, then its total effects on competitiveness could be much bigger than the effects suggested by the age-productivity profile of an individual. Estimates of the economywide effects of workforce demographics are, in fact, bigger than the results implied by individual age-productivity profiles (Feyrer 2008). Hence, besides examining the relationship between age and worker productivity, one should examine how an aging workforce could affect mobility, entrepreneurship, innovation, and comparative advantage.

Transient Effects of Aging on the Productivity of the Workforce

Higher age is associated with a deterioration in some skills. However, some seemingly inevitable effects of aging could, in fact, reflect issues specific to an older cohort of workers rather than the process of aging that will at some point affect younger cohorts. For example, 30-year-olds in 1984 may have lacked certain skills that 30-year-olds today possess. Suppose the former, who are 60 years old today, still lack these skills. This is a cohort effect. It would be wrong to interpret the lack of these skills in today's 60-year-olds as a long-term effect of aging, because those who will be 60 years old in 30 years' time will not lack these skills. There is evidence in the medical literature that future cohorts will do better as they age. In developed countries such as the United Kingdom, the relationship between age and certain age-sensitive cognitive skills has become less negative in more recent cohorts, possibly because of better health and education at younger ages (Skirbekk et al. 2013).

In Europe and Central Asia, as in other developing regions, the rise in average educational levels in successive cohorts is a particularly important cohort effect. The rates of completed tertiary education are considerably lower among older cohorts in many countries in the region (figure 4.1). This gap is less pronounced in richer countries, such as the Czech Republic, than in poorer countries, such as Turkey. Thus a simple comparison of younger and older workers today, without adjusting for educational differences, could give a misleadingly pessimistic impression of the long-term effects of aging. In the future, the region will still have older workers, but these workers will also be better educated.

Even after the data are adjusted for educational attainment, a cross-sectional comparison of the productivity of old and young workers could lead to incorrect conclusions. Figure 4.2 shows the occupational distribution of the employed population with less than a college education in Poland in 2010. Poland is used as an example because its labor force patterns are fairly representative of aging middle-income countries in Europe and Central Asia. As the figure shows, older workers tend to be concentrated in the primary sector; thus, the average agricultural worker is markedly older than the average services or manufacturing worker. Clerical and ordinary service sector workers, in contrast, are the youngest.

FIGURE 4.1
The rates of completed tertiary education are considerably lower for older workers in many countries in the region, 2010

■ 25–34
■ 55+
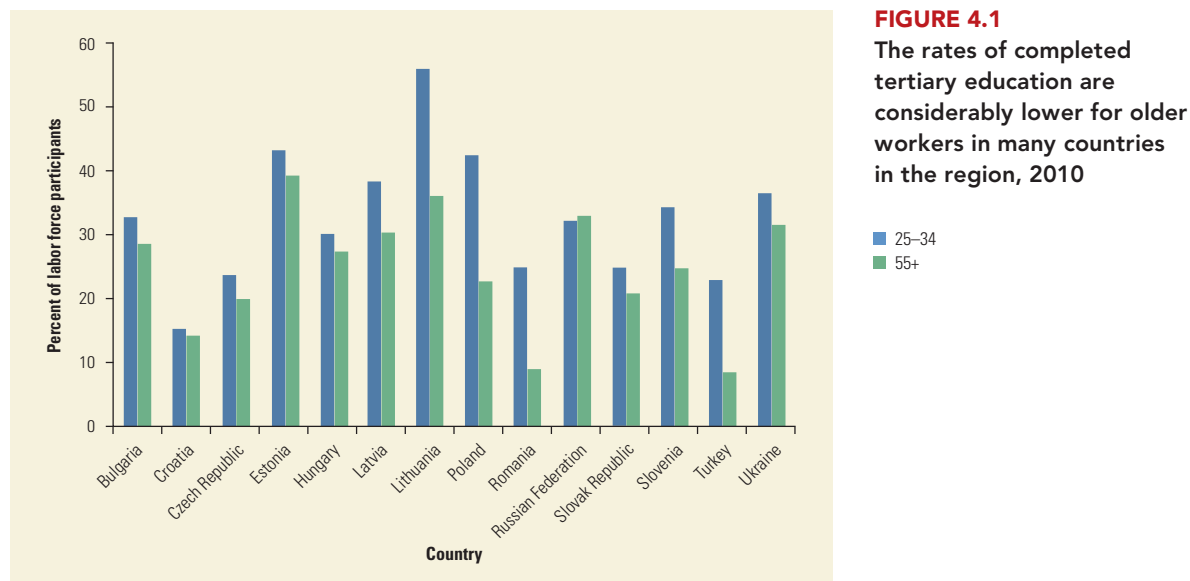
Source: World Bank calculations based on EU LFS.

FIGURE 4.2 **Older nontertiary graduates work in agriculture more than in services or manufacturing, Poland, 2010**

■ 55+   ■ 35–54   ■ 20–34
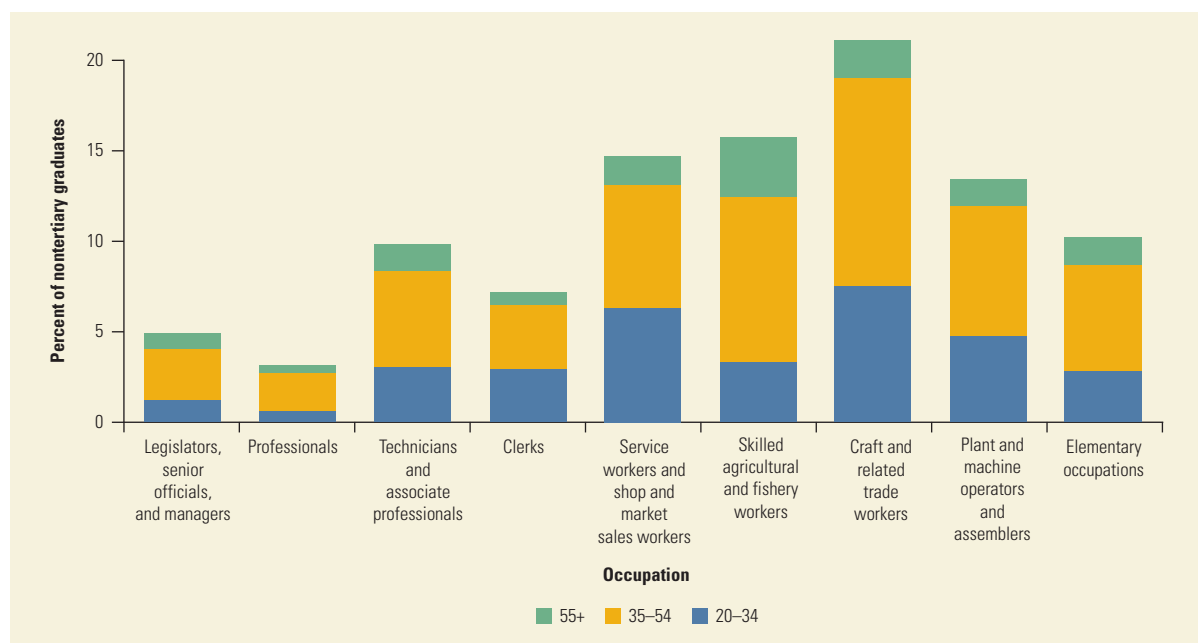
Source: World Bank calculations based on EU LFS.

Since the average age of workers in agricultural and elementary sectors is older than in the service sectors, one might conclude that younger workers are relatively more productive in service sectors, that is, that productivity in service occupations declines with age. This would be incorrect. Because labor demand shifts away from the primary sector as a country develops, the comparative youth of tertiary occupations likely reflects a cohort effect (that is, progressively younger cohorts

FIGURE 4.3

No significant change has occurred in the occupational pattern of cohorts, Poland

■ 2003
■ 2008
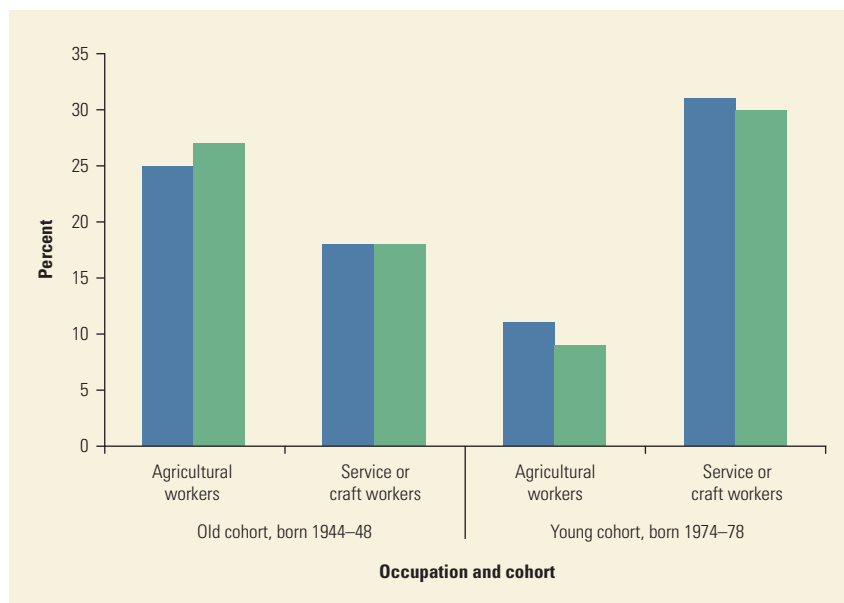
Source: World Bank calculations based on EU LFS.

are ever more likely to enter nonprimary sectors). This cohort effect is revealed in figure 4.3, which uses panel data to track two Polish cohorts, one young (born in 1974–78) and the other old (born in 1944–48) over a five-year period (2003–08). If the relative youth of service sector occupations is truly an age effect, then one could expect both cohorts to be moving away from services into agricultural occupations as they age. But, as the figure shows, there is no significant change in the occupational pattern of either cohort between 2003 and 2008. The younger cohort was less likely to be in agricultural occupations, but in both periods.

Given the likelihood of such transitory cohort effects, one should be careful in drawing conclusions from cross-sectional comparisons of young and old workers in the region. Detailed analysis of occupational patterns carried out as background work for this report suggests that the observed cross-sectional patterns are usually a mix of counteracting cohort and age effects. This makes it difficult to tease out the long-term effects of aging. Most of the evidence discussed here is therefore taken from research conducted in other (mostly Organisation for Economic Co-operation and Development, OECD) countries. The lessons from this body of research, especially those studies that are careful about separating the long-term effects of aging from cohort effects, are more relevant to Europe and Central Asia than naive extrapolations from current patterns.

The Stability of the Human Capital Stock and the Labor Force

The younger generations entering the labor markets of Europe and Central Asia now (and over the past 20 years) have (and have had) much higher levels of educational attainment than the generations exiting the labor market because of age. Thus, a decline in the labor force does not necessarily imply a decline in the stock of human capital. Indeed, the stock of human capital, as measured in total years
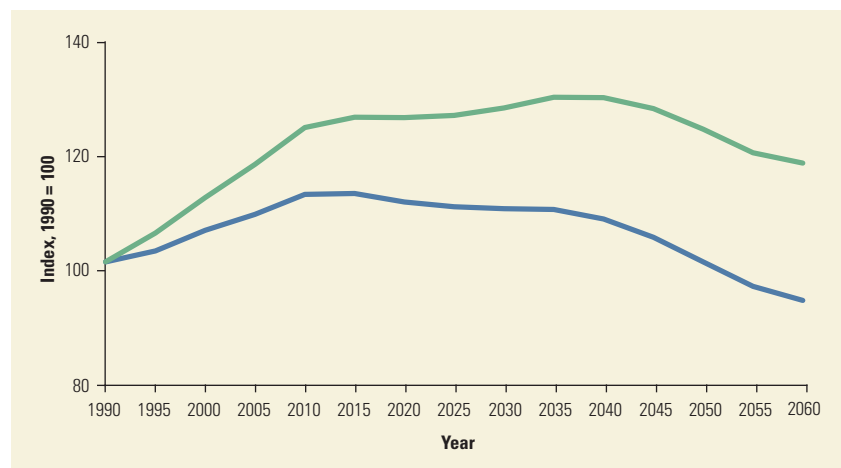
FIGURE 4.4

The stock of human capital has expanded more than the size of the working-age population in Europe and Central Asia over the past 20 years

- Working-age population
- Stock of years of education

Source: World Bank calculations based on Lutz, Butz, and KC 2014.

of schooling among the working-age population (15–64 years), has expanded much more than the size of the working-age population over the past 20 years (figure 4.4). Yet, even with an ever-increasing level of education among incoming young people, the expansion is expected to slow after 2020. Nonetheless, the stock of total years of schooling will remain fairly constant, while the size of the working-age population will start to decline.

This trend differs considerably across subregions (see figure 4.5 on the next page). By far the biggest contribution to the increase in the stock of total years of schooling will come from the young countries, where the stock of years of education is projected to almost double from 2015 to 2060 (the countries in the European Free Trade Association, or EFTA, and the EU-15 countries are also projected to raise their stock of years of schooling, despite a shrinking working-age population). In the older subregions, though, the stock of years of schooling will decline in parallel with the shrinking size of the working-age population over the next 45 years. Unless the educational attainment of younger generations can be boosted significantly (in addition to what can be expected from past trends), the sheer volume of exits among older generations will simply be too large to be offset by better-educated youth.

Going forward, addressing the challenges of aging would require that more people enter the labor force and participate much longer, but also that younger generations achieve higher educational attainment to offset (at least partially) the loss in human capital from aging. Also critical are improving the quality of education and equipping today's youth with skills that will allow them to make the most of their potential.

The Improving Quality of Education

The quality of education has clearly been rising in recent years, and today's young labor market entrants have better cognitive skills than their parents. There is clearly room for improvement, because many countries in Europe and Central Asia still lag behind Western European and Asian countries. Indeed, the region's performance on the OECD's Programme for International Student Assessment (PISA),

FIGURE 4.5   The biggest contribution to the increase in the stock of total years of schooling will come from the young countries
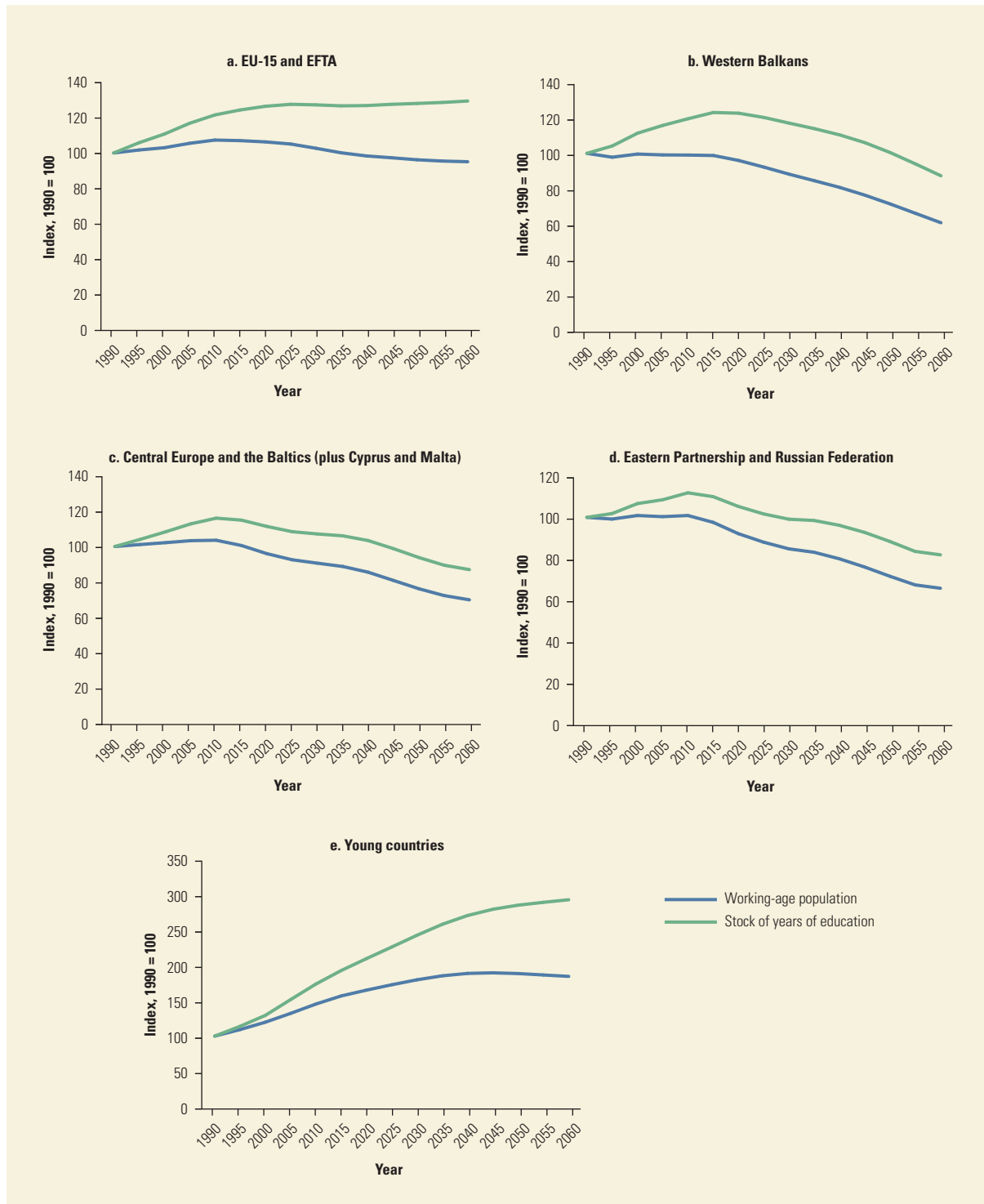
Source: World Bank calculations based on Lutz, Butz, and KC 2014.
Note: EFTA = European Free Trade Association (Iceland, Liechtenstein, Norway, and Switzerland).

which assesses competencies in reading, mathematics, and science among 15-year-olds, is largely below OECD averages (figure 4.6). Several countries in the region have large shares of 15-year-olds who, after taking the PISA reading test in 2012, were assessed as functionally illiterate. This was the case, for example, of close to 40 percent of the 15-year-olds in Bulgaria and 37 percent in Romania. Such poor reading performance means that students cannot absorb information contained in the texts they read, which is a severe limitation in today's labor market and significantly undermines the opportunity for effective lifelong learning.

Nevertheless, despite these discouraging results, the trend in most countries in the region is positive. Compared with 2009, the literacy, numeracy, and science skills among tested students have clearly improved. The only exceptions are Hungary, the Slovak Republic, and Slovenia. This gives rise to the hope not only that the new generation of labor market entrants will spend more time in education (see above) but also that the quality of basic education—and, thus, their cognitive skills and prospects for successful lifelong learning—will improve.

A look at purely cognitive outcomes—literacy, numeracy, and problem-solving skills—among adults across OECD countries reveals that younger generations have better cognitive abilities than older generations. Complementing PISA, the OECD's Programme for the International Assessment of Adult Competencies (PIAAC) tests literacy, numeracy, and proficiency in problem solving among 16- to 65-year-olds in technology-rich environments. Younger adults (aged 25–34) perform better than older adults (55–64) in almost all countries (figure 4.7).

The difference in cognitive achievements is statistically significant and large on all three tested dimensions for most countries, with the exception of the Russian Federation. There, the older generation not only is better educated than the younger generation but also seems to be able to translate this better education into better cognitive skills. In all other countries, especially in Belgium, Finland, Japan, and the Republic of Korea, young workers are doing better than older workers. Overall, the gap is largest in problem-solving skills, with an across-country average difference of 0.75 standard deviations between the young and the old; in literacy and numeracy, the average differences are somewhat smaller, at 0.53 and 0.43 standard deviations, respectively. This shows that younger generations do particularly well in technology-rich environments and, not surprisingly, are better able to use computers than older generations.

Inactive older people exhibit by far the lowest achievement in cognitive skills. On all dimensions and in all countries, they not only perform much less well than the young but also less well than their working peers. Although this is not proof that remaining active in the labor market has a positive effect on cognition (because people with lower cognitive skills might drop out of the labor force earlier), it is a testament to how work and cognitive achievement go hand in hand.

Inactive workers' cognitive achievement is low on average but not necessarily lower than the average cognitive achievement among young workers in some occupations. For example, the gap between older inactive workers and young workers in elementary occupations is much narrower than the average across occupations and in literacy and numeracy skills even reversed (figure 4.8).[1] Thus, while

> **Young labor market entrants have better literacy, numeracy, and science skills than older generations, a sign that education quality is improving.**

FIGURE 4.6 PISA scores of 15-year-olds in the region are mostly below the OECD average
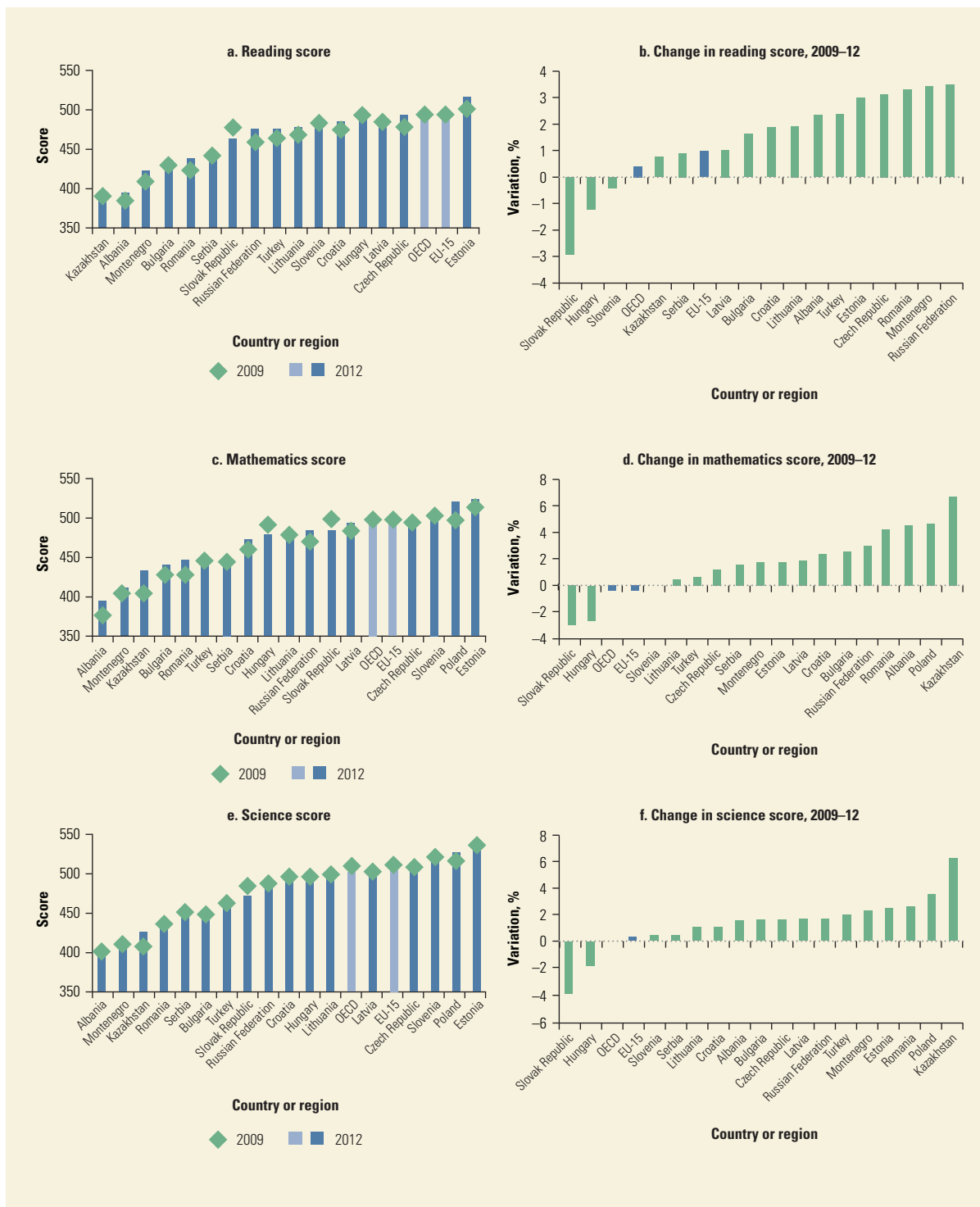
Source: World Bank calculations based on PISA International Database.
Note: OECD = Organisation for Economic Co-operation and Development; PISA = Programme for International Student Assessment.

FIGURE 4.7 Younger adults (25–34) perform better than older adults (55–64) in almost all countries, 2012

Source: World Bank calculations based on data in PIAAC Public Data and Analysis (database).
Note: The differences in mean z-scores within each country are calculated in reference to the average adult population in that country. Values are thus not comparable across countries.

FIGURE 4.8 The gap in cognitive achievement between older inactive workers (55–64) and young workers (25–34) in elementary occupations is narrow, 2012
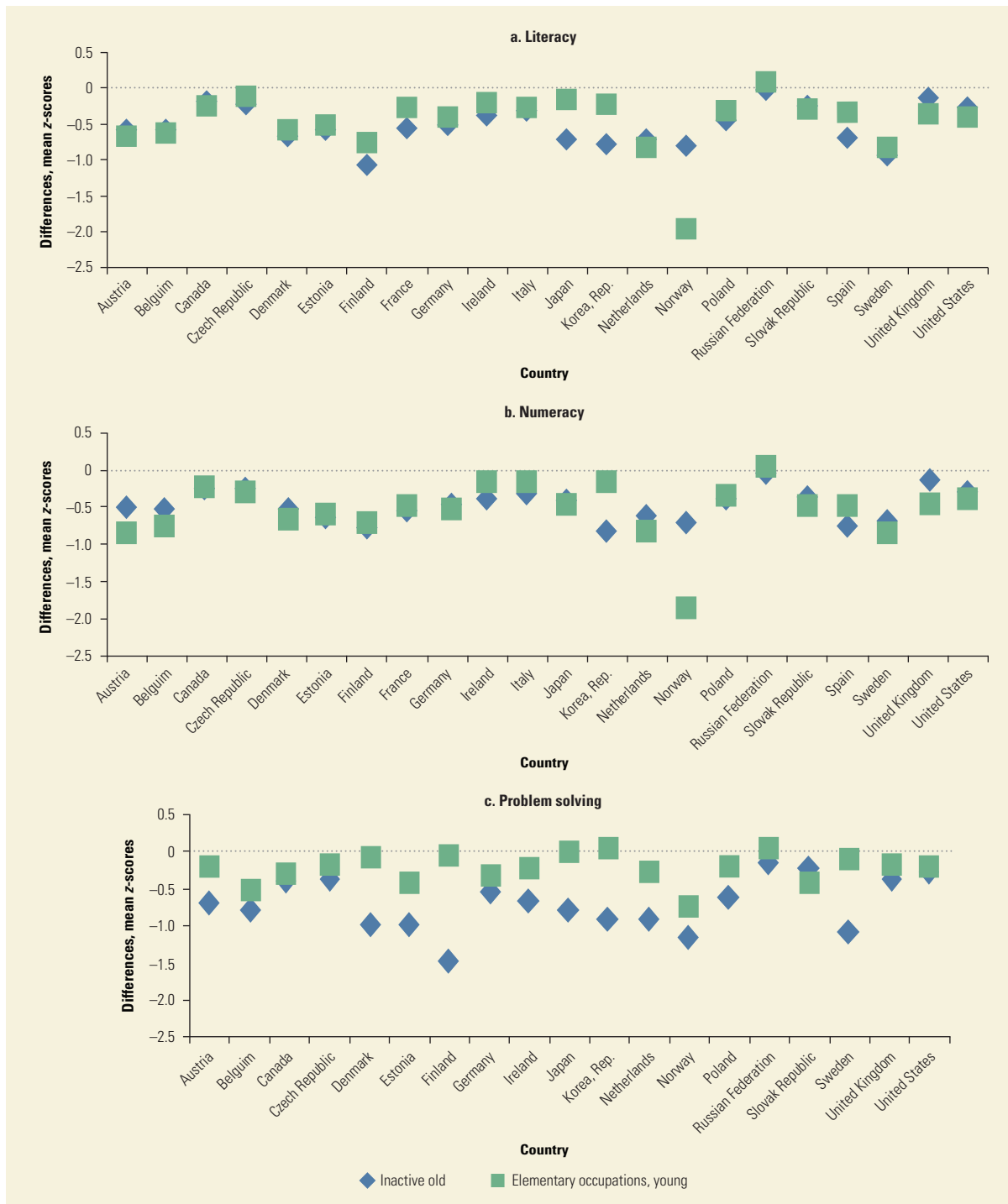
Source: World Bank calculations based on data in PIAAC Public Data and Analysis (database).
Note: The differences in mean z-scores within each country are calculated in reference to the average adult population in that country. Values are thus not comparable across countries.

FIGURE 4.9 Older workers (55–64) display less learning and willingness to learn than younger workers (25–34), 2012
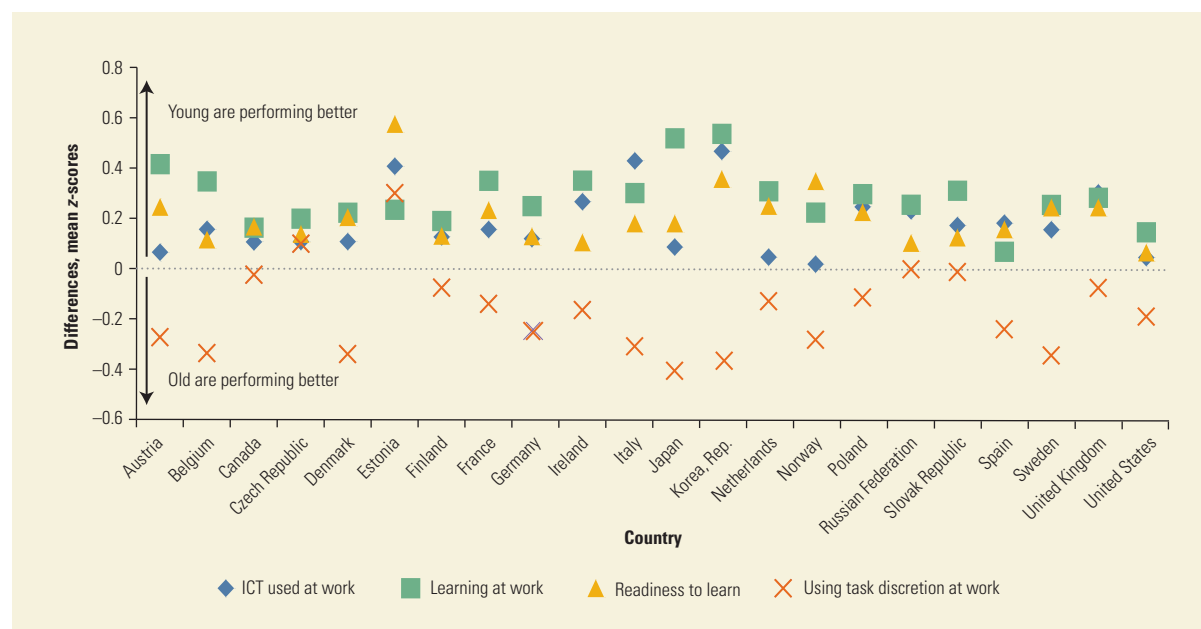
Source: World Bank calculations based on data in PIAAC Public Data and Analysis (database).
Note: z-scores within each country are calculated in reference to the employed population in that country. Values are thus not comparable across countries. ICT = information and communication technology.

older inactive workers may be unable to return to their former occupations due to a deterioration in cognitive skills, they may be able to obtain jobs in occupations with lower cognitive skill profiles; for example, services, retail, craft work, machine operation, and elementary occupations have significantly lower skill requirements than clerical or management work. At the same time, elementary occupations are hardly an attractive pathway back into work or for staying in work for older people. Nonetheless, the analysis shows that there is a large variation in skill requirements across occupations and that older people can meet the skill requirements in some occupations. A prerequisite, though, is that older people maintain a willingness to change and adapt and remain open to new experiences.

Older workers use certain skills significantly less at work than younger workers and also display less willingness to learn and less actual learning at work. Figure 4.9 depicts the estimated difference in the use of certain skills between younger workers (aged 25–34) and older workers (aged 55–64). (The difference is expressed in terms of standard deviations for the entire employed population of a country, a z-score.) The figure depicts the work skills in which the difference between old workers and younger workers is significant in most countries.[2] The figure reveals that younger workers use more skills in information and communication technology, show more willingness to learn, and also learn more at work. However, older workers use other skills—particularly, task discretion—more often at work relative to younger workers. For many other skills, though, such as reading and numeracy or exerting influence on others, the differences between the young and the old are often not significant.

The Skills of Older Workers: Shifting, Not Declining

Aging does not necessarily lead to a drop-off in skills. In line with the findings that there have been cohort improvements in health, evidence has shown major improvements in cognitive functioning from generation to generation (this phenomenon has been called the Flynn effect). According to a recent study, this elevation of cognitive performance is maintained across the life span. In a projection analysis, it was found that in the year 2042 the United Kingdom will be chronologically older but, based on the cohort improvements, cognitively younger (Skirbekk et al. 2013). Although the aging brain experiences a decline in certain cognitive functions, it also shows a remarkable ability to compensate for this decline through improved performance in other functions, particularly verbal skills, greater reliance on the wealth of experience an aging brain has accumulated, and enhanced noncognitive skills, especially social skills. Besides compensatory processes taking place between the basic functioning of the brain and accumulated bodies of knowledge, it is also possible to improve the basic functioning of the brain through training. The most pervasive and generalized effects are found for aerobic exercise interventions where training for 45 minutes three times a week improves cognitive functioning in above 60 years old and reactivates areas of the brain that undergo strong age-related decline (Voelcker-Rehage, Godde, and Staudinger 2011). Similarly, although an aging body experiences a decline in motor functions, physical strength, and perceptional capacity (seeing, hearing, feeling), the body also has a remarkable ability to maintain those functions that are needed routinely, including physical strength. Medical technology and simple workplace adjustments can also help offset the decline in perceptional capabilities. Still, some people seem to do much better than others in compensating for the weakening in certain skills through improvements in other skills: people who are better educated, have kept on working longer, stayed physically and mentally fit and socially active, and continuously task themselves with new challenges show much better cognitive performance at older ages. Yet, to accomplish this, people must remain active and dynamic on many dimensions throughout their lives and regularly take up new challenges. A prerequisite is to remain extroverted and open to new experiences. However, it is precisely these two personality traits that seem to deteriorate with age. If the next generation of older people is to benefit fully from the compensatory power of their brains and bodies, they must have maintained a mind-set of openness to new experience, and extroversion is key.

Important changes take place in the brain as it is aging. The weight and volume of the brain shrink by about 2 percent every decade of adult life, and the flow of blood to the brain and, hence, the oxygen supply become less abundant (Wieczorkowska-Wierzbińska 2014). These physiological changes also have important effects on cognitive performance, personality traits, and noncognitive skills, but the effect of aging on skills is quite diverse: not all dimensions of cognitive and noncognitive skills are negatively affected by aging.

A review of the literature on the effects of aging on cognition paints a multifaceted picture (Cai and Stoyanov 2014; Wieczorkowska-Wierzbińska 2014). Cross-

The aging brain experiences a decline in certain cognitive functions but also shows a remarkable ability to compensate by improving performance in other functions, particularly verbal and social skills.

TABLE 4.1 Effects of Aging on Various Basic and Higher-Level Cognitive Functions

Function	Subfunction	Impact of aging	Remarks
Working memory	Attention resource allocation	Negative	Impaired for various tasks that require high attention.
	Speed of information processing	Strongly negative	Could affect the processing of more complex tasks.
	Inhibitory control	Unclear	Unclear if older people can suppress irrelevant information.
Memory	Episodic memory	Strongly negative	Ability to remember context declines.
	Semantic memory	Positive	Older people have larger knowledge set.
	Autobiographical memory	Stable	Some decline in remembering context.
	Procedural memory	Stable	Ability to keep existing and acquire new skills and procedures is preserved.
	Implicit memory	Stable	The brain can draw on accumulated experience at older age.
	Prospective memory	Negative	Can be improved with reminders.
	Short-term memory	Stable	
Attention	Ability to concentrate	Stable	
	Selective attention	Weakly negative	Older people require slightly more time to focus selective attention.
	Dual tasks	Negative	Older people require more time to divide or switch attention.
Perception	Hearing and vision	Negative	Hearing and vision impairments can often explain age-related gaps in cognitive performance.
Higher-level cognitive functions	Language and speech	Strongly positive	Discourse skills especially improve with age.
	Decision making	Unclear	Older people rely more heavily on prior knowledge and less on new information.
	Executive control memory	Unclear	Fluctuations in efficiency over time, with a possible increase in inefficient episodes with age.

Sources: Based on Cai and Stoyanov 2014; Wieczorkowska-Wierzbińska 2014.

sectional studies and longitudinal studies do not provide a clear answer on the effects of aging on the brain because the former fail to take into account cohort effects, while the latter may be subject to positive effects on test results, given that the same test is repeated with the same individuals over time. Nonetheless, there seems to be a consensus in the literature about the dimensions of cognition that are positively affected by aging and the ones that are negatively affected. Table 4.1 summarizes these findings, which are also described in more detail below.

Working memory—that is, the active manipulation of information currently held in focal attention (not to be confused with short-term memory, see next paragraph)—is negatively affected by aging, although there is no agreement about the mechanism through which this occurs. Attentional resource allocation seems to decline with age, meaning that older people perform less well than younger people in tasks that require more attention (but not in tasks that require less attention) (Craik 1986). The speed of information processing seems to decline with age, which could affect the processing of more complex tasks in many dimensions. With regard to inhibitory control, finally, there is no consensus in the literature: some studies find that older people have difficulty suppressing irrelevant information by denying access to and freeing up working memory space for relevant information, while other studies do not support these results (Hasher, Zacks, and May 1999; McDowd and Shaw 2000).

Memory seems to be mostly negatively affected by aging, although there are important exceptions. The greatest declines are observed in episodic memory. Older adults have problems with reality monitoring, which is related to remembering context or source information: where or when something was heard or read or even whether something actually happened or was merely thought about (West 2005). Remembering such peripheral details is particularly demanding on attentional resources in the brain, which might decline with age (see previous paragraph). Semantic memory among older adults, however, is largely preserved. Older people generally have a large knowledge of the world and are able to preserve this knowledge, although the retrieval of specific details might decline (Craik 2002). Autobiographical memory is largely preserved, although some details may be lost. Procedural memory—that is, knowledge about skills and procedures—is largely preserved in age. The acquisition of procedural skills in both the motor and the cognitive domains is normal among older adults and is retained across the life span (at least until the oldest old ages). There is often little slowing of skilled performance with age, especially if the levels of expertise are high, although some individual components of the skill may decline. For instance, although the finger movements of an experienced typist slow with age, overall typing speed is preserved because of adjustments in other aspects of the skill set, for example, scanning farther ahead in the text (Salthouse 1984). Similarly, implicit memory, which refers to a change in behavior that occurs as a result of prior experience, although one has no conscious or explicit recollection of that prior experience, does not seem to be affected by aging, pointing to the ability of the brain to draw on accumulated experience at older ages. Prospective memory—remembering to do things in the future—seems to be impaired by aging, but this shortage can be overcome by salient reminders or clues. Short-term memory, finally, shows no decline with aging (Park and Hedden 2001).

Attention, by and large, seems to be negatively affected by aging, but not all dimensions of attention, and attention can be improved through training. Older adults show no decline in their ability to maintain concentration for an extended period of time, and their performance on tasks requiring selective attention is only mildly affected. Selective attention is the ability to attend to some stimuli, while disregarding others that are irrelevant to the task at hand. Older people are slower than younger adults in focusing selective attention but are not differentially affected by distraction (McDowd and Shaw 2000). Similarly, older people have problems with dual tasks that require divided attention or the switching of attention. They do particularly badly if both tasks require high attention, and they have more difficulty allocating resources appropriately if instructions are given to vary task priority (Tsang and Shaner 1998).

Perception is reduced in most older adults and is often, but not always, correctable by external aids (Schneider and Pichora-Fuller 2000). In fact, a significant proportion of the age-related variance in several cognitive tasks can be accounted for by hearing and vision impairments. If these sensory differences are statistically controlled, age differences in cognitive functioning are often no longer significant (Baltes and Lindenberger 1997). Other theories suggest that perception and cognition are part of a highly integrated system and rely on a common pool of atten-

tional resources (Schneider and Pichora-Fuller 2000). If parts of this system are stressed—for instance, if auditory or visual acuity are compromised and are essential to a task—other parts of the system will be negatively affected.

Speech and language processing—higher-level cognitive functions (speech and language, decision making, and executive control memory)—is largely intact in older adults, although processing time may become somewhat slower. Some evidence suggests that discourse skills actually improve with age, as older people (1) tell well-structured, intricate narratives that are judged by others to be more interesting than those told by younger persons; (2) use more extensive vocabularies and appear to have few difficulties in processing ongoing speech; and (3) show good levels of comprehension by effectively using context to interpret the message (Kemper and Kemtes 2000; Wingfield 2000). Some comprehension deficits occur under difficult processing conditions, but they seem to be primarily attributable to sensory loss or working memory limitations, not to impairments in basic language capacities (Wingfield and Stine-Morrow 2000). Older adults also experience problems with comprehension if individual words are presented at a rapid rate but show sharply reduced impairments if such words form meaningful sentences.

The overall effect of aging on *decision making* is somewhat unclear. What is clear, though, is that older people make decisions differently from younger people. Attentional and working memory limitations probably impair the ability to make decisions. Decision making seems to be a domain that makes clear demands on processing resources, but, in everyday life, these demands may be reduced by life-relevant knowledge or expertise in the problem-solving domain: in making decisions, older adults often come to the same conclusions as younger adults but reach their conclusions in a different way. They tend to rely more on prior knowledge about the problem domain and less on new information, whereas young people tend to sample and evaluate more current information and consider more alternatives before making their decisions (Sanfey and Hastie 2000). Possibly because of working memory limitations, older adults tend to rely on expert opinion to a greater degree than young adults do.

Playing a key role in virtually all aspects of cognition—such as allocating attentional resources among tasks, inhibiting distracting and irrelevant information, encoding and retrieval, directing all manner of problem solving and decision making—*executive control memory* is characterized by fluctuations in efficiency over time, with interwoven periods of optimal and nonoptimal performance. There can be an age-related increase in the frequency of these fluctuations (Bunce, Warr, and Cochrane 1993). Executive control deficits have been ascribed a causal role in the explanation of cognitive aging (the frontal lobe hypothesis of aging) (West 1996). In support of this hypothesis, both structural and functional neuroimaging studies have revealed a decline among older adults in the volume and function of prefrontal brain regions (Raz 2000).

Thus, the impact of aging on cognitive performance is somewhat mixed: while some functions are declining, others are improving. What is clear, though, is that the brain has a remarkable ability to compensate for the decline in some functions by improving other functions. The way aging brains make decisions is a good ex-

FIGURE 4.10   Old-high performers display a bilateral activity pattern in brain activity, suggesting that they rely more on experience, less on learning

a. Young   b. Old-low   c. Old-high
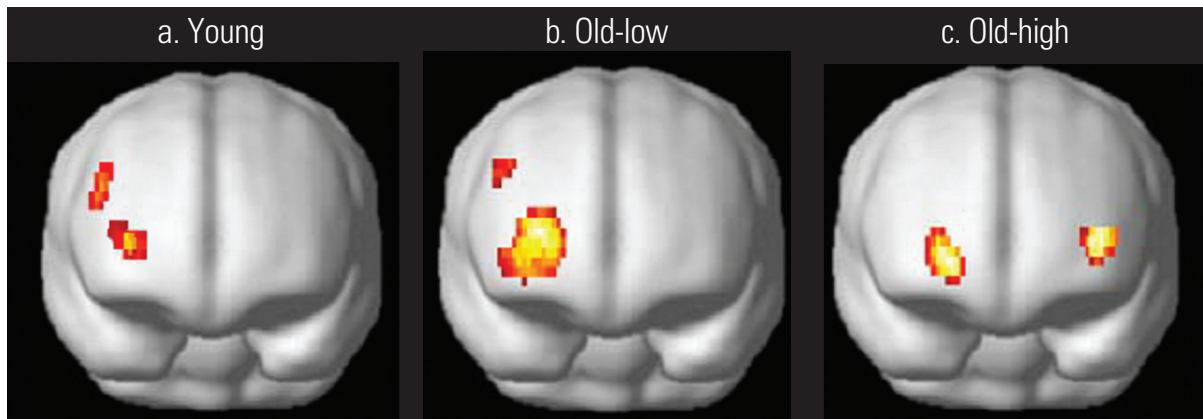
Source: Used by permission of Oxford University Press, USA. S. M. Daselaar and R. Cabeza, figure 6, "Age-Related Changes in Hemispheric Orga-nization," in *Cognitive Neuroscience of Aging: Linking Cognitive and Cerebral Aging,* ed. R. Cabeza, L. Nyberg, and D. C. Park (New York: Oxford University Press, 2004), 325–53.

ample. Aging brains might consider newer information less often than younger brains, but, given that they have a much larger amount of experience and knowledge at hand, this is actually more efficient. This is confirmed by recent stud-ies using brain scans (for example, see Cabeza et al. 2002; Daselaar and Cabeza 2004; Rosen et al. 2002). In one study, two groups were selected from a larger sample of older adults (Daselaar and Cabeza 2004). One group, identified as old-high in figure 4.10, performed as well as a group of young people in a battery of memory tests. The other group of older people (old-low) performed significantly less well. These two groups and the young groups were then subjected to brain scanning to determine the location of the center of brain activity.

The poorer-performing older participants showed no reduction in lateralization (specialization of brain functions between the left and the right hemispheres), whereas the better-performing older participants showed a bilateral activity pat-tern (utilization of both hemispheres of the brain). This finding suggests that the poorer-performing older participants recruited brain regions similar to those re-cruited by the young adults but used them inefficiently, whereas the better-performing older participants compensated for age-related memory decline by reorganizing the episodic retrieval network.

Besides cognitive skills and the functioning of the brain, aging also affects personality traits and noncognitive skills, both of which are also highly relevant for labor market outcomes. The most common model for personality traits is the five-factor model, which identifies the following main traits: (1) openness to new expe-riences; (2) conscientiousness; (3) extroversion; (4) agreeableness; and (5) neuroti-cism (aversion to negative outcomes, sometimes also called emotional stability). Although the impact of aging on these personality traits is complex, there is some agreement in the literature that conscientiousness, agreeableness, and neuroticism/emotional stability improve with age, while openness and extrover-
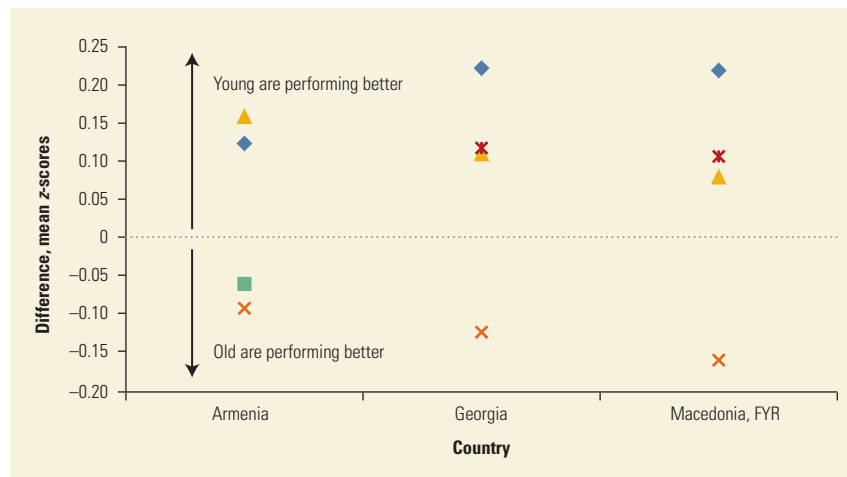
FIGURE 4.11
Younger people (25–34) do better on measures of extroversion and openness to new experiences, while older people (55–64) do better on measures of agreeableness and conscientiousness, 2012

◆ Openness
■ Conscientiousness
▲ Extroversion
✕ Agreeableness
✖ Emotional stability

Source: World Bank calculations based on STEP Skills Measurement Program data.
Note: z-scores within each country are calculated in reference to the total employed population in that country. Values are thus not comparable across countries. Only statistically significant differences are shown.

sion decline (Wieczorkowska-Wierzbińska 2014). The age differences seen in cross-sectional studies are similar to the age trajectories observed in longitudinal studies (see Lucas and Donnellan 2011; Roberts, Walton, and Viechtbauer 2006; Terracciano et al. 2005). Longitudinal work on personality development during adulthood has shown that with increasing age, people become more emotionally stable, more agreeable, and more conscientious (Staudinger 2015). This pattern has been described as an increase in social mastery and presents a strong asset for any labor force. There are, however, mixed findings on whether the increase in conscientiousness is linear through age or peaks in middle age and declines from that point forward (Donnellan and Lucas 2008; Lucas and Donnellan 2011; Roberts, Walton, and Viechtbauer 2006; Soto et al. 2011; Terracciano et al. 2005). Unfortunately, in current cohorts the dimension of openness to new experience, which is crucial when it comes to learning new things and staying flexible, has been demonstrated to decline after midlife. Nevertheless, while some studies find that openness declines through adulthood, others report relative stability or even an increase in this trait (see Donnellan and Lucas 2008; Lucas and Donnellan 2011; McCrae and Terracciano 2005; Roberts, Walton, and Viechtbauer 2006; Soto et al. 2011; Specht, Egloff, and Schmukle 2011; Terracciano et al. 2005). That this trajectory is modifiable, however, has been shown in a quasi-experimental study that showed that older people increase in openness rather than decline if they receive training first and then enter into a new environment (Mühlig-Versen, Bowen, and Staudinger 2012).

These results are more or less confirmed by data from the recent STEP (Skills Toward Employability and Productivity) skills measurement surveys conducted by the World Bank in various countries of the region. Figure 4.11 depicts the estimated differences between younger and older people in Armenia, Georgia, and the former Yugoslav Republic of Macedonia in terms of z-scores, standard devia-

Older people (55–64) are better at dealing with hostility than younger people (25–34), 2012

◆ Grit
■ Hostility
▲ Decision making
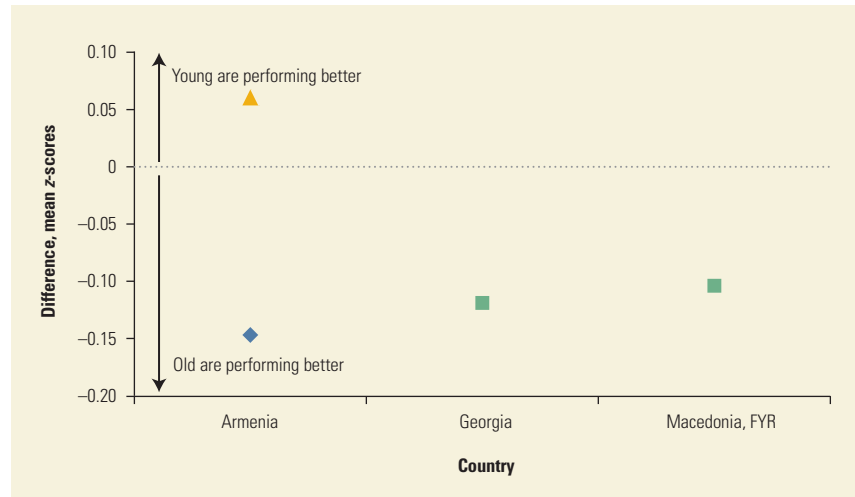
Source: World Bank calculations based on STEP Skills Measurement Program data.
Note: z-scores within each country are calculated in reference to the total employed population in that country. Values are thus not comparable across countries. Only statistically significant differences are shown.

tions for the entire employed population of a country. Younger people do better on measures of extroversion and openness to new experiences. However, younger people also seem to do better on measures of emotional stability in Georgia and FYR Macedonia. On agreeableness, though, older people score better in all three countries and also on conscientiousness in Armenia. These differences in personality traits translate into differences in noncognitive skills: older people are better at dealing with hostility (figure 4.12). In Armenia, the survey also found that older people have significantly more grit than younger people, while younger people seem to have better decision-making skills.

The literature provides ample evidence for the declining physical strength of older people, suggesting that older workers are less suitable for physically demanding jobs (for example, see Hedge, Borman, and Lammlein [2006] for a survey). At the same time, key strengths can be maintained through regular use. A good example is grip strength: while grip strength peaks at the age of 35 and declines quickly thereafter in the general population, this might not be true among workers who rely on their grip strength every day. In fact, the grip strength of assembly-line workers has been shown to remain constant until the age of 65 (Spirduso, Francis, and MacRae 1995).

In conclusion, the effects of aging on the brain, the body, and the personality, as well as on cognitive and noncognitive skills and physical strength, are diverse. To speak of a decline that comes with aging is true only to a limited extent; rather, the brain and the body are compensating, and skills are shifting toward new strengths. Some cognitive decline can be well explained by a decline in perceptional abilities—hearing and seeing—that can easily be offset with appropriate interventions. Yet, overall, the evidence points to a remarkable ability of the body, the brain, and the personality to compensate for weaknesses by building up and relying on new skills. The next section discusses whether firms take advantage of these new strengths.

How Firms Are Adjusting to the New Comparative Advantages

The effects of an aging workforce on firm-level productivity highlight the need for firms to adjust to the shifting abilities of older workers. This adjustment is feasible because skills do not necessarily decline with age; rather, the strengths and weaknesses of aging brains, minds, and bodies shift. Until recently, the firm-level evidence suggested that after a certain age, the age-productivity profile is either flat or declining. However, with data availability improving, results from more recent studies question whether there is such a declining age-productivity profile. Psychologists have found that crystallized cognitive skills such as interpersonal management and communication improve with age, as discussed in the previous section. In addition, more industry-specific skills are acquired with age. In contrast, manual skills and fluid cognitive skills, such as the capacity to learn new concepts and solve abstract problems, deteriorate with age. Memory, multitasking, and the speed of information processing also decline with age.

This varying relationship between aging and cognitive and noncognitive skills suggests that sectors are affected dissimilarly by workforce aging. Evidence for this is starting to emerge, although it is still limited. For instance, it has been hypothesized that the decline in the fluid cognitive skills and adaptability that accompanies aging is more harmful to productivity in sectors experiencing rapid technological change. Consistent with this, in Finland, the age-productivity profile is more positive in technologically less dynamic sectors (forestry and manufacturing, compared with electronics). In Belgium, similarly, aging has a more negative impact in sectors that use information and communication technologies more intensively (Daveri and Maliranta 2007; Lallemand and Rycx 2009). In Germany, however, such intensity does not seem to make a difference (Bertschek and Meyer 2009).

> Firms adjust to the shifting abilities of older workers, and so do countries. Recent studies found that aging countries shift their export patterns as they become more productive in sectors relying more on skills that improve with age.

In general, the varying effects of age on different types of cognitive and noncognitive skills imply that economies with an older workforce have an endowment of skills different from those with a younger workforce. Older economies will be more productive in sectors that rely more on skills that improve with age—age-appreciating cognitive skills—than in sectors that rely more on skills that weaken with age (age-depreciating cognitive skills) or on physical ability (Cai and Stoyanov 2014). Thus, age could affect the pattern of comparative advantage and trade.

A recent study using detailed international trade data finds evidence in support of the existence of such a shift in endowments in economies with an aging workforce and of the ability of firms to take advantage of this shift (Cai and Stoyanov 2014). The study first constructs industry-level measures of intensities in the three types of age-dependent skills, namely, age-appreciating skills, age-depreciating skills, and physical ability.[3] This exercise reveals that some industries, such as printing, pharmaceuticals, chemical products, and audiovisual equipment manufacturing, are relatively intensive in age-appreciating skills, while others, such as textile mills, wood products, and many food-processing industries, are relatively intensive in age-depreciating skills. Older countries *export* relatively more goods whose

In Central Europe and the Baltics, the age-appreciating cognitive skills content of exports has been rising, while the age-depreciating cognitive skills and physical ability content has been falling, 2000–10

■ Age-appreciating cognitive skills
■ Age-depreciating cognitive skills
■ Physical ability
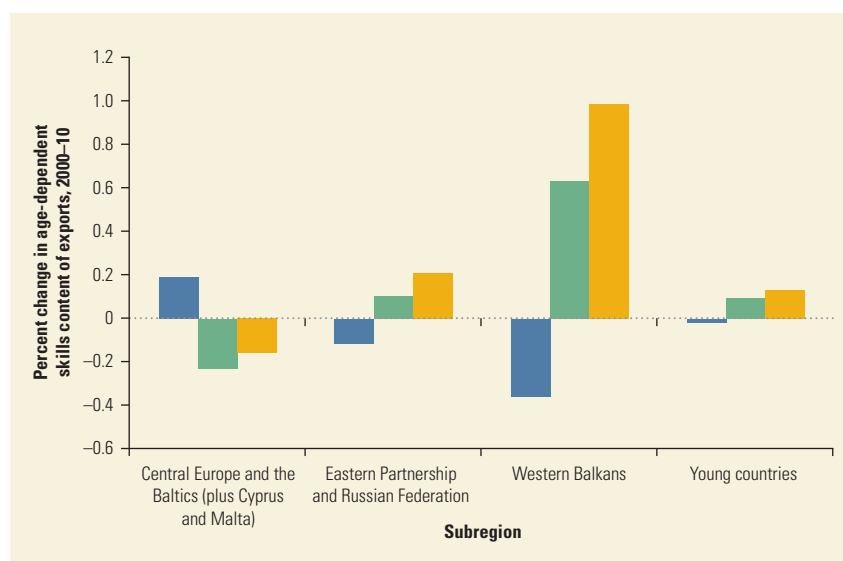
Sources: World Bank calculations based on data in Cai and Stoyanav 2014; UN Comtrade.

production uses age-appreciating cognitive skills intensively, while they *import* relatively more goods whose production uses age-depreciating cognitive skills and physical ability intensively. Furthermore, countries that have aged in past decades have, on average, specialized in products that are relatively intensive in age-appreciating skills.

For this report, the industry-level skill intensity measured in Cai and Stoyanov (2014) has been used to examine the age dependence of the skills content of the exports in different subregions.[4] Figure 4.13 shows how the skills content of the region's exports has changed over the past decade. In Central Europe and the Baltics, the age-appreciating cognitive skills content of exports has been rising, while the age-depreciating cognitive skills and physical ability content of exports has been falling. This matches the prediction based on changing comparative advantage as these economies adapt to their older populations.

In other parts of the region that are also aging, such as the Eastern Partnership and Russian Federation, and the Western Balkans, the reverse is true. These parts of the region are exporting more and more goods whose production uses age-depreciating cognitive skills and physical ability intensively. Because age is clearly not the only factor that determines comparative advantage, the change in comparative advantage caused by aging in this group appears to be offset by other factors such as natural resources.

The cross-country pattern in the age-appreciating skills content of exports is largely consistent with the idea of age-based comparative advantage (figure 4.14). Many of the aging parts of the region look similar to aging advanced economies such as Japan, the economies of Western Europe, and the United States. The younger part of the region (Central Asia and Turkey) exhibits a markedly lower age-appreciating skills content in exports. The Western Balkans, which has a lower-than-expected age-appreciating skills content, and India, a young country that has a higher-than-expected age-appreciating skills content, stand out as exceptions.

Sources: World Bank calculations based on data in Cai and Stoyanav 2014; UN Comtrade.

However, some exceptions are to be expected because age is clearly not the only factor determining comparative advantage.

Figure 4.15 compares the age-depreciating cognitive skills content of exports across the same countries. As expected, the exports of younger countries tend to have a greater age-depreciating cognitive skills content. Yet, once again, the Western Balkans and the Eastern Partnership and Russian Federation are exceptional, with substantial age-depreciating skills content in exports, again, probably because other factors may offset the demographic effect.[5]

The trends displayed in figure 4.15 suggest that this anomalous pattern is also intensifying over time. The concern is that these countries are persistently exporting products in which their competitiveness could decline as they age.

Overall, these patterns suggest that aging affects trade patterns. This finding could have significant implications for growth. First, it implies that access to foreign markets can, by enabling aging economies to capitalize on their comparative advantage in certain age-appreciating skills, counteract other potentially negative effects of aging. Hence, improvements in trade facilitation could help countries adjust to aging.

Second, the volume and composition of trade are known to have dynamic growth implications (Harrison and Rodríguez-Clare 2010). For aging countries, it is crucial to understand the scope for future growth inherent in products relatively intensive in age-appreciating skills.

Third, if aging countries are to be truly able to capitalize on such a comparative advantage, their resources should be able to flow to industries where age-appreciating skills are more important, underlining the importance of labor mobility. It is important to understand whether growing specialization in sectors

FIGURE 4.15

The exports of younger countries tend to have a greater age-depreciating cognitive skills content, 2010
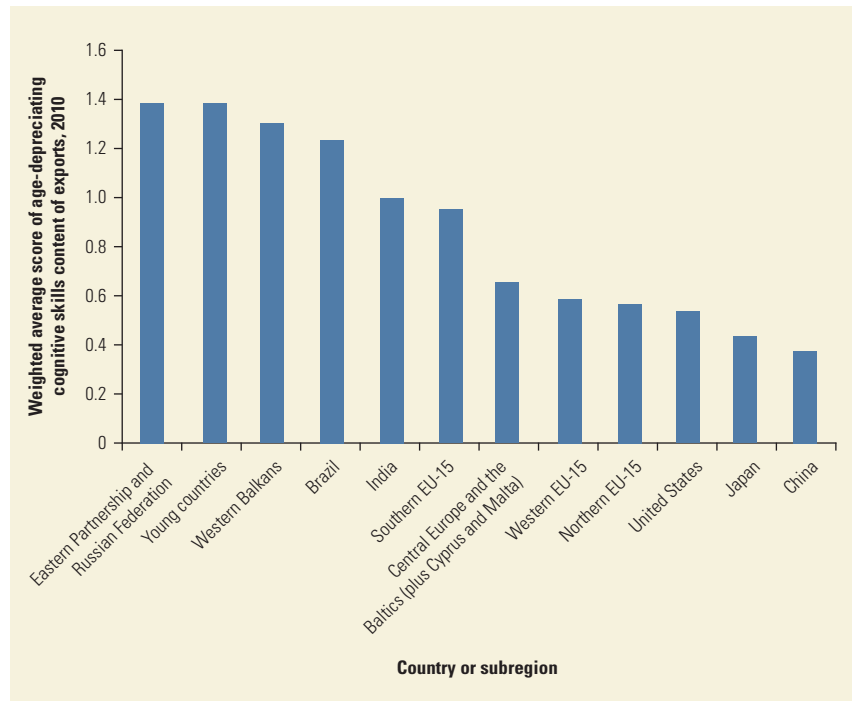
Sources: World Bank calculations based on data in Cai and Stoyanav 2014; UN Comtrade.

intensive in the use of age-depreciating skills in countries in the Western Balkans and in the Eastern Partnership and Russian Federation is the result of economic inflexibility that is preventing the reallocation of resources to sectors intensive in age-appreciating skills.

Does Labor Reallocation Become Less Efficient with Aging?

The movement of workers to higher-productivity sectors is a major contributor to aggregate productivity growth in developing economies. Such structural change in employment is one reason why countries in the region experienced a surge in productivity in the years of transition following 1990. At a broad level, this was achieved through a reallocation of labor and capital from agriculture and industry into services. Before the transition, the region was overindustrialized and had a rather small service sector relative to income levels. But between 1990 and 2005, the share of services in employment rose by some 10–15 percentage points in most countries in the region (Alam et al. 2008). Because productivity levels were generally the highest in services, this reallocation boosted overall productivity.

Analysis at a more detailed sectoral level also shows that the movement of workers to more productive sectors has been a source of aggregate productivity growth in many countries in Europe and Central Asia, thereby helping these coun-

FIGURE 4.16   The net movement of workers to higher-productivity sectors raised productivity, 1998–2008
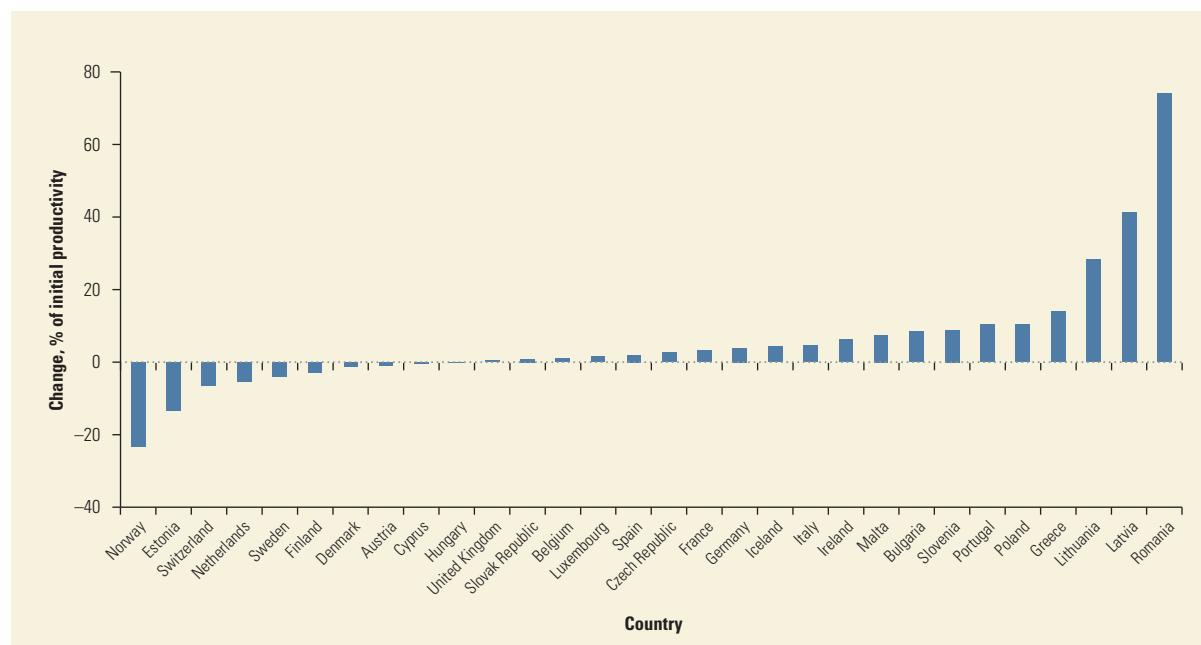
Source: World Bank calculations based on data in Eurostat Statistics (database).

tries begin catching up with Western Europe. Figure 4.16 shows the impact of intersectoral labor reallocation on labor productivity growth in EU member states in 1998–2008. With everything else held constant, the figure shows that the net movement of workers to higher-productivity sectors raised labor productivity by 28 percent in Lithuania, 40 percent in Latvia, and 74 percent in Romania. The impact was significant (10 percent) in Poland and Bulgaria as well.

Even within sectors, the movement of workers from less productive to more productive firms can increase aggregate productivity. In general, large productivity gaps across firms mean that interfirm reallocation of resources, including labor, can be a major source of productivity growth in developing countries (Banerjee and Moll 2010; Syverson 2011). For instance, recent research suggests that efficient resource reallocation to more productive firms could enable China and India to make up a third of their aggregate productivity gap with the United States (Hsieh and Klenow 2009) and could boost manufacturing productivity by 45 to 127 percent in Latin American countries (Busso, Madrigal, and Pagés 2012).

Interfirm labor reallocation within sectors also contributed to productivity growth during the transition years in Europe and Central Asia. As described in a recent World Bank report on productivity growth in the region, labor reallocation rates are high in countries that are still addressing the resource misallocations inherited from central planning (Alam et al. 2008). Reallocation accounted for 15–20 percent of total growth in manufacturing productivity in the early reformers in the region.[6] In some late reformers, it may account for up to 70 percent of total growth in manufacturing productivity.

FIGURE 4.17

The net change in employment in low-, medium-, and high-productivity sectors was much lower among the older age group, 1998–2008

■ Younger than 50
■ Older than 50
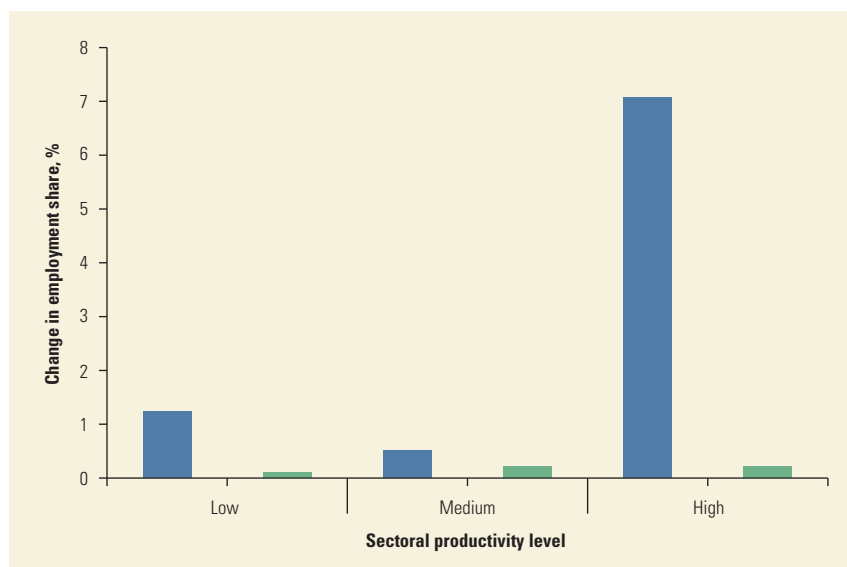
Source: World Bank calculations based on data in Eurostat Statistics (database).
Note: The change in employment in each age category is calculated relative to the change in the population share of the age category to account for different rates of change in the population share of each age category. The sample includes EU countries that experienced structural transformation.

Even after this legacy of resource misallocation has been addressed, labor mobility will continue to be a source of growth through efficient reallocation in Europe and Central Asia. Changes in technology and market conditions continuously create new areas of opportunity. Reaping the benefits of such shifts requires some movement of workers from declining to rising sectors (or firms). Similarly, the benefits of globalization are more fully realized if more workers move to internationally competitive sectors. Indeed, in dynamic economies such as the United States, jobs are being created and destroyed at significant rates, even if total employment rates are relatively stable.

If older workers are less mobile across jobs, then aging could impede productivity-enhancing structural changes in the region. Employment changes during the transition years suggest that this is the case. Many EU countries, including Bulgaria, the Czech Republic, Latvia, Lithuania, Poland, Romania, the Slovak Republic, and Slovenia, experienced productivity-enhancing structural change in employment during 1998 and 2008. The net change in employment in low-, medium-, and high-productivity sectors was much lower among the older age group (people 50 years of age and above). Among people below 50 years of age, the increase in employment was heavily concentrated in high-productivity sectors. In contrast, people above 50 saw relatively similar levels of employment change in low-, medium-, and high-productivity sectors (see figure 4.17). Thus, the positive structural change—a net shift to higher-productivity sectors—was driven by younger workers.

Observed job transitions in OECD countries, measured by tracking individuals over time in panel datasets, indicate that, even among those who are already working, older individuals are less likely to change jobs (Zissimopoulos and Karoly

2007). A study in the United States shows that, within any two-year period during the 1990s, about 9 percent of the 51- to 55-year-old men who were self-employed at the start of the period had moved into a wage-earning job by the end of the period. This transition rate declines with age: among 56- to 61-year-old and 62- to 67-year-old men, respectively, it is 7 percent and 3 percent. In general, observed age and job transition profiles suggest that job mobility costs rise with a worker's age and years of experience (Artuç 2012).

If a country opens up more to trade, wages and employment in sectors of comparative advantage expand at the cost of other sectors. Recent trade theory predicts that, even within sectors, the most productive firms would grow, while the least productive could shrink or even exit (Melitz and Trefler 2012). The movement of workers to sectors or firms where labor demand and, hence, wages are rising is needed to exploit fully the efficiency gains from trade. Older workers seem to be less able to adjust to such episodes. One study finds that, compared with workers above 45 years of age, workers aged 25–44 years are 11 percentage points more likely to be reemployed after job loss because of competition with imports. This implies that the older the workforce, the harder the time it has in adjusting to trade shocks (Artuç 2012).

Lower mobility also increases the vulnerability to economic change wrought by new technologies. In the past 25 years, most Western European countries and the United States have seen a hollowing out or polarization in the distribution of occupations: the share of middle-skill jobs has been declining, while the share of jobs at the two extremes of the skill distribution has been rising (Autor, Levy, and Murnane 2003; Goos, Manning, and Salomons 2009). This is often attributed to the rise of technologies that have enabled routine tasks—whether manual or cognitive—to be automated or outsourced. The occupational distribution is thus polarizing toward low-skilled jobs that are intensive in nonroutine manual tasks and high-skilled jobs that are intensive in nonroutine and interpersonal cognitive tasks. But, because of lower occupational mobility, older workers have been affected more by this polarization. The average worker in routine, task-intensive jobs, which are in decline, is getting older (Autor and Dorn 2009).

To examine this issue in the context of the region, an analysis adapted from an approach developed by Autor, Levy, and Murnane (2003) to calculate the skills content of employment across various age groups in the region has been conducted for this report. Figure 4.18 gives a sense of the average skills content of employment in Poland, which is quite representative of aging middle-income economies in Europe and Central Asia in this respect (see the note to figure 4.18 for a brief description of the method).

Among the college educated, occupations intensive in nonroutine analytical and interpersonal skills dominate, followed by routine analytical skills. Routine cognitive skills dominate employment among the less well educated, while employment intensive in nonroutine interpersonal cognitive skills is relatively low. The young (20- to 24-year-olds) do not look so different from older workers (55- to 59-year-olds) in this respect. This is a concern, though: the less well educated youth in the region still seem to be working in occupations that use routine cognitive skills and noncognitive skills, which are more vulnerable to globalization and technological change.

The skill intensity does not differ for less educated workers, but college-educated older workers use more nonroutine cognitive skills than their younger counterparts, Poland, 2010

Legend:
- ■ Nonroutine cognitive analytical skills
- ■ Nonroutine cognitive interpersonal skills
- ■ Routine cognitive skills
- ■ Routine manual skills
- ■ Nonroutine manual skills
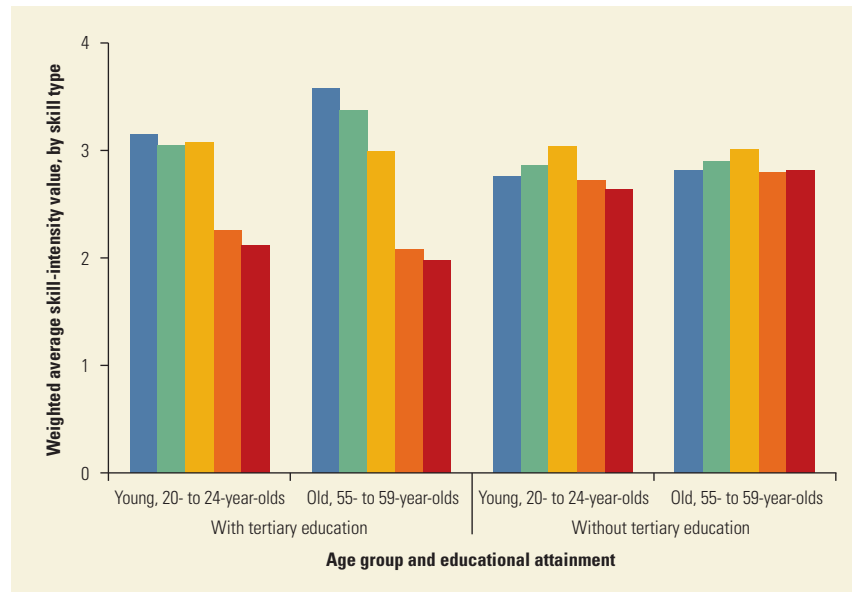
Sources: World Bank calculations based on estimates of Aedo et al. 2013 using data from EU LFS.
Note: The figure is constructed according to the approach of Autor, Levy, and Murnane (2003). In this approach, each occupation is assigned a skill-intensity value for the five types of skills indicated in the figure. The occupational pattern is then used to calculate the skills content of the employed. The content of a given skill in the employment of an age group is calculated as the weighted sum of that skill's intensity across all occupations. The weights are the shares of the occupation in the employment of the age group.

The lower rate of job transition among older workers with job-specific human capital is not necessarily undesirable from the perspective of efficiency. As workers age, acquired skills increasingly tie them to jobs. Older workers are comparatively rich in skills specific to their current jobs (Jovanovic 1979; Topel 1991). Such specific human capital can range from task-specific skills to organizational knowledge that is not as relevant in another job. Older workers are also more likely to already be in jobs to which they are well matched. The cost of letting go of specific human capital or a good job match could outweigh the returns from moving to a more productive firm. Thus, too much mobility could lead to a loss of such human capital. The real issue is whether specific human capital matters in the face of technology or market demand shocks if there is a clear efficiency gain from labor reallocation. Is there some market failure that makes the private value of specific human capital greater than the social value? The answer could hint at the types of policy approaches that are desirable and effective in addressing mobility issues.

Older individuals would find it more difficult to change jobs if they are tied more closely to a location. To the extent that this arises because of greater home ownership rates among older individuals, enhancements in the functioning of real estate markets could also improve job mobility. Another issue is that pensions are generally not fully portable across jobs, so that individuals close to retirement age have an added incentive not to change jobs. If having a job following retirement does not affect retirement benefits, it is possible that job mobility will fall as the retirement age approaches but will then rise after retirement.

Raising the early retirement age—that is, the minimum age for full pension eligibility—does, in fact, induce people to stay longer in their jobs (Staubli and Zweimüller 2013). Moreover, postretirement employment is not uncommon in some countries. Among U.S. retirees, 26 percent take up such full-time bridge jobs. Of these, about 60 percent work in occupations that are different from the jobs from which they retired (Maestas 2010). This suggests that some of the decline in mobility because of aging does not derive from aging but from the way pensions affect the incentives to change jobs. Skill specificity continues to matter past retirement: among retirees, those who have more job-specific skills at retirement are less likely to take up a different type of bridge job (Gobeski and Beehr 2009).

Introducing greater pension portability could increase efficient job relocation among older workers. But there is reason to believe that older workers would still face more difficulty in finding new jobs. Observed reemployment rates among displaced workers fall with age. For instance, among people displaced because of plant closures in Austria, older workers had lower reemployment rates, although they tended to catch up eventually (Ichino et al. 2007). There is similar evidence from other countries, including evidence on job displacement during trade shocks (see above) (Johnson and Mommaerts 2011). A significant number of older job seekers are likely to become discouraged in looking for work (Maestas and Li 2006).

These findings suggest that some kind of job search assistance could have an impact on labor mobility among older workers. However, why job searches are less successful among older individuals is not well understood. Perhaps employers discriminate against older job seekers. A recent experimental study of women applying for entry-level jobs in the United States found that, everything else being equal, a younger worker is more than 40 percent more likely than an older worker to be offered an interview (Lahey 2008). Thus, looking at policies or programs that have successfully addressed gender discrimination in job markets could be helpful (Aguiar, Hurst, and Karabarbounis 2013).

Job search efforts fall after middle age. This may be caused by less motivation to find a job, ill-health, or lower expectations of a successful search. Targeted pilot programs to address such potential issues are worth considering.

Does Aging Slow Innovation and Technology Adaption?

In the process of economic development, as the gains from the use of existing resources and technologies are exhausted, innovation becomes more important for competitiveness. According to a typology proposed by the World Economic Forum, countries with a gross domestic product (GDP) per capita of US$9,000–17,000 are in transition from efficiency-driven development to innovation-driven development (Schwab 2012). By this definition, most countries in Europe and Central Asia are in that transition to innovation-driven growth (box 4.1).

Given the rising role of innovation, the relationship between age and innovative capacity could become a key channel through which aging affects the region's competiveness. The knowledge about aging and innovativeness is limited, but sobering. Most of this knowledge is based on observing the ages of great innovators such as patent grantees, noted inventors, and Nobel laureates. Research

BOX 4.1 The Growing Importance of Innovation in Europe and Central Asia

One signal of the growing influence of innovation in the region is the size of the technology- and knowledge-intensive sectors. Although it would be misleading to equate high-technology activities with innovation, these sectors do tend to be more dependent on new ideas generated by research and development (R&D). Figure B4.1.1 shows the share of employment in high-technology manufacturing and knowledge-intensive services in a sample of European countries.[a] In Bulgaria, the Czech Republic, Hungary, and Poland, the share is comparable to that of France, Germany, and Italy. Some countries are even exporting high-technology manufactured goods in significant volumes (figure B4.1.2). High-technology goods account for about 15 percent of the goods exports of the Czech Republic and Hungary, which is comparable to the corresponding shares in France, Germany, and the United Kingdom. The share of high-technology exports is not as high in Bulgaria, Poland, and

Romania, but it is still significant and rising. These findings show that firms in these countries are increasingly competing in the international market for knowledge- and technology-intensive products.

To many, the word *innovation* conjures images of high-technology firms with R&D centers staffed by scientists and engineers. While this is certainly part of the picture, much of the innovation that occurs in firms in Europe and Central Asia probably involves incremental improvements to existing products, processes, or organizational practices. Such innovation is not uncommon. Figure B4.1.3 presents descriptive statistics on the innovative activities of firms from the most recent World Bank Enterprise Surveys conducted in the region. In Romania, 75 percent of firms reported they had introduced at least one of the following in the past three years: a new product, production process, management practice, marketing method, or logistical process. In Georgia, which has the

FIGURE B4.1.1 In some countries in the region the share of employment in high-technology manufacturing and knowledge-intensive services is similar to that in developed European countries
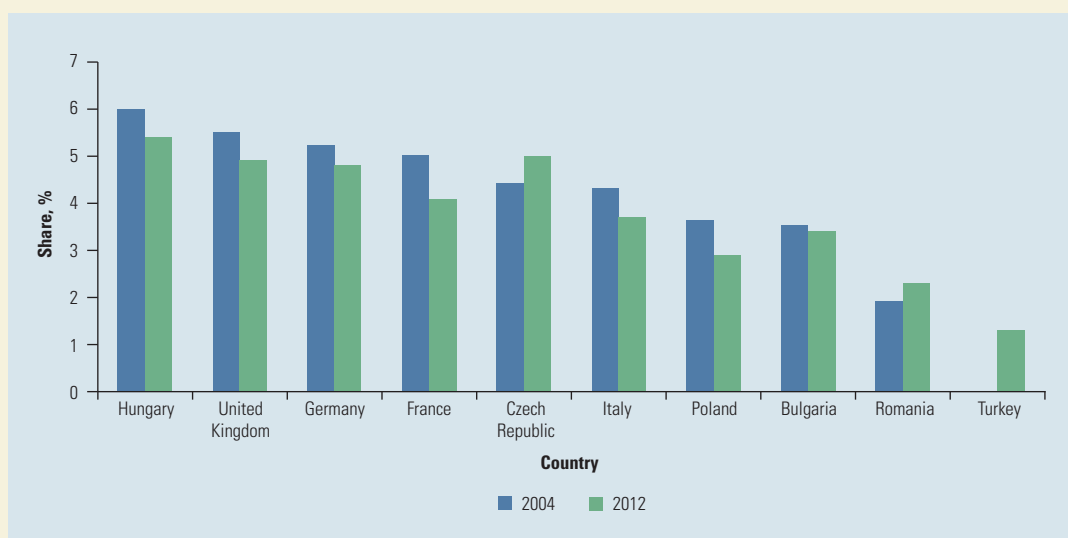
Source: Eurostat Statistics (database).
Note: Turkey 2004 data not available.

BOX 4.1 *(continued)*

FIGURE B4.1.2 Some countries in the region are exporting high-technology manufacturing products in significant volumes
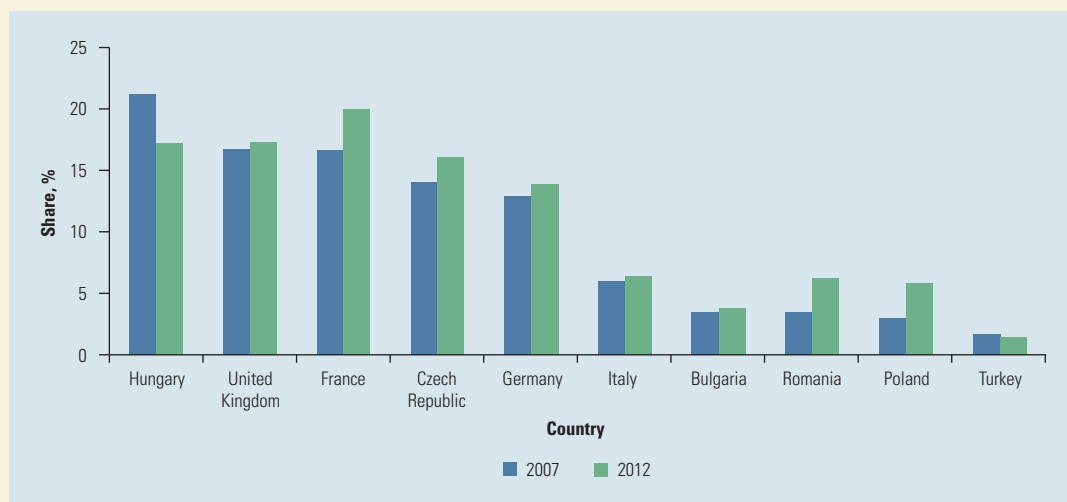
Source: Eurostat Statistics (database).

FIGURE B4.1.3 Incremental innovation is common among firms
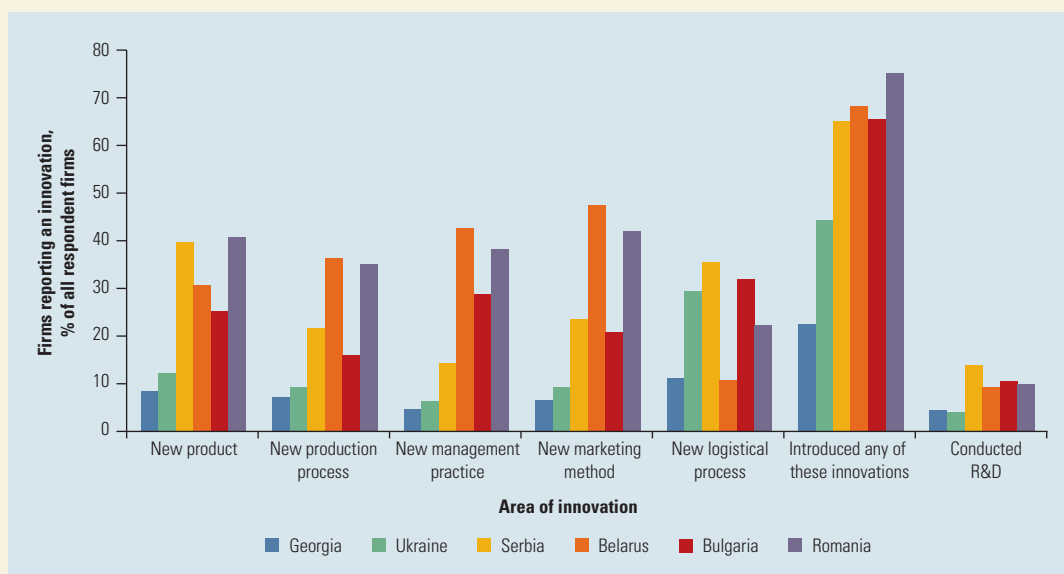
Source: Enterprise Surveys 2013–14 (database).
Note: Countries are sorted left to right in increasing order of nominal GDP per capita. R&D = research and development.

(Continued)

The Growing Importance of Innovation in Europe and Central Asia *(continued)*

lowest GDP per capita in this group, the incidence was lower, but not insignificant, at 23 percent. Despite the high rates of introduction of new products and methods, only 4 percent of firms in Georgia and 9 percent in Romania reported in-house R&D activities, suggesting that the reported innovation was incremental.

Figure B4.1.4 presents other characteristics of firm-level innovation in Europe and Central Asia that also hint at the incremental nature of the innovations. In response to the surveys, most firms claimed that their innovations were developed or adapted by them from their own ideas. Relatively few reported that collaboration with domestic or international firms, suppliers, or research institutes was the source. In no more than 10 percent of the cases did the firms claim the innovations were new to international markets. About 50 percent of the innovations were new only to the national market. Thus, on average, nearly 40 percent of the innovations were new only to the firms in the same localities as the respondents.

FIGURE B4.1.4 Firm-level innovations are mostly self-developed and new only to the national market
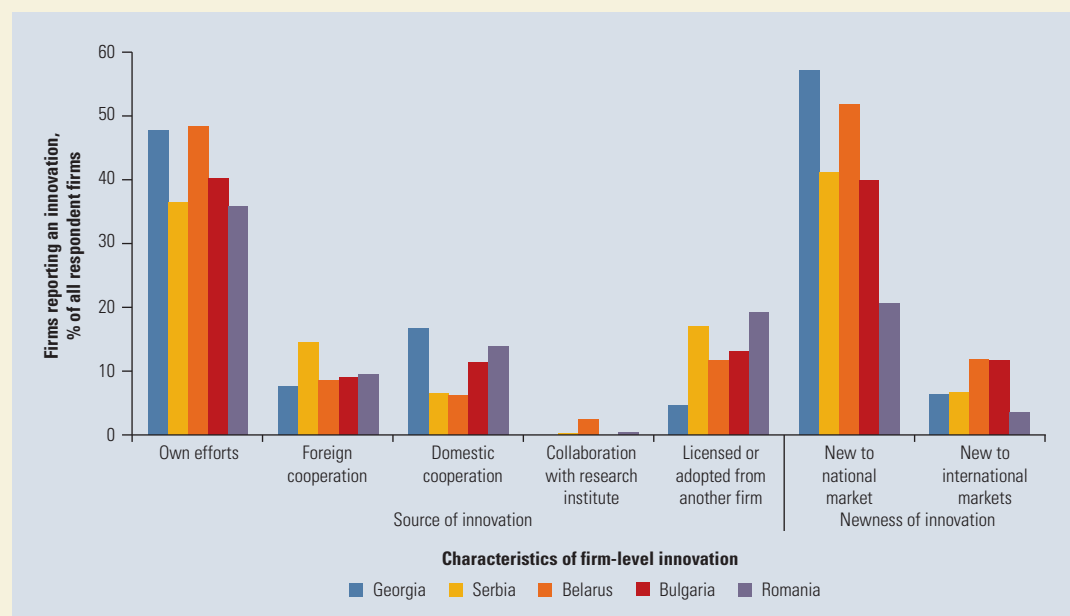
Source: Enterprise Surveys 2013–14 (database).
Note: Countries are sorted left to right in increasing order of nominal GDP per capita.

a. Eurostat classifies industries such as pharmaceuticals; computer, communication, and media electronics; precision and medical instruments; and aircraft and spacecraft as high-technology industries. Knowledge-intensive services include air and water transport, telecommunications, finance, real estate, education, and health care.
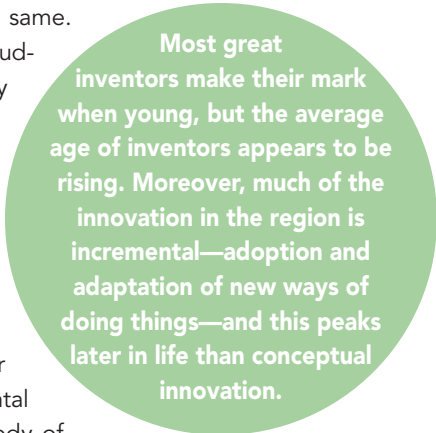
conducted in the 1950s found that the productivity of scientists and inventors tended to peak between ages 30 and 40 (Lehman 1953). This could be because of an age-related decline in fluid cognitive skills, such as problem solving and learning, that are important to innovation. If it is still true, then aging could slow the aggregate rate of invention.

More recent research suggests that the peak age of invention has risen, though not by much. Among Nobel laureates and great inventors, the mean age at which noted innovations were produced rose by six years over the 20th century (Jones 2010, 2011). On closer inspection, this finding appears to be driven by the fact that inventors have become especially unproductive at younger ages, not because they have become more productive at ages above 50. Before 1905, 60 percent of physicists did their prize-winning work before age 40. This share had dropped to 19 percent by the year 2000. This could be because, as the body of scientific knowledge becomes richer and more complex, mastering it takes longer. Nevertheless, the mean age of great invention is still well before age 50.

A more optimistic interpretation of this delay in the life cycle of the creativity of inventors is that the limits imposed by biological age are not inflexible. A comparison of creative productivity and age across different fields suggests the same. One hypothesis, based on historical data from a wide range of fields, including the sciences and the arts, is that fields with more ambiguous, loosely defined concepts take longer to master and, hence, see more late bloomers (Simonton 1997). For instance, historians tend to peak later than physicists. Another hypothesis based on the empirical study of creativity is that the life cycle of creativity depends on how the inventor works. Some inventors are conceptual, making sudden breakthroughs, usually at an early age. But others are experimental, working by trial and error and reaching peak productivity gradually, late in life (Galenson 2009, 2010). Both types of innovators can exist within the same field: for instance, impressionist painters were visually driven and more experimental than abstract painters (Galenson and Weinberg 2001).The current body of knowledge on aging and innovation is largely about great inventors and scientists. This research remains relevant to the region since even though great inventions are few and far between, they likely have wide spillover effects on productivity. Thus, the indirect effect of a slowdown in great invention, within or outside the region, could still be significant.

> **Most great inventors make their mark when young, but the average age of inventors appears to be rising. Moreover, much of the innovation in the region is incremental—adoption and adaptation of new ways of doing things—and this peaks later in life than conceptual innovation.**

Since much of the innovation in the region represents incremental improvements, it is important to consider the cognitive process behind incremental innovation. Even though much of firm-level innovation is incremental, research on technology adoption across countries suggests that the capacity to adopt and adapt technologies depends on domestic R&D capacity. For instance, firms that spend more on R&D are generally more likely to adopt technologies (Goldberg et al. 2008). This could be because doing research, even if it is not at the frontier of technology, is necessary to learning about new technological developments and how to adapt them to local needs. Conceptual innovators peak earlier than experimental innovators. If incremental innovation is more experimental in nature, then age may be less a disadvantage in this type of innovation.

In the popular view, the young are supposed to be more open to new technologies. Some studies have observed a negative association between age and technology adoption. For instance, among small and medium German enterprises in knowledge-intensive services and information and communication technologies, those with an older workforce are less likely to adopt new technologies (Meyer 2011). Among college graduates in the United States, the young use computers

more intensively than the old (Weinberg 2004). This pattern seems to hold in a wide range of contexts. For example, economists in graduate school are much more likely than their older colleagues to adopt into their research the new paradigms that are emerging in their field and to which they are exposed.

None of this evidence, though, proves that aging alone reduces the adaptability to new production technologies. Partly, this is because age is correlated with the length of experience with existing technologies, and it is difficult to distinguish between the effects of aging and the effects of experience. In a study conducted in the United States, when researchers introduced a new business process reengineering tool into a medical products plant, workers who were familiar with the old process had difficulty adjusting to the new production technology and process (Brynjolfsson, Renshaw, and Alstyne 1997). They preferred their previous, more passive roles that required less attention.

How a new technology interacts with experience might matter more than pure age. While computer adoption falls with age among U.S. college graduates, it rises with age among those with only high school degrees (Weinberg 2004). This could be because computers complement knowledge acquired through experience among high school graduates more strongly. Computers have consistently been associated with an increase in the relative wages of experienced workers. In contrast, the work that college graduates do on computers relies more on abstract reasoning skills than on knowledge acquired through experience. For them, the greater adaptability that comes with youth overcomes the benefit of experience.

Incremental innovation—which is largely about the adoption and adaptation of new ways of doing things—may thus not slow with aging, provided that it reinforces work experience. New technologies that complement experience could see high adoption rates even among aging workforces. The social returns to such technologies would be particularly high. Hence, it is important to study how R&D policy and promotion programs can be geared to the identification and development of such technologies.

Does Entrepreneurship Decline with Aging?

There is little quantitative research on how rates of entrepreneurship vary with age or on how the determinants of entrepreneurship vary with age. However, based on what is known about how job mobility declines with age, it seems likely that entry into entrepreneurship also declines with age. Survey data from the United States show that transitions from wage-earning jobs to self-employment decline with age (Zissimopoulos and Karoly 2007). But these data contain limited information on entrepreneurial activity and characteristics. This section presents a new analysis of survey data from the Global Entrepreneurship Monitor (GEM), a unique dataset that enables researchers to examine how patterns of entrepreneurship vary with age across a broad group of countries.[7]

At first glance, GEM surveys show a marked decline in entrepreneurial activity at older ages throughout the world, including in Europe and Central Asia. The surveys define early-stage entrepreneurship as either engagement in a start-up
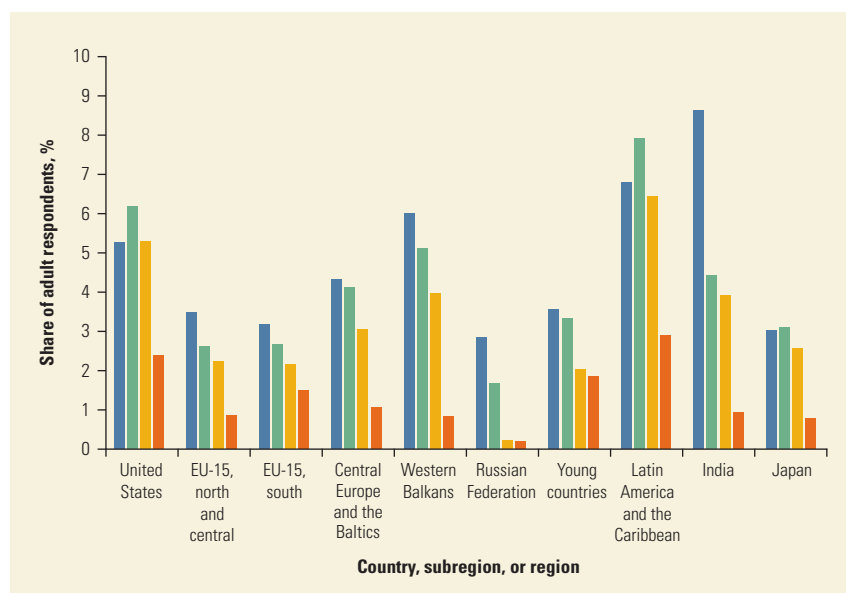
Legend:
- ■ 18–34
- ■ 35–44
- ■ 45–54
- ■ 55+

Source: Harmonized data in GEM.

activity or running a new business. Figure 4.19 shows the share of the adult population reporting involvement in business start-up activities such as looking for equipment or a location, organizing a start-up team, working on a business plan, or beginning to save money. In the United States, such individuals constitute around 6 percent of the 18–54 age group but only 2.7 percent among people aged 55 years or older. A similar drop in start-up activity after age 55 is observed in Europe and Central Asia, the Baltics, Western Europe, India, Japan, and Latin America.[8]

The age at which entrepreneurial activity begins to decline seems to vary across regions. In Central Europe and the Baltics, the Western Balkans, the Russian Federation, young countries, and India, 18- to 34-year-olds report the highest rate of start-up activity. In these places, the rate declines steadily with age. However, in some parts of the world (such as Latin America, Western Europe, and the United States), it is the middle aged who are most likely to report involvement in start-ups.

Consistent with the sharp decline in start-up activity at older ages, the share of individuals who report that they are owner-managers of a new business (defined by GEM as a business younger than 42 months) is also lowest in the 55+ age group (figure 4.20).[9]

GEM surveys also indicate that the decline in early-stage entrepreneurial activity becomes especially pronounced among individuals above age 65 (figure 4.21). For instance, in Central Europe and the Baltics, Western Europe, and the United States, less than 1 percent of individuals aged 65 or older report that they run a young business. The surveys show that this decline with respect to younger age groups is slightly less pronounced in the United States.[10]

Individuals past the age of 55 are also less likely than younger individuals to be running an established business (defined by GEM as a business older than 42
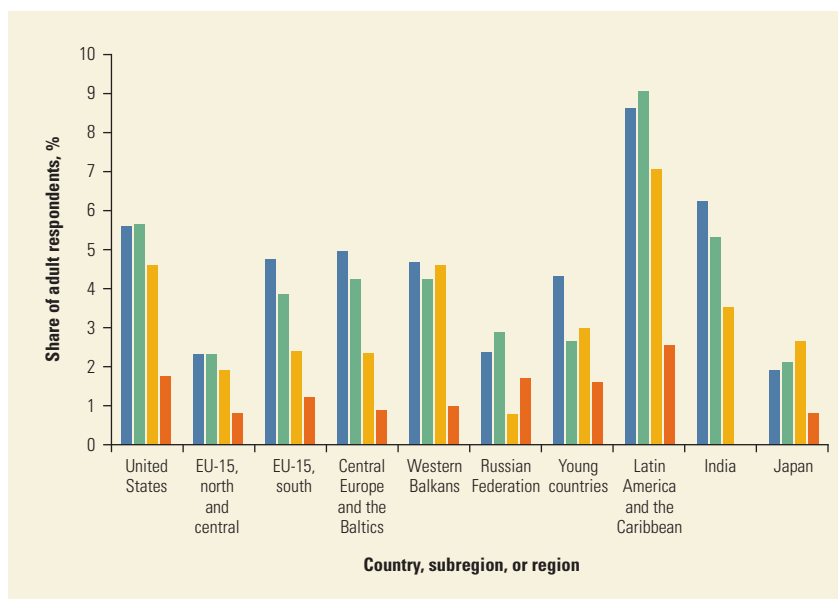
Source: Harmonized data in GEM.
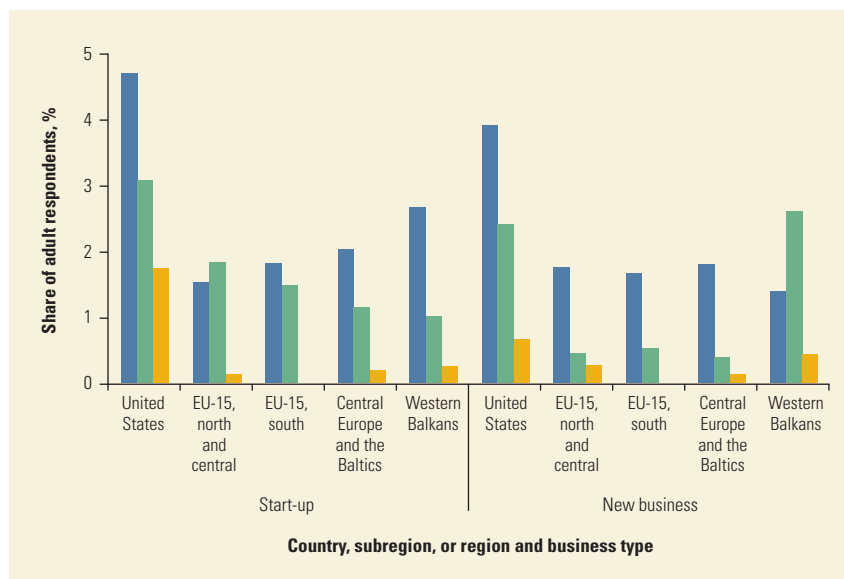
Source: Harmonized data in GEM.

months). But this decline is not as pronounced as the decline in early-stage entrepreneurship (figure 4.22). In the United States, for instance, about 9 percent of persons aged 55 years and above run a business that is older than 42 months, a rate only three percentage points below the rate among 45- to 54-year-olds. In Central Europe and the Baltics, about 4 percent of persons aged 55 years and above run long-established businesses, compared with 7 percent among 45- to 54-year-olds. Thus, many individuals past the age of 55 continue to run businesses
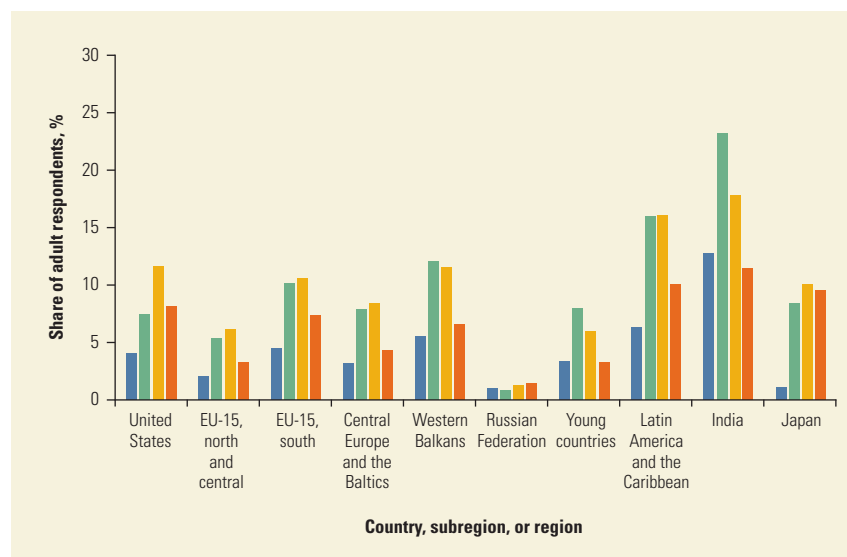
FIGURE 4.22

Many individuals past the age of 55 continue to run businesses established when they were younger, 2008

- 18–34
- 35–44
- 45–54
- 55+

Source: Harmonized data in GEM.

established when they were younger. This survival rate seems to be higher in more developed countries, such as Japan and the United States.

It is possible that, in Europe and Central Asia, older cohorts with a longer history of work during the pretransition era have an attitude toward entrepreneurship different from that of younger cohorts. If so, the decline in entrepreneurship with age is overstated by the cross-sectional comparison of age groups. However, an examination of cohorts across the 2001 and 2008 rounds of GEM suggests that a cohort effect cannot explain the sharp drop in entrepreneurship past the age of 55 (figure 4.23).[11] Consider individuals aged 46–52 years in 2001, who are 53–59 by 2008. This cohort saw a marked decline in the rate of early-stage entrepreneurship, from 4.9 percent to 2.5 percent, between 2001 and 2008. Similarly, the cohort aged 53–59 in 2001 had become significantly less involved in early-stage
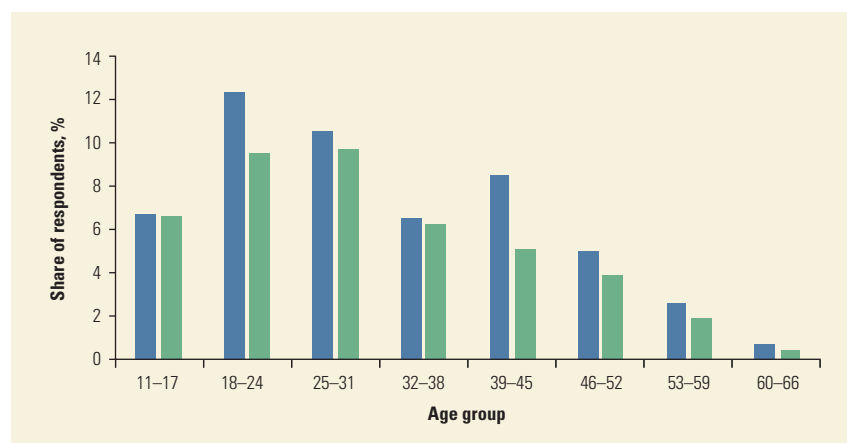
FIGURE 4.23

Taking into account the cohort effect, the decline in early-stage entrepreneurship in Europe and Central Asia may start among people in their early 40s

- 2001
- 2008

Source: Harmonized data in GEM.

FIGURE 4.24

The share of individuals who agree that "starting a business is considered a good career choice" does not fall after the age of 55, 2008

- 18–34
- 35–44
- 45–54
- 55+
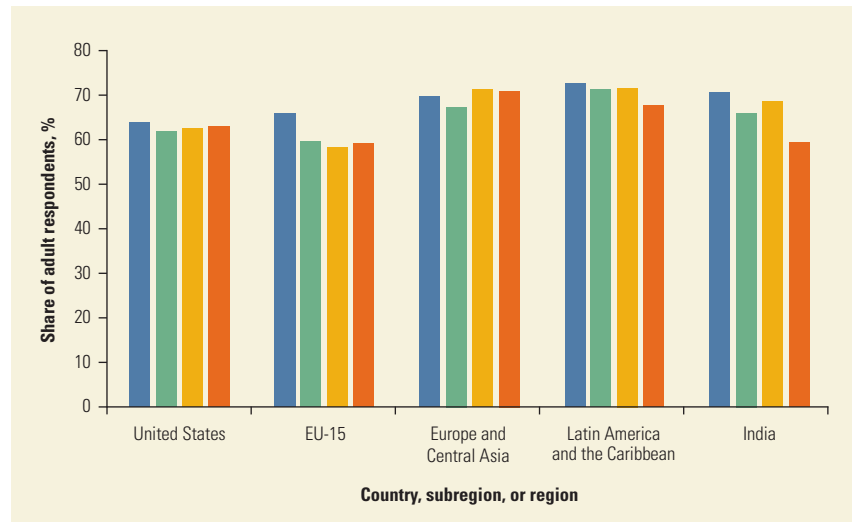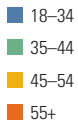
Source: Harmonized data in GEM.

entrepreneurship by 2008. The results suggest that the decline in entrepreneurship might start among people in their early 40s in the region, given that the cohort aged 39–45 in 2001 had become significantly less entrepreneurial by 2008.[12]

There is also some survey evidence that lower rates of entrepreneurship among the elderly in Europe and Central Asia are not the result of a generational difference in attitudes toward entrepreneurship. The share of individuals who agree that "starting a business is considered a good career choice" does not fall after the age of 55 in the region (figure 4.24). Older cohorts do not seem to have a less positive view of entrepreneurship.

Access to finance does not appear to drive differences in entrepreneurship among age groups. Access to finance is known to be a constraint on entrepreneurship, and recent experimental evidence on how to promote self-employment among youth in developing countries partly confirms this (McKenzie and Woodruff 2014).[13] It is not clear that it should be as much of a constraint on the elderly, as they are likely to have accumulated more savings than younger cohorts. In any event, GEM data do not suggest that financing patterns vary with age. Among early-stage entrepreneurs, the share of start-up funding expected to be met out of own funds does not show any age patterns (figure 4.25). The expected share of own funds is uniformly high, from 60 to 80 percent of start-up funding, suggesting that finance is a major constraint for young and old alike. This is consistent with prior research showing that self-reported liquidity constraints are associated with lower transitions into self-employment (Zissimopoulos and Karoly 2007).

The GEM surveys hint that the motivation and intent for entrepreneurship vary by age in many parts of the world, including Europe and Central Asia. The surveys ask early-stage entrepreneurs whether they are motivated by a perceived opportunity or have been driven into self-employment out of necessity, that is, because they did not have a better job. About 46 percent of early-stage entrepreneurs older than 55 in the region cited a necessity (such as financial need) as their main
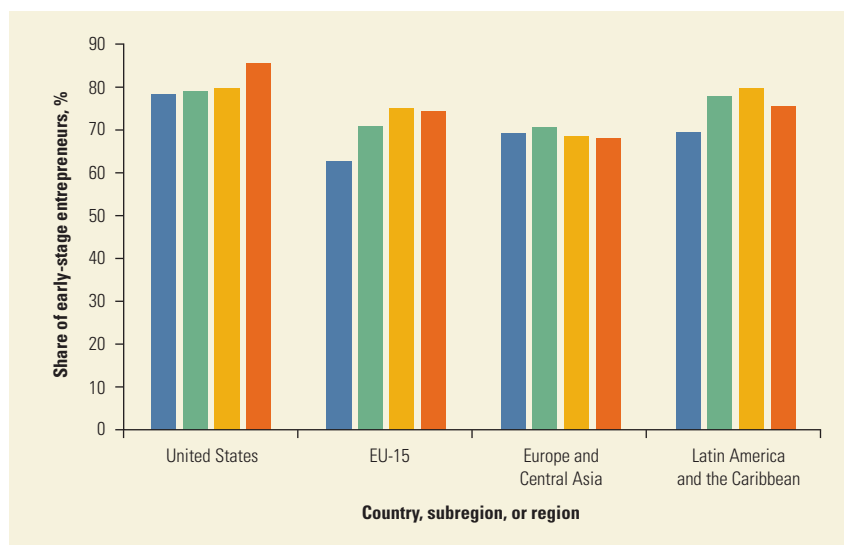
FIGURE 4.25
The share of start-up funding expected to be met out of own funds does not show any age patterns, 2008

■ 18–34
■ 35–44
■ 45–54
■ 55+

Source: Harmonized data in GEM.

motivation, as opposed to only 29 percent of early-stage entrepreneurs between the ages of 18 and 34 (figure 4.26). The reverse age pattern holds for entrepreneurs citing an opportunity as their motivation. This is also the case in other regions of the world, although the United States is a notable exception.

Consistent with this pattern, older individuals are also less likely to plan on becoming entrepreneurs. For instance, when asked if they expect to embark on a start-up in the next three years, about 28 percent of respondents 18 to 34 years of age in the region answered in the affirmative, as opposed to only 5 percent of those aged 55 or older (figure 4.27). This is consistent with prior research, which
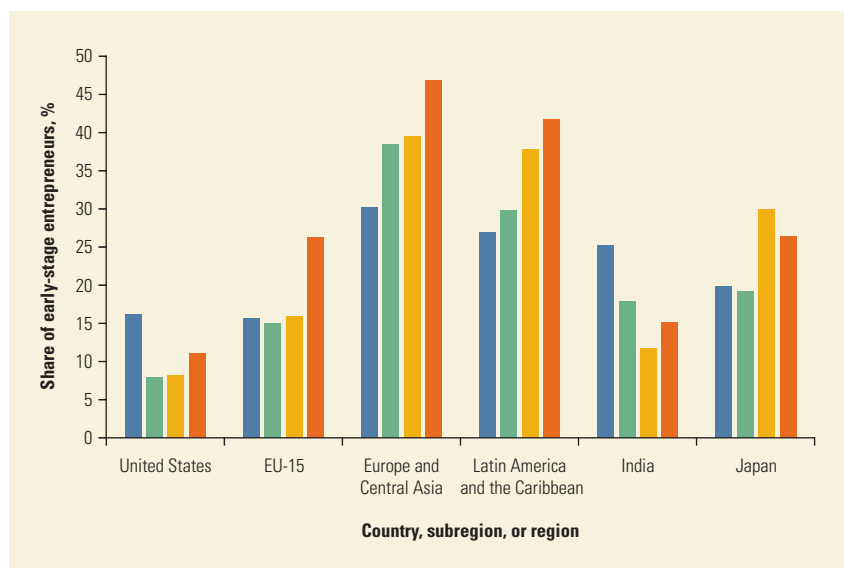
FIGURE 4.26
Older entrepreneurs are more necessity driven than their younger peers, 2008

■ 18–34
■ 35–44
■ 45–54
■ 55+

Source: Harmonized data in GEM.

FIGURE 4.27
Older individuals are less likely to plan on becoming entrepreneurs (in the next three years), 2008

■ 18–34
■ 35–44
■ 45–54
■ 55+
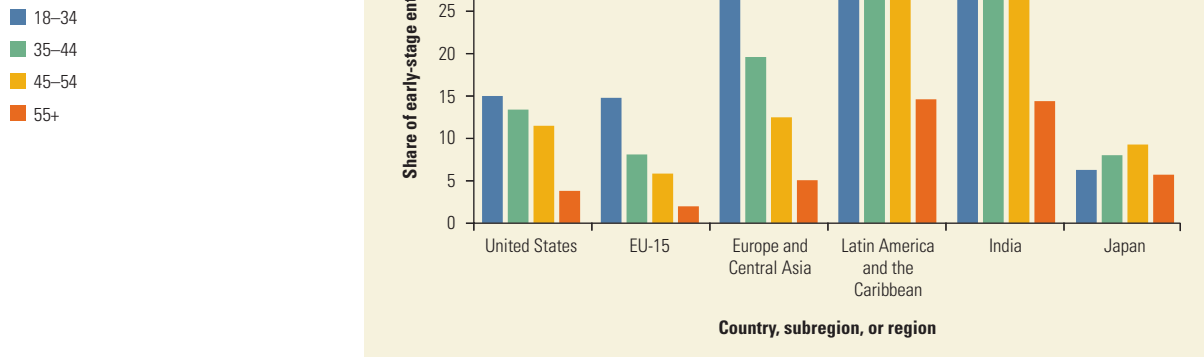
Source: Harmonized data in GEM.

finds that the probability of preferring to be self-employed declines strongly with age (Blanchflower, Oswald, and Stutzer 2001; Criaco 2012). That said, the lower incidence of intentional choice may also reflect a lack of perceived feasibility among older individuals.

Entrepreneurial activity is related positively to educational attainment, particularly among the elderly. Across regions, the rate of early-stage entrepreneurship is higher among people who have completed at least high school than among those with less education (figure 4.28). In Europe and Central Asia, for instance, the rates are 9 and 5 percent, respectively. The relationship between educational attainment and entrepreneurship is particularly strong among people 55 years and older

FIGURE 4.28
The rate of early-stage entrepreneurship is higher among high school graduates than among those with less education, 2008

■ Did not complete high school
■ Completed at least high school
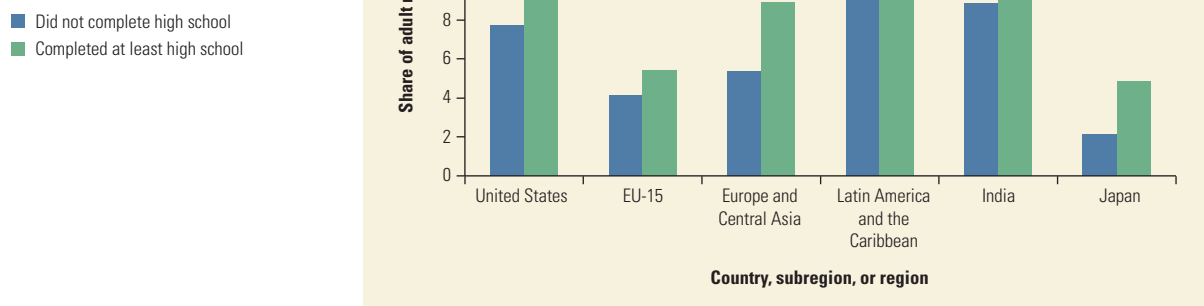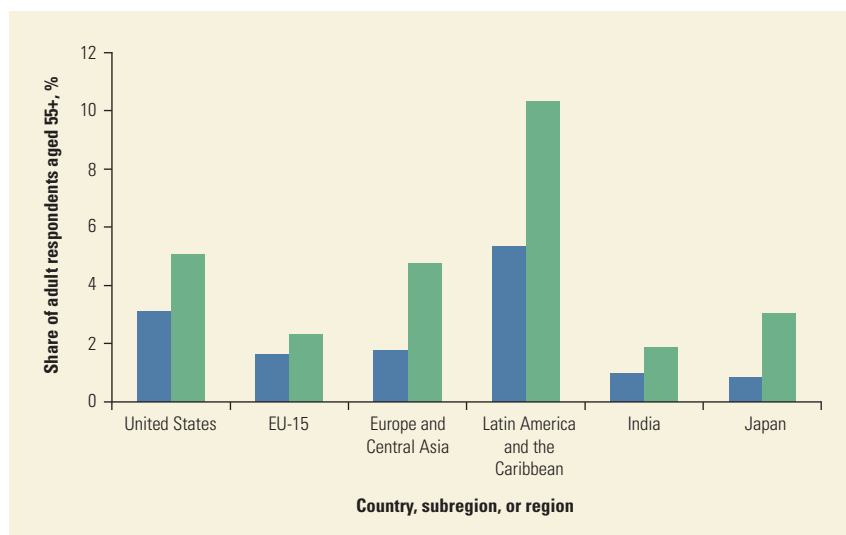
Source: Harmonized data in GEM.

FIGURE 4.29

The relationship between educational attainment and entrepreneurship is particularly strong among people 55 and older, 2008

■ Did not complete high school
■ Completed at least high school

Source: Harmonized data in GEM.

in Europe and Central Asia (figure 4.29). Those 55 and older with a high school education are nearly three times as likely to engage in early-stage entrepreneurship as their less well educated counterparts. This pattern is observed in some other locations, too, such as Japan.

The Mixed Impact of Aging on Productivity

A decline in the labor force may not reduce the stock of human capital, as younger workers in the region tend to have higher levels of educational attainment, and education of higher quality, than do generations exiting the labor market because of age. While aging is associated with reduced cognitive skills—literacy, numeracy, and problem solving—and declining physical strength (although key strengths can be maintained through regular use), aging is also associated with improved verbal skills, greater reliance on the wealth of experience an aging brain has accumulated, and enhanced noncognitive skills, especially social skills. Aging could reduce aggregate productivity if older workers are less mobile across jobs, perhaps because they are more tied to specific locations. However, lower mobility due to job-specific human capital does not necessarily impair productivity.

Moreover, aging does not necessarily slow innovation and technology adaptation. While most great inventors make their mark at relatively young ages, the average age of invention appears to be rising. Moreover, much of the innovation in the region represents incremental improvements, which arguably depend more on experimental than on conceptual innovation, and experimental innovators tend to peak later in life than conceptual innovators. The old are commonly seen as less open to new technologies, although this may reflect their longer experience with existing technologies rather than the impact of aging on openness. More pessimistically, entrepreneurship, which is important to productivity, does appear to decline with age in the region.

Notes

1. Younger workers in elementary occupations were selected because it is assumed that they more accurately reflect the current demand among employers for certain skills.
2. For some of the skills, the difference might be insignificant in a few countries.
3. For this, the study relies on data on occupational patterns within industries in the United States, combined with survey-based data on the skills that various occupations employ.
4. The age-appreciating cognitive skills content (or age-depreciating cognitive skills and physical ability content) of a country's exports is calculated as the weighted average of the age-appreciating cognitive skills score (or age-depreciating cognitive skills and physical ability score) of various industries (see Cai and Stoyanov 2014). The weights are the respective industry shares in the country's exports.
5. A similar pattern is observed in the physical ability content of the exports of these countries.
6. These are mainly the countries in Central Europe and the Baltics.
7. GEM, a survey among adult populations, is conducted across several countries at regular intervals and generates comparable cross-country data on entrepreneurship. Like most other surveys, GEM defines entrepreneurship broadly to include any self-run business, with or without employees. Unless otherwise reported, the estimates presented here are based on 2007–08 GEM survey data, the latest years for which cross-country harmonized data are publicly available (see GEM).
8. The countries in Central Europe and the Baltics covered by GEM surveys are Croatia, the Czech Republic, Hungary, Latvia, Poland, Romania, and Slovenia. The countries of the Western Balkans that are covered are Bosnia and Herzegovina, FYR Macedonia, and Serbia. The young countries covered are Kazakhstan and Turkey.
9. This finding also suggests that engaging in start-up work does not often lead to the establishment of a new business. Consider, for example, the fact that about 5 percent of 18- to 34-year-olds in Central Europe and the Baltics report engaging in some form of start-up activity. If the typical start-up took 12 months, then this would imply that more than 15 percent of this age group should own businesses that are younger than 42 months. But this rate is actually only 4 percent, suggesting that most start-up activity fails.
10. Individual countries such as Kazakhstan and Russia are not shown because the sample size is too small for the estimation of rates among individuals over 65 years of age.
11. Technically, these are pseudocohorts because GEM is not a panel dataset; that is, the survey does not follow the same individuals over time but takes fresh samples of each cohort in every new round. Although a longer time span would have been more suitable for this analysis, this is the longest time interval between publicly available GEM rounds.
12. Figure 4.23 does hint that a cohort effect among younger generations could, with time, increase the rate of entrepreneurship in all age groups. Specifically, 25- to 31-year-olds in 2001 were less entrepreneurial than 25- to 31-year-olds in 2008; the same held for 32- to 38-year-olds in 2001 and 2008. This could be related to the fact that individuals aged 25–31 in 2001 were among the last cohorts to have finished their schooling entirely in the pretransition era.
13. The evidence suggests that a combination of credit and training works well in promoting self-employment among youth.

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5

Aging and Poverty and Inequality

Introduction

Do inequality and poverty increase in an aging society? Demographic variables have often been considered important determinants of the distribution of income, going back to the classical economists (Malthus, Smith, and Ricardo). A main theme was that fast population growth would put downward pressure on returns to labor versus returns to capital (land, and other physical and natural resources). Conversely, aging—that is, low or even negative population growth—would increase wages relative to returns to capital. Since ownership of capital assets tends to be concentrated, this change in relative factor returns could reduce income inequality. Furthermore, capital holders, usually older people, are likely to lose while young workers gain. More recently, empirical evidence from developed and aging countries, such as Japan, the United States, and Western Europe, shows that age groups tend to become more vulnerable and unequal over their life cycle. Across people within the same age group, some manage to accumulate more wealth over a longer working life while others risk falling into poverty with limited savings stretched over a longer retirement period (see, for example, Attanasio, Hurst, and Pistaferri 2014;

This chapter uses results from the following background papers commissioned for aging work in the Europe and Central Asia Region of the World Bank: "Old Age and Poverty in ECA Countries" (2014), by João Pedro Azevedo, Ana María Munoz Boudet, and Minh Nguyen; "Inequality and Aging" (2014), by Maurizio Bussolo, Tu Chi Nguyen, Sara Signorelli, and Simone Schotte; "Expenditure Patterns over the Lifecycle and Time" (2014), by Brooks Evans, Z. Majoka, Kenneth Simler, and Nistha Sinha; "Intergenerational Support in Europe" (2014), by Marco Albertini; and "Subjective Well-Being in the ECA Region" (2014), by Jan Bauer, Peng Nie, and Alfonso Sousa-Poza.

Deaton and Paxon 1994; Ohtake and Saito 1998). Societies with different age structures will have different levels (and structures) of income and wealth distribution.

Assessing whether and how aging affects poverty and inequality is a complex task. Welfare can be measured using individual-level variables, such as labor earnings or pensions. In this case, the age structure of a population can be straightforwardly linked with the distribution of income across individuals. However, for other welfare measures, such as consumption, which is almost always estimated at the household level, aging can be linked with the welfare distribution only through the composition of the household. While individuals' income, consumption, and saving choices may follow a certain life cycle, households do not necessarily exhibit the same pattern. People of the same age can have different income and consumption patterns depending on the resources they share with other members of their households. Therefore, not taking into account the composition of the household can lead to biases in the estimation of the welfare of individuals (see box 5.1), and in assessing the relationship of welfare and aging.

Another difficulty of assessing the welfare dynamics of aging societies is that aging is normally a slow process. Even in the fastest cases (see examples on demographics in part I of this volume), it takes years before shifts in age structures become apparent. It is therefore a challenge to observe the impact of aging and even more difficult to separate it from many other forces—technological progress, economic growth, and trade, among others—that are at play during the same period. During the decade from the mid-1980s to the mid-1990s, poverty and inequality in the region were driven by the recession that accompanied the transition to market economies in the 1990s and the subsequent recovery (box 5.2).

> The elderly are not the poorest group in Europe and Central Asia, and aging does not necessarily lead to higher poverty rates. Pensions and transfers have helped.

A slight positive relationship can be detected between aging and both inequality and poverty reduction in the past decade, but there is a large heterogeneity in these variables among countries of similar demographic evolutions (figure 5.1). For example, both Lithuania and Romania saw the share of the elderly in the total population increase by around 1.7 percentage points, but Lithuania's Gini increased by 1 point while Romania's decreased by 2 points. Similarly, the share of elderly in the populations of Moldova and Turkey increased by around 1.3 percentage points, but the former reduced the poor population by 68 percentage points, whereas poverty in the latter dropped by only 8 percentage points. Furthermore, countries that succeed in lifting people out of poverty are not necessarily becoming more equal, suggesting that even as the bottom income group improves its welfare, its growth may not be fast enough to catch up with the better off.

This chapter tries to overcome these challenges to show the impact, or at least the potential influence, of aging on poverty and inequality. While it may be difficult to conclude whether poverty and inequality increase in aging societies, identifying winners and losers from the aging process can be very useful. As shown in part III, voting patterns change with age, and reforms that may benefit the whole society—such as those balancing adequacy and affordability of pension benefits or care arrangements that facilitate the labor participation of women—may be blocked by narrow interest groups.
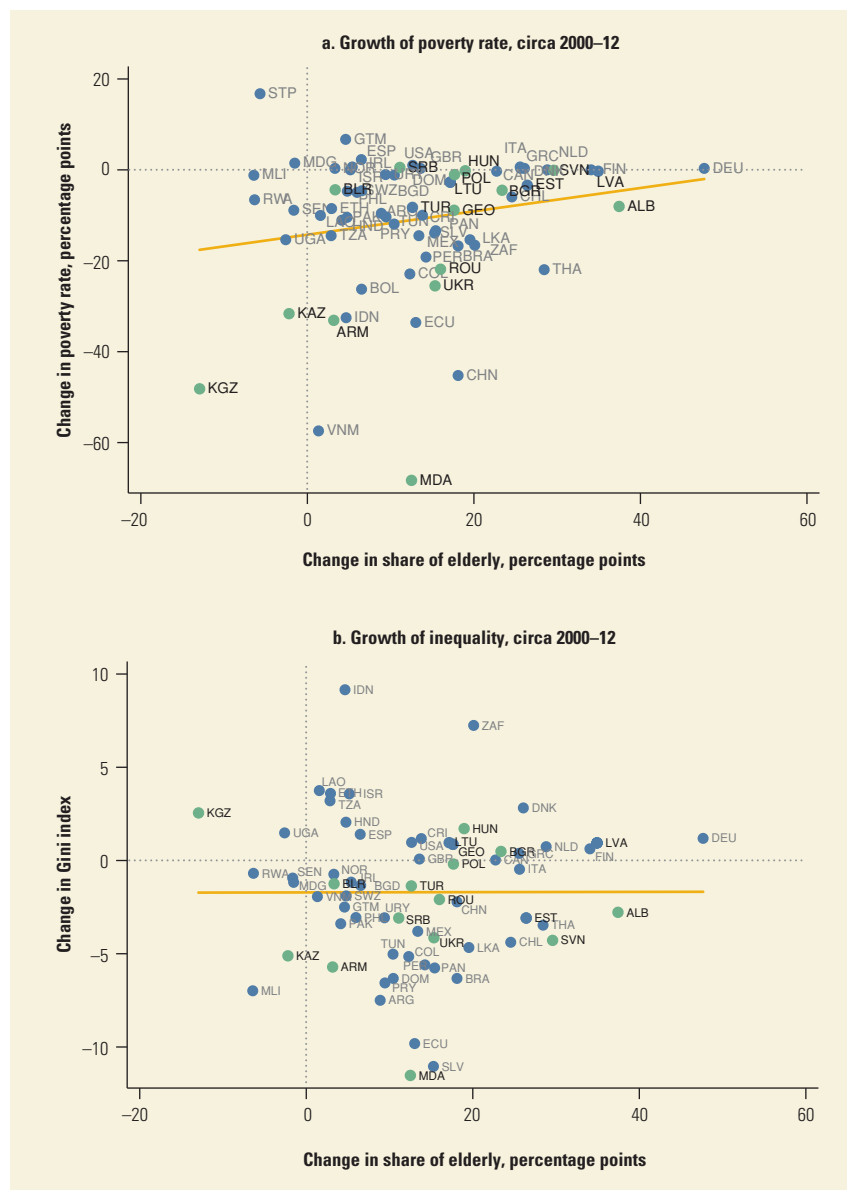
FIGURE 5.1
Aging societies are not necessarily becoming poorer and more unequal

● Europe and Central Asia
● Rest of the world

Source: World Bank calculations based on WDI.
Note: Poverty rates are calculated using the US$2.5 a day (2005 purchasing power parity equivalent) poverty line.

The assessment of the impact of aging on welfare proceeds in stages. First, the chapter examines the extent of poverty among the elderly, which is expected to account for a major part of poverty overall, and how that is affected by household composition, interhousehold transfers, and consumption patterns. Then, using the model developed in chapter 3, the chapter examines the likely relationship between demographic changes, including a decline in fertility and a rise in longevity, on inequality. This analysis is complemented by a review of inequality within the

BOX 5.1 Estimating Poverty for Demographically Different Households

An individual is counted as poor when his or her income (or consumption)—obtained by dividing total household income (or consumption) by the number of individuals of the household—is less than a poverty line. A poverty line is defined based on the needs of an individual living in a household of typical size and age composition. However, individuals do not live in households with the same demographic composition, and the "average" demographic composition is actually changing in an aging society. Some live in smaller households, which do not benefit from scale economies (for example, housing costs are lower per person in larger households). Old individuals, in particular, tend to live with other old individuals in smaller households (figure B5.1.1). These elderly households also have different consumption patterns from households with mixed-age members.

FIGURE B5.1.1 Older individuals tend to live in smaller households in Europe and Central Asia
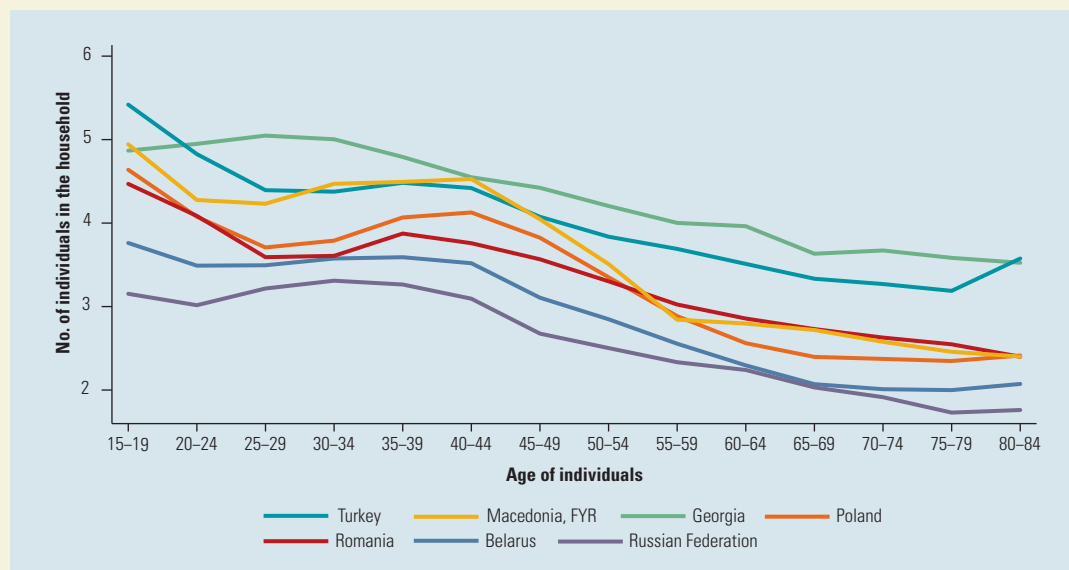
Source: Calculations based on most recent year available in ECAPOV harmonized data.

The economic literature has come up with mechanisms for adjusting poverty measurements for these differences in household composition. When the demographic composition of households and scale effects are taken into account, poverty estimates change (Rothbarth 1943; Deaton and Muellbauer 1986; Lanjouw and Ravallion 1995; Batana, Bussolo, and Cockburn 2013). An exercise in 17 countries in the Europe and Central Asia region and the Baltics using ASPIRE, a World Bank database that compiles social protection and labor indicators from officially recognized international household surveys, shows that unadjusted calculations would yield a poverty incidence (at the 40th percentile poverty line) of 36 percent among the elderly and 52 percent among youths. However, taking into account scale and age composition effects,[a] the poverty rate differential between the young and the elderly becomes smaller and even negative in a few countries: Georgia, Hungary, Kosovo, Lithuania, Serbia, and Ukraine (Evans 2014; Evans and Palacios 2014).

Another bias of poverty estimation may come from the survey selection or mortality bias. More educated and wealthier individuals tend to have healthier lifestyles, and hence they have a higher probability of surviving longer (Attanasio and Hoynes 2000). In contrast, poorer individuals tend to die earlier or, if less healthy, may reside in elder-care centers and thus are not captured in surveys. In other words, there are age-related biases that may make the elderly seem less poor than they actually are.

Conversely, a bias in the measurement of consumption may lead to an overestimation of the poverty level among the elderly. The elderly have different preferences and needs from the young. Specifically, the opportunity cost of (leisure) time tends to fall after retirement, which affects consumption patterns. For example, household data from Poland show that although the share of food consumption does not decline with age, the elderly are more likely to consume more purchased foods (which are prepared at home) and less likely to eat away from home (figure B5.1.2) (Evans et al. 2014). As a result, although total consumption, including imputed value for home production, may not decline after retirement, poverty for old people will appear higher if calculated using exclusively the value of goods and services purchased in the market.

FIGURE B5.1.2 **Food consumption does not decline with age, but the pattern changes, Poland, 2010**
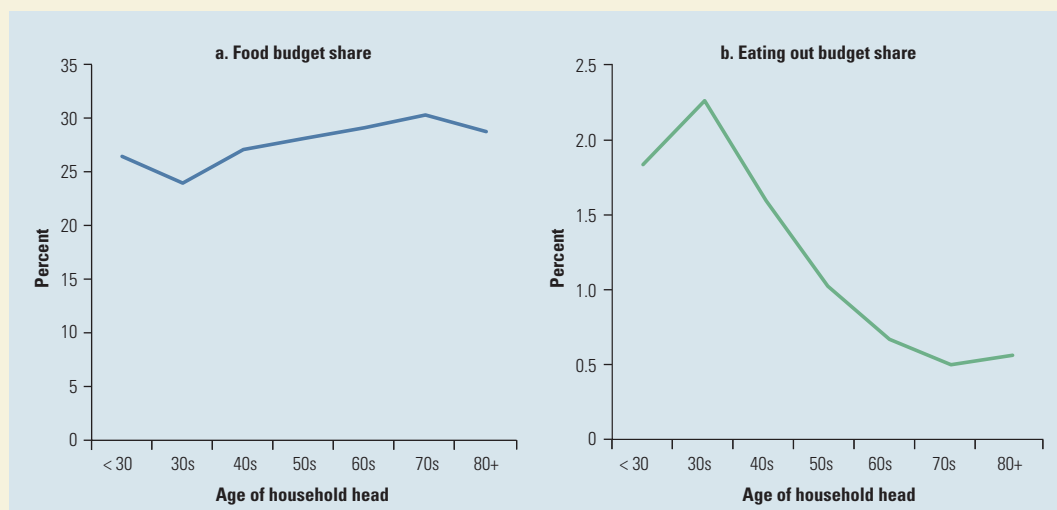
Source: Evans et al. 2014. Calculations based on ECAPOV harmonized data.
Note: Consumption is measured at the household level.

a. The methodology of equivalence sensitivity is based on Deaton and Paxson (1997) and Lanjouw and Marra (2013). The economies of scale parameter takes any value between 0 and 1 and 1, where 1 assumes no economies of scale (unadjusted per capita), and 0.5 assumes that half the resources are shared. The economies of composition parameters give different discounts for children and elderly, assuming that they require fewer resources than adults for the same level of welfare.

elderly population and the rise in wealth inequality and its implications for future generations. The next section considers the importance of pensions for poverty and inequality and the likely implications of pension reform programs in the region. Finally, the chapter summarizes the discussion with an estimation of how the channels between aging and poverty or inequality may play out in different countries in the Europe and Central Asia (ECA) region and the Baltics.

BOX 5.2 Recent Trends in Poverty and Inequality in Europe and Central Asia, 1987–2012

Recent trends in poverty and inequality in the region have been characterized by two distinct phases: the first covers the decade from the mid-1980s to the mid-1990s; the second extends from the mid-1990s until now. During the first period, poverty and inequality rose sharply as countries transitioned to market economies. On average across countries, the Gini index of inequality of consumption per capita increased from 23 in 1988 to 35 in 1994. For some countries, the expansion was large: the Gini climbed 18 points in the Kyrgyz Republic and Ukraine and 24 points in the Russian Federation within five years. Similarly, between 1988 and 1998, absolute poverty (based on consumption per capita) in the region rose from 2 to 21 percent (World Bank 2000).

This evolution in poverty and inequality is closely linked with the economic transition that many countries experienced. Under the planned economy, most people had secure employment and stable wages, assets were concentrated in the state, earnings dispersion in the dominant state sector was explicitly restricted, and tax and transfer policies were designed to limit income differentials. The result was a rather low level of poverty and inequality. The collapse of the Soviet Union was accompanied by a rise in vulnerability and inequality. Observers have provided several reasons for this increase: the redistribution of capital from the state to private agents; the ensuing shrinkage of the public sector and the creation of a fully liberalized private sector; the emergence of entrepreneurial opportunities for creative individuals; price liberalization; the changes in asset returns, especially the liberalization of wage setting leading to a rise of skill premiums; the appearance of unemployment; trade liberalization and the resulting creation of winners and losers; and the general decline in safety net and redistributive policies (see, for example, Commander, Tolstopiatenko, and Yemtsov 1999; De Soto and Dudwick 1999; Ferreira 1999; Giammatteo 2006;

Ivaschenko 2003; Milanovic 1999; Mitra and Yemtsov 2006).

In the next 15 years, absolute poverty dropped to less than 10 percent on average across countries. Inequality stabilized after the transition and even decreased in some cases. The Gini declined and remained relatively stable at around 32 in most countries. To this day, inequality in regional countries remains among the lowest in the world. The average Gini in Europe and Central Asia in the past decade was approximately 35, compared with 39 in East Asia and the Pacific and 41 in the Middle East and North Africa, as well as in South Asia. In contrast, the average Gini is 49 in Latin America and 45 in Sub-Saharan Africa (World Bank 2014).

These shifts, however, differed across countries. Progress on poverty was more dramatic in some countries, and the stabilization of inequality happened earlier for some countries than others. Some countries, including most Central European countries, emerged from the transition in a better position in terms of welfare. They became middle-income countries with low poverty rates and inherited a relatively large human capital stock from the Socialist period. Fluctuations in inequality in these countries have declined since the early part of the 2000s (Simai 2006). Other countries that began the millennium in the low-income group—including Armenia, Azerbaijan, Belarus, Kazakhstan, the Kyrgyz Republic, Moldova, Tajikistan, and Ukraine—saw inequality decrease a bit later, from around 2005 onward. Nevertheless, these countries achieved the largest reduction in poverty, albeit from a very high base. Most impressive is Moldova, which cut absolute poverty by 68 percentage points from 2000 to 2012. The decreasing trend did not start in Bosnia and Herzegovina, Kosovo, the former Yugoslav Republic of Macedonia, and Serbia until after 2010, partly because they were subject to political and economic transformation much later, which may have led to more stratification in society.
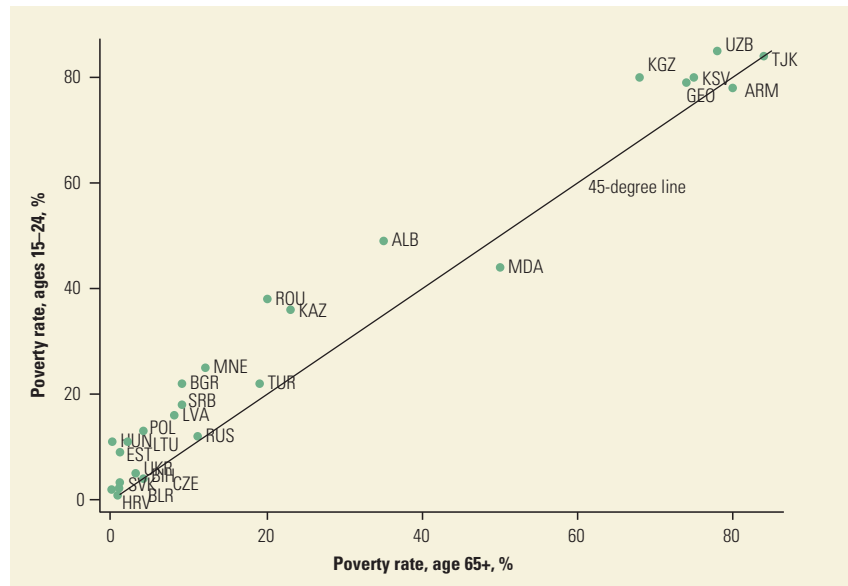
FIGURE 5.2
The elderly are less poor than the young in many countries in Europe and Central Asia, circa 2010

Source: Azevedo, Munoz Boudet, and Nguyen 2014. Calculations based on ECAPOV harmonized data.
Note: Poverty is calculated from household income (or consumption) per capita using the US$5 a day (2005 purchasing power parity equivalent) poverty line.

The Extent of Poverty in Aging Societies

Poverty in aging societies can change for two broad reasons. The first is rather mechanical: as the share of old people increases in a population, the poverty incidence of this group will account for a larger weight in the calculation of the poverty rate of the society as a whole. The second broad reason for poverty change is less direct and more difficult to quantify, but it can be important. As societies become older, household composition changes, and more elderly live alone. As a result of this change in living arrangements, older and younger people are less likely to share their incomes. The former become more dependent on pensions, and the younger become more vulnerable to downturns in the economy. In addition, growing demand by the elderly for certain goods and services—health care, for example—can put pressure on the prices of these services and affect consumption levels and therefore poverty. These issues are discussed in detail below.

The elderly are not the poorest group in Europe and Central Asia and aging does not necessarily lead to higher poverty rates. Household survey data show that poverty among the young is higher than among the old. Even in poorer countries such as Armenia, Azerbaijan, Georgia, the Kyrgyz Republic, Tajikistan, and Uzbekistan, where overall poverty rates ranged from 75 to 85 percent at the US$5 purchasing power parity (PPP) level in 2005, the old-age poverty rate is still below that of the young. Across age groups, the difference in the incidence of poverty is quite large (figure 5.2). The average poverty incidence for the group aged 15–24 around the year 2010 (specific year for each country depends on data availability) is 32 percent, and its median is 20 percent.[1] In contrast, for the old group (65 or more years) the average and the median poverty incidence are 26 and 10 percent, respectively.

FIGURE 5.3

The elderly are less likely to live with nonelderly in aging societies

● Europe and Central Asia
● Other countries
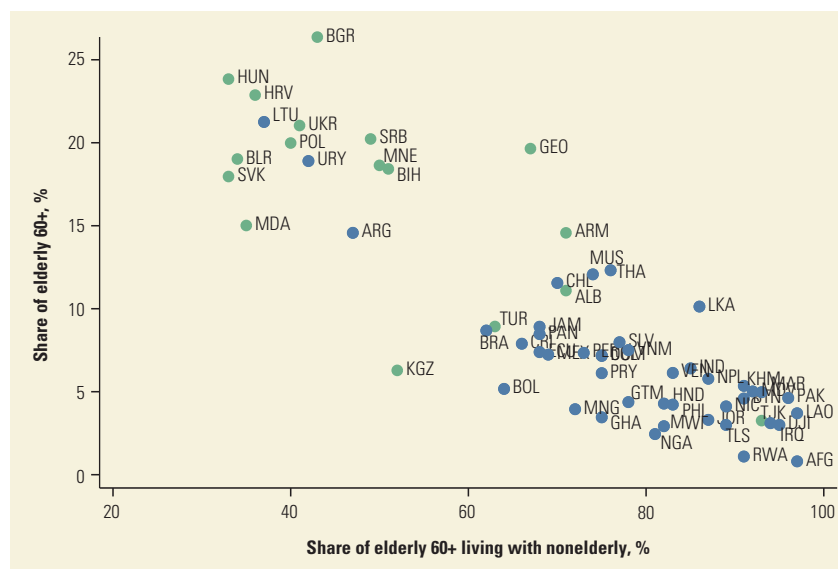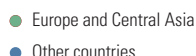
Sources: Calculations based on coresidence data from Evans and Palacios (2014) and elderly share data from World Population Prospects: The 2012 Revision. Coresidence data are from the ASPIRE database, which harmonizes the most recent available household surveys across 62 countries.
Note: The figure reflects the most recent year available. Not all countries in the region are represented due to availability of data.

Poverty rates are higher for old individuals than for young ones in only two countries (Armenia and Moldova) out of 26. Societies with a higher share of elderly, therefore, do not necessarily have higher overall poverty rates.

The aging of a society can still influence the overall poverty rate in indirect ways. One important mechanism is the change in household composition and the related shifts in income sources and consumption patterns.

The elderly in an aging society are more likely to live alone or only with other elderly (figure 5.3). The rise in elderly-only households is directly linked to decreasing fertility or increasing longevity—there are simply fewer younger individuals—but it is also due to the declining prevalence of multigenerational households. Figure 5.3 also highlights that this living arrangement among the elderly is particularly common in Europe and Central Asia. For the same share of elderly in the population, a country in this region has more elderly living alone (or with other elderly) than in other regions. For example, people aged 60 or older account for approximately 7.8 percent of the total population in India and the Kyrgyz Republic, but in the Kyrgyz Republic just 52 percent live with nonelderly, whereas in India 85 percent do. And in older societies, such as Argentina and Moldova, where the elderly account for 15 percent, the share of elderly living with nonelderly is 35 percent in Moldova but close to 50 percent in Argentina. Elderly-only households account for about 10 percent of households in Europe and Central Asia,[2] but only 1–5 percent in Latin America, Africa, and Asia (Evans and Palacios 2014). In addition, an average (weighted by population) of eight countries in Central Europe and the Baltics based on European Union Statistics on Income and Living Conditions (EU-SILC) data[3] shows that the share of elderly-only households has increased in recent years, from 8.6 percent in 2005 to 9.2 percent in 2012. The rise is particularly large among the bottom 40 percent of the income distribution, from 9.4 percent in 2005 to 12.2 percent in 2012.
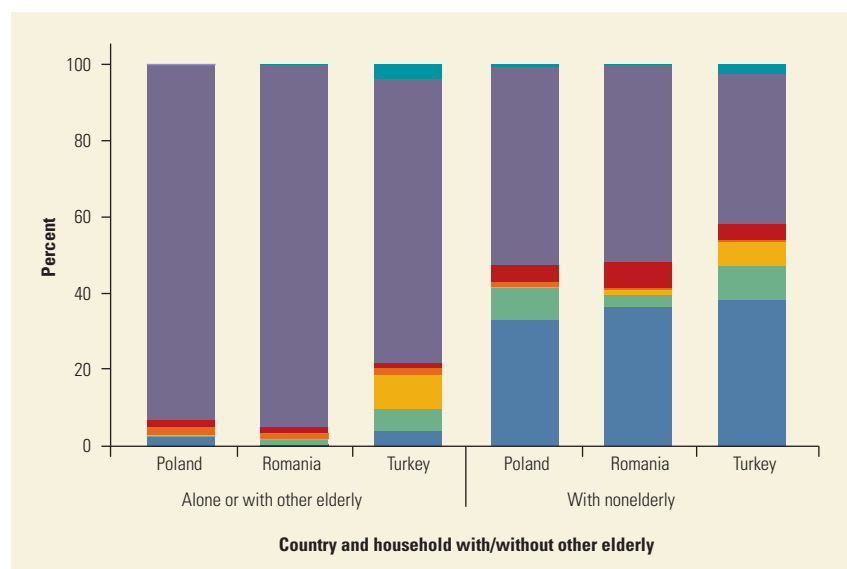
FIGURE 5.4

Elderly (65+) living by themselves rely significantly on pension income, 2010

Legend:
- Labor
- Agriculture
- Capital
- Transfers
- Benefits
- Pensions
- Other

Sources: World Bank calculations based on ECAPOV harmonized data.
Note: Labor includes wages and self-employment. Agriculture includes income from farm production. Capital includes rents and the sale of property. Transfers include interhousehold transfers, whether domestic or involving a foreign country. Benefits include all social assistance transfers such as housing subsidies and child, unemployment, and disability benefits. Pensions include contributory, survivor, and social pensions. Other includes scholarships, alimony, and other unspecified income.

Who the elderly live with is an important determinant of their access to resources. Elderly living with nonelderly have some access to labor income, whereas elderly living alone or only with other elderly rely almost exclusively on pension income (figure 5.4). On average, in Poland, Romania, and Turkey more than 80 percent of the incomes of elderly living alone or with other elderly comes from pensions. In contrast, elderly living with nonelderly have a higher proportion of their incomes (50 percent on average) linked to other sources (such as labor income). This highlights the vulnerability of elderly living by themselves (alone or with an elderly partner) when the pension system becomes less generous and moves away from its safety net function (see below for a discussion of these effects).

Women are particularly likely to live alone. Although elderly women and men are equally likely to live without their children (about one in three elderly men or women), a higher share of female elderly live alone because they outlive their partners. Available data from 14 countries in the region indicate that, on average, 19 percent of elderly women live alone, compared with 7 percent of the male elderly (Evans and Palacios 2014). In Belarus and Moldova, as many as 47–48 percent of female elderly live alone. These women may not necessarily be impoverished, thanks to the prevalence of a survivor pension, a legacy of the Soviet system in many regional countries. However, their income is on average lower than that of other women; they hold less savings and experience poorer health (Azevedo, Munoz Boudet, and Nguyen 2014).

Beyond their own income and resources shared within the household, the elderly can rely on support from other parts of society, such as social benefits and interhousehold transfers (transfers between generations residing in separate households). Social and interhousehold transfers play a limited role in poverty reduction but could be important for the most vulnerable, especially if they have no

FIGURE 5.5

Transfers from children to their parents tend to be progressive, 2004–07
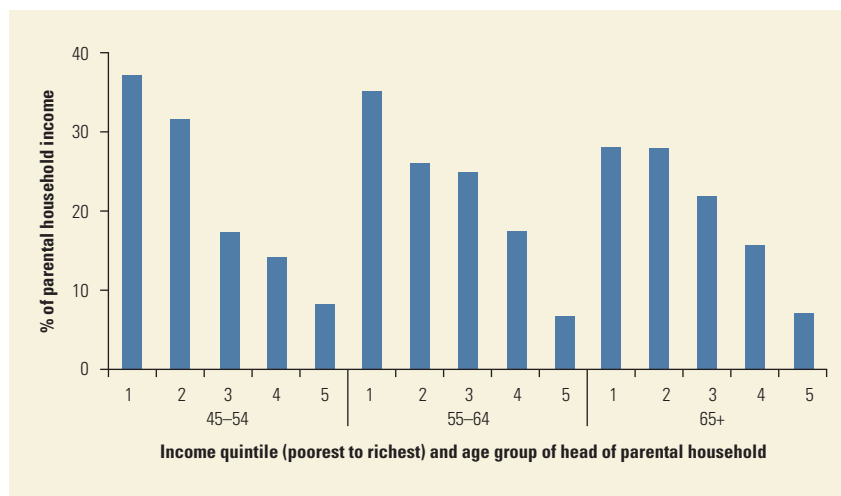
Source: World Bank calculations based on GGS Wave 1 (database).
Note: The transfers indicated are weighted averages of transfers in Bulgaria, the Czech Republic, Georgia, Romania, and the Russian Federation.

other resources. Social assistance from the government (excluding pensions) does not make up much of the elderly's income, probably because many of these benefits are not targeted to the elderly (see figure 5.4). Poland, where these transfers played an important role in reducing poverty among households with elderly from 2005 to 2010, may be an exception. Interhousehold transfers also play a small role in supporting the elderly. Data for the region from different sources—including the EU-SILC, the Generations and Gender Survey (GGS), and the Survey of Health, Ageing and Retirement in Europe (SHARE)—show that less than 7 percent of the elderly respondents received financial support from a child.[4]

These transfers, although small, tend to be progressive, as they benefit the poorest old. According to the SHARE data, there is a negative correlation between the pension income and real wealth of the elderly and the likelihood of receiving transfers from their children. Elderly women living without a partner, and especially if they face limitations in their ability to cope with daily living activities, are among the most frequent recipients of private transfers.[5] Similarly, GGS data show a declining trend of transfers as a share of household income as income rises.[6] On average, the older poor receive 20–40 percent of their income from their children, and, notably, a much larger share is received in poorer countries such as Georgia and Romania (see figure 5.5). Similarly, public transfers delivered through social assistance programs are often targeted to the poorest. Nevertheless, governments of aging societies will be confronted with the need to assist a portion of the growing elderly population who suffer from dwindling pensions, the deprivation of living alone, and the lack of support from elsewhere.

Increasing shares of old individuals and shifts in household composition are also related to changes in demand patterns for aging societies. The share of consumption expenditures devoted to transportation and education drops rapidly as the age of the household head advances beyond retirement, due to a reduced need to commute to work and a smaller number of children in the household. In contrast, the consumption share for health and utilities increases (see figure 5.6). The increase in health spending often stems from older individuals' higher needs

FIGURE 5.6 Older individuals spend a higher share of their expenditures on health and utilities and less on transportation and education, circa 2012

a. Transportation budget share

b. Utility budget share

c. Education budget share

d. Health budget share

Legend: Georgia, Poland, Romania, Serbia, Turkey
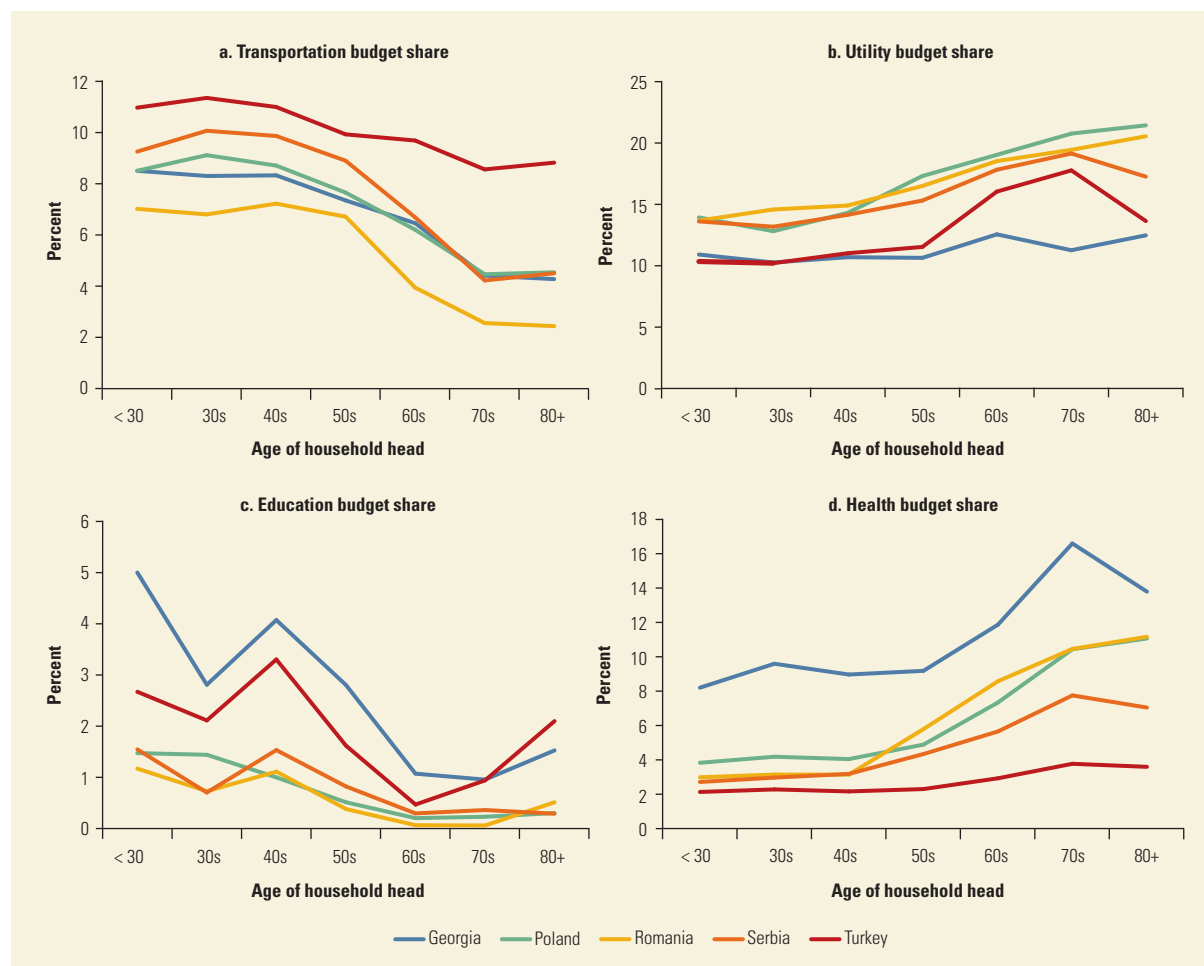
Sources: Evans et al. 2014. Calculations based on ECAPOV harmonized data.
Note: Consumption is measured at the household level.

for medical services related to rehabilitation and long-term care. The rise in consumption of electricity, heating, and other utilities may be due to the elderly living in smaller households but larger houses (as their children move out), spending more time at home, and owning older and less energy-efficient appliances (Yamasaki and Tominaga 1997).

This shift in consumption patterns is expected to be more pronounced as populations become older. The rising demand for energy and certain health care services in aging countries could put upward pressure on prices of those services if supply does not adjust accordingly. The elderly may have to spend a lot on medicine and care, whether they are rich or poor or whether prices increase or not, out of necessity. Rising prices could then reduce the purchasing power of vulnerable elderly households and push them into poverty. Furthermore, as energy and medicine are goods of necessity, the poor may adjust to the rising prices through suboptimal mechanisms, such as reducing food or education spending.

It should be noted that these aging-related issues affect poverty in a deeper sense. Poverty is measured for individuals. However, their welfare, incomes, and consumption depend on household arrangements, in particular on how incomes are pooled and how consumption and saving decisions are taken within the household and then recorded in household survey data. Taking into account these measurement issues may actually change the assessment of the situation (see box 5.1 for details).

Do the Elderly Perceive Themselves as Worse Off?

It is not easy to examine changes in subjective well-being at old age, because the development of well-being along the life cycle can differ vastly across countries, age groups, gender, and income groups. There is also no agreement in the literature on the definition of subjective well-being (or life satisfaction), which is a complex concept easily susceptible to bias. Similarly, subjective well-being can determine one's longevity as much as age is a predictor of well-being (the direction of causation between well-being and age is unclear). In Europe and Central Asia in particular, analyses of well-being have produced mixed results. On the one hand, Deaton (2008) argues that in middle-income and transition countries, where health satisfaction seems to be affected more negatively by age, life satisfaction declines with age. He points out that this age-related decrease is strongest in Central Europe and the Baltics and the former Soviet countries, where the elderly seem to be the most dissatisfied age group of all, but he attributes this trend to cohort effects. On the other hand, analyses that controlled for other factors affecting well-being find a U-shaped relationship between age and satisfaction (Hayo and Seifert 2003; Blanchflower, Oswald, and Stutzer 2008), where well-being picks up after middle age (although the exact age varies across studies).

A closer look at Europe and Central Asia shows that perceptions of well-being do not appear to deteriorate significantly at old age. A first analysis uses the Integrated Values Survey, which measures subjective well-being by asking respondents to rank their individual life satisfaction on a 10-point scale, with 10 being the most satisfied.[7] Although the exact relationship between age and life satisfaction is unclear, life satisfaction does not show significant differences across age groups (figure 5.7). There is a small increase after retirement followed by a limited decline toward the end of the life cycle, but it is barely significant. Another analysis uses the Life in Transition Survey, which covers all countries in Europe and Central Asia except Kosovo, to follow individuals from 2006 to 2010. Subjective well-being in this survey is measured on a 5-point scale,[8] but again perceptions of well-being are not strongly related to age.

A few additional observations regarding subjective well-being among the elderly in Europe and Central Asia are worth noting. First, individuals in the region tend to be less satisfied with their lives than their Western European counterparts are. Being employed, married, in good health, and rich seem to be positively correlated with life satisfaction, which may explain the lower outcome in the region than in more developed countries. Similarly, unemployment can result in long-term depression of individual well-being. Although widowhood is expected to reduce life satisfaction due to loneliness and, in some cases, loss of income, according to the Russian panel data, individuals can adapt to these events rather quickly. In short, the impact of aging on subjective welfare warrants deeper re-

FIGURE 5.7 Subjective well-being does not change significantly over the life cycle
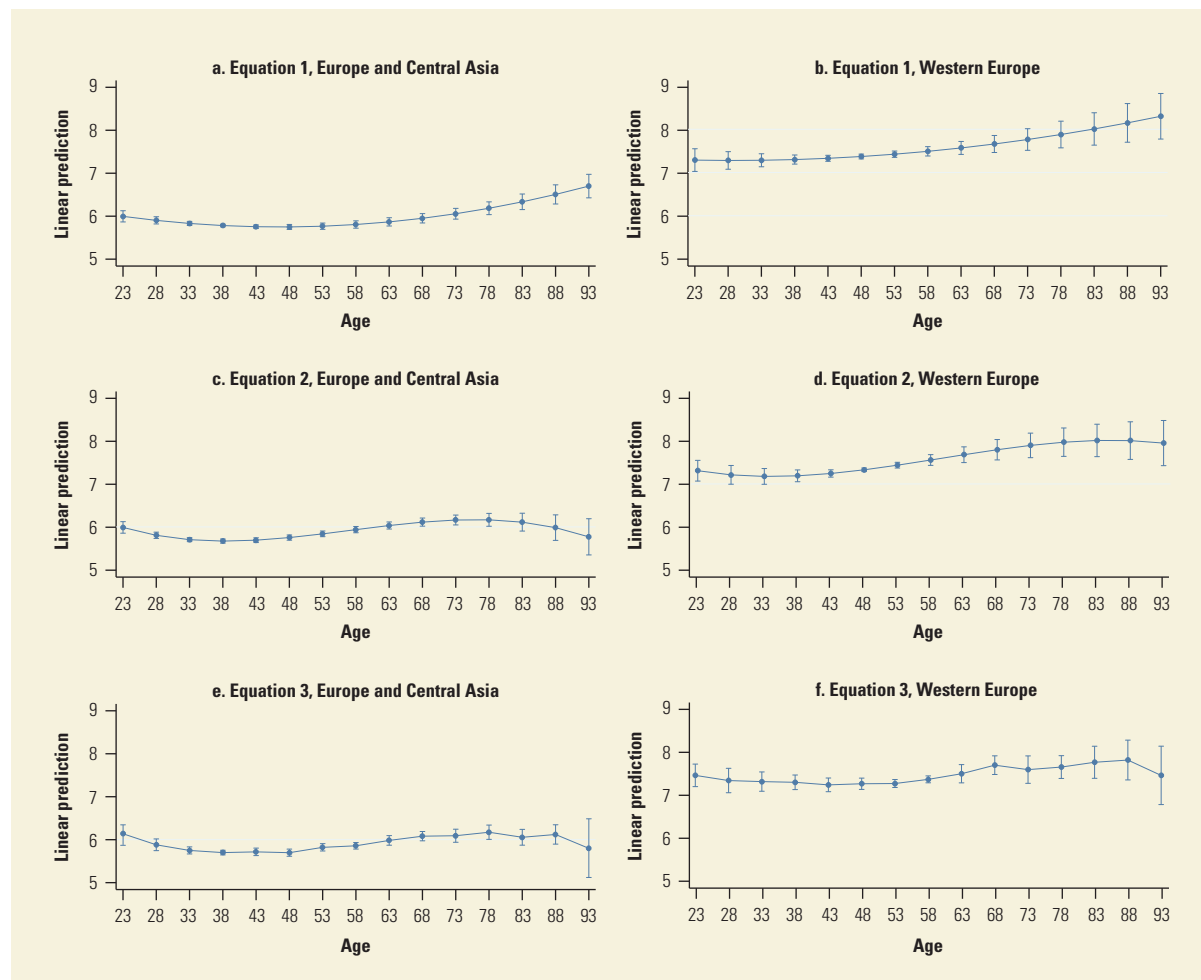
Sources: Bauer, Nie, and Sousa-Poza 2014. Calculations are based on the Integrated Values Survey, which merges the European Values Study (EVS, 1981–2008) with the World Values Survey (WVS, 1981–2009).
Note: Life satisfaction is individually self-rated on a 10-point scale. Controls include sex; employment status (5-point scale, 0 = unemployed, 1 = full-time employed, 2 = part-time employed, 3 = self-employed, 4 = other; unemployment as reference); marital status (4-point scale, 0 = single/never married, 1 = married/living together, 2 = divorced/separated, 3 = widowed; single/never married as reference); education (3-point scale, 0 = low-level education, 1 = medium-level education, and 2 = high-level education; low-level education as reference); income (5-point scale, first-step income as reference); self-reported health (5-point scale, self-reported very poor health as reference); and dummies for cohort, children living in household, and year. Equation 1 regresses life satisfaction on age and age squared. Equation 2 regresses life satisfaction on age, age squared, and age cubic. Equation 3 regresses life satisfaction on age group dummies. The bars represent 95% confidence interval.

search, but there is no concrete evidence that the elderly in Europe and Central Asia are less satisfied with their lives than the young, although they may be less happy than their counterparts in more developed countries.

Does Inequality Rise with Population Aging?

The aging of a society can also influence inequality. As in the case of poverty, aging affects inequality through different channels; the net impact is uncertain and depends on country characteristics (box 5.3 provides a more technical overview of

BOX 5.3 The Impact of Aging on Inequality

There is a vast literature on the effects of demographic changes on welfare and inequality. This research can be divided into three broad areas, according to the channels analyzed: (1) direct effects; (2) indirect effects; and (3) compositional effects (Lam 1997). Figure B5.3.1 illustrates the elements considered by each.

The direct effects include the impact of a change in the age structure on production through shifts in the relative supply of labor and capital, and on consumption through changes in the relative demand for different goods. For example, the entrance of the large baby-boom cohort into the labor force considerably reduced the mean wages

FIGURE B5.3.1   Aging affects inequality through multiple channels
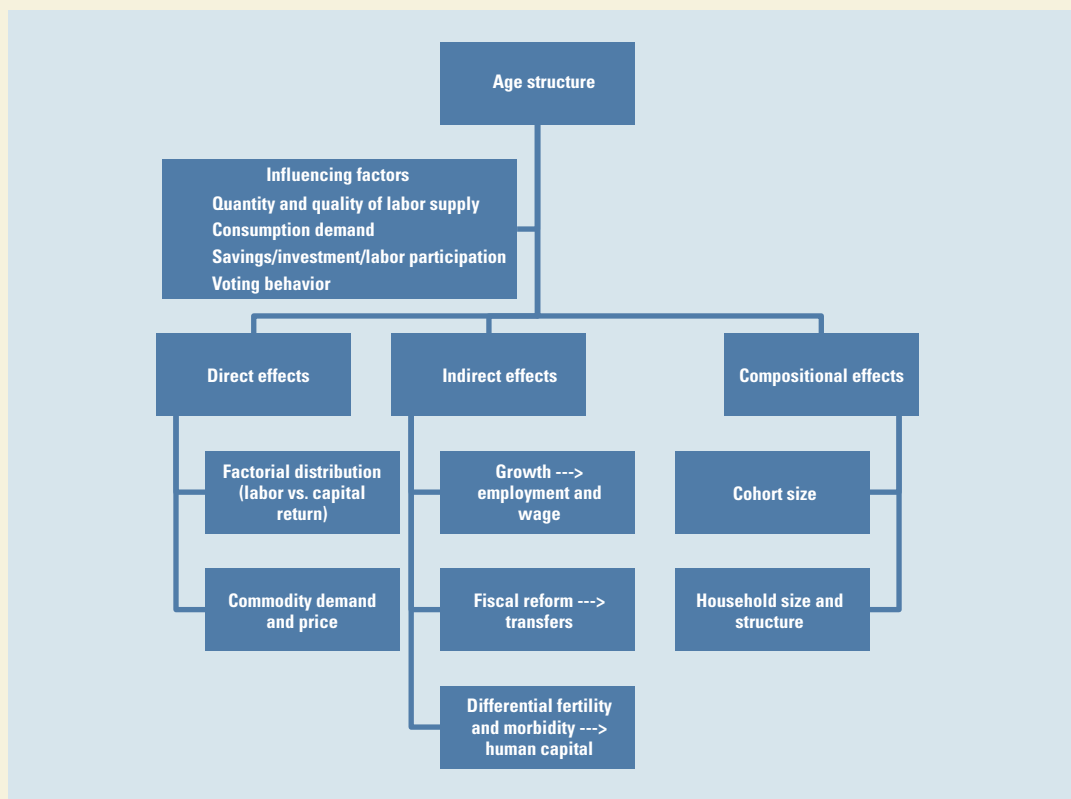
of young workers and thus increased inequality between generations (see, for example, Berger 1989; Freeman 1979; Lam 2006; Welch 1979). Whether this impact is permanent or transitory remains to be seen. However, as the baby-boom cohort ages, the relatively smaller young generation will benefit from higher returns to labor com-

pared to capital (Krueger and Ludwig 2007). This mechanism can potentially shift resources from the old, many of whom own capital, toward the young wageworkers, widening the income gap between the two age groups. The higher returns to human capital investments may also exacerbate inequality among workers. Since the poor rely more on

(Continued)

BOX 5.3 *(continued)*

labor income and the rich more on capital income, however, a rise in the return to labor can reduce inequality for the society as a whole.

Aging also affects inequality indirectly, through the impact of aging on economic growth, through changes in individual and firm behavior, and through measures taken by the government in response to structural shifts. Although the literature on the impact of aging on growth draws mixed conclusions (see chapter 3), individuals are likely to adjust to the prospect of living longer through more investment in human capital, greater labor force participation, and higher savings, thus raising growth (Miyazawa 2006). Growth, in turn, is expected to affect inequality, although the direction of the impact depends on the pattern of growth. On the one hand, growth may widen inequality, since the rich are likely in a better position to invest in human capital and save, and through bequests they will transmit this inequality to the next generation. On the other hand, growth may generate more opportunities for the poor, hence reducing inequality. Governments may be under pressure to curtail pension provision for the elderly, and the choice of pension systems, defined contributions or defined benefits, can provide different incentives for savings and labor force participation (Dedry, Onder, and Pestieau 2014). Conversely, governments may be influenced by a greater political power of the elderly and divert resources away from the young (Arawatari and Ono 2008).

Finally, aging may affect inequality by changing the relative size of age groups, referred to as the compositional effect (Deaton and Paxson 1994; Lam 1997). If birth cohorts (groups of population born in the same period) tend to become more unequal as they age, as is hypothesized by the Mincerian theory of increasing skill premium along with experience (Mincer 1974), the rise in the share of the elderly in the population will increase total inequality. If the mean income of the elderly is closer to the population average than that of the young, however, total inequality will decrease. Nevertheless, the magnitude of this shift is rather small, for two reasons. One is that the demographic transition takes a long time, and it can be decades before a significant rise in the share of the elderly is recorded. Second, since total income can be measured only at the household level and the age structure of households may shift more slowly than the individual age structure, the rise in the share of "older" households may be smaller.

A framework is useful for putting these effects together. A population can be divided into different age groups, and overall inequality will depend on the distribution within and across age groups, as well as their sizes. In more formal terms, most inequality indexes can be written as a function of three components: inequality within groups I_g, the average levels of welfare $\overline{w_g}$ of the groups, and the population share of each group, as follows:

$$I_{total} = f(I_g; \overline{w_g}; n_g).$$

In this framework, the within- and between-group inequality is influenced by the direct and indirect effects of aging, while the group size drives the compositional effect. But adding these elements can be tricky, because they sometimes counterbalance each other. The impact of aging on total inequality, therefore, depends on how each channel plays out in different contexts.

these dynamics). A useful way to organize the discussion on aging and inequality is to split the population into different groups according to their ages and consider what happens to inequality between groups and within groups as the share of older people increases.

Inequality between groups, also called intergenerational inequality, takes into account the gap between the average individual in one group and the average individual(s) in the other group(s). For simplicity, consider just two groups, the

young and the old. In most cases, the young tend to rely on wages and the old tend to rely on returns on their assets. In an aging population, the return on labor tends to rise relative to the return on capital (assets), so that the young will be better off. The shift in returns may result in lower overall income inequality if the young group was initially poorer and larger, but this varies among countries.

Inequality within each age group (or generation) depends on the dispersion of assets and returns owned by the various members of the group. A general finding is that the skill premium, or the gap in labor incomes between a skilled and an unskilled worker, tends to be larger in older groups. This is because better-educated workers tend to work on more complex tasks and usually improve their productivity with experience. In addition, they tend to work less physically demanding jobs and thus have longer work lives. If this skill gap persists as society ages, a larger polarized group of old workers could push up overall inequality in a society.

> **Aging societies run the risk of becoming polarized as differences in earnings, participation, health status, and even mortality between skilled and unskilled tend to increase with age.**

The higher accumulated benefits of better-educated individuals—or individuals starting their life cycle with some other advantage—can translate into larger savings and wealth later in life and be passed on to the next generations. Thus, intergenerational transfers or inheritance mechanisms could reproduce inequality within the younger generations of the future.

These issues are discussed in more detail in the sections that follow. The first section focuses on inequality between the young and the old, or how inequality between age groups changes as a result of aging. The second section looks at some evidence that human capital returns rise with age, which leads to higher inequality among the old than among the young. The third and final section explains how inequality at old age can be passed on to younger generations. These dynamics are examples of the risks that aging poses to equality.

Will Aging Shift the Distribution of Income toward the Young?

Aging is expected to shift relative factor prices—in practice, the ratio of wages to the return on capital (*w/r*), which plays a central role in determining the winners and losers from demographic change. Aging brings about an increase in the capital-labor ratio (and the capital-output ratio) and a corresponding increase in the ratio of wages to capital income. Simulations using the overlapping generations (OLG) model developed in chapter 3 find that both declines in fertility and increases in longevity increase wages relative to the return on capital. With improved longevity, higher savings (due to agents' foreseeing longer lives) push up investment and support a larger capital stock. The larger capital-to-labor ratio is associated with higher wages relative to the return on capital. With reduced fertility, the growth rates of population and gross domestic product (GDP) slow down, but, given that the saving rate is not affected, the investment-to-GDP ratio remains the same. As a result, the capital stock increases relative to labor supply. In the fertility scenario, the *w/r* ratio rises by more than one-third over the 50-year period of the simulation (see figure 5.8).[9] This result is consistent with other empirical exercises. For example, Krueger and Ludwig (2007), studying the impact of aging, project an approximately one-percentage-point decline in the interest rate and a

FIGURE 5.8   The wage-capital return ratio increases as fertility declines

a. Capital returns   **b. Wage rate**   **c. Wage-capital return ratio**

Source: Overlapping generations (OLG) model developed for this study.

4 percent rise in wage rates in the countries of the Organisation for Economic Co-operation and Development (OECD) between 2005 and 2050.

   Given that capital is held in larger proportion by older individuals, while younger individuals rely mainly on income from wages, changes in the *w/r* ratio can result in a redistribution of income from the old to the young. So that the impact of these changes in factor prices on changes in the personal income distribution can be measured, the population is split into three age groups: young (ages 15–40), middle aged (ages 41–65), and old (above age 65). In the steady state, the young rely heavily on labor income, while their capital income is negative; that is, they borrow (figure 5.9). With a decline in fertility, the young benefit from both the increase in wages and the decline in the price of capital. For the middle aged, the effect is ambiguous because they supply labor, while also holding assets. Unlike the young
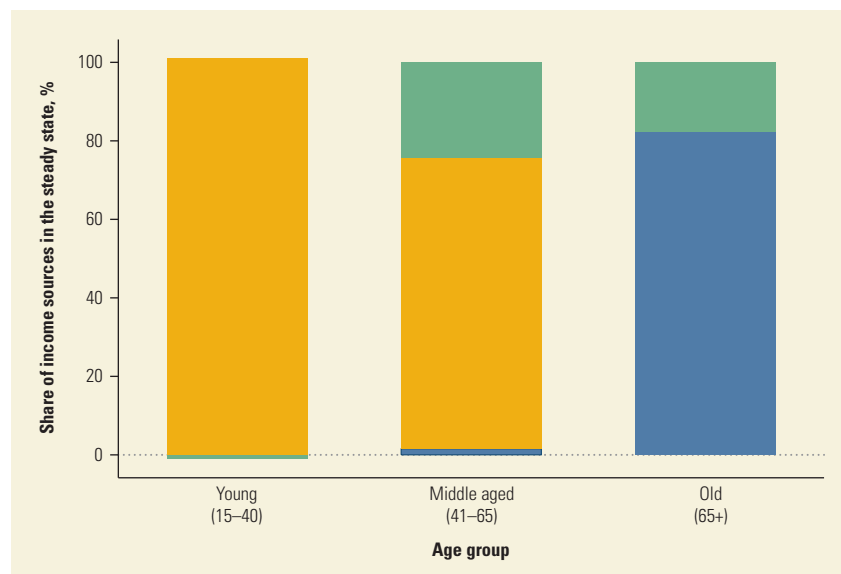
FIGURE 5.9

In a stable population, the young rely heavily on labor income while the old rely more on income from assets

- Pensions
- Capital
- Labor

Source: Overlapping generations (OLG) model developed for this study.

FIGURE 5.10

The young may experience income gains while the old may be worse off as fertility declines

— Young (15–40)
— Middle aged (41–65)
— Old (65+)
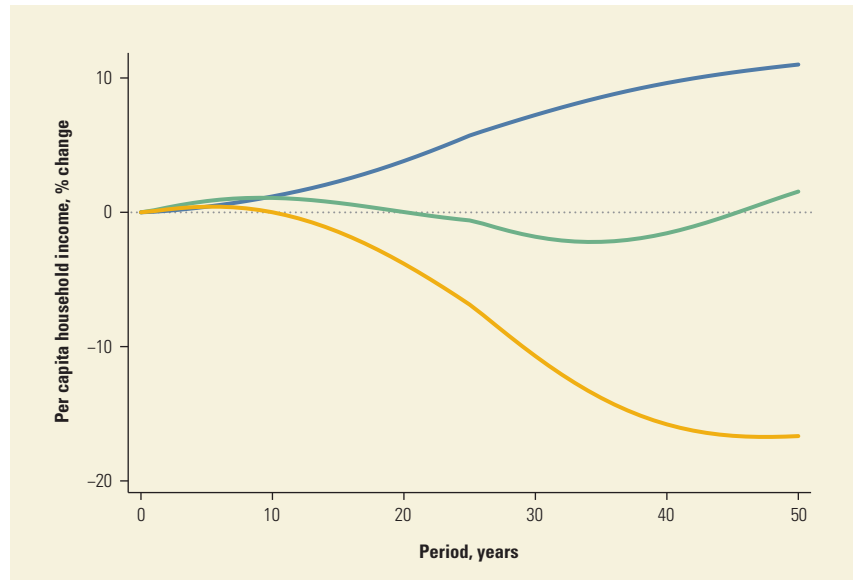
Source: Overlapping generations (OLG) model developed for this study.

and the middle aged, the old do not benefit from higher wages because they do not participate in the workforce, while they lose because of the decline in capital returns.

Thus, the young experience a remarkable increase in market incomes, the elderly are clearly less well off, and the middle aged are mostly unaffected (figure 5.10). Similar shifts in income among generations can be seen with aging due to an increase in longevity.

The redistribution of income from the old to the young in reaction to population aging predicted by the model simulation may also be observed in the real world, because the differences in income composition assumed in the model (see figure 5.9) closely match actual patterns (figure 5.11). Labor income is the principal

FIGURE 5.11

Households with more elderly are more dependent on pensions, Central Europe and the Baltics, 2010

■ Capital
■ Labor
■ Pensions
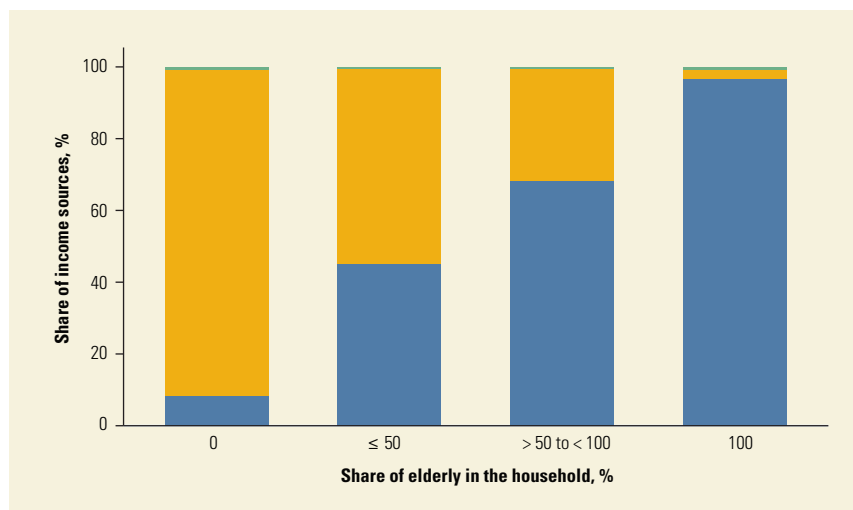
Source: World Bank calculations using data from EU-SILC.

TABLE 5.1 Change in Income Inequality after a Reduction in Fertility

Age category	Annual income per capita		Population share (%)		Gini index of income distribution	
	Steady state (US$)	Fertility scenario (US$)	Steady state	Fertility shock	Steady state	Fertility shock
Young	16,157	17,929	43	31		
Middle aged	19,322	20,100	38	41	15	18
Old	11,649	9,779	19	28		

Source: Overlapping generations (OLG) model developed for this study.
Note: The estimates of incomes and population shares refer to the 50th year after the start of the fertility decline.

income source among younger households in Central Europe and the Baltics. As the share of elderly in households rises, pension benefits become more important, although capital returns constitute a relatively minor income source. This implies that younger households will tend to benefit from a rise in the ratio of wages to the return on capital in reaction to population aging, while the old will tend to suffer a welfare loss.

Two additional elements need to be taken into account to measure the impact of the redistribution of income from the old to the young on societal inequality. First, the extent to which the younger age groups that are gaining from the rise in wages were initially poorer, or richer, than the older age groups that are losing must be clarified. Second, the relative size of the three age groups must be determined. In the model scenarios based on data from the Russian Federation, the young and middle aged are initially a larger and richer group than the old. The reduction in fertility ultimately (after 50 years) increases the incomes of the already richer young and middle aged relative to the poorer old. In addition, the population weight shifts away from the initially large group of the young, who have earnings in the middle of the distribution, toward the initially smaller and poorer old group (table 5.1). As a result, the Gini index rises by 20 percent (from 15 in the steady state to 18) over the 50-year period.[10] Fifty years after the start of the demographic shift, the middle aged are earning more than twice as much as the elderly, compared to 1.66 times in the steady state.

The inequality outcomes are similar in the increased longevity scenario, although the two scenarios diverge in the longer run. The impact of the rise in fertility is only temporary, and when the dependency ratio returns to its steady-state level, inequality also returns to its initial level. But the dependency ratio in the increased longevity scenario is permanently higher, so that the change in the distribution of income is likewise permanent.

Will the Gap between Low- and High-Skilled Workers Widen with Age?

The above discussion of intergenerational inequality is essentially an *aggregate* story that depends on the return on labor versus capital. However, inequality is also, and in reality mostly, due to dispersion around these aggregate macroprices: not everyone is getting the average wage or benefiting equally from its increase. For the full story of aging and inequality to become clear, inequality within age groups and the aging-related shifts in the relative sizes of these groups must be examined. The following discussion examines the dispersion around the average

FIGURE 5.12

Low-skilled elderly have increased their employment, but their employment rates are still below those of their skilled counterparts

Legend:
- College, male (solid blue)
- College, female (solid green)
- No college, male (dashed blue)
- No college, female (dashed green)
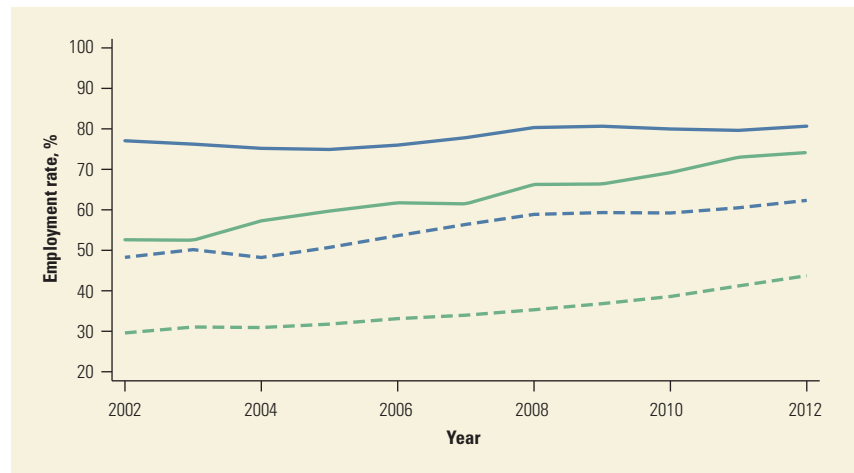
Source: Giles, Koettl, and Huang 2015, using data from EU LFS.
Note: Weighted average of Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic, and Slovenia by country populations.

wages for different age groups, highlighting the increase in dispersion as the average age of the group increases.

Inequality within a specific age group can be explained, at least in part, by the different composition of the group in education and participation in the labor market. For the older age groups, the gaps in earning and participation among the skilled and unskilled are higher than in the younger age groups.

Within the older age groups, some elderly benefit from the rise in the relative return to labor as they work longer, but many others do not. First of all, the choice to work longer is not available to all. Differences in participation choices between low- and highly educated individuals tend to be exacerbated by aging. Because of meager wages, but also because of worse health conditions (see chapter 2), unskilled workers in a selection of regional countries tend to become unemployed or inactive at earlier ages than their skilled counterparts (figure 5.12). Older workers (aged 56–60) with tertiary education and above are much more likely to be employed than those with less than a college education. This gap has been closing for men (from 30 percentage points in 2002 to 18 percentage points in 2012) but has been widening for women (from 22 to 30 percentage points), as the employment rate of high-skilled females is increasing much faster than for low-skilled females.

An older society may be a polarized one, with the large cohort of older workers split into a rich and a poor group. A large literature (Acemoglu 2002; Acemoglu and Autor 2011; Denk et al. 2013; Golding and Katz 2007; OECD 2011; World Bank 2014) emphasizes that the skill premium plays a key role in explaining the recent increases in inequality of labor incomes in OECD countries and has also been an important force in pushing up inequality in ECA countries during the transition (box 5.2). There is evidence that the skill premium is widening with age (Kitov and Kitov 2013; Marotzke 2014). As experience is rewarded more for the better educated, the skill gap for workers who enter the labor market around the same time widens over their working lives, and inequality is then higher for the working elderly (Blundell 2014; Card and Lemieux 2001; Acemoglu and Autor 2011).

The magnitude of this effect for Europe and Central Asia (using data on Georgia, Moldova, Romania, and Russia) can be assessed by identifying different

FIGURE 5.13 Labor income inequality between high- and low-skilled workers increases with age

a. Predicted monthly income, Russian Federation

b. Ratio of labor income of skilled to unskilled workers, Russian Federation

c. Predicted monthly income, Romania

d. Ratio of labor income of skilled to unskilled workers, Romania

e. Predicted monthly income, Moldova

f. Ratio of labor income of skilled to unskilled workers, Moldova

g. Predicted monthly income, Georgia

h. Ratio of labor income of skilled to unskilled workers, Georgia

Sources: Bussolo et al. 2014. Data for Georgia: Household Budget Survey, GeoStat, Tbilisi, http://www.geostat.ge/index.php?action=0&lang= eng; for Moldova: Household Budget Survey, National Bureau of Statistics, Chisinau, http://www.statistica.md/index.php?l=en; for Romania: Household Labour Force Survey, National Institute of Statistics, Bucharest, http://www.insse.ro/cms/en; for the Russian Federation: RLMS–HSE database.
Note: High skilled = tertiary and above; low skilled = less than tertiary. The results are for cohorts of workers born between 1981 and 1985. The college/high-school mean labor income ratio serves as a summary index of the premium that high-skilled workers command relative to low-skilled workers, and this premium is determined by the relative supply and relative demand for skills. Since information on labor status is not available for all countries in all years, there is no differentiation between wage-employed and self-employed. However, for those countries where the information is available, robustness checks revealed very similar patterns when restricting the sample only to wageworkers.

cohorts of workers, according to their year of birth, and by "following" them as they go through their life cycles.[11] The returns to experience (approximated by age) are higher for the high skilled than for the low skilled, causing the wage gap to be particularly large among the active old (figure 5.13).[12]

In Russia, for example, 25- to 29-year-old university graduates earn on average US$90 (constant 2005 PPP equivalent) more per month than lower-skilled individuals at the same age, which is equivalent to a premium of almost 15 percent.[13] This premium increases over the life cycle, reaching about 40 percent, or approximately US$450, for workers close to retirement (ages 50 to 64). In Romania, the overall pattern is similar, but the skill premium starts for the younger workers at a much higher level. With approximately US$450 compared to US$300 per month, 25- to

FIGURE 5.14

The skill premium for older workers is higher than for younger workers in most countries, circa 2010

■ 30- to 34-year-olds
■ 56- to 60-year-olds
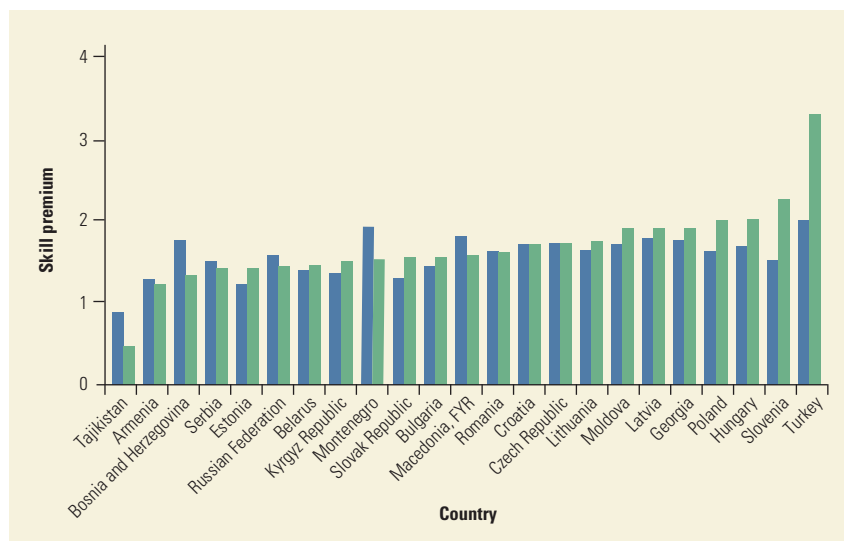
Sources: Bussolo et al. 2014. Calculations based on ECAPOV harmonized data except Romania; for Romania, Household Labour Force Survey, National Institute of Statistics, Bucharest, http://www.insse .ro/cms/en; for the Russian Federation: RLMS–HSE (database); for Turkey: Labour Force Statistics, TurkStat, Ankara, http://www.turkstat.gov.tr/Start.do.
Note: Skill premium is defined as the high/low skill mean monthly wage ratio of wage-employed workers (high skilled = tertiary and above; low skilled = less than tertiary).

29-year-old university graduates earn on average 50 percent more than their lower-skilled counterparts. At ages 50 to 64, the difference is expected to rise to more than 70 percent, equivalent to a wage gap of about US$500 per month.

An interesting feature of the evolution of the skill premium, especially clear for the cases of Moldova and Russia, is that it does not increase at the same speed across all ages. The age effect estimated from the data is shown to be concave, as the skill premium increases at decreasing rates after ages 45 or 50. This slowing of the growth in the premium may be associated with a reduction in cognitive skills as workers age (see chapter 4). It may also imply that high-skilled workers at later stages of their working life profit less from skill-biased technological change, as they have more difficulty in picking up new technologies.

Similar patterns are observed in many other countries in Europe and Central Asia where the skill premium among older workers (56–60 years old) is higher than among younger workers (30–34 years old) (figure 5.14). These patterns refer to a particular year and thus do not reflect the true life-cycle evolution of the wage gap as in the results for Georgia, Moldova, Romania, and Russia. Nevertheless, the results are indicative of a higher wage inequality among the older workers.

Inequality of Wealth among the Elderly and Implications for Future Generations

The cumulative advantage hypothesis predicts that a favorable position in early life generates additional benefits throughout the life cycle, widening the welfare dispersion among the elderly.[14] Differential earning power in the earlier years of the life cycle builds up as time passes, so that there are wider disparities in accumu-
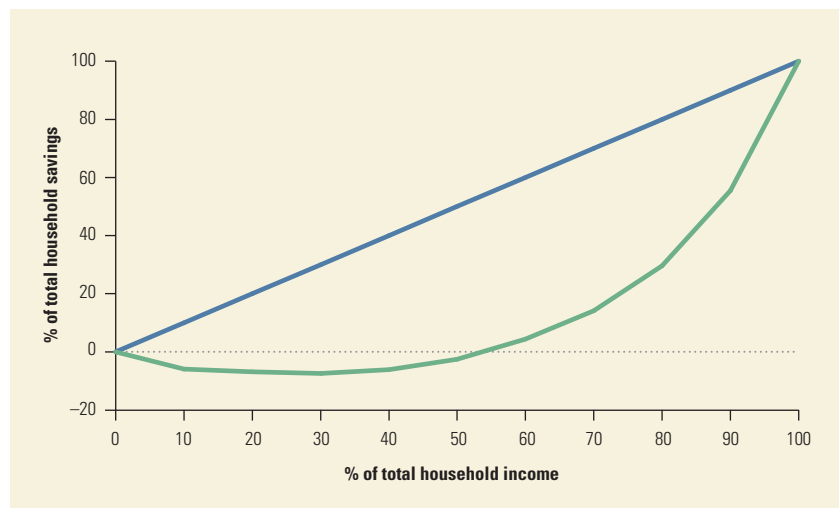
FIGURE 5.15

Household savings are concentrated in high-income groups in the Russian Federation, 2012

——— 45° line
——— Lorenz curve, 2012

Source: Bussolo and Schotte 2014. Calculations based on data in RLMS–HSE.
Note: Savings are calculated as the sum of the net change in financial assets, minus the net change in liabilities, plus the net change in real estate holdings in the previous 30 days.

lated wealth in the later years (Budría Rodriguez et al. 2002; Davies and Shorrocks 2000). Inequality in incomes over the life cycle can lead to much larger inequality in wealth among the retired elderly, because differences in stock variables, such as wealth, can become multiples of differences in flow variables, such as incomes. An extensive literature, both empirical and theoretical, shows that asset holdings are generally much more unequally distributed than labor earnings (Budría Rodriguez et al. 2002; Davies and Shorrocks 2000). In most countries, the Gini index for wealth typically lies in the range of about 60–80, twice that of disposable income, which falls in the range 30–50 (Davies et al. 2011).

The rich generally have more savings than the poor, because they have more lifetime income and save more as a percentage of their earnings.[15] Poorer households tend to save for precautionary purposes and retirement provision, while households with higher lifetime income also keep substantial amounts of assets even during old age in order to leave bequests.[16] Moreover, in anticipation of higher longevity, people, especially the rich elderly, may increase their savings (see chapter 3).[17] For example, in 2012 the richest 20 percent of all households in Russia accounted for approximately 70 percent of total household savings (figure 5.15).

The unequal wealth distribution, therefore, is particularly large toward the end of the life cycle. The positive relationship between age and savings may be steeper among the rich, who tend to have longer life expectancies. By contrast, poorer individuals with flat income-age profiles will accumulate fewer assets. Data from Russia suggest that, at the peak (at the end of one's working life), those with tertiary education—a proxy for a higher income profile—accumulate a stock of wealth more than three times as large as those with lower education (figure 5.16).[18] Although this wealth diminishes during retirement as the elderly draw down their savings, those with lower levels of education run out of their accumulated wealth quicker (at around 70–75 years old compared with around 80 years old for the
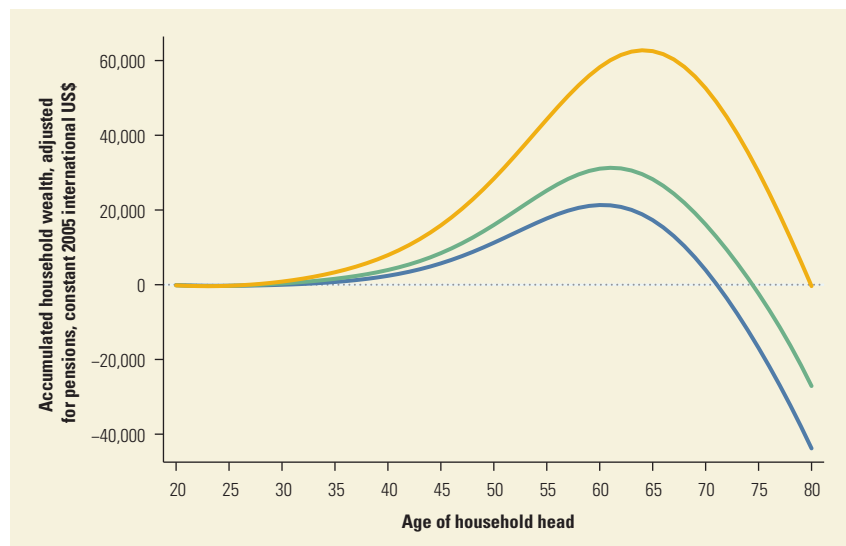
Source: Bussolo and Schotte 2014. Calculations based on data in RLMS–HSE.

college educated), and some of the rich elderly may have enough at the end of their life cycle to pass on to their offspring.[19]

High wealth inequality among the elderly increases inequality among younger generations. Children of better-off parents enjoy many advantages from a young age well into adulthood. From the beginning, children of more educated parents tend to receive better educations, allowing them to have a better welfare start than their peers (see, for example, Breen and Goldthorpe 1997; Breen and Jonsson 2005). A family's sponsorship of children may also continue well beyond childhood. Parents from higher (occupational) social classes, with higher educational levels, incomes, and financial wealth, are more likely than lower-class parents to provide adult children with financial and social support. Social support can include parents' investment in adult children's housing, entrepreneurship, geographical mobility, and the like, which then lead to more and better job opportunities (Litwak 1960; Kohli and Albertini 2008; Albertini and Radl 2012). By providing their time in the form of grandparenting, the elderly make it possible for their children—mainly women—to have more children and participate in the paid labor market. Among the countries sampled in SHARE, on average more than one grandparent out of two had provided some grandparenting time in the 12 months previous to the interview.[20] Although there is no evidence on whether this intergenerational time transfer differs across income groups, the longer life expectancy and better health among the rich may mean that they are better able to provide care and social support to their children.

As for financial support, there is a large literature on parents' support for children (see, for example, Kurz 2002; Spilerman 2004; Kohli and Albertini 2008; Spilerman and Wolff 2012). This support can even go beyond the joint life course of the two generations in the form of bequests, thus widening inequality for society as a whole in subsequent periods (Bernheim, Shleifer, and Summers 1985; Szydlik 2004; Mare 2011). An analysis based on the Generations and Gender Sur-
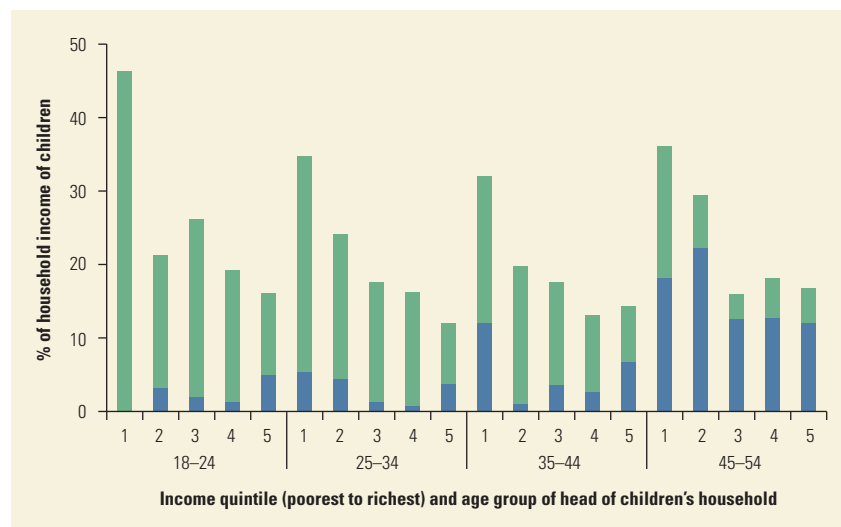
FIGURE 5.17

Adult children receive a significant part of their income from their parents, 2004–07

■ Inheritance
■ Other

Source: World Bank calculations based on GGS Wave 1.
Note: The transfers indicated are weighted averages of transfers in Bulgaria, the Czech Republic, Georgia, Romania, and the Russian Federation.

vey data reveals that the money children receive from their parents can be a non-trivial source of income (figure 5.17). For household heads in their late 40s or early 50s, a large part of the transfers come from inheritances from their parents. Although households in the bottom quintile received the most as a share of their income, there is not much difference among other quintiles, which translates into a large disparity in the absolute amount of the transfers across income groups. Data on the region from EU-SILC and SHARE confirm this pattern. For example, an analysis of the SHARE data shows that children of more wealthy families are more likely to receive economic help.[21] In addition, the fact that richer households tend to have fewer children than poorer households would exacerbate the unequal effect of transfers from parents to children, because the large transfers from richer parents would go to fewer children while the reverse is true for transfers from poorer parents.

In summary, the widening disparity in labor income among the old, the higher saving rates among the rich, and the steeper relationship between age and savings among the rich imply a growing discrepancy in accumulated wealth between the rich and the poor. This increased inequality is likely to persist in the future through the financial and social support that the older generations transfer to their children.

The Effects of Reforms on the Ability of Pensions to Limit Poverty and Inequality among the Elderly

Pensions—the main source of income for individuals aged 55 or older—play a crucial role in explaining why poverty incidence among the elderly is generally low.[22] This can be illustrated by recalculating poverty incidence by age after subtracting pension receipts from total income (figure 5.18). For example, in the

FIGURE 5.18   Pensions help reduce poverty in old age, 2011
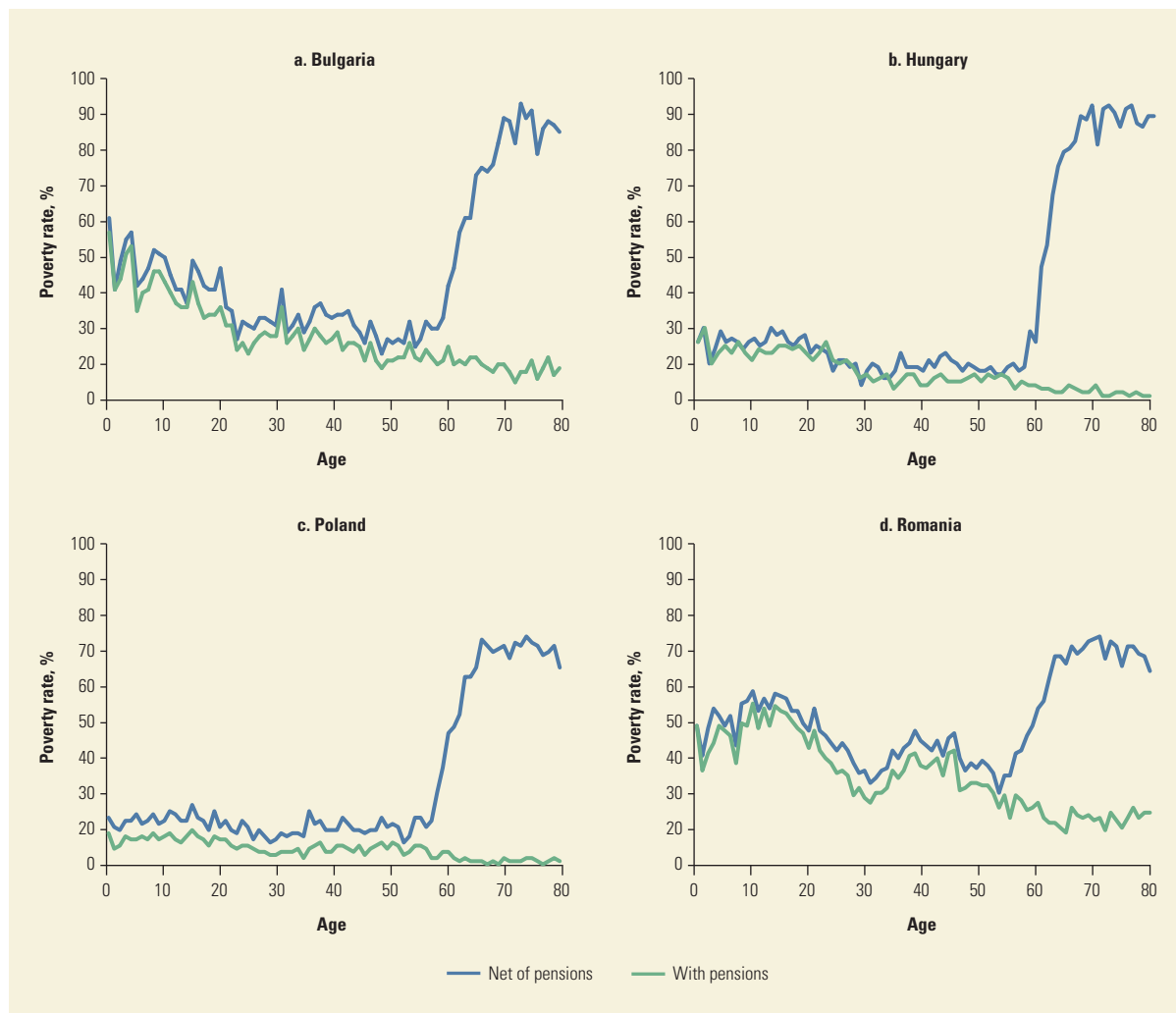
Source: Azevedo et al. 2014. Calculations based on ECAPOV harmonized data.
Note: Poverty is calculated based on household income per capita using the US$5 a day (2005 purchasing power parity equivalent) poverty line.

absence of pensions, up to 70 percent of the elderly in Hungary in 2011 would have fallen into absolute poverty (US$5 2005 PPP equivalent). In general, most countries in the region have some form of public pension program that aims at providing a minimum standard of living to address the problem of old-age poverty.[23]

The calculation of poverty rates without counting pensions may, however, overemphasize the importance of pensions, for two reasons. First, in figure 5.18, pensions include both contributory and noncontributory transfers, but only the latter can be strictly considered a pure transfer that could be subtracted from total income to measure net-of-pension poverty. Second, calculating poverty by using the income net of pensions (both contributory and noncontributory) assumes an extreme and rather unrealistic counterfactual. Individuals would indeed save more
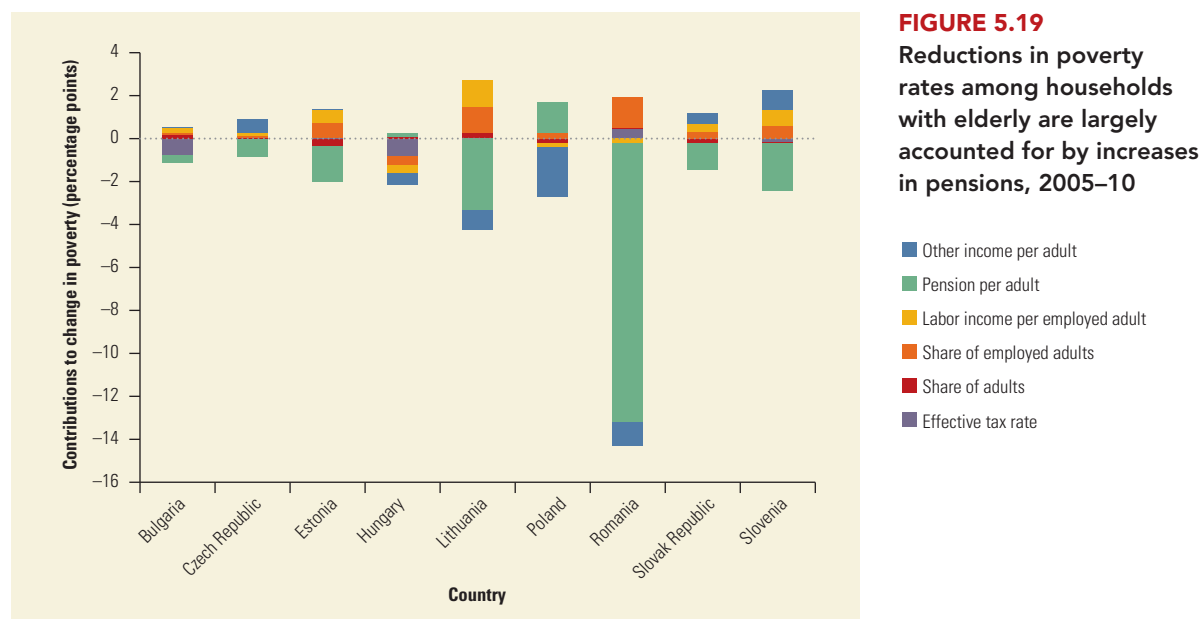
Source: Azevedo et al. 2014. Calculations based on the EU-SILC data in the ECAPOV harmonized data.
Note: Poverty is calculated from household income per capita using the US$5 a day (2005 purchasing power parity equivalent) poverty line.

on their own against the possibility of losing, or not receiving, a pension. Nevertheless, changes to the pension system may have significant implications for old-age poverty.

Pensions reduce poverty not only for the elderly but also for those who live with them. Among the 19 countries for which data are available, households with pensioners are less likely to be poor than households without pensioners in six countries—Armenia, Georgia, Hungary, the Kyrgyz Republic, Poland, and Romania—and are at least on the same level of welfare in seven countries.

Only in six—Bosnia and Herzegovina, Bulgaria, Croatia, Kosovo, Lithuania, and Moldova—are households with pensioners perceptibly more likely to be poor than households without pensioners. It appears that, at least in some countries, pensioners are bringing enough regular income into the household to pull the entire household out of poverty (Schwarz et al. 2014).

The contribution of pensions to reducing poverty for households with elderly can be quantified by decomposing the change in income for each household over a period of time. A household's disposable income is derived from the labor income of employed adults (which depends on the wages and the share of adults employed), pensions, and other nonlabor income, net of taxes. Changes in each of these components, therefore, make up the total change in the household's income. This decomposition was applied to nine countries in Central Europe and the Baltics over a period of five to six years (circa 2005–10). In seven countries (Bulgaria, the Czech Republic, Estonia, Lithuania, Romania, the Slovak Republic, and Slovenia), pensions help reduce poverty among households (figure 5.19). The only exceptions are Hungary and Poland, where other income (social assistance transfers, for example) are more important in reducing poverty. This period,

FIGURE 5.20 Pensions help lower inequality among the elderly
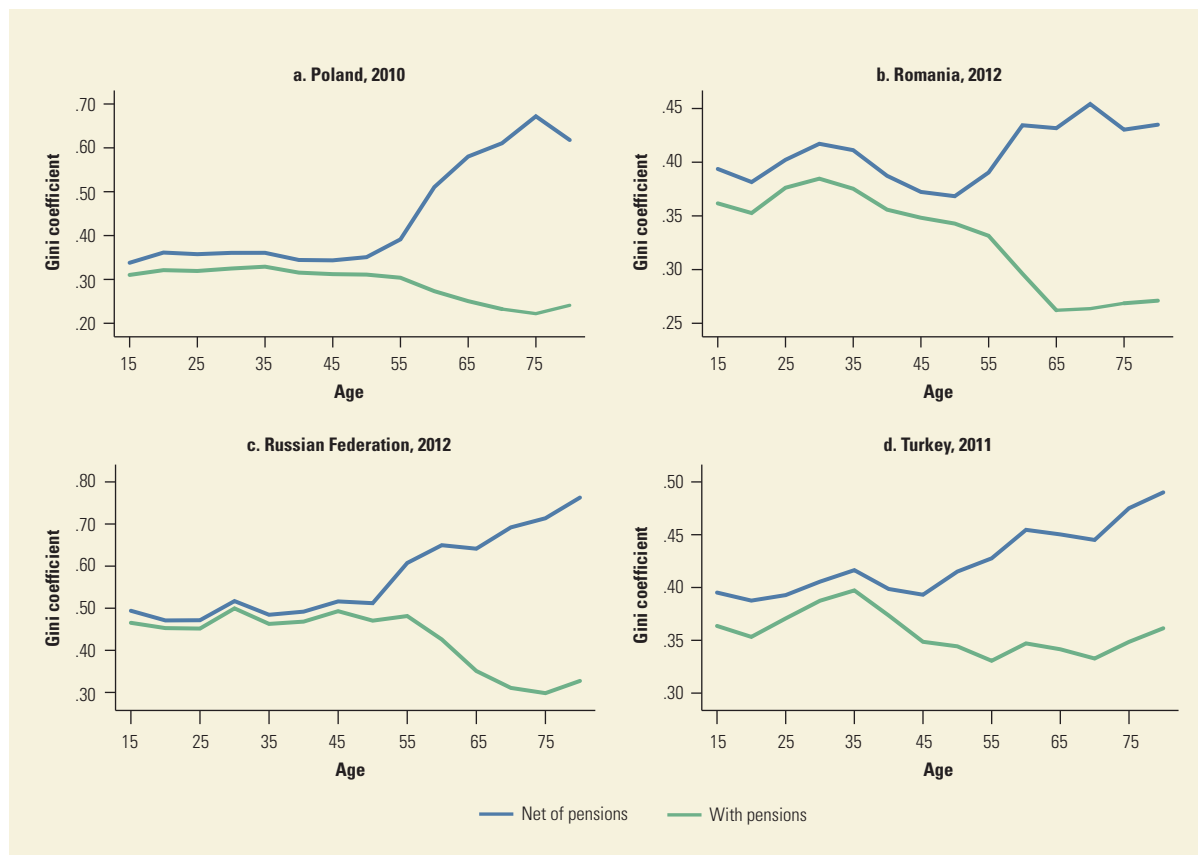
Sources: Bussolo et al. 2014. Calculations based on ECAPOV harmonized data except for the Russian Federation: RLMS–HSE; for Turkey, Labour Force Statistics, TurkStat, Ankara, http://www.turkstat.gov.tr/Start.do.
Note: Inequality is calculated for income per capita within five-year age groups.

encompassing the crisis, also saw a decrease in wages and employment, which drove the increase in poverty in many countries.

Pensions also have an equalizing effect on the retirees, since the distribution of pensions has been rather equal. The wide coverage and low dispersion of pension benefits is a legacy of the central planning system. Until recently, almost 100 percent of the elderly in most countries in the region received pensions (Schwarz et al. 2014), given that most of the elderly population, who were in their working age under the centrally planned economy, were formally employed and eligible for pensions. The flat pensions reflect the low wage differentiation in the central planning system (Schwarz et al. 2014). The low pension inequality also reflects the flat, or progressive, features of some pension systems, such as the aforementioned targeted or minimum benefits and ceilings on pensionable earnings (OECD 2013). In fact, as illustrated in figure 5.20, inequality among the retirees would be much higher, and wider than that among the young, if pensions were excluded. Again, similar to the case of poverty, inequality net of pensions may be overestimated

since pensions include both contributory and noncontributory sources, and people would tend to adjust their income and savings throughout their life cycle if pensions were not available. Nevertheless, this scenario illustrates the equalizing role of pensions.

The recent wave of pension reforms may undermine the role of pensions in reducing poverty and inequality for future retirees. To reduce the potential fiscal burden of pensions as dependency rates increase, governments have implemented reforms to cut pension expenditures. Such measures include strengthening the connection between contributions and benefits, raising the retirement age, tightening the eligibility criteria, and decreasing the generosity or duration of benefits (World Bank 2013). In particular, many countries in the region have shifted toward a multipillar system with more focus on the insurance and saving functions of pensions, so that minimum income provision and redistribution among the elderly are no longer a key goal (Chłoń-Domińczak and Strzelecki 2013).[24] This is not to say that the income replacement goal of pensions is undesirable, but if reforms mean that pensions no longer fulfill the goal of poverty and inequality reduction and this function is not picked up by other measures, poverty and inequality are expected to increase.

The reduction in progressiveness as a result of these reforms is illustrated in figure 5.21. Before reforms, many systems replace a higher share of income for low earners than for high earners. As a result of reforms, the postreform gross replacement rates—the ratio between gross pension entitlement upon retirement and gross preretirement earnings—are flatter across all earnings levels. In Poland and the Slovak Republic, for example, the introduction of a defined-contribution component links benefits more closely to contributions, as defined-contribution schemes create individual pension pots that are then converted to annuities upon retirement. As a result, the replacement rate increased to a much larger extent for higher earners than for low earners. Turkey retains a measure of progressiveness but is less progressive than before the reform. In Hungary, the higher replacement rate for all income levels is due to an increase of five years in men's retirement age, which was part of the 2009 reform (OECD 2013).

Similar patterns are observed in other countries in Europe and Central Asia. Romania has been implementing a point system since 2001, whereby the benefit is calculated according to the number of contributing years and the wage from which the contributions are made. In addition, many countries have encouraged voluntary saving through supplementary or private pension schemes, which further reproduce the income dispersion observed within the working-age groups among the elderly (OECD 2013). The stronger reliance on contribution schemes undermines the role that public pensions have played in equalizing incomes by providing for a larger share of the net replacement rate for the low-wage earners than for the better-off (Holzmann and Guven 2009).

The unequalizing effect of linking pensions with wage and contributions will be compounded by the increase in the retirement age. Many countries, including Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Poland, Romania, Slovenia, and Turkey, are gradually increasing the retirement age, as well as restricting eligibility or lowering benefit amounts for early retirement. As explained above,

> **The recent wave of reforms make pensions more fiscally sustainable, but their role in reducing poverty and inequality for future retirees may be limited if not complemented by safety nets.**

FIGURE 5.21 Replacement rates become less progressive after pension reforms
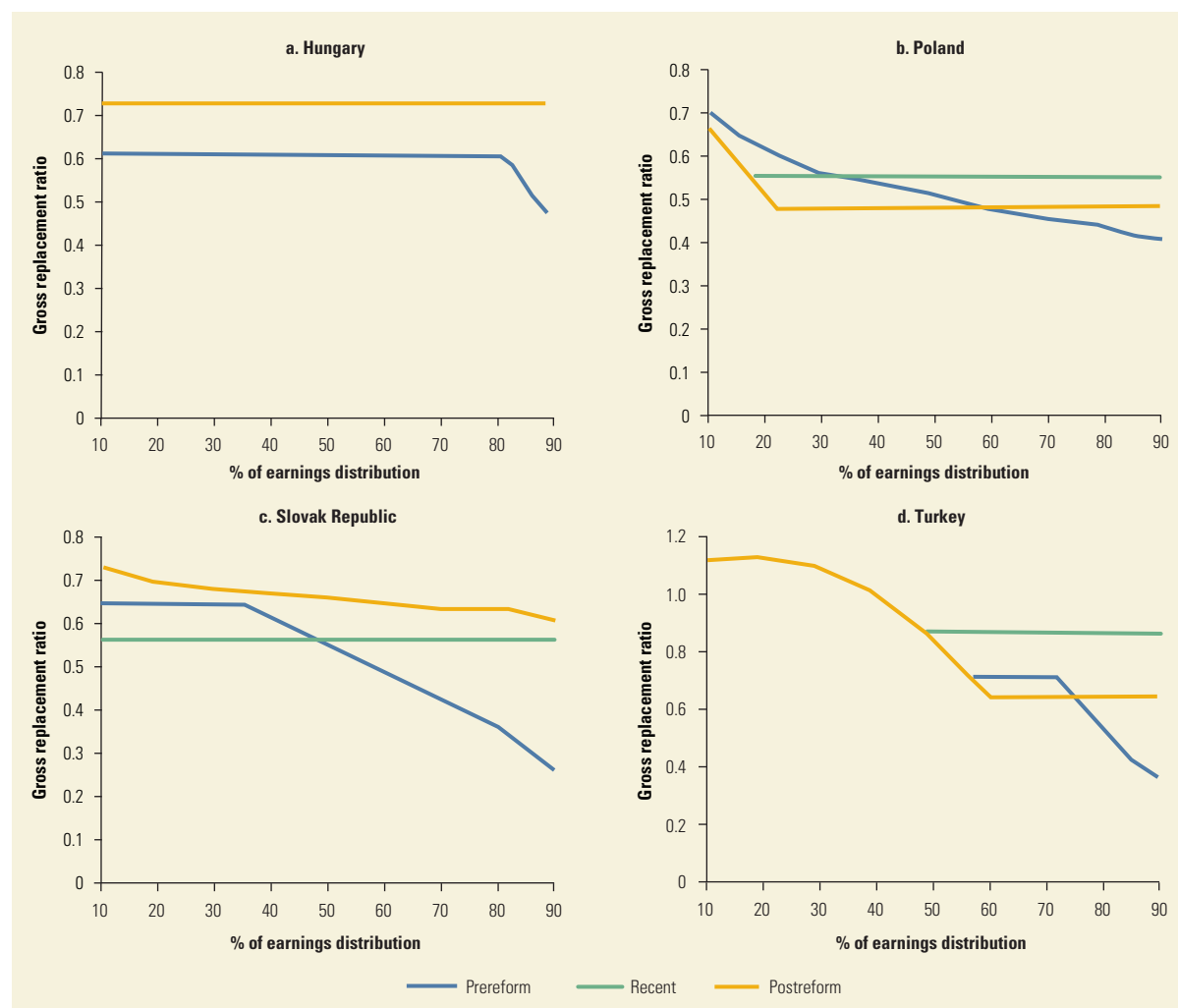
Source: OECD 2013.
Note: The gross replacement rate is defined as the individual pension entitlement from all mandatory sources of retirement income divided by net preretirement earnings. Pension entitlement is calculated for a full-career worker working each year from age 20 to the country's standard retirement age. The assumption is that individuals stay at the same point in the earnings distribution throughout their careers. The calculation is forward looking: it presumes that a full career is spent working according to the long-term rules envisaged in the pension system at each stage of the reform process. Hungary introduced a defined-contribution system in 1998 but closed it in 2012 as a result of the 2009 pension reform. The *prereform* curve applies to the pension system in place in the early 1990s; *postreform* denotes the results of the latest—or current—scheme introduced up to 20 years later; *recent* denotes reforms undertaken in the interim period between the early 1990s (*prereform*) and the latest legislation (*postreform*).

although this longer working life is important for economic growth and fiscal sustainability, it is not necessarily available to all. Those who choose, or can afford, to stay in the workforce are generally better off, while workers at the lower end of the income distribution are more likely to drop out early because their jobs are more physically demanding, they have worse health outcomes, or there is more competition from younger workers. Thus, the pension distribution will increasingly become polarized, as high-skilled workers enjoy pension benefits mirroring their high

FIGURE 5.22   Pension benefits for low-wage earners are projected to be low in most countries
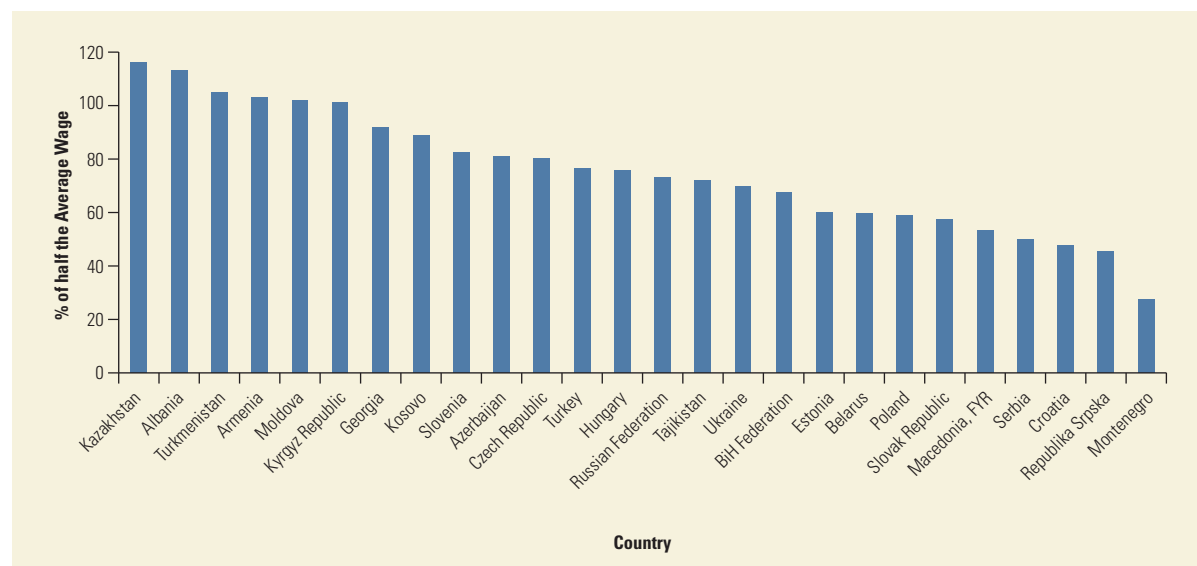
Source: Schwarz et al. 2014.
Note: The Federation of Bosnia-Herzegovina (BiH Federation) and Republika Srpska, which together make up the country of Bosnia and Herzegovina, have separate pension systems and are treated as separate data points in the figure. Hypothetical wage replacement rates for low-wage earners are calculated for a hypothetical individual who starts work at age 20 in year 2010, earning half the average wage of that country. That person is further assumed to work continuously until retirement age, always earning half the average wage of the current year. The benefits are calculated as a share of half the average wage of the country.

lifetime wages, and low-skilled workers receive low benefits due to their low lifetime wages and possibly reduced benefits if they retire early.

Those at the bottom of the pension distribution may, after the reforms, receive less than what is needed to cover their needs. It was calculated that the poverty line at US$5 a day (2005 PPP equivalent) equals about 70 percent of the average wage across Central Europe and the Baltics (Holzmann and Guven 2009).[25] As seen in figure 5.22, a typical low-wage earner (defined as earning half the average wage) with a full career in most countries would receive pension benefits equivalent to less than 120 percent of his or her preretirement wage (and well below this level in most countries), or less than 60 percent of the average wage. While this threshold may be higher than the poverty line in some countries, this means that most low-wage earners are at risk of falling into poverty if they rely only on their pension receipts. In reality, many low-wage earners, especially women, do not have full careers since they may retire early or suffer from periods of unemployment and will retire with even lower pension benefits than projected here.

Moreover, many elderly will be left out of the contributory pension system because they are not eligible. Coverage is projected to decline as a result of high unemployment, informality, and more stringent old-age pension eligibility conditions (increasing the minimum contribution years and rate, for example).[26] Participation in the formal labor market has dropped, and informal employment has increased since the transition to market-based economies in the 1990s. On average in 2010, 30 percent of the working-age population in the region was employed in

FIGURE 5.23 Coverage of pensions for the elderly is projected to decline sharply in many countries
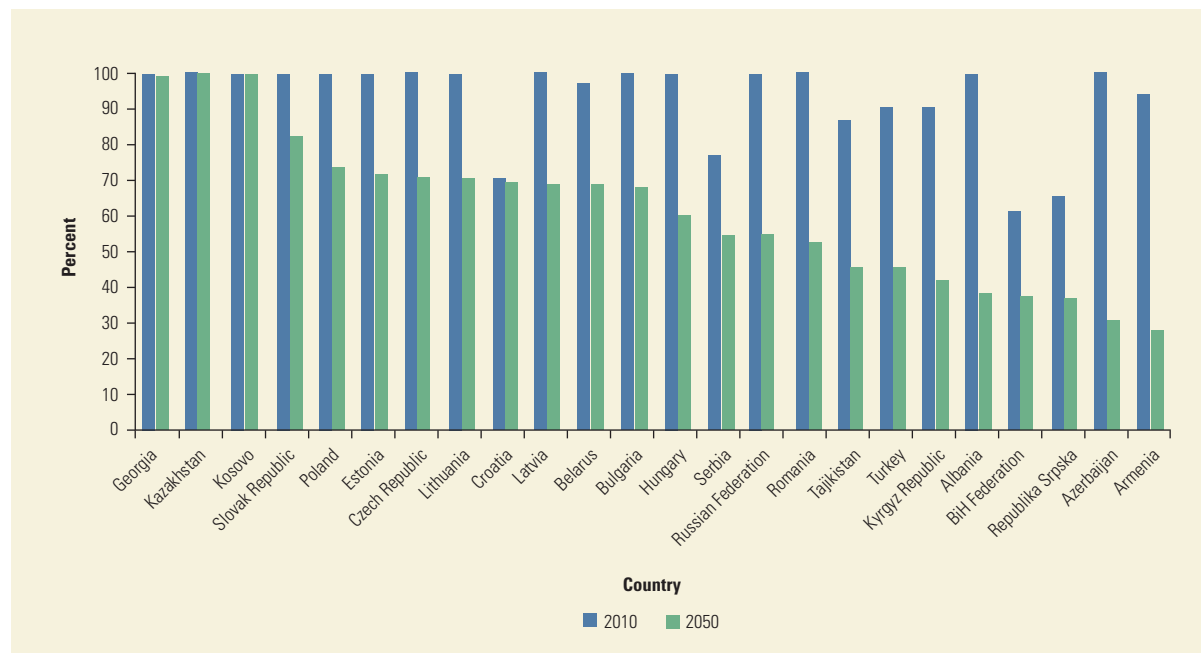
Source: Schwarz et al. 2014.
Note: The Federation of Bosnia-Herzegovina (BiH Federation) and Republika Srpska, which, together, make up the country of Bosnia and Herzegovina, have separate pension systems and are treated as separate data points in the figure. Pensions refer to the contributory pension scheme, and the projected coverage for 2050 is calculated based on the share of contributors among the prime working-age population (aged 35–39) in 2010.

the informal sector (Schwarz et al. 2014). The persistently high youth unemployment rate observed in many regional countries as a result of the 2008–09 financial crisis means that many will not have the contributory length required to qualify for pension benefits. The frequent movements in and out of the formal workforce of many workers, especially women, may lead to sporadic contributions that make them ineligible. Although some of these trends are not directly related to aging, their impact is exacerbated by the more stringent pension eligibility criteria. In the future, a growing population of retirees who had been unemployed, informally employed, inactive, or underemployed will be left out of the pension system. Thus, the share of the elderly that will qualify for pensions after the reforms is likely to decline sharply by 2050 (figure 5.23). People without pension rights are likely to be poorer, since they tend to have had less earning opportunity and lower income in their lifetime. Many of these people will not have sufficient savings to sustain themselves in old age.

The reform of the pension system is an important step toward achieving fiscal sustainability in many regional countries with aging populations but should be complemented by a safety net for the elderly poor. Until recently, those who are not covered by the contributory system and those who do not receive enough to meet basic needs have been supported by public-provided pensions with a function of old-age protection, among others. However, these schemes have experienced a retrenchment in recent years. The Czech Republic, Georgia, and Kazakhstan are among the few countries in the region that retain universal benefits.

Others, such as Armenia, Azerbaijan, Croatia, Hungary, and Poland, have abolished the minimum or universal pension schemes and folded them into either the guaranteed minimum income (which is means tested but not specifically targeted to the elderly) or the basic pension, which requires a minimum number of years of service (Holzmann and Guven 2009; World Bank 2013). As of now, the coverage of safety net retirement benefits in many countries (such as Estonia, Hungary, Poland, the Slovak Republic, Slovenia, and Turkey) is less than 30 percent of the elderly, which is often lower than the share of the workforce in the informal labor market who would be ineligible for contributory pensions (OECD 2013). The benefits are already low and in some cases insufficient to protect the elderly from poverty. For example, in Slovenia, net (after taxes) targeted and minimum pension benefits were worth around 40 percent and 93 percent of the poverty threshold in 2008, respectively (OECD 2013).

In sum, although pension reform is important for fiscal sustainability and for the other functions of pensions, such as saving and insurance, excessive moves toward linking pensions with wages and years in the labor force may undermine the old-age protection and redistribution functions of the pension system. As the distribution of pensions increasingly mimics the distribution of wages and wages are becoming more unequal with age, income inequality among retirees will increase. These reforms would also pose disadvantages to low-income workers who lack the means to finance their retirement. Furthermore, the retrenchment of public pensions means that they will not be adequate to protect those who are at the bottom, or who are left out of the contributory pension system, from poverty.

The Risk of Increasing Poverty and Inequality

This chapter has outlined the main channels through which aging affects poverty and inequality. How each of these channels plays out in each country depends on the country context. Table 5.2 summarizes the risk of rising poverty through these channels in selected countries in the region, and table 5.3 does the same for inequality. In each table, countries are first separated between currently young (average age below 35) and already aging (average age above 35) societies. Young countries are aging fast, but they have some time to build up the poverty-reduction and redistribution functions of their pension and safety net systems. Each country group is further divided according to the risk of future increases in poverty or inequality (if no further policy changes are made). These tables provide a snapshot of the channels through which aging is likely to affect poverty and inequality in each country.

For *poverty*, the critical channels include household composition and pension adequacy. While the former determines how much the elderly depend on pension income, the latter reflects whether the pension scheme in each country covers a significant share of retirees and provides sufficient benefits to keep them out of poverty. The lack of data makes it difficult to assess the extent to which private savings (either through pension funds or other accounts) can complement pension income at old age. Nevertheless, for many low-income countries in Europe and Central Asia where the capital market is less developed, workers, especially low-income ones, are not expected to save enough to finance their retirement, and

TABLE 5.2 Aging and Risk of Poverty in Selected Countries

Type	Country	Average age, 2014	Projected change in average age, 2014–60	Poverty, circa 2012 (%)	Elderly poverty, circa 2012 (%)	Coverage of contributory pension, 2050 (%)	Coverage of social pension, circa 2012 (%)	Benefits for low earners: contributory pension, 2050 (% average wage)	Benefits from social pension, circa 2012 (% average wage)	Elderly dependent on pensions, circa 2012 (%)	Risk
Young	Kazakhstan	31.7	5.8	34.7	23.4	100.0	—	58.1	—	34.2	L
	Tajikistan	25.1	7.7	51.5	51.8	46.0	—	36.0	—	8.4	M
	Turkey	32.0	12.6	20.7	18.8	45.8	22	38.2	5.2	37.9	M
	Kyrgyz Republic	27.8	7.8	79.0	68.5	41.8	Available	50.7	—	48.9	M
	Azerbaijan	32.3	10.8	75.5	71.7	31.0	Available	40.5	—	15.8	M
	Uzbekistan	28.6	11.8	85.2	78.4	—	—	—	—	17.4	U
Old	Georgia	41.5	3.1	77.9	73.7	100.0	Available	45.9	—	31.6	L
	Czech Republic	42.5	5.1	0.8	0.0	71.3	SA	40.1	—	73.7	L
	Bulgaria	40.0	3.6	16.7	9.2	68.3	MT	55.0	17.7	56.7	L
	Slovak Republic	39.6	7.3	1.9	0.1	82.8	3	28.8	22.2	60.1	M
	Poland	40.4	7.2	4.9	1.2	73.9	12	29.5	14.7	56.4	M
	Estonia	41.3	3.9	5.0	0.6	71.8	6	30.1	14.7	71.3	M
	Lithuania	41.9	1.2	8.0	1.6	71.1	—	—	—	71.7	M
	Croatia	38.9	5.6	0.9	1.1	70.2	SA	23.8	—	62.2	M
	Latvia	40.2	3.9	11.3	2.7	68.9	MT	—	—	61.0	M
	Belarus	43.1	3.3	1.6	0.8	68.9	—	30.0	—	67.6	M
	Hungary	41.6	3.9	5.8	0.4	60.5	MT	37.9	12.4	64.5	M
	Russian Federation	39.4	2.8	10.7	11.3	55.0	Available	36.5	—	49.6	M
	Romania	40.5	6.9	34.5	18.0	52.6	SA	45.0	9.0	63.2	M
	Slovenia	42.5	4.9	0.2	0.1	—	17	41.3	31.1	68.9	M
	Albania	35.7	11.4	47.5	35.4	38.6	—	56.6	—	30.5	M
	Armenia	35.7	10.5	79.6	80.1	27.7	Available	51.5	—	28.7	M
	Serbia	39.9	9.1	15.1	9.1	55.2	—	25.0	—	50.8	H
	Bosnia and Herzegovina	40.2	8.1	4.5	4.4	37.7	—	28.5	—	48.7	H
	Moldova	38.4	9.4	46.5	50.2	—	—	51.0	—	65.4	U
	Macedonia, FYR	37.9	7.2	35.1	28.1	—	—	26.6	—	39.9	U
	Montenegro	38.3	6.7	14.7	9.1	—	—	13.7	—	52.1	U
	Ukraine	40.7	2.7	3.9	2.6	—	—	34.9	—	58.7	U

Sources: Pension data compiled from European Commission 2012; Holzmann and Guven 2009; OECD 2013; Schwarz et al. 2014. Population data from World Population Prospects: The 2012 Revision. Poverty and coresidence data from ECAPOV harmonized data.
Note: Poverty is calculated based on consumption (or income) per capita using the US$5 a day (2005 purchasing power parity equivalent) poverty line.
  Coverage of contributory pensions is projected based on the share of contributors among the prime working-age population (aged 35–39) in 2010.
  Benefits of contributory pensions for low-wage earners are projected for a hypothetical individual who starts work at age 20 in the year 2010, earning half the average wage of that country. That person is further assumed to work continuously until retirement age, always earning half the average wage of the current year.
  The elderly dependent on pensions are those who live alone or only with other elderly.
  The Federation of Bosnia-Herzegovina and Republika Srpska, which together make up the country of Bosnia and Herzegovina, have separate data; the value here reflects a simple average of the two.
  MT = means-tested scheme specifically for the elderly; SA = social assistance scheme that is means tested and available to all population, not just the elderly; L = low; M = moderate; H = high; U = unclassified; — = data unavailable.

TABLE 5.3 Aging and Risk of Inequality in Selected Countries

Type	Country	Average age, 2014	Projected change in average age, 2014–60	Gini, circa 2012	Elderly Gini, circa 2012	Risk factors Contributory pension benefits for high earners vs. low earners, 2050	Risk factors Wage premiums (old vs. young), circa 2012	Risk factors Employment gap, circa 2012	Risk
Young	Kyrgyz Republic	27.8	7.8	33.4	31.3	1.1	1.1	1.3	L
	Kazakhstan	31.7	5.8	28.6	27.0	1.8	—	1.2	L
	Azerbaijan	32.3	10.8	16.6	17.5	2.1	—	1.5	L
	Tajikistan	25.1	7.7	30.8	33.4	3.1	0.5	1.8	H
	Turkey	32.0	12.6	40.2	38.9	3.4	1.6	1.3	H
	Uzbekistan	28.6	11.8	35.3	36.7	—	—	3.9	U
Old	Moldova	38.4	9.4	29.2	26.3	0.9	1.1	1.0	L
	Macedonia, FYR	37.9	7.2	44.0	40.8	0.9	0.9	1.9	L
	Armenia	35.7	10.5	30.5	28.8	1.0	1.0	1.0	L
	Hungary	41.6	3.9	28.9	19.9	1.5	1.2	1.5	L
	Russian Federation	39.4	2.8	39.7	32.1	1.6	0.9	1.4	L
	Albania	35.7	11.4	29.0	27.7	1.9	—	2.2	L
	Georgia	41.5	3.1	41.3	40.6	2.5	1.1	1.0	L
	Bosnia and Herzegovina	40.2	8.1	33.0	32.8	2.7	0.8	2.3	L
	Belarus	43.1	3.3	28.1	22.4	2.8	1.0	1.1	L
	Czech Republic	42.5	5.1	26.4	16.3	3.1	1.0	1.6	H
	Serbia	39.9	9.1	29.6	27.8	3.6	0.9	1.5	H
	Ukraine	40.7	2.7	24.7	23.0	3.9	—	1.5	H
	Croatia	38.9	5.6	33.7	36.9	4.0	1.0	2.6	H
	Slovak Republic	39.6	7.3	26.5	16.3	4.0	1.2	1.5	H
	Poland	40.4	7.2	33.2	25.8	4.0	1.2	1.6	H
	Slovenia	42.5	4.9	24.9	22.7	4.6	1.5	2.5	H
	Estonia	41.3	3.9	32.3	19.2	5.0	1.2	1.3	H
	Montenegro	38.3	6.7	30.6	27.2	5.8	0.8	1.6	H
	Bulgaria	40.0	3.6	34.2	28.1	—	1.1	1.7	U
	Latvia	40.2	3.9	35.7	25.3	—	1.1	1.3	U
	Romania	40.5	6.9	34.9	27.1	—	1.0	1.9	U
	Lithuania	41.9	1.2	32.3	22.3	—	1.1	1.5	U

Sources: Pension data compiled from European Commission 2012; Holzmann and Guven 2009; OECD 2013; Schwarz et al. 2014. Population data from World Population Prospects: The 2012 Revision. Gini, wage premium, and employment calculations based on ECAPOV harmonized data.
Note: Gini is calculated based on consumption (or income) per capita.
   Benefits of contributory pensions are projected for a hypothetical individual who starts work at age 20 in the year 2010. High-wage earners are those who are earning twice the average wage of that country. Low-wage earners are those who are earning half the average wage of that country. That person is further assumed to work continuously until retirement age, always earning the same relative wage of the current year.
   Wage premiums (old vs. young) is the ratio of the wage premium (between college educated and less than college educated) among employed workers aged 56–60 to the wage premium among workers aged 30–34.
   The employment gap is the ratio of the employment rate among college educated to the less than college educated aged 56–60.
   The Federation of Bosnia-Herzegovina and Republika Srpska, which together make up the country of Bosnia and Herzegovina, have separate data; the value here reflects a simple average of the two.
   L = low; H = high; U = unclassified; — = data unavailable.

pension income is crucial. This estimation also does not take into account other transfers, public or private, besides pensions, but, as discussed at the beginning of this chapter, household survey data show that they currently make up an insignificant share of the elderly's income.

Among young countries, the only one with a low risk of higher poverty is Kazakhstan, which has a universal pension scheme that covers all elderly. The benefits for low earners under Kazakhstan's system are moderate, almost 60 percent of the average wage or slightly less than the US$5 a day poverty line. Other young countries (Central Asia and Turkey) will face a moderate risk of an increase in poverty if the current system remains, since less than 50 percent of retirees will be covered by the contributory pension system (estimated by the share of current contributors among prime working-age population). These young countries also have some form of social pension, but the benefits are barely sufficient to lift the elderly out of poverty. In addition, the indexation of pensions has not been sufficiently updated, so the real value of pension receipts is declining.

Among the older societies, countries with a low risk of a poverty increase are those that provide contributory pensions of high coverage (more than 60 percent) and moderate benefits for low-wage earners (more than 35 percent of average wage, or equivalent to US$2.50 a day), accompanied by some form of social pensions, most often a means-tested scheme targeted toward retirees with limited support. These include Bulgaria, the Czech Republic, and Georgia. Those that have a moderate risk are lacking in either coverage or benefits. They include Albania, Armenia, Belarus, Croatia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, the Slovak Republic, and Slovenia. Finally, Bosnia and Herzegovina and Serbia are considered to have a high risk of poverty increase, because they have a pension system with low coverage and low benefits. Furthermore, around 50 percent of their elderly currently do not live in households with working-age members, which raises their dependence on pension income.

Increases in *inequality* with aging will be driven by potential changes in inequality in pensions and labor income. Inequality in labor income depends on differences in labor force participation and wages between the high and the low skilled. In most countries, these gaps increase with age, so that the rise in the average age of workers will increase the polarization between the low and the high skilled. Differences in labor force participation and wages between the low and the high skilled will generate differences in the number of years and amount of contributions to pension systems, which determine the pensions available during retirement. How big these gaps are, however, depends on the labor market and the progressiveness of the pension system in each country, which affects how much inequality may increase in the future.

Most young countries will face a low risk of rising inequality with aging, thanks to their progressive pension systems. These include Azerbaijan, Kazakhstan, and the Kyrgyz Republic. In these countries, a high earner (with wages twice the average wage) would receive on average less than twice the pension income of a low earner (earning half the average wage). This means that the difference in contributory pension benefits between high and low earners is much less than the difference in their income during their working years.[27] Conversely, Tajikistan and Turkey will face higher risk since they have less progressive pension systems: a high earner in Tajikistan would receive pension benefits more than three times higher than a low earner (although this still reflects some redistribution, given that a high earner earns four times the wage of a low earner). The risk is even higher in Turkey, where the wage premium among old workers is 1.6 times that among young workers. If

this trend continues, the higher share of old workers in the labor market means that wage inequality (and in consequence pension inequality) will rise in the future.

Among older societies, those with a more progressive pension system, such as Albania, Armenia, Belarus, Bosnia and Herzegovina, Georgia, Hungary, FYR Macedonia, Moldova, and Russia, have a lower risk of rising inequality. In addition, their wage premiums do not differ much between young and old workers. Countries with less progressive pension systems will have a higher risk of rising inequality. These are Croatia, the Czech Republic, Estonia, Montenegro, Poland, Serbia, the Slovak Republic, Slovenia, and Ukraine. In particular, in Estonia and Montenegro, a high earner will receive more than five times as much in pension benefits as a low earner, exacerbating the gap between them during working age. These polarization trends are important to consider, since they can drive the widening of inequality among the older age groups, which can then be passed on to younger generations.

It is important to note, however, that some countries with low risk of inequality may have moderate to high risk of poverty increase, such as Belarus, Bosnia and Herzegovina, Hungary, and Russia. This could be the case if countries maintain a flat, but low, benefit system that is equal but ineffective in poverty protection. In contrast, some countries that have reformed their pension system to enhance sustainability and the income replacement function by moving away from the flat benefit system, such as the Czech Republic, Estonia, and Poland, may fare less well on the inequality risk but are better at reducing poverty. This assessment, therefore, needs to be seen in the context of each country. Countries should choose which functions the pension system can serve, in view of their demographic and labor market situations as well as the availability of other tools. If pensions are not effective at reducing poverty and inequality, they should be complemented by other measures, such as social safety nets, to ensure that poverty and inequality do not rise as a result of aging.

Notes

1. The averages in this paragraph are calculated as simple averages of the poverty incidence levels for each country.
2. Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Georgia, Kazakhstan, the Kyrgyz Republic, the former Yugoslav Republic of Macedonia, Montenegro, Poland, Romania, Russia, Serbia, Turkey, and Ukraine.
3. The Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic, and Slovenia.
4. Across the GGS and SHARE, most interhousehold transfers are from parents to children rather than the other way around.
5. Complete details of the analysis can be found in Albertini (2014).
6. Note that even if transfers account for a small percentage of the income of the richer recipients, they can be larger—in monetary amount—than the transfers going to the poorer recipients.
7. The question asked is, "All things considered, how satisfied are you with your life as a whole these days?"
8. The question asked is, "To what extent do you agree with the following statement? All things considered, I am satisfied with my life now."

9. In the fertility scenario, there is a gradual decline in the number of newborns by 50 percent distributed over 25 years, that is, an annual decline by 2 percent of the initial value over 25 years. With a fertility decline of this magnitude, one can expect an increase in the wage rate (w) of about 10 percent (between year 0 and year 45), while returns to capital (r) will be reduced by 20 percent. This implies an increase in the wage-capital return ratio (w/r) of 38 percent.

10. The Gini index is calculated here for inequality across the income per capita of the various age cohorts. It does not account for any dispersion that may exist within a specific age group. Therefore, both the level and the changes in this Gini index underestimate the real-world level and changes.

11. A decomposition technique initially proposed by Deaton and Paxson (1994) for separating the cohort from the age effects was used. Countries that have frequent wage data for a long period of time (12 years or more) were chosen. Ideally, to determine how the skill premium changes with age, one would need to follow a cohort of workers over time. Without long-running panels, synthetic cohort techniques were employed on long-running cross-sections tracking cohorts of individuals born around the same period of time (within a five-year interval). There was no series of cross-sections that covers the entire working life of a cohort so it was assumed that different cohorts follow similar aging patterns, and the age effects were obtained from different cohorts at different stages of the life cycle. Longer and more frequent cross-sections, therefore, allow for more accurate estimation of the age effects.

12. High-skilled workers were defined as tertiary educated or "college equivalent" workers and low-skilled workers as workers with less than tertiary education. Note also that other factors affect the skill premium and need to be controlled for to properly identify the age effect. An important one is skill-biased technological change. New technologies tend to complement high-skilled workers and substitute for low-skilled workers. As a result, the relative demand for high-skilled labor tends to increase faster over time than does relative supply (see, for example, Acemoglu 2002; Acemoglu and Autor 2011; Fitzenberger and Kohn 2006; Katz and Autor 1999). This time effect needs to be isolated from the age and cohort effect, and the data for these four countries allow doing so up to a point, given that these datasets are not real panels.

13. The analysis has not been performed for hourly earnings, so it is not possible to exclude the possibility that part-time or underemployment may be more important for either the skilled or unskilled category of workers and thus may bias the results on the monthly wages.

14. There is a large literature on the cumulative advantage hypothesis; see, for example, DiPrete and Eirich 2006.

15. In some countries, however, the capital markets may be incomplete so there are insufficient channels for saving (for example, mistrust in or lack of access to financial institutions), which limits the capacity to accumulate wealth throughout the life cycle. In addition, people who save through asset accumulation may be asset rich but less wealthy in income if their ability to liquidate their assets is limited by the inflexibility of the market.

16. Older households tend to increase their savings for two main reasons: (1) the risk of high medical expenses in old age; and (2) bequest motives (Székely and Attanasio 2000; Chamon and Prasad 2010; Belke, Dreger, and Ochmann 2012; Carroll 1998; De Nardi, French, and Jones 2010; Dynan, Skinner, and Zeldes 2004).

17. It may take some generations of longer life expectancy for the population to adjust their saving behaviors.

18. In the calculation of wealth accumulation, pension contributions were treated as savings and pension receipts as dissaving. Pension contributions were imputed by estimating the contribution rate which, if applied to all forms of labor income, would balance the pension fund, that is, which equilibrates pension contributions and receipts. Though this method is very rough given the complexity of the Russian pension system, it provides a valid approximation. The estimated contribution rate of 24.18

percent closely matches the official rate of insurance premium to the Pension Fund of Russia (applied to wages below the set limit value), which was fixed at 22 percent in 2012 (http://www.pfrf.ru/rates_premiums/).

19. This estimation may be underestimating wealth since pension receipts include not only contributory pensions but also noncontributory sources, which are direct transfers from the government.

20. More evidence on the prevalence of grandparenting help in the region is described in chapter 2 (figure 2.9). Complete details of the analysis can be found in Albertini (2014).

21. Complete details of the analysis can be found in Albertini (2014).

22. The pivotal role of pensions in reducing the risk of old-age poverty is not new. Their relevance was highlighted when discussing the transition of the former Soviet Union in the early 2000s to avoid poverty for individuals after reaching retirement age (Chawla, Betcherman, and Banerji 2007; Chand and Jaeger 1996).

23. These schemes can take many forms, including a minimum pension that covers some set of minimum needs of the elderly (for example, Poland, the Slovak Republic, Slovenia, and Turkey), a basic scheme that pays at a flat rate independent of the earnings of contributors (for example, the Czech Republic and Russia), and a resource-tested or targeted plan that pays out a progressive benefit to retirees based on their incomes (for example, Bulgaria) (Hauner 2008; OECD 2013; World Bank 2013). Not all of them are well targeted or effective, however, as some of them may apply to a very small subset of pensioners while others are universal but provide very little benefit. The wide coverage of some programs also makes them unsustainable and has led to reforms in recent years (Williamson, Howling, and Maroto 2006).

24. A multipillar system typically consists of four pillars: the zero pillar retains the safety net function by providing a fixed pension to all or a targeted group of retirees regardless of contributions; the first pillar replicates the pay-as-you-go system previously existing in many ECA countries and plays a limited insurance and redistributive role by providing minimum or progressive pension benefits to contributors; the second pillar is a defined-contribution scheme and ties benefits to preretirement earnings with the aim of enhancing benefit adequacy; the third pillar is voluntary but similar to the second one in design and aims to supplement the savings of the retirees.

25. This is an average across eight countries (Bulgaria, Croatia, the Czech Republic, Hungary, Poland, Romania, the Slovak Republic, and Slovenia).

26. The only exceptions are Georgia and Kazakhstan, which maintain a universal pension to provide pensions to all persons reaching retirement age, regardless of work history or contributions to the pension system (although the former is preparing to move to a universal, means-tested social assistance system) (Falkingham and Vlachantoni 2012).

27. Inequality would actually be somewhat higher than this indicates, because skilled workers are more likely than unskilled workers to work until retirement age, so the latter do not always get the full pension benefits.

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PART

III
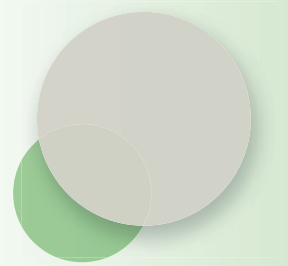
Policies

Overview

Although governments on all levels are already making many adjustments to enable their populations to achieve healthy, active, and prosperous aging, they still need to overcome the legacies of policies and mindsets formed when populations were expanding. The policy areas that deserve most attention are those that will help rebalance and stabilize the demographic structure and that will enhance the positive and mitigate some of the negative economic consequences of aging.

The previous two parts of the report have painted a carefully optimistic picture of the demographic prospects of the region and the economic consequences of aging. First, aging in Europe and Central Asia is not so much an existential crisis but a return to more normal levels of population growth. Aging has been driven mostly by a drop in fertility, in many countries to well below replacement rates, and not so much by an improvement in longevity. Outmigration has aggravated the demographic change in many countries. As the experience of the more advanced economies shows, a rebound in fertility, an improvement in life expectancy, and a rebalancing of migration are feasible if the right policies are put in place. Second, individuals, firms, and societies can adjust their behavior, production processes, and institutions to adapt to, and take advantage of, the new realities of an aging society. Thus aging does not necessarily imply substantial increases in dependency ratios, declines in productivity, or stark choices between unsustainable fiscal positions and widespread poverty among the elderly.

Aging undoubtedly creates winners and losers, and the design, choice, implementation, and ultimate success of interventions depend on identifying them and building consensus. Hence, before discussing specific policies and interventions in

chapter 7, chapter 6 considers the political economy challenges of aging societies. As large cohorts become old (for example, the baby-boom generation in the United States), they nevertheless continue to hold considerable electoral power. Their voting patterns show a preference for the status quo and little interest in important reforms, for example, in education or the environment. One interpretation of this phenomenon is that the increasing importance of older voters as societies age will imply increasing opposition to essential reforms. However, a deeper analysis shows that preferences of older individuals on many of these issues reflect the views and experience of their specific generation (a cohort effect) and are not the result of changes in response to aging itself. Indeed, views on most of the policy priorities considered in our analysis, with the important exceptions of pensions and education, do not change substantially over the life cycle. Thus, opposition to reform will not necessarily rise in all policy areas as populations age, but in some areas it will, giving urgency to certain reforms, in particular pension policies. Also, governments could encourage political participation by younger age groups, making sure their voices are heard and the interests of younger generations are adequately reflected in policy.

Chapter 7, then, discusses the two key policy areas relevant to achieving "Golden Aging" in Europe and Central Asia. In the first area, rebalancing demographics, the top priorities are: (1) increasing fertility to sustainable levels; (2) reforming health and long-term care systems to allow for healthier aging; and (3) embracing migration as part of the solution. As the experience of developed countries has shown, reconciling family and career goals, especially for women, would help bring fertility closer to the replacement rate. Providing formal child care from an early age is the most effective means of achieving this. Many Western European countries have started reforms that focus on providing comprehensive child care from early ages, but much more could be done. Likewise, care for the elderly, once provided informally by the extended household, could be organized in a more extensive and sustainable fashion. These and other interventions have been found to help women move toward their desired balance between participation in the labor market and family size.

Achieving the cardiovascular revolution in Europe and Central Asia could significantly increase life expectancy. Chapter 2 emphasized that behavioral changes—particularly reductions in smoking and alcohol consumption, increases in exercise, and healthier eating habits—would prolong lives at minimal cost. In turn, improving longevity would present further challenges. The demand for formal long-term care services will rise, and this should be accommodated in a way that moves care away from hospitals into the community—which is both a more adequate care setting for the elderly and much more cost efficient. Improvements in longevity would also help with the rebalancing of population demography in the region.

Finally, migration policies can also influence demography. Some of the countries in the region that are aging rapidly are also experiencing high levels of outflows of young workers. These workers, in turn, help rebalance the aging demographic of receiving countries. Erecting barriers to emigration and immigration is likely to be difficult and, over the long term, counterproductive, as a highly mobile workforce can produce a host of economic benefits to both sending and receiving

economies. Instead, governments can focus on improving the prospects for productive employment at home and start designing proactive immigration policies to attract the right talents and workers for their economies. Reversals from net emigration to net immigration flows have occurred often and are facilitated by a more open migration regime. Governments can also take steps to increase benefits from the diaspora, in the form of remittances, technology flows, and trade.

The second group of policies that would help achieve Golden Aging concerns the economic consequences of aging. Policies should focus on enhancing the opportunities that aging provides for individuals and firms and on mitigating some of the negative economic consequences of aging. The top priorities consist of ensuring: (1) longer and more productive work lives; (2) fiscal sustainability; and (3) continued reduction of old-age poverty and efficiency-friendly levels of equality. While progress is being made, a lot more could be done. Governments should creatively take advantage of the smaller cohorts of young students and workers, and prepare them better for longer and productive lives. Some countries have started reforming their pension systems, but often these reforms have been on the margin and insufficient. At the same time, reforms to ensure fiscal sustainability should be complemented by safeguards to protect the elderly from falling into poverty, most importantly ensuring a basic pension benefit for retirees who lack alternative sources of income. Effective retirement ages have started to increase again, but further increases would avoid sharp rises in dependency ratios. Firms have started to cope with aging workforces by shifting their production in light of resulting changes in comparative advantage and adjusting workplaces to meet the needs of older workers. Nevertheless, more effort is required to disseminate the success of these workplace interventions and to overcome discrimination against older workers. Health and long-term care systems should be reformed to balance the needs of an aging population with what governments can afford.

These policies should be evaluated according to their implications for society as a whole. Aging is a societal phenomenon, and focusing too narrowly on how policies affect specific issues or groups can be counterproductive. For example, achieving sound fiscal policies would require adjusting unsustainable pension schemes. Nevertheless, providing adequate insurance to protect the elderly, and to prevent them from falling into poverty, remains a critical issue for the society even if the government books are balanced.

The report closes with an attempt to map out the challenges of aging for Europe and Central Asia and their peers in Western Europe and the Baltics on eight different policy dimensions: one dimension on the political economy challenge (voting participation of the young); three dimensions on demographic rebalancing (fertility, healthy life expectancy, and net immigration); and four dimensions related to dealing with the economic consequences of aging (labor force participation, the quality of education as an indicator for future labor productivity, public debt, and old-age poverty). In each of these eight dimensions, each country is assessed in terms of how advanced or behind it is compared to its peers in the region and in Western Europe. In terms of the overall aging challenge, many Western Balkan countries and some of the Central Asian countries lag behind the most. The Central Asian countries are still relatively young, so they have more time to address those

challenges , but the high voting participation of the old means that they need to put in place reforms before the old-age groups form a significant resistance. What is most striking, though, is that all countries in Europe and Central Asia face greater aging challenges than their Western European peers—but they are almost as old, or older. In other words, the policy challenges are considerable for Europe and Central Asia, and the pressure to solve them soon is considerable.

6

Overcoming the Legacy of Expanding Populations

Introduction

Current social security systems—including decisions on financing, program design, and the age of eligibility for a pension—were adopted during a post–World War II period remarkable for its prosperity and for the expansion of younger age groups. Adapting this system to deal with aging societies, longer lives, shrinking younger cohorts, and retiring baby boomers will be above all a political economy challenge.

As people become older, their daily decisions and preferences change, including those on the provision of public goods. They tend to spend less time and fewer resources on formal education, since their expected time in the workforce is becoming shorter and therefore they will be less likely to enjoy the increased earnings that would result from investing in human capital. Similarly, they may have less incentive to invest money in improving their homes, as they might not be able to reap the capital gains associated with a higher value. In contrast, they may allocate a larger share of their incomes to health and recreation services to achieve a good quality of life in old age. These changing consumption patterns over the life cycle will also emerge at the country level. As a society becomes older, the optimal

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bundle of goods and services (both private and public) will change to reflect the preferences of the population. The new, optimal bundle of private goods and services will emerge as firms adapt their supply to the changing individual preferences. By contrast, changes in the public goods and services in democratic societies occur in response to changes in political power and may respond to shifts in voting patterns as societies age.

The theory of the median voter provides a framework for analyzing the political economy of public spending patterns in aging societies and suggests a shift to new policy priorities. The median voter theory is typically applied to redistribution issues. It argues that in more unequal societies the median voter is relatively poor and therefore will push for higher levels of progressive taxes and transfers. This argument can be extended to compare the voting preferences of young versus old societies. As a society becomes older, the median voter will tend to be older as well. Hence, the national policy priorities will tend to reflect more closely the preferences of older individuals.

> **Adapting institutions— institutions built during periods when populations were expanding—to deal with aging societies, shrinking younger cohorts, and retiring baby boomers is above all a political economy challenge.**

Yet, the fact that voters are getting older does not necessarily mean that the window of opportunity for reforms is disappearing. Again, one should not extrapolate current characteristics—in this case, the policy preferences of the old—into the future without taking into account possible behavioral changes—or, in the case of political economy, changes in policy preferences. The analysis presented below reveals that many preferences of voters are not due to aging per se but are due to a specific generation—in other words, a cohort effect. There are some exceptions. For example, older people are less in favor of increasing spending on education and more in favor of increasing spending on pensions. But in other important areas, for example migration, cohort effects seem to dominate. Moreover, as future generations grow old having experienced migration firsthand, their attitudes toward migrants could improve. Nevertheless, some urgency might be warranted in introducing reforms quickly. It may also be important to encourage the young to participate in society and in the electoral process. Some countries, especially in Central Europe and the Baltics, have in fact lowered the voting age to attract young voters.

Voters Are Getting Older

In some countries in Europe and Central Asia (ECA), such as Bulgaria, Croatia, and Slovenia, people older than 50 already represent at least 50.1 percent of the voting population. The median voter will be 50 or older in the majority of ECA and other European countries by the 2020s, and in all ECA countries except Turkey and Central Asia by the 2040s.[1] Unless the young increase their participation in the voting process, it seems that the typical voter in Europe and Central Asia will become older very rapidly (figure 6.1).

An older median voter could bring a dramatic change in the composition and size of public spending. If the elderly have selfish preferences, they would tend to support an increase in pensions financed by their younger peers through a pay-as-you-go system. Similarly, since a large share of health care consumption occurs during the last few years of life, and particularly in the final year (see chapter 7), the elderly are also likely to support heavier government spending on health care and
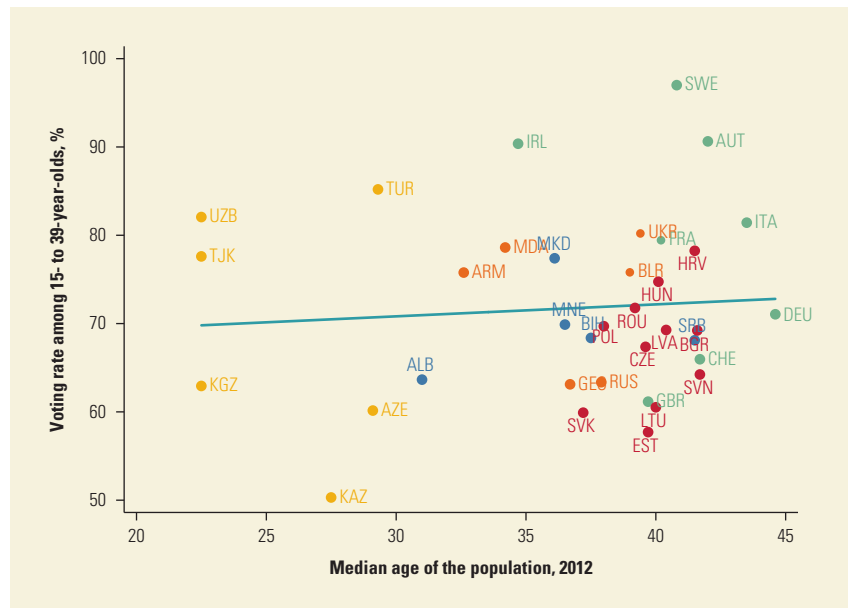
FIGURE 6.1

Increasing voter turnout among youth may slow down the aging of the voting population in Europe and Central Asia

- ● Western Europe
- ● Central Europe and the Baltics
- ● Western Balkans
- ● Eastern Partnership and Russian Federation
- ● Young countries

Sources: The voting rate was estimated from LiTS II 2010, while the median age comes from World Population Prospects: The 2012 Revision.

long-term care, especially when the costs can be financed through general taxation. Higher spending on primary or secondary education, however, often gets considerable support from younger generations, whose children benefit. Finally, support for climate change policies may be lower among older people, who are less likely than younger generations to reap the eventual benefits. However, the elderly may have altruistic preferences toward their younger counterparts or future generations, and they may also benefit from externalities associated with higher spending allocated to their younger peers (for instance, if higher spending on education reduces crime rates). The emergence of pensioners' parties across aging European countries might suggest that the policy preferences of the elderly are rather self-serving, although these parties have had only limited influence (box 6.1).

Older individuals may also affect economic policy by influencing mainstream political parties. If old individuals will be the new majority, the established political parties are likely to compete for their votes, particularly as older individuals are much more likely to participate in the electoral process than their younger peers. The share of people who cast a vote in the most recent election tends to increase with age for all country groups in Europe and Central Asia and starts to decrease only at around age 70 for most groups (figure 6.2).

Thus the potential effects of demographic change on political economy issues in Europe and Central Asia might be larger than that indicated by increases in the average age of the population, because old people are also more likely to participate in the voting process.

If an aging electorate manages to influence the debate over the level and composition of public expenditures, then the outlook for government expenditure patterns might look very different from what it is today. Figure 6.3 shows survey data on individual preferences for policy priorities, by age and country group. While health care is the highest priority for government spending across all country

The Emergence of Pensioners' Parties in Europe

Policy priorities will not necessarily shift dramatically

A few political parties that focus on pensioners' rights have emerged in some European economies since the 1980s. In some years, as many as five pensioners' parties have competed for seats in the national parliaments of countries in Western Europe and three in Eastern Europe, sometimes capturing about 4 percent of the votes (figure B6.1.1).

FIGURE B6.1.1 **A pensioners' political movement has emerged across Europe**
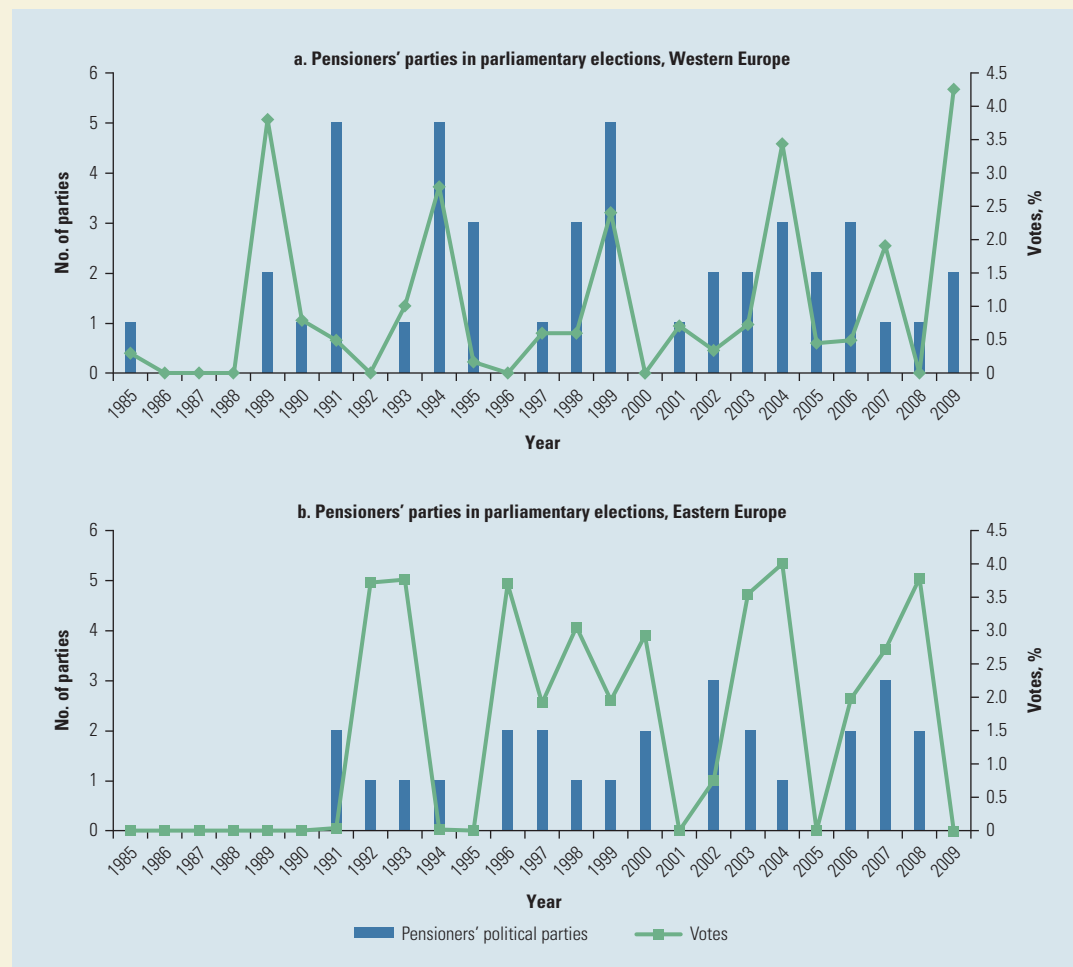
Source: Based on data from Hanley 2010.
Note: The percentage of votes is the average for all countries with pensioners' political parties contesting parliamentary elections in that voting year. The country groupings defined by Hanley 2010 are different from the groupings used in this report. Western Europe includes Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Scotland, Spain, Sweden, and the United Kingdom. Eastern Europe includes Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Russian Federation, Serbia, the Slovak Republic, Turkey, and Ukraine.

BOX 6.1 *(continued)*

The success achieved by pensioners' political parties has varied. The Alternative Democratic Reform Party in Luxembourg—which was founded in 1987 as a single-issue party to demand equality of state pension provision between civil servants and all other citizens (Bolleyer 2013)—has consistently achieved around 10 percent of the votes in parliamentary elections since the late 1980s. Similarly, the Democratic Party of Pensioners captured more than 7 percent of the votes during the parliamentary elections of Slovenia in 2008. However, the success of so-called gray interest parties across Europe has been limited, and only a few have established themselves on a longer-term basis (Hanley 2010).

Even though pensioners' political parties have not gained support comparable to that of the mainstream political parties, they have managed to influence important policy decisions. For example, the Party of United Pensioners in Serbia blocked the 10 percent reduction in pensions agreed on as part of a package of spending cuts required for Serbia to obtain a stand-by loan agreement with the International Monetary Fund (Hanley 2010). Similarly, the Alternative Democratic Reform Party in Luxembourg influenced a decision to adopt legislation to restrict the naturalization of immigrants in 2001 (Bauböcket et al. 2006).

FIGURE 6.2   Older people are more likely to participate in voting
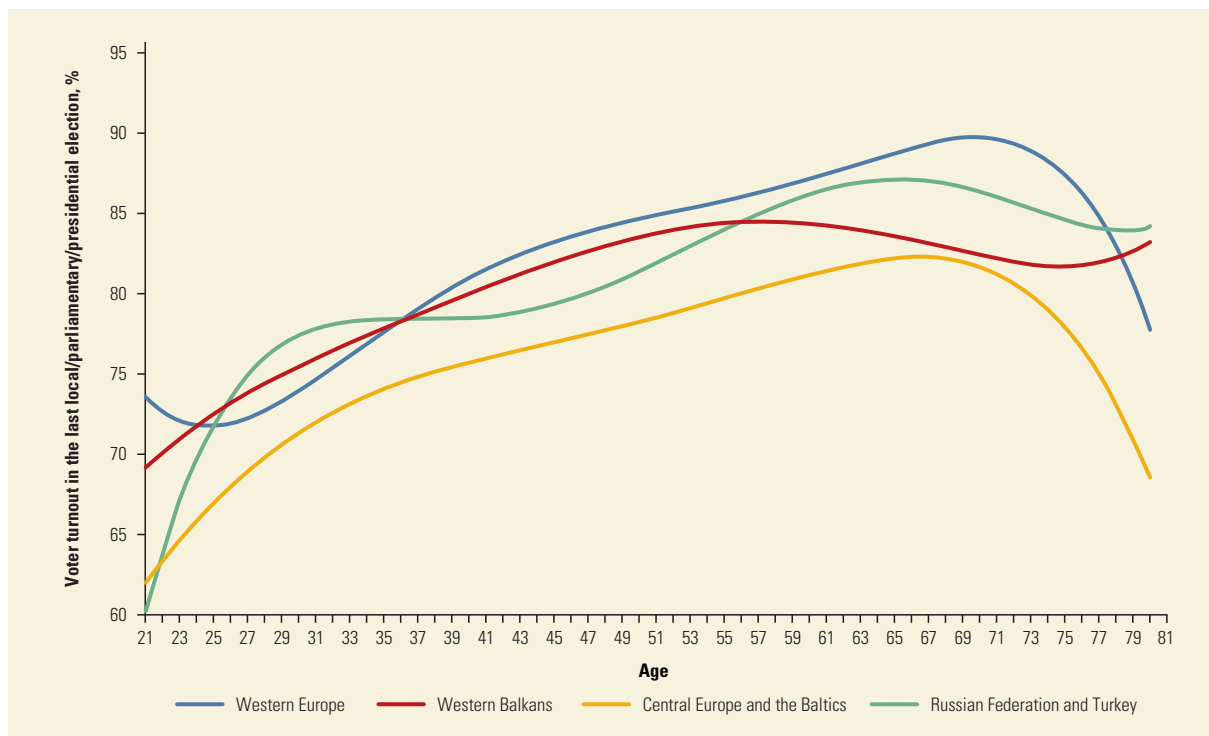
Source: De Mello et al. 2014, based on data from LiTS II 2010.

FIGURE 6.3 Older people want more public spending on pensions but less on education
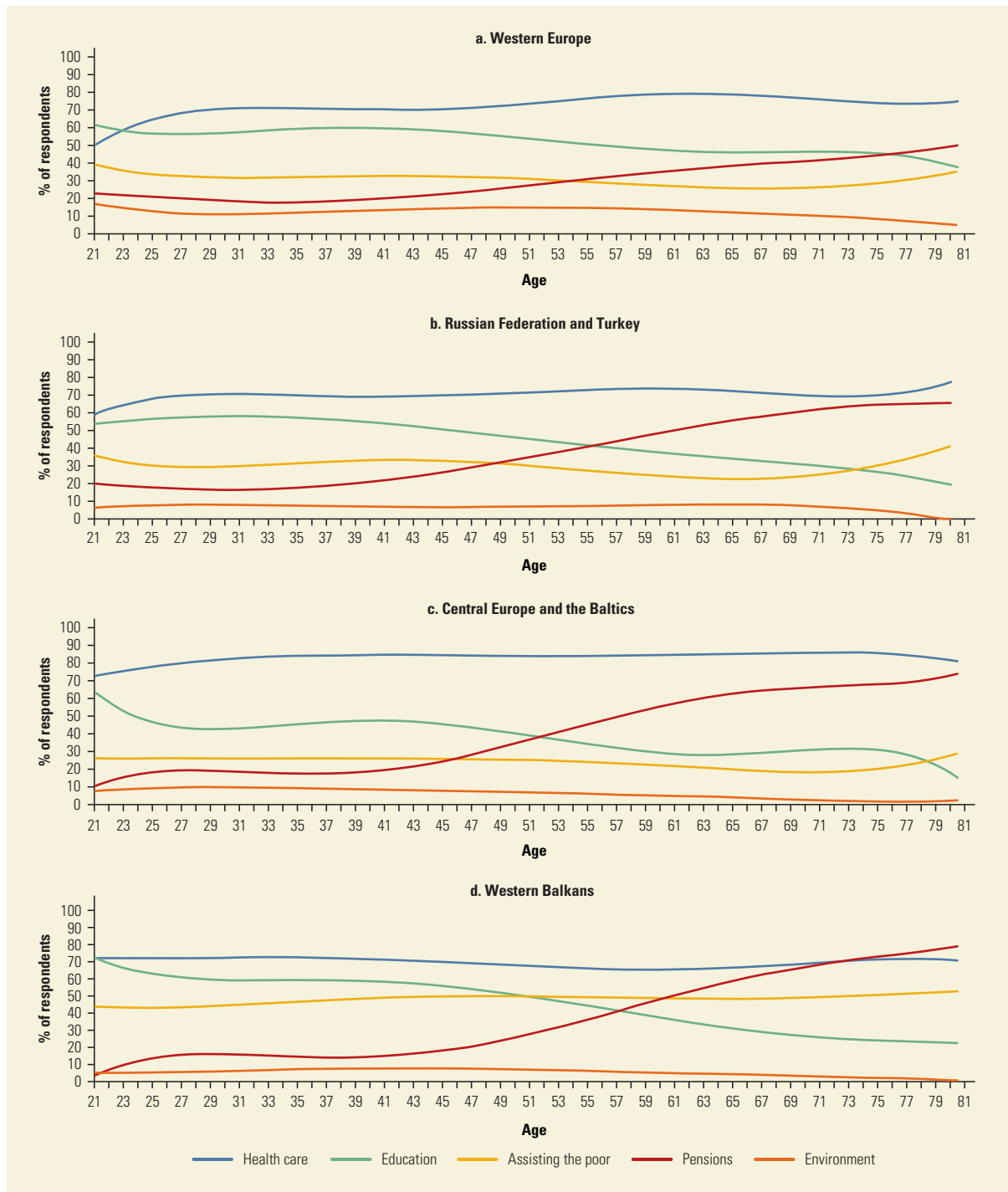
Source: De Mello et al. 2014, based on data from LiTS II 2010. Each line is a five-degree polynomial approximation.
Note: Individual preferences were measured on the basis of individuals' stated preferences for allocating additional government spending using the responses to the following question: "In your opinion, which of these fields should be the first and second priorities for extra government spending?" The list of possible responses includes education, environment (including water quality), health care, housing, pensions, assisting the poor, public infrastructure, and other.
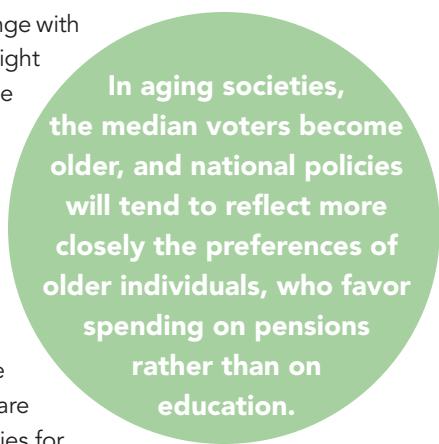
and age groups, there are significant differences by age on the allocation of public revenues on education, pensions, environment, and assistance to the poor. In all four groups of countries, old people are less likely than their younger peers to consider education and the environment as priorities for extra government spending. Support for extra spending on assisting the poor tends to decline with age (though not monotonically) and to increase after age 70 in all country groups except the Western Balkans. In contrast, support for pensions as a first or second priority for extra government spending tends to increase with age across all countries.

This evidence, however, does not necessarily mean that individuals' support for increasing expenditures in certain areas changes with age. Alternatively, the different preferences of older individuals may reflect other factors that also change with age. For example, if older people earn more than younger people, they might be more likely to use private services rather than public ones and hence may be less likely to support increasing expenditures in areas that will not benefit them directly. Estimating the effect of age on policy preferences while controlling for other observable individual characteristics sheds light on these issues.[2] Even when other characteristics that change during the life cycle are controlled for, research shows that people older than 54 are 14 percent less likely to consider education and 5 percent less likely to consider assisting the poor as first or second priorities for government expenditures than individuals younger than 25. At the same time, people older than 54 are 9 percent more likely to consider health care and 25 percent more likely to consider pensions as first or second priorities for government expenditures than individuals younger than 25. Finally, people older than 54 are 3 percent less likely to consider the environment as a first or second priority for extra government spending than younger people are.

> In aging societies, the median voters become older, and national policies will tend to reflect more closely the preferences of older individuals, who favor spending on pensions rather than on education.

A naïve extrapolation from these preferences to the future would suggest that the share of government revenues allocated to pensions and health care will be even greater and that the share allocated to education, assisting the poor, and the environment will be lower than it is today as the median voter ages. Such an extrapolation would be based on the assumption that the age patterns observed in a cross-section are entirely driven by life-cycle patterns. However, these age patterns can also be driven by a generational change. In other words, old people today may have preferences different from their younger peers because they grew up in a different environment and not because their preferences changed as they became older. If this is the case, then older people in the future will not necessarily have the same preferences as the current old residents of Europe and Central Asia.

Controlling for generational, or cohort, effects is important. Fullerton and Dixon (2010), using data for the United States between 1984 and 2008, find that evidence suggesting that older people support spending for health care and social security, but not education, reflects cohort—not age—effects. The only paper that appears to attempt to disentangle age, cohort, and year effects in attitudes toward public spending priorities in European economies is Sørensen (2013), who finds that people do shift their public spending priorities over their life cycles but not by as much as cross-sectional age comparisons would suggest.[3] In particular, old people tend to be less supportive of an increase in government expenditures

FIGURE 6.4 The economy is more important than pensions or health care for European residents: Could this ranking change in aging societies?
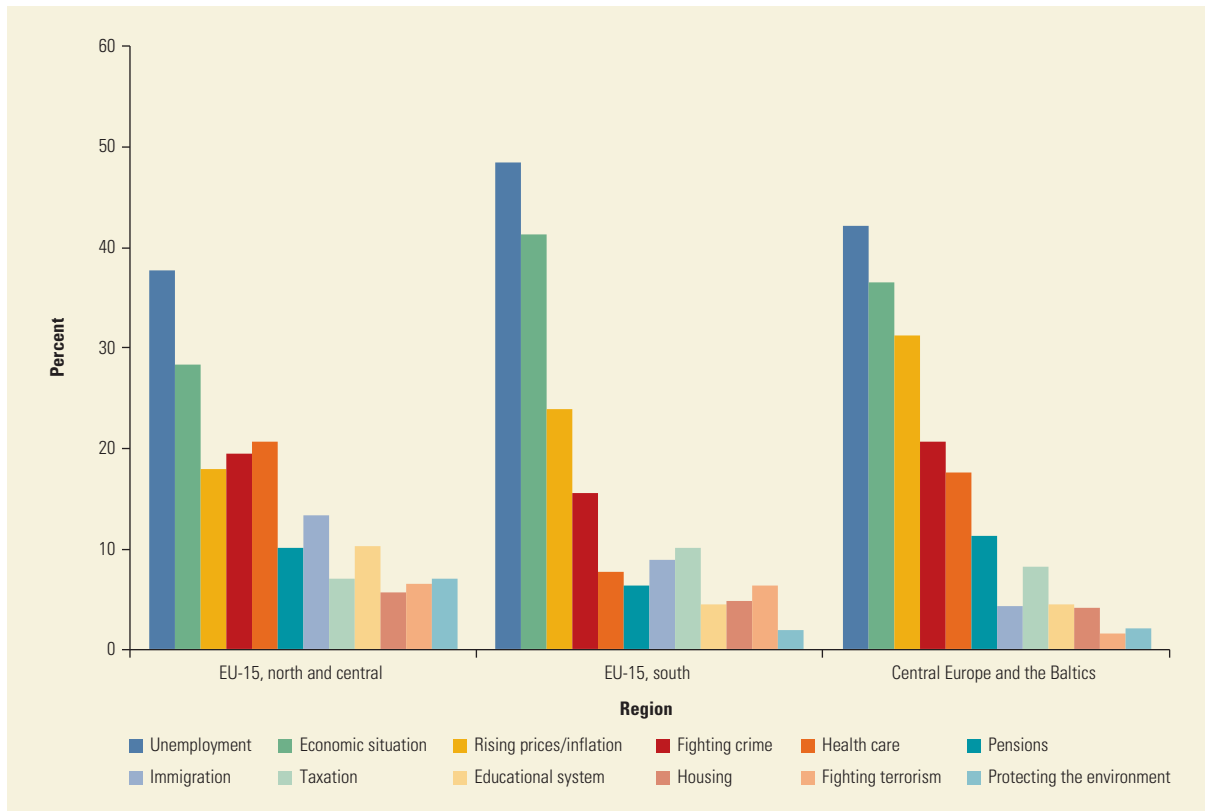
Source: De Mello et al. 2014, based on annual surveys from Eurobarometer between 2004 and 2013.

allocated to education, but more supportive of an increase in pension expenditures, than their younger peers. Controlling for cohort effects significantly reduces, but does not entirely eliminate, these age patterns.

The authors of this chapter performed a similar analysis using Eurobarometer Surveys to overcome limitations of the Sørensen (2013) data, which had a limited number of not mutually exclusive expenditure categories (whereby individuals could choose increasing expenditures in all categories) and had a country coverage not representative of Europe and Central Asia.[4] The data used here are representative of 27 countries in Western and Central Europe and the Baltics. General issues such as unemployment, the economic situation, and prices are among the top choices for the most important issues facing the country, followed by more specific subjects such as crime, health care, pensions, and immigration (figure 6.4).[5] While this survey does not specifically try to elicit preferences on the allocation of public expenditures, it does provide a snapshot of the main concerns.

Following the methodology described in De Mello et al. (2014), the analysis here estimates age effects on the probability of choosing each alternative, while controlling for other demographic characteristics.[6] Figure 6.5a shows the age

FIGURE 6.5 Differences in policy preferences across age groups in Europe tend to diminish if generational changes are accounted for

Source: De Mello et al. 2014, based on annual surveys from Eurobarometer between 2004 and 2013.

effects from the basic model and confirms the stylized facts: while older people are less likely to consider education an important issue, they are more likely to consider health care and pensions important issues. Figure 6.5b shows that the estimated age effects change once the year of birth as a control variable is added.

While the age patterns become slightly more pronounced (but also less precise) with respect to education, they remain unchanged for pensions and basically vanish for health care. In other words, the fact that older people are more likely to consider health care an important issue for the country is largely driven by a cohort effect, not by aging. In contrast, attitudes toward education and pensions seem mostly driven by aging and not by differences between generations.

Figure 6.5 also illustrates the importance of separating cohort and age effects with respect to attitudes toward crime, housing, taxation, and the economic situation. The fact that old people are less likely to consider taxation or housing important issues for the country (figure 6.5a) is largely driven by a cohort— not age—effect. In contrast, the fact that old people are more likely to consider crime an important issue is mostly driven by an aging effect.[7]

> Voting patterns of the old are not fixed. Old people today may have preferences different from the young because they grew up in a different environment, not because their preferences changed as they became older.

The fact that cohort effects, or generational differences, explain a large part of the different preferences by age should not be surprising. Some of the cohorts included in the analysis were marked by important historical events in the region. Economic crises, World War II, the reconstruction years after the war, the emergence of the welfare state, and the rise and fall of socialism in Central Europe and the Baltics may have shaped their preferences on the role of government.

In conclusion, while aging societies will have different policy priorities, the change will be less dramatic than a simple comparison of preferences across age groups would suggest. According to these findings, generational differences explain a large share of the different policy priorities of old and young people today. Out of the 12 policy priorities considered, these results suggest that only education and the situation of the economy will be given less importance as societies age.[8] Pensions and fighting crime might gain more relevance on the policy agenda.

Behavioral changes over time could further reduce the impact of aging on policy preferences. For example, working people and more educated people are more likely than retirees and less educated people to consider education or the economic situation a priority. As in the future older people are expected to be more economically active and more educated than that age group is today, more old people may consider education or the economic situation important, compared to the current survey results. In other words, the shift in policy priorities associated with the aging process might be even smaller than suggested by pure life-cycle patterns.

The evidence reviewed above suggests that once generational and behavioral effects are taken into account, an aging electorate will not necessarily exert additional pressure on government budgets by supporting increasingly larger expenditures on things of importance primarily to the old. The next section evaluates whether aging voters may lower the overall support for a policy strategy that aging societies will urgently need: a more open immigration regime to make their economies more flexible and dynamic.

The Influence of Age and Cohort Effects on Attitudes toward Immigration

The residents of some of the oldest countries in Europe and Central Asia do not show highly positive perceptions of immigrants. For instance, less than 20 percent of the native adult population of Bulgaria and Hungary think that immigrants make a valuable contribution to the economy (figure 6.6). Instead, they believe that immigrants are more likely to be a burden on their social protection systems. At the same time, more immigrants will be essential in these countries, since individuals 65 years old and above represent more than 15 percent of their populations, and this figure is projected to increase in the near future.

There are three main reasons that could explain why natives oppose immigration. First, native workers may fear competition from an increasing supply of foreign workers. Second, natives may anticipate that immigrants will not pay taxes but will use public goods and services, potentially increasing natives' tax burden and reducing the supply and quality of public services. Finally, natives may believe that immigration will change desirable "compositional amenities" associated with the characteristics of their neighbors and coworkers (Card, Dustmann, and Preston 2012).

At the same time, Facchini and Mayda (2009) show that in developed economies, high-income individuals oppose immigration when migrants are unskilled and therefore likely to be a net burden on the welfare state; but they support the entry of skilled immigrants who are more likely to make a net contribution to public finances. Interestingly, income and skill levels of unskilled migration can have opposite effects on an individual's self-interest. That is, an educated native will benefit from unskilled immigrant workers, since they provide a complementary factor to skills. However, an educated native—who is likely to earn a higher-than-average

FIGURE 6.6

Is aging making countries less open to international migrants?

- ● Western Europe
- ● Central Europe and the Baltics
- ● Western Balkans
- ● Eastern Partnership and Russian Federation
- ● Young countries
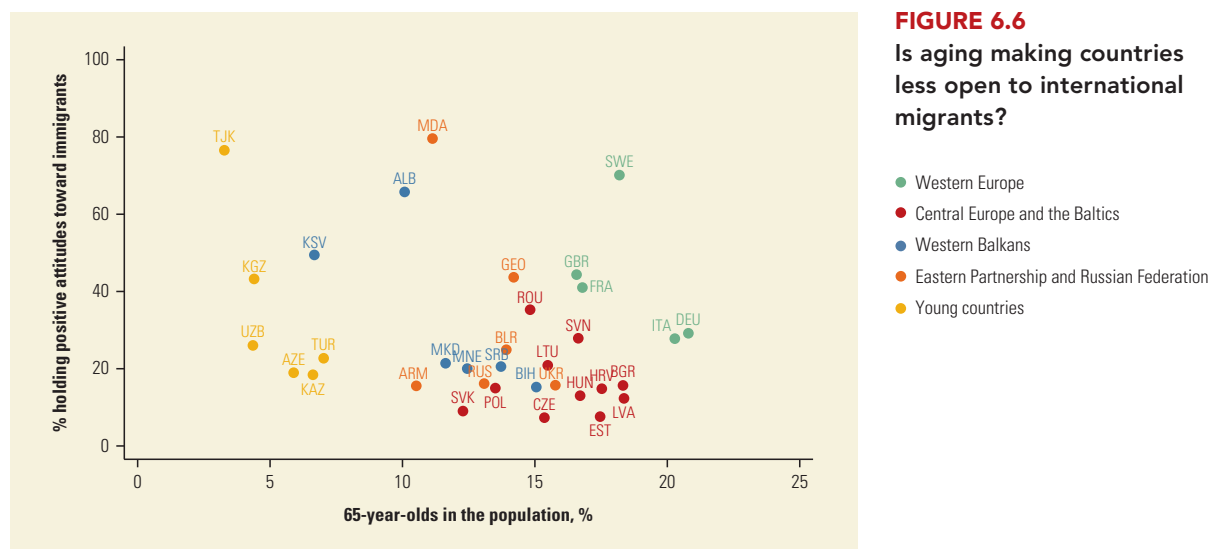
Source: Schotte and Winkler 2014, based on LiTS II 2010 and WDI.
Note: A native respondent is considered to have positive attitudes toward immigrants if he or she thinks that they make a valuable contribution to the economy (as opposed to being a burden to the social protection system).

income—may have to pay higher taxes if unskilled immigrants are a net burden to the welfare state.

In both ECA and other countries in Europe, age, education, and income levels are the main individual characteristics that predict the attitudes of natives toward immigrants (figure 6.7). Using repeated cross-sections from the European Social Survey, Schotte and Winkler (2014) estimate binary choice models for attitudes toward immigration using several explanatory variables and find that only age, tertiary education, and income have a consistent effect on attitudes toward immigration across economies. College graduates and richer individuals are more likely to see immigration as a positive factor, probably because workers with more human capital or physical capital (as proxied by income) will benefit from unskilled immigration. Older individuals are more likely to have negative attitudes toward immigrants, which may reflect concerns over compositional amenities or fears that old-age benefits might be in jeopardy if immigrants turn out to be a fiscal burden.

The fact that today's older people tend to have more negative attitudes toward migrants does not imply that anti-immigrant sentiment will necessarily increase in Europe and Central Asia as the population ages. Schotte and Winkler (2014) distinguish between the impact of cohort, survey year, and age on attitudes toward immigration. They find that in most countries the effect of age becomes insignificant or positive once they control for cohort effects (figure 6.8). Among ECA countries, only in the Czech Republic and Romania, do individuals' attitudes toward migration become more negative with age. In other words, these results imply that when cohort effects are taken into account, older individuals will have more positive attitudes than younger ones toward immigrants. If the cohort effect remains constant, then the general attitudes toward immigrants should improve as the whole society ages.

However, just because aging does not usually mean greater hostility to immigration, attitudes toward immigration in Europe and Central Asia will not necessarily become more positive over time. Cyclical events can have a substantial impact on the political economy of immigration reform. For example, political pressures to end the era of open borders in the late 19th and early 20th century in the United States increased during economic downturns, eventually resulting in immigration restrictions, both in the form of literacy requirements and the implementation of immigrant quotas in 1921 (Goldin 1994). Europe should not ignore this historical event, which slowed the process of economic convergence across countries in the 20th century (Taylor and Williamson 1997). In fact, empirical evidence shows that attitudes toward migrants in Europe are strongly correlated with the performance of the labor market and the business cycle (figures 6.9 and 6.10).

The performance of the labor market is a very good predictor of changes in anti-immigrant sentiment in several high-income European countries (see figure 6.9). For instance, an increase (decrease) in the unemployment rate in Belgium, Finland, Germany, the Netherlands, and Switzerland is typically accompanied by more negative (positive) attitudes of natives toward migrants. These results remain even after controlling for individual characteristics such as income and education. Similarly, natives are less likely to display positive attitudes toward migrants during recessions than during times of positive economic growth (see figure 6.10).

FIGURE 6.7   Positive attitudes toward immigrants decrease with age but increase with income and educational attainment
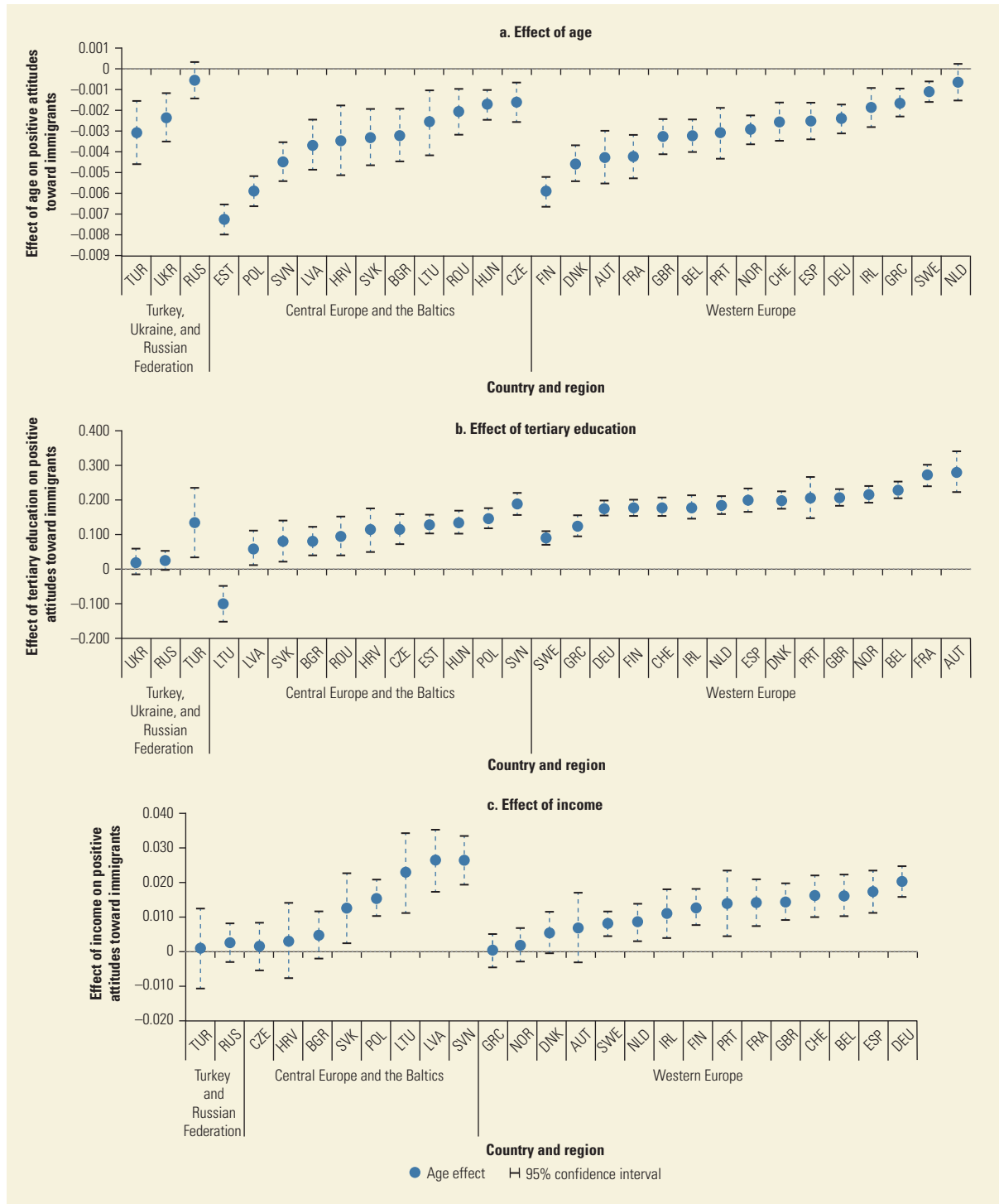
a. Effect of age

b. Effect of tertiary education

c. Effect of income

● Age effect   ⊢ 95% confidence interval

Source: Schotte and Winkler 2014, based on European Social Surveys for 2002, 2004, 2006, 2008, 2010, and 2012.
Note: Survey years vary by country. Each point represents the marginal effect of that individual characteristic on the probability that the individual expresses positive attitudes toward immigration. Positive attitudes are measured using the question, "To what extent do you think the country should allow people of the same race or ethnic group as most natives to come and live here?" The possible answers include *many, some, a few,* or *none.* Those who answer *many* or *some* are considered to show positive attitudes.

FIGURE 6.8 The more negative attitudes of older individuals against immigrants are driven largely by generational change, not by aging
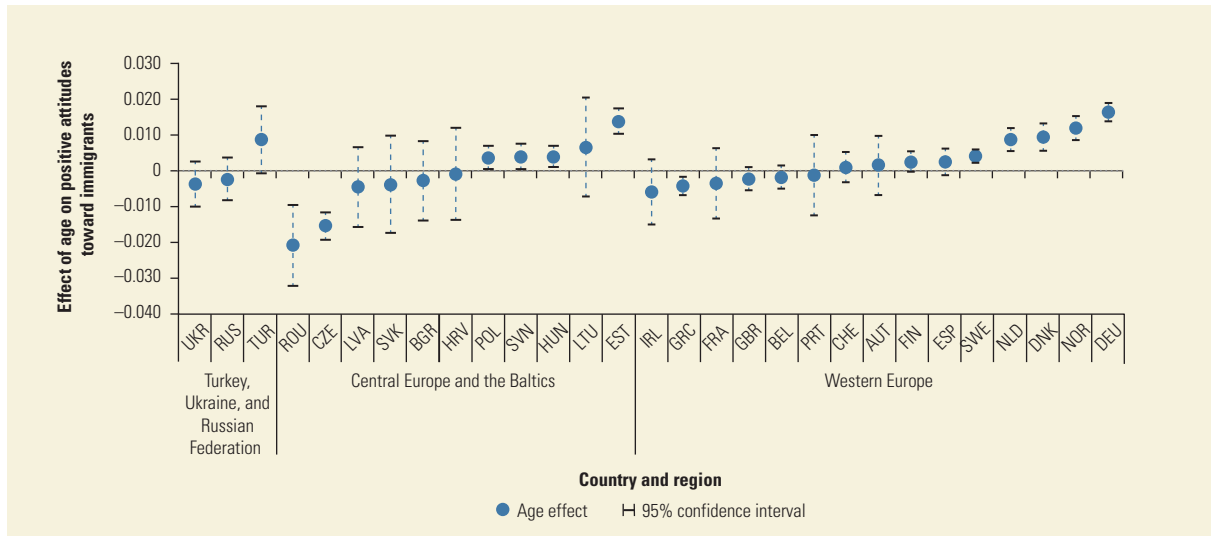
Source: Schotte and Winkler 2014, based on European Social Surveys for 2002, 2004, 2006, 2008, 2010, and 2012.
Note: Survey years vary by country. Each point represents the marginal effect of that individual characteristic on the probability that the individual expresses positive attitudes toward immigration. Positive attitudes are measured using the question, "To what extent do you think the country should allow people of the same race or ethnic group as most natives to come and live here?" The possible answers include *many*, *some*, *a few*, or *none*. Those who answer *many* or *some* are considered to show positive attitudes.

FIGURE 6.9 When unemployment increases, positive attitudes toward immigrants tend to lessen in Europe
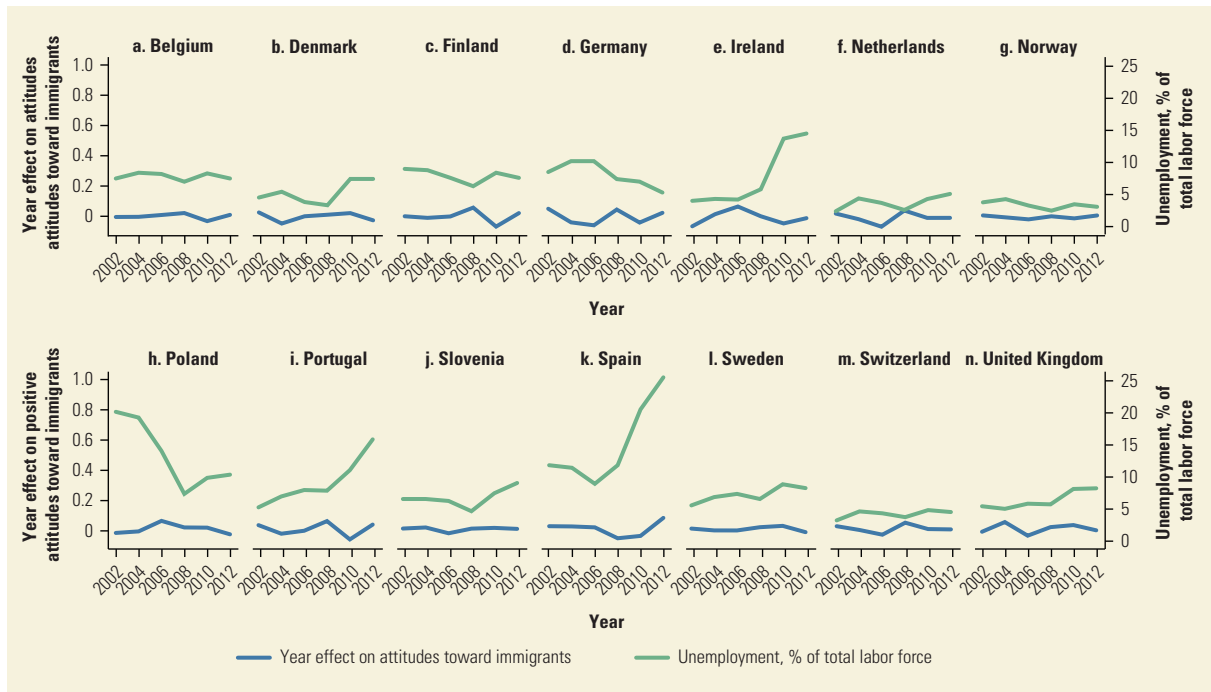
Sources: Schotte and Winkler 2014, based on European Social Surveys for 2002, 2004, 2006, 2008, 2010, and 2012. The unemployment rate comes from Eurostat.
Note: The "year effect" coefficients are the marginal effects associated with the year dummy variables from a probit model following Deaton and Paxson (1994) decomposition. Controls include age and year of birth and other socioeconomic characteristics.
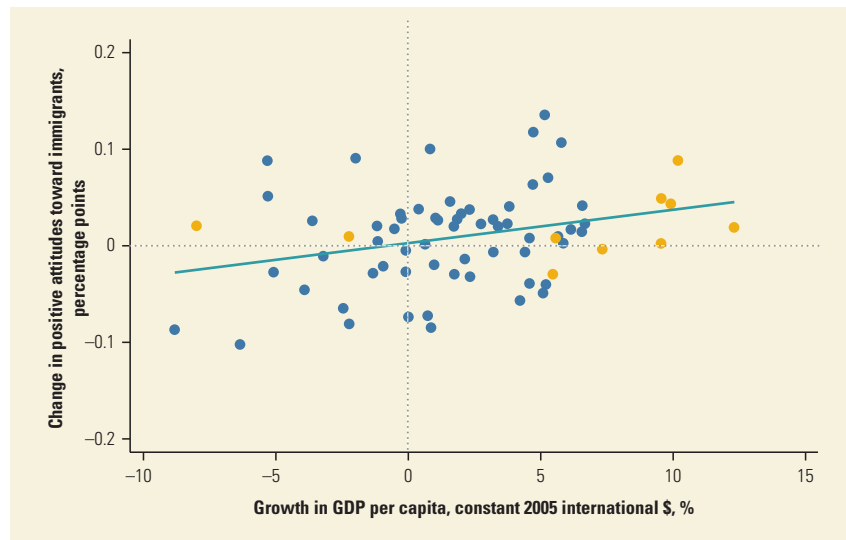
FIGURE 6.10
Attitudes toward immigrants become more negative during recessions

● Western European countries
● Central Europe and the Baltics

Sources: Schotte and Winkler 2014, based on European Social Surveys for 2002, 2004, 2006, 2008, 2010, and 2012. GDP figures come from WDI.
Note: Survey years vary by country. Attitudes toward immigrants are measured using the question, "To what extent do you think the country should allow people of the same race or ethnic group as most natives to come and live here?" The possible answers include *many*, *some*, *a few*, or *none*. Those who answer *many* or *some* are considered to show positive attitudes.

Conclusions

In conclusion, the different attitudes of older and younger individuals toward policy priorities and immigration largely reflect differences between generations and specific time effects rather than aging. That is, older individuals are more likely to support more public spending on health or to display anti-immigrant attitudes because they were born in a different time from their younger counterparts, not because their preferences changed as they became older.

Nevertheless, governments should take into account the potential for aging to affect attitudes toward some critical policies. In particular, aging societies may be more likely to favor increasing public spending on pensions and reducing public expenditures on education. Therefore, reforms to pension systems should be undertaken before their support among the electorate becomes even lower. Governments can also reduce the impact of aging on political decisions by encouraging political participation among the young. In fact, the legal voting age was lowered in many countries during the 20th century (International Institute for Democracy and Electoral Assistance 2004). Countries in Central Europe, the Baltics, the Eastern Partnership, and the Russian Federation today have on average the lowest legal voting age in the world, followed by Latin America and Western Europe (see figure 6.11). For example, the residents of Serbia and Slovenia are allowed to vote by the age of 16 if they have a job.

FIGURE 6.11
Countries in Europe and Central Asia have some of the lowest legal voting ages in the world
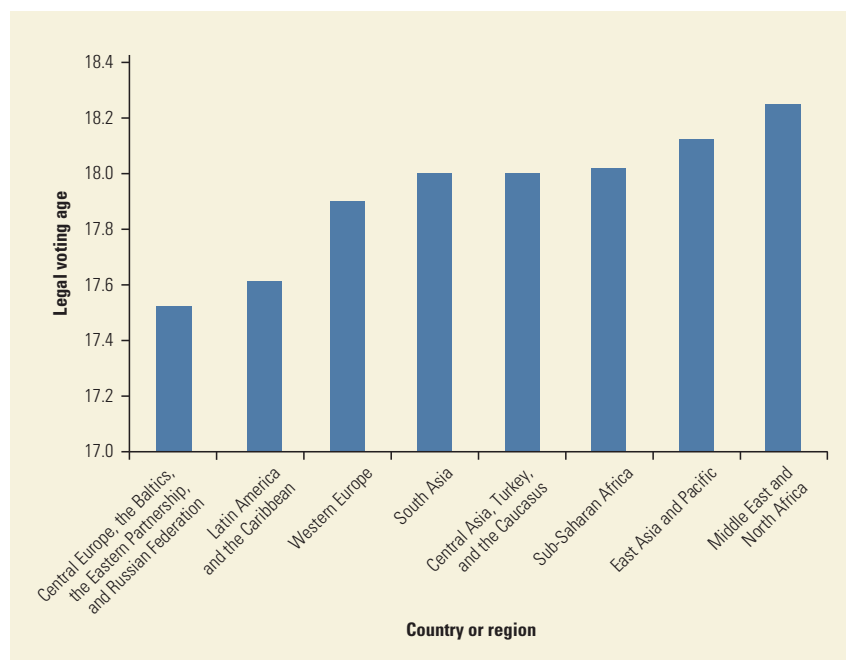
Source: Based on data from *The World Factbook.*
Note: The average legal voting age is computed using the minimum possible age at which an individual can vote if he or she meets other requirements such as, for example, having a job or being married.

Notes

1. These numbers were estimated using the country-level population projections from the United Nations and the voter turnout rates by age group and country from LiTS II 2010. The projections assume that the proportion of people who vote by age will remain fixed over time.
2. See De Mello et al. (2014) and Schotte and Winkler (2014) for details.
3. Sørensen (2013) uses data from the International Social Survey Programme, which comprises four repeated cross-section sample surveys for the years 1985, 1990, 1996, and 2006 and covers 22 countries, 16 of them in Europe.
4. The Eurobarometer Survey includes the question, "What do you think are the two most important issues facing [*our country*] at the moment?," where respondents can choose within a set of 16 categories. We use repeated cross-sections from Eurobarometer Surveys with annual frequency between 2004 and 2013 for 27 countries, including Austria, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, the Slovak Republic, Slovenia, Spain, Sweden, Turkey, and the United Kingdom.
5. Other categories include public transportation, defense, foreign affairs, others, don't know.
6. See De Mello et al. (2014) and Schotte and Winkler (2014) for regression results.
7. See De Mello et al. (2014) and Schotte and Winkler (2014) for details.
8. Even though a larger elderly population may reduce total education expenditures, it is not clear that it will reduce spending per student, since a lower fertility rate also means fewer school-age children. The overall effect of aging on expenditures per student will depend on which of the two forces prevails. The digital revolution and profound changes

in the prevailing paradigm of delivering education services may in any case result in a lower cost of delivery as brick-and-mortar facilities geared to mass education give ground to Internet and virtual education services more tailored to individuals and business demand.

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7

Promoting Healthy, Active, and Prosperous Aging

Introduction

The "Golden Age"—a period of stable population when people live long, healthy, active, and prosperous lives—is within reach for countries in the Europe and Central Asia region. But it will require coordinated actions among different actors, including the government, the private sector, and societies, and across many areas, ranging from labor markets to health care to education and pensions. As this report shows, many adjustments are already taking place. Individuals are working longer and saving more; firms have developed ways to use skills that appreciate with age; governments have implemented pension reforms to discourage early retirement and link benefits with contributions. These adjustments, however, cannot take place in isolation since the effects of one action may complement or undermine another. Firms and governments that adopt policies to encourage more labor force participation among older workers should be aware that certain health conditions and skills are necessary for people to be able to work longer and that such opportunity may not be available to all. Similarly, motivating higher female labor force participation and raising fertility to desirable levels may shift the burden of child care from mothers to grandmothers and lead more women to take early retirement. A focus on fiscal sustainability and aging-related expenditures may take away needed investments in the health and education of future generations.

This chapter discusses options for tackling the challenges and seizing the opportunities that an aging population may bring, based on the literature and empirical evidence of what has worked within the region and in benchmark countries in Western Europe. For clarity, the chapter discusses these options in turn, starting with demographics, then the economy. However, as noted, interventions should be implemented as a package, rather than in isolation. Countries will need to choose which areas are most important and which actions are most appropriate, depending on their demographic and economic conditions. The chapter therefore ends with an assessment of how well-placed countries are to face the challenges of aging and what their specific priorities may be.

Supporting the Rebalancing of Demographics

Population growth is slowing in Europe and Central Asia due to a decline in fertility. This is a normal process and desirable if it leads to more balanced age structures. However, in many countries in the region the decline in fertility has been dramatic and has not been accompanied by the improvements in the health status of older individuals achieved in more advanced countries. If this trend continues, dependency ratios (adjusted for morbidity) could rise sharply, along with the fiscal burden of pension and health care systems. Achieving more balanced age structures would require policy interventions to support a rebound in fertility to near-replacement rates, gains in life expectancy (particularly, increasing the number of healthy years of life), and increases in net immigration rates.

Policies supporting a rebound in fertility to near-replacement rates, gains in healthy life expectancy, and increases in net immigration rates would help achieve more balanced demographics.

As the experience of some high-income countries has shown, a rebound in fertility is possible, even after long periods of low fertility rates. The key priority is reconciling the family and career goals of women. Effective policies for raising fertility rates include the provision of child care services during early life, short maternity leave with earnings-related pay, and extended financial support after childbirth. By contrast, financial transfers right at birth, such as birth grants and long maternity leaves, appear to be less effective in raising fertility rates.

Improvements in life expectancy in Europe and Central Asia will require shifting the focus of health systems from hospital-centered care to prevention and prioritized investments. Benefit packages would need to be reworked to encourage improvements in diet and in tobacco and alcohol use. Investments would need to be carefully selected to encourage the use of certain preventive medications and to increase the provision of formal long-term care services. As the experience of high-income countries has shown, a greater emphasis on community-based formal care services rather than on institutional care would be more effective.

Finally, encouraging immigration can contribute to establishing more balanced age structures. Limits on emigration are difficult to enforce and, given the potential benefits of a diaspora, often counterproductive. A more effective approach would involve creating an investment climate that encourages immigration, while maximizing the gains from, and minimizing the negative impact of, emigration and immigration.

Achieving a Rebound of Fertility Rates

With the exception of the young countries (Central Asia and Turkey), most countries in Europe and Central Asia have extremely low fertility rates, much lower than the slightly older countries of Western Europe (see figure 7.1a). However, this may partly reflect a temporary phenomenon. Women in Europe and Central Asia are becoming more educated and are increasing their participation in the labor market and thus may be delaying having children. If these women ultimately want to have two or three children, then the fertility rate may rise in the future (see chapter
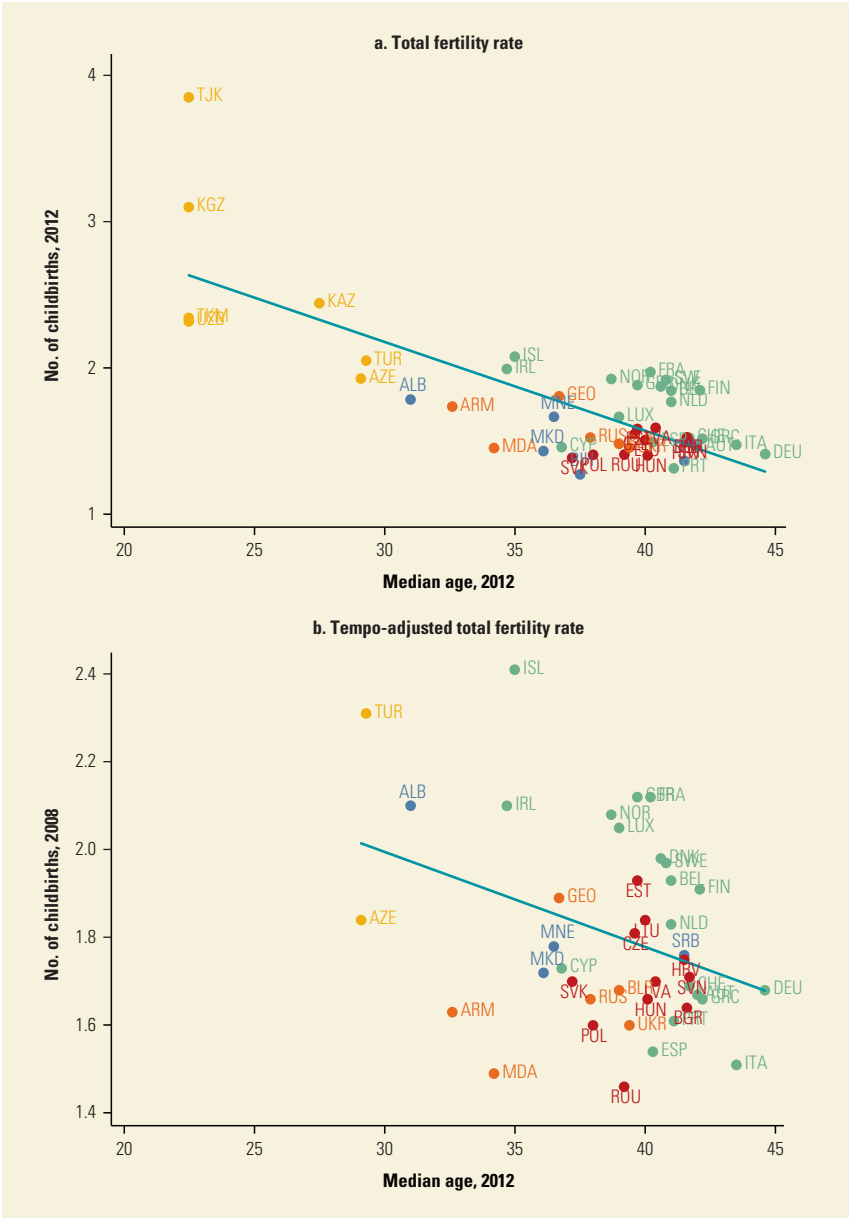
FIGURE 7.1

Although many countries in the region have extremely low fertility rates, it may be a temporary phenomenon

- ● Western Europe
- ● Central Europe and the Baltics
- ● Western Balkans
- ● Eastern Partnership and Russian Federation
- ● Young countries

Sources: Total fertility rate and median age from World Population Prospects: The 2012 Revision; tempo-adjusted total fertility rate from European Demographic Data.

FIGURE 7.2 Women throughout Europe have fewer children than they would like
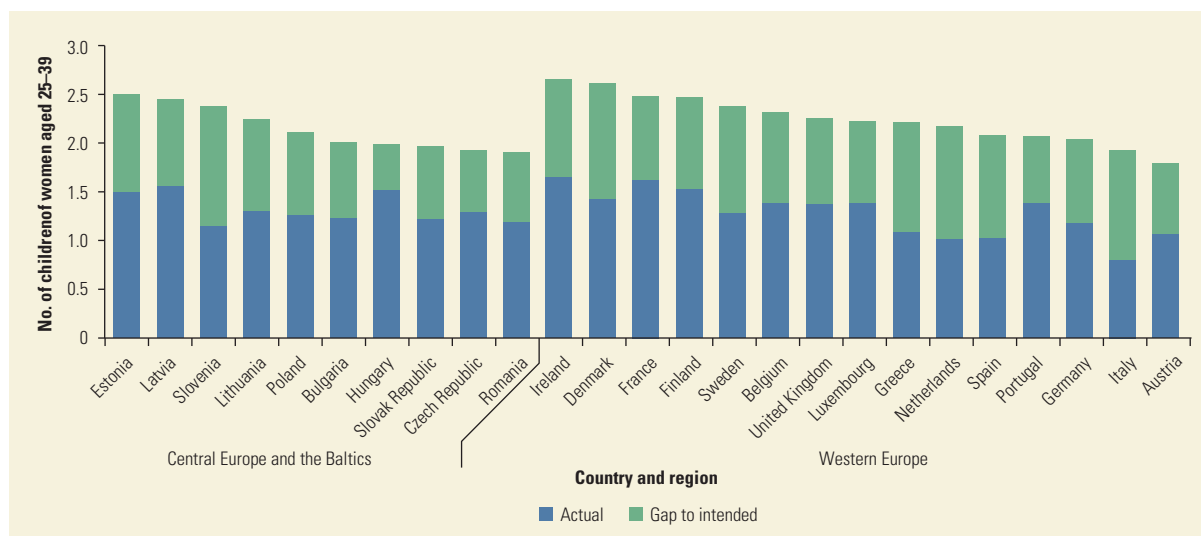
Source: Eurobarometer Survey 2006: childbearing preferences and family issues in Europe.
Note: Countries are ranked by the decreasing number of ultimately intended family size of respondents. This information is based on survey responses to the question, "And for you personally, what would be the ideal number of children you would like to have or would have liked to have?"

1). Adjusting for this effect, the so-called tempo-adjusted fertility rate (see figure 7.1b) shows a somewhat higher fertility rate for most countries in Europe and Central Asia but still lower than in Western Europe, confirming that a return to a sustainable fertility rate would involve major policy efforts.

The key to moving toward replacement fertility rates is to facilitate a reconciliation between work and family life. Many aging countries in Europe and Central Asia and throughout the world have been experimenting with policies aimed at increasing fertility rates. These policies fall largely into three areas: financial transfers, child care services, and maternity leave policies. Depending on the exact design, most policies have some impact but often affect the timing of births rather than the completed family size. For the latter, policies that help women combine motherhood with labor market participation—in particular, child care services—seem to be critical.

Women throughout Europe have fewer children than they want. The number of children that women aged 25–39 intend to have is well above the number they actually have (figure 7.2), suggesting that there are barriers to family formation that policy can address. However, while family policies can clearly influence the timing of births, it is less clear whether family policies can significantly raise completed family size. A growing literature, largely based on the advanced countries, is attempting to assess the influence of policies on fertility behavior (see Thévenon and Gauthier 2011 for a recent overview). Some cross-national studies have investigated the impact on fertility rates of financial transfers, leave policies, child care policies, and expenditures for families (Gauthier and Hatzius 1997; Adsera 2004; d'Addio and Mira d'Ercole 2005; Hilgeman and Butts 2009; Kalwij 2010). Most recently, Luci-Greulich and Thévenon (2013) investigated the impact of these

policies on fertility trends in 18 countries in the Organisation for Economic Co-operation and Development (OECD) over 1980–2007.

These studies find that each instrument of the family policy package (paid leave, child care services, and financial transfers) has a positive influence on fertility on average, suggesting that the combination of these forms of support for working parents during their children's early years is likely to facilitate having more children. Extended financial transfers during childhood and the provision of child care services for children under age three have a larger potential influence on fertility than leave entitlements and financial transfers granted around childbirth. Moreover, these findings highlight important differences in the influence of each policy measure across country groups with different family policy systems. The results of this cross-national comparison of fertility trends are consistent with the findings of studies focusing on specific countries, which can analyze more precisely the impact of a single measure or a policy reform.

All countries that have achieved replacement fertility rates after a period of low fertility have implemented policies that help women combine work with family formation. The effectiveness of policies and workplace practices that support childbearing is a major determinant of achieving both high fertility and female employment rates.

Increasing the weeks of parental leave seems to have a weak but negative effect on fertility (Luci-Greulich and Thévenon 2013), while income security provided by earnings-related payments is found to have a significantly positive influence on fertility (for instance, in Nordic countries; see Andersson et al. 2009). This finding reflects the fact that short but earnings-related leave fosters women's labor market attachment before and after child arrival, which has an indirect but positive influence on fertility. However, the effect of leave on female employment reverses when the period of leave becomes too long (Thévenon and Solaz 2013), which suggests that an increase in fertility due to the extension of leave entitlements would be obtained at the expense of female employment.

> All countries that have achieved replacement fertility rates after a period of low fertility have implemented policies that help women combine work with family formation.

Some insight into the effects of policies for reconciling fertility and female labor force participation can be seen by looking at Iceland, which has one of the higher fertility rates and the highest labor force participation of women among OECD countries (83 percent for the age group 15–64, compared to the OECD average of 62 percent; see OECD Statistics). Iceland was also named the country with the narrowest gender pay gap in the world by the World Economic Forum in 2013. Two main policies in Iceland that are likely contributors to this high participation rate among women are maternal leave policies and child care benefits. While maternal leave benefits provided in Iceland are not particularly generous compared to other OECD countries, men's benefits are among the most generous. Couples get nine months of paid leave at around 80 percent of salary. Each parent has a three-month period exclusively at his or her disposal, and the remaining three months can be shared between themselves at their own convenience. Iceland also has one of the highest coverage rates of child care in Europe. Since 1998, more than 90 percent of three- to five-year-olds in Iceland have been enrolled in public day care. Parents pay about 30 percent of the real cost of day care (Eydal and Ólafsson 2008).

FIGURE 7.3

A substantial gap in life expectancy at birth exists in Europe and Central Asia

- ● Western Europe
- ● Central Europe and the Baltics
- ● Western Balkans
- ● Eastern Partnership and Russian Federation
- ● Young countries
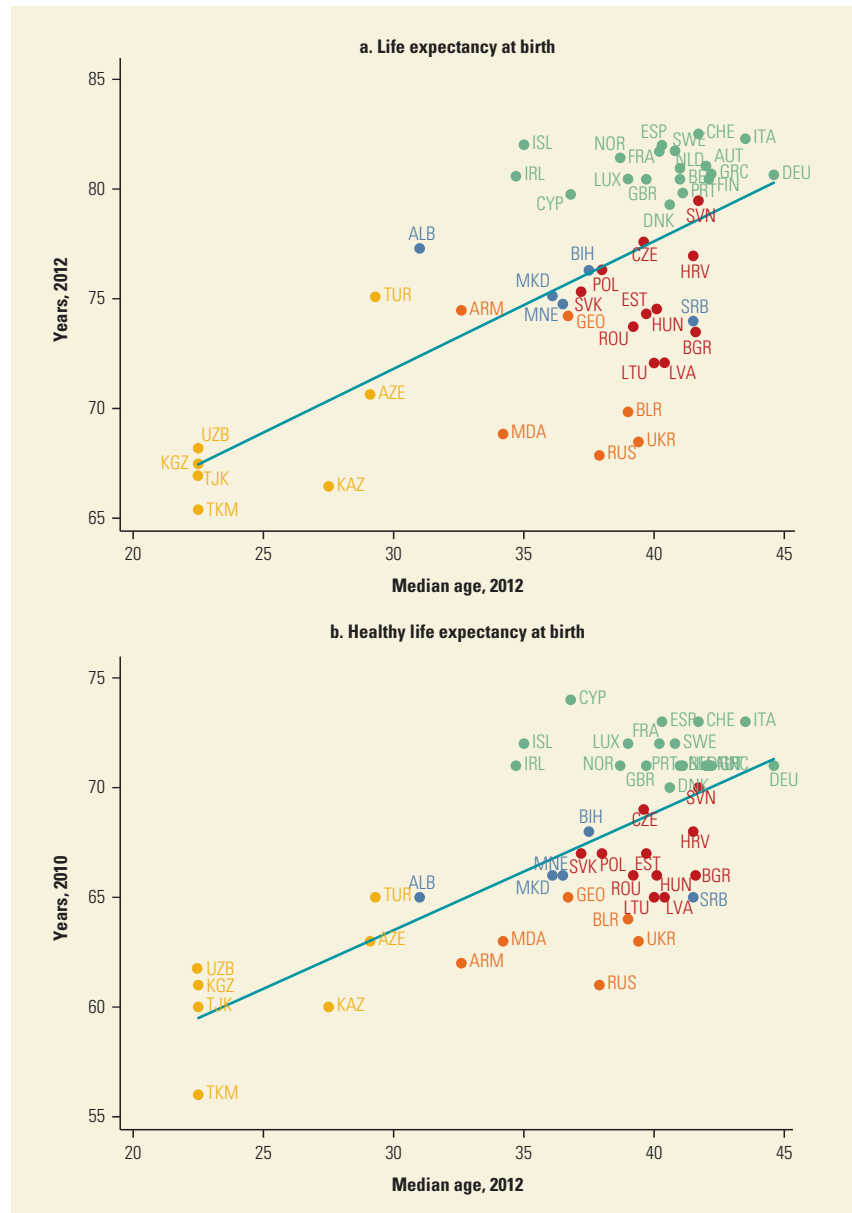
Sources: Median age and life expectancy at birth from World Population Prospects: The 2012 Revision; healthy life expectancy at birth from IHME.

Achieving Healthy Aging

The second policy area that supports a rebalancing of demographics is health. Although most countries in Europe and Central Asia are almost as old as high-income European countries, the life expectancy at birth is significantly lower—in the case of countries like Belarus, Moldova, the Russian Federation, and Ukraine, as much as 10 years lower (figure 7.3a). The gap for expected healthy life years at birth—that is, adjusting for morbidity and disability—is a bit narrower but still substantial (figure 7.3b).
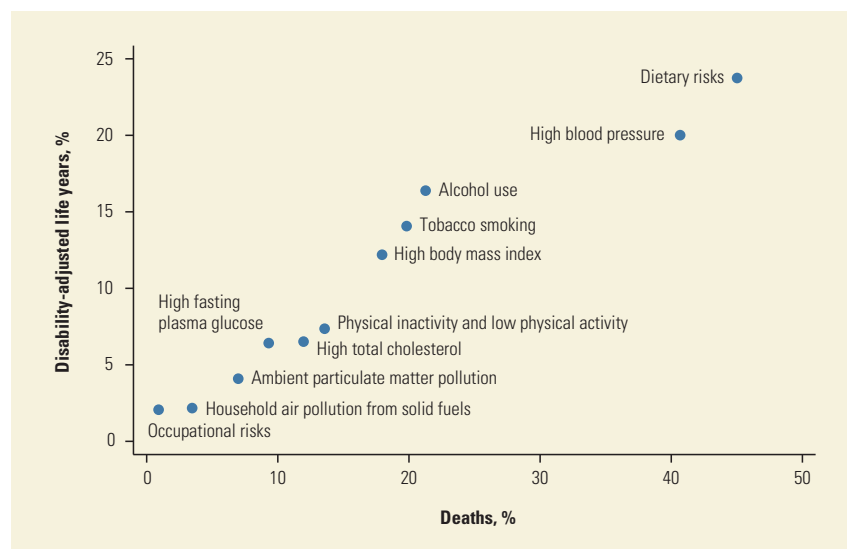
Source: IHME 2010 (modified with permission).

While countries in Europe and Central Asia generally have lower life expectancy and a higher burden of disability than their richer neighbors, effective interventions to promote healthy aging—in particular, preventive measures to reduce cardiovascular disease—are known and relatively inexpensive (see chapter 2). A key reform that would help cope with the increasingly complex health and social needs of aging populations, and keep them healthy and independent for longer, is to shift from the hospital-orientated systems of many countries in Europe and Central Asia to community-based care, coordinated through stronger primary care and integrated with social services (long-term care).

Improving the health of older individuals while containing costs would require reducing demand and improving the management of supply, through several specific measures: (1) reducing the need for care in older age by reorienting the benefits package to primary and secondary prevention; (2) implementing prioritization systems to assess value for money and drive evidence-based investment in new technologies, particularly medications; and (3) using purchasing power to encourage care that will deliver better, more cost-effective health outcomes.

Prevention means lowering the risk that people will develop disease and delaying the onset of infirmity. Preventing diseases that are associated with both acute and long-term care will not only increase health and productivity but also significantly reduce the financial burden and capacity demands of managing those diseases and their complications. Investment in approaches to help people avoid developing diseases (primary prevention) and avoiding the complications from these diseases (secondary prevention) is a cost-effective, forward-looking strategy for reducing the health and long-term care costs of aging populations. Indeed, the primary prevention of disease through decreasing tobacco use and managing other key risk factors like high blood pressure, dietary habits, alcohol use, and obesity (figure 7.4) has accounted for around half the benefits seen in the West, with improved treatment for the other half (Smith and Nguyen 2013).

Achieving the Cardiovascular Revolution

This forward-looking approach does not always receive adequate investment in Europe and Central Asia, particularly for key risk factors such as high blood pressure (hypertension) and high cholesterol. For example, people in the region are five to six times less likely to be adequately treated for hypertension than their OECD counterparts, and people with high cholesterol are three times less likely to be adequately treated than their EU-15 counterparts (Smith and Nguyen 2013). In another example, older people are advised to have an annual influenza vaccination, as they are more at risk of developing complications than younger people. Yet the population coverage of this vaccine is extremely low in Europe and Central Asia, despite evidence showing that the vaccination strategy is more cost effective than treatment of the complications from influenza (Peasah et al. 2013).

Investment in medications focused on preventing key noncommunicable diseases has not been sufficient. While medications that lower blood pressure and cholesterol are part of outpatient drug benefit packages in many countries in Europe and Central Asia, they often require a copayment. This is a false economy, because out-of-pocket payments, no matter how small, reduce adherence to medication regimes (Sidorenko and Zaidi 2013). For example, in Moldova, 50 percent of survey respondents took antihypertensive medication only "when needed" (rather than daily) and 5 percent only "when affordable" (Roberts et al. 2012). This behavior increases the risk of acute episodes like heart attack and stroke and essentially pushes the costs of these diseases to more expensive levels of the health system and ultimately to society through lost productivity in the older population (Baicker and Goldman 2011). In fact, 100 percent subsidization of hypertension and cholesterol medication is one of the "best buys" in health (Gaziano, Opie, and Weinstein 2006; WHO 2011).

Basic health promotion can be highly effective in maintaining health in old age. Smoking is the leading global cause of preventable death (WHO 2013). The prevalence of cigarette smoking has fallen in many regions around the world, but smoking remains a pervasive habit in Europe and Central Asia. More of the population smoke in the region than almost anywhere else in the world. They smoke more cigarettes, they smoke more frequently, and they are less successful at quitting than their EU-15 counterparts (Smith and Nguyen 2013). The population of Europe and Central Asia is aware of the health and financial implications of smoking; indeed, the share of people in the region that complain about smoky environments is double that in EU-15 countries (Smith and Nguyen 2013). Given that so many people are trying to give up smoking and are aware of the health consequences, it is not surprising that there is significant support from the general population in the region, particularly women, for tobacco control policies. Several countries in Europe and Central Asia have harnessed this public support to implement comprehensive tobacco control policies and are now reaping the rewards in the better health of their populations. Successful tobacco control policies are multisectoral and require strong political commitment but are supported by compelling and consistent evidence on what works. Implementing effective tobacco control policies now will go a long way toward improving the health of aging populations.

A preventive approach is also vital when it comes to cancer. As discussed in chapter 2, Europe and Central Asia will be disproportionally affected by cancer,

but at the same time is not well equipped to prevent and treat it. Treatment alone cannot address the human and economic costs of cancer. Innovative cancer drugs are one of the main drivers of rising health costs; yet increased expenditures have not been matched by better outcomes (Chalkidou et al. 2014). The cost of the current model of cancer treatment is rapidly becoming unaffordable even for high-income countries. Action to prevent cancer is essential to maintaining the sustainability of health spending in Europe and Central Asia against the backdrop of rapidly aging populations. Low-cost and effective preventive measures include tobacco and alcohol control, vaccination programs, and improving diet and exercise.

Evidence from high-income economies indicates that disease prevention is more cost effective than treatment. In the United States, for each 10 percent increase in spending on local public health interventions, an economic evaluation demonstrated a 3.2 percent drop in deaths from cardiovascular disease, a 1.4 percent drop in deaths from diabetes, and a 1.1 percent drop in deaths from cancer (Mays and Smith 2011). A model-based analysis finds that improved primary and secondary prevention of seven chronic diseases in the United States would reduce direct treatment costs by US$218 billion in 2023, US$76 billion on cardiovascular disease alone. The impact of prevention on saving treatment costs was found to be even greater in low-income communities (DeVol and Bedroussian 2007). There has been criticism of the cost-effectiveness of preventive approaches, with reviews finding a wide range of costs per year of healthier life gained (Cohen, Neumann, and Weinstein 2008). However, these critiques often look at the health benefits alone, thus ignoring the benefits of longer productivity, intergenerational transfers, and social capital when more individuals enter old age in good health.

> Preventive measures, such as tobacco and alcohol control, vaccination programs, and improving diet and exercise, are effective in improving the health of older individuals while containing costs of health care.

Expanding Community-Based Formal Long-Term Care Services

Most countries in Europe and Central Asia are unprepared to manage the impending rise in the need for formal long-term care services. Expenditures on long-term care are difficult to estimate, because these services are provided by a mixture of health and social services, formal and informal sectors, and national and subnational levels of government (World Bank 2010). This approach can result in undesirable fragmentation and cost shifting and partly accounts for variations in countries' spending on long-term care. The status quo in Europe and Central Asia is to rely on health funding to make up for any deficit in long-term care funding, putting pressure on the sustainability of health system financing across the region (World Bank 2010).

The demand for long-term care is driven not by the growing number of older people per se but by the number of elderly individuals dependent on others for care. Thus, the old-age dependency ratio (the number of elderly people as a share of the 15- to 64-year-old workforce) does not accurately indicate the demand for long-term care. A more useful indicator is the care-dependency ratio, that is, the ratio between those requiring care and the healthy population. Although there is a paucity of data on dependency ratios in Europe and Central Asia, a World Bank study found that the care-dependency ratio in Latvia and Poland was higher than in Western Europe (World Bank 2010).

BOX 7.1   What Is Long-Term Care?

Long-term care is a descriptive term for the organization and delivery of a wide range of services designed to support people who lose their ability to autonomously perform basic everyday tasks due to physical or mental deterioration. Long-term care is distinct from health care, in that it does not focus on "curing" people; instead, it aims to help people live a dignified and fulfilling life and may include support for activities of daily living like bathing, dressing, eating, or other personal care. It may also include instrumental activities of daily living, such as preparing meals, cleaning, managing money, and transportation. Long-term care may be delivered in residential institutions or in the home, as residential or day care, as personal nursing care, or as daily visits by a meals service.

Types of Long-Term Care

- *Personal care.* Nonskilled care, such as help with bathing, dressing, eating, getting in and out of a bed or chair, moving around, and using the bathroom.

- *Domestic care.* Assistance with instrumental activities of daily living (for example, cooking, cleaning, and managing finances).

- *Health or nursing care.* Care that requires the services of a health professional, for example, administering medication or changing dressings.
- *Community-based services.* Services set in the community, such as adult day services, home-delivered meals, or transportation services designed to help older people and people with disabilities stay in their homes as independently as possible.
- *Day services.* Services provided during the day at a community-based center that address the individual needs of functionally or cognitively impaired adults by providing social and support services in a protective setting, but not 24-hour care.
- *Assisted living facility.* Residential living arrangements that provide individualized personal care, generally not as intensive as care offered at a nursing home and designed to allow people to remain relatively independent.
- *Nursing homes (also known as long-term care facilities).* Residential facilities that provide general nursing care to those who are chronically ill or unable to take care of daily living needs.

Care to meet differing levels of dependency can take on many different forms and can be given in the home, in community centers, or in institutions such as nursing homes (see box 7.1). Long-term care models differ substantially across countries. While the high-income Nordic countries rely mostly on the state to provide extensive formal care services, in many countries in Europe and Central Asia there is a strong reliance on informal care provided by spouses or children. Clearly, care provided by family members and friends is a substitute for nursing home and formal home care (Lo Sasso and Johnson 2002; Van Houtven and Norton 2004, 2008; Charles and Sevak 2005). Therefore, expanding formal long-term care services in Europe and Central Asia will raise the financial cost of long-term care for both government and families. At the same time, though, the availability of long-term care can reduce hospital stays. In fact, in many countries acute hospital bed care often substitutes for long-term care. Thus, a large hospital infrastructure is being used to provide inappropriate and expensive care for elderly patients. Expanding community-based formal care services would help reduce hospital costs, improve the quality and appropriateness of care services, and lift the care burden for the many informal caregivers, mostly women.

In richer countries, there is a continuing shift from acute care to long-term care late in life. The greatest costs in long-term care are the residential costs associated with institutional care (such as meals and overhead) and labor. The delivery of long-term care can suffer from being conceptualized as medical care and relegated to institutional settings (Norton 2000); this is a particular risk in Europe and Central Asia due to the legacy of institutional facilities. Many municipal hospitals are being turned into long-term care homes (World Bank 2010), a trend that risks expanding long-term care costs (rather than containing them) through overmedicalizing old age. Institutional care is an important component of many long-term care systems, but by nature it is a high-intensity solution; providing a range of care intensity to address different levels of needs would improve cost effectiveness and financial sustainability. The ability of people to maintain the autonomy and independence of receiving care in their own home, rather than relying on residential facilities for long-term care, produces fiscal and psychosocial benefits (Kaye, Harrington, and LaPlante 2010). Home services are often more financially efficient and more highly rated by recipients (World Bank 2010). An important way to develop sustainable long-term care services is to shift it out of the nursing home and invest in developing community-based services (Kaye, Harrington, and LaPlante 2010).

In OECD countries, lower levels of severe disability combined with healthy aging are enabling older people to remain independent at home for longer. This may lead to less expensive lifetime care needs: Lubitz et al. (2003) find that individuals in the United States who were in a nursing home at the age of 70 had much higher cumulative health expenditures over their lifetime than did individuals who were independent at that age. Efforts to improve the health status of middle-aged individuals now are likely to reduce both health and long-term care costs. Indeed, healthy aging and productivity gains from retention in the workforce could together reduce the projected increase in long-term care costs by 5–10 percent by 2050 (OECD 2011).

Reforming the long-term care system is particularly urgent in Europe and Central Asia. The provision of long-term care services is inadequate, while the large baby-boom generation is beginning to enter old age with high levels of dependency and disability. Moreover, the focus of long-term care in Europe and Central Asia has traditionally been to address the physical needs of recipients. As the prevalence of dementia soars, a more holistic provision of care that encompasses mental health would help meet the particular needs of these citizens (Warshaw and Bragg 2014). As part of the effort to make long-term care more sustainable, given the likelihood of growing demand, governments in Europe and Central Asia should consider new ways to deliver care that do not necessarily follow the same pathway as developed in the EU-15.

There is a need to balance fair financing and fiscal sustainability, where people who can afford to contribute to long-term care do so and others are subsidized so that they can access the care they need. Governments' approach to cost sharing, the balance of formal and informal care, the focus on institutional or community care, and the choice of in-kind or cash benefits all have important implications for the sustainability of funding long-term care. Reforms should address several issues that determine cost effectiveness and the well-being of patients. Individuals who need long-term care require a holistic assessment, with options that effectively

combine health and social care, optimize healthy aging, and provide access to community-based services such as home care and day care. The goal of these reforms would be to increase recipient satisfaction, reduce the cost of care, and prevent older people in need of low levels of care from becoming dependent. By understanding people's aspirations, and by focusing on improving their functionality and quality of life rather than attempting to treat the untreatable, the medical component of care can be focused on explicitly medical matters, while long-term care can become more cost effective and more satisfactory to its recipients. Later on, the chapter explores approaches used by other countries to fund both health care and long-term care.

Embracing Migration as Part of the Solution

Migration is the final policy area to consider in supporting the rebalancing of demographics. Right now, almost all countries in Europe and Central Asia have negative net immigration rates (see figure 7.5). For some countries, like Albania, Armenia, Georgia, and Moldova, the annual rate is as low as −5 per 1,000 population. Not surprisingly, some of the young countries also have very low net immigration rates. If countries want to return to more stable demographics, the net immigration rates would also have to increase again. The main driver of the low net immigration rates is the large emigration to Western Europe. However, policies aimed at controlling emigration are difficult to enforce and often counterproductive, as they discourage return and can erode the benefits of a diaspora. As with the aging process itself, rather than trying to affect these demographic trends directly, a more promising path for migration policies is to maximize the gains of emigration and immigration, while minimizing their potential negative effects (table 7.1).

Moving toward a more liberal regime of legal migration can affect the size of, and benefits from, migration. Reducing visa requirements seems to have spurred

FIGURE 7.5

Almost all countries in Europe and Central Asia have negative net immigration rates

- ● Western Europe
- ● Central Europe and the Baltics
- ● Western Balkans
- ● Eastern Partnership and Russian Federation
- ● Young countries
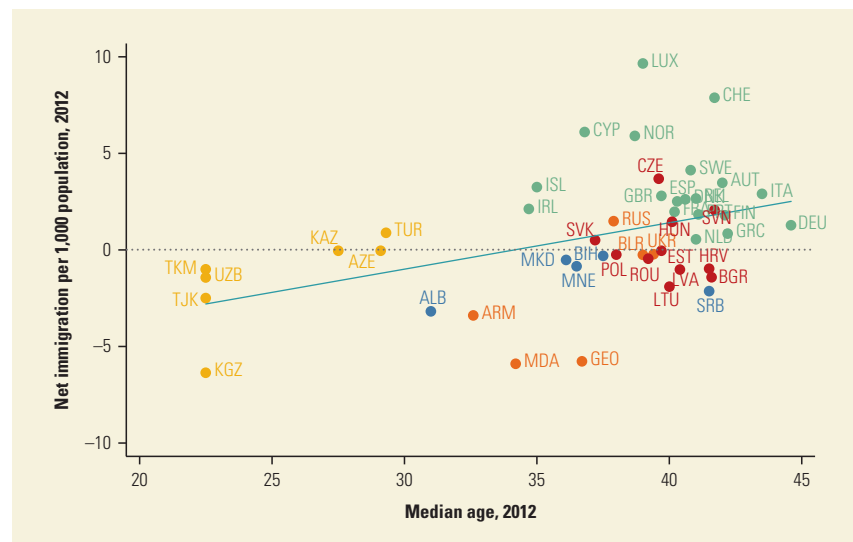
Source: World Population Prospects: The 2012 Revision.

TABLE 7.1 Policies to Make the Most out of Migration in Aging Societies

Policy areas			
Replacement migration	**Labor market**	**Fiscal outcomes**	**Dynamism**
Enable international mobility	Improve integration in the labor market	Improve the efficiency of social protection systems	Improve the business climate
Improve the quality of domestic graduate schools		Reduce barriers to formal employment	Raise incentives to channel remittances to the formal financial sector
Enhance the validation of credentials			Promote the links between emigrants and the home country
Improve information flows regarding job vacancies across borders			

migration during the last EU enlargement process, as well as in other contexts (see, for example, Bertoli, Fernández-Huertas Moraga, and Ortega 2011). Flexible visa arrangements or allowing dual citizenship can encourage trade and investment by eliminating bureaucratic constraints on business activities faced by foreigners.

Policy regimes that aim to affect the skill mix do not seem to achieve their goal and may also constrain geographic mobility. For example, skill-screening mechanisms for the admission of immigrants do not seem to affect the skill composition. Instead, the self-selection of immigrants accounts for most of the differences in skill composition across countries (Hanson 2010). Similarly, studies have demonstrated the importance of diaspora networks for immigration, concluding that changes in immigration policy may have a limited impact on migration flows because of the strength of the network effects (Özden, Rapoport, and Schiff 2011).

Better integration policies not only help attract workers from abroad but also help increase their contribution to productivity growth, fiscal outcomes, and the dynamism of the economy. Even though migrants make a significant contribution to the labor force in the region, their labor market outcomes are worse than those of natives with the same observable skills (see chapter 1), a fact that highlights the potential benefit of better integration policies for the labor market. These policies include improving the recognition of qualifications, promoting language courses, and ensuring that immigrants are included in active labor market policies, while alleviating the constraints that may limit the employment opportunities for migrant groups such as entrepreneurs, refugees, and foreign students upon graduation (OECD 2013).

More flexible labor markets in Europe and Central Asia would help reduce the potential negative effects of immigrants on the wages of natives. Overly generous and poorly designed welfare benefits, as well as rigid labor regulations (for example, high costs of firing employees, high replacement rates of unemployment benefits, unnecessarily high minimum wages, and high business-entry costs) may not only harm the employment outcomes of both natives and immigrants but also create the wrong incentives for immigrants. These policies may attract low-skilled workers who may be more likely than high-skilled migrants to end up as burdens on the public sector. At the same time, rigid business and labor regulations may

discourage the immigration of high-skilled workers and entrepreneurs. While rigid employment-protection policies may find a certain degree of support from individuals who oppose immigration, these policies may actually exacerbate the problem of lack of jobs for both natives and immigrants and thereby contribute to the negative perceptions of immigrants in the region.

Ensuring that immigrants are employed in the formal sector (rather than the informal sector) would help support fiscal sustainability. In turn, reducing labor taxation, especially among low-wage, part-time, and second earners, would encourage more formal employment. Ensuring that migrants can take the benefits from contributory social security schemes (such as pensions) home when they leave would also encourage formal sector employment, since otherwise immigrants may choose to work in the informal sector to avoid contributions from which they may not benefit (Holzmann and Koettl 2014). In addition, improving the targeting of social protection systems would avoid leakages toward the nonpoor population and minimize the risks of creating disincentives to work (Arias et al. 2014).

While emigration may have some negative effects on sending countries, they can also make efforts to turn this curse into a blessing. The diaspora can help promote trade, investment, and technology transfer between the sending and the receiving economy. A supportive business climate would encourage diasporas to invest back home.

Policies that would channel remittances to productive uses include encouraging the entry of foreign banks to foster modernization and trust in the banking system; improving the deposit insurance system and disseminating information on the scheme to build trust in the formal banking sector; promoting competition of commercial banks to reduce transfer fees; and integrating microfinance institutions into the remittances services to mobilize savings from unbanked migrants and channel them toward productive investments (World Bank 2006). In addition to fostering productivity growth, the formalization of remittances may also raise fiscal revenues.

Aging societies would benefit from more- and better-integrated migrants. Even though emigration flows are accelerating the aging process across most countries in Europe and Central Asia, emigration can bring a host of positive effects to those who are left behind. At the same time, while promoting immigration is not the magic bullet against the aging process, it can bring large positive effects to offset the impact of aging on the economy. Instead of trying to affect migration flows directly, effective migration policies should focus on making the economy more attractive to potential immigrants and emigrants by improving efficiency, by reducing the barriers to formal employment, and by promoting a better integration of the foreign born.

Addressing the Economic Consequences of Aging

Policies can help cope with the challenges of, and reap the benefits from, aging. Reforms that would encourage longer working lives as life expectancy increases include raising retirement ages, ensuring that disability and unemployment ben-

efits are not used as a road to early retirement, and improving labor market flexibility to help older unemployed workers find jobs. The productivity of older workers can be increased through workplace adjustments, reassignment to age-specific tasks, mixed-age working teams, reduced work time, and training. However, the limited evidence suggests that continuous education programs have had only mixed success in Europe and Central Asia. Training programs may be more effective if they are structured to meet the different needs of older workers, linked to employment opportunities, and subject to rigorous evaluation.

Governments face challenges in containing age-related costs while protecting the elderly from falling into poverty. Raising the retirement age would help ensure fiscal sustainability, while the low-income elderly can be protected by a basic pension to retirees who lack alternative income sources, a disability pension for those unable to work, and adequate survivor pensions. Health costs will rise with population aging, but improvements in health status, limits on the use of health technologies to those that are cost effective, and improvements in procurement procedures could generate dramatic cost savings. Increased reliance on general tax revenues and strengthened enforcement of contributions could markedly improve the sustainability of health care systems. The funding of long-term care has generally evolved into mixed systems with different services provided by different sources. Key challenges of these systems include providing comprehensive coverage, ensuring coordination among care providers, and limiting incentives for patient shifting.

Population aging will tend to increase inequality if reforms to achieve sustainable pension systems severely reduce pension benefits to the poor, particularly given the vulnerability of the many elderly-only households in Europe and Central Asia. Means-testing the basic pension benefit, or limiting it to those not covered by contributory pensions, could rein in the costs of protecting the poor elderly. Encouraging investments in critical services, such as health care, that will be subject to greater demand with an aging population would reduce the vulnerability of the aging poor. Providing low-skilled workers with the opportunity to improve their skills throughout their lives would help reduce inequality. Finally, inheritance taxes can limit the perpetuation of inequality through generations.

Enabling Longer Work Lives

As countries in Europe and Central Asia improve life expectancy, ensuring that individuals continue to work later in life would support fiscal sustainability and growth. As the experience in high-income countries has shown, there is a strong temptation to shorten work lives as populations expand, life expectancy increases, and incomes rise. At the moment, participation rates in the labor market at older ages are low in Europe and Central Asia—although not far from some benchmark countries in Western Europe (see figure 7.6).

While eligibility for a pension is the most important determinant of whether older people keep working (see chapter 3), other factors also influence this decision. For clues about what policies keep older people employed, it is useful to look at Iceland, which has the highest employment rates for older people in Europe and among OECD countries. For those 55–59 years old, the employment rate in 2010 was 84.2 percent, compared to the EU average of 60.9 percent. For those aged

FIGURE 7.6

Participation rates in the labor market at older ages are low in aging societies

● Western Europe
● Central Europe and the Baltics
● Western Balkans
● Eastern Partnership and Russian Federation
● Young countries
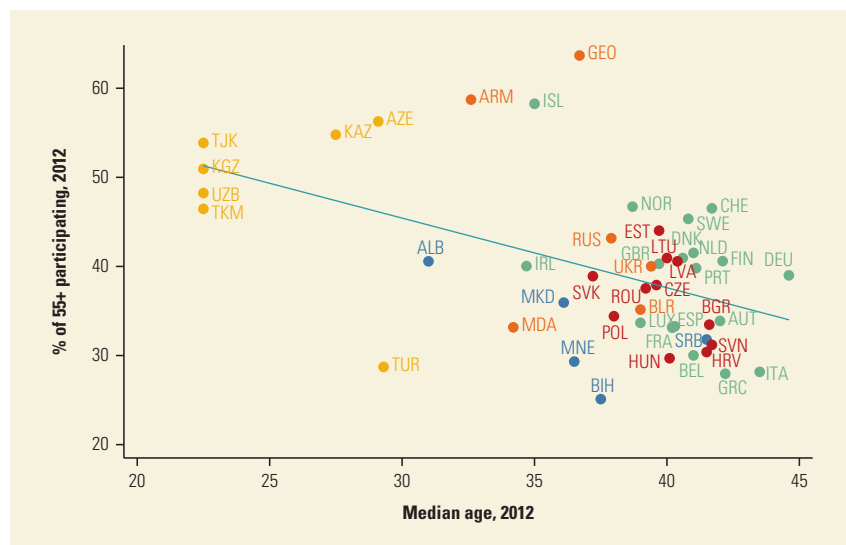
Sources: Median age from World Population Prospects: The 2012 Revision; participation rate from ILOSTAT Database.

60–64 and 65–69, the employment rate in Iceland was 74.6 and 47.7 percent, respectively, while the EU average was 30.5 and 10.2 percent, respectively (Eurostat).

Iceland's success reflects a combination of elements. First, the pension system has lower future benefits for workers who retire early, a high retirement age (67 for both men and women over the past three decades), and strong incentives to work even longer. While the system delivers one of the highest replacement rates in the world—97 percent for the average worker—it has a low public cost of less than 2 percent of gross domestic product (GDP), compared with the OECD average of more than 7 percent (Gill and Raiser 2012). The system also relies substantially on private solutions: private funds account for more than 60 percent of mandatory components of the pension system. The system consists of three pillars:

• *Social security.* This is a tax-financed and means-tested public pension scheme. Individuals can postpone their retirement until 72, in which case their pensions increase by 0.5 percent every month. This means that postponing retirement from 67 to 72 results in a 30 percent increase.

• *Occupational pension.* This is a mandatory occupational or private (but publicly regulated) pension scheme. Postponing retirement increases the annual pension proportionally.

• *Voluntary private pension.* This scheme was created in 1998 and provides some tax exemptions to contributors.

Other policies have contributed to Iceland's success. There is no specific early retirement scheme, and unemployment and disability benefits are well managed to avoid abuse (that is, using them as a route to early retirement). Training rates for older workers are among the highest in the world: among workers aged 55–64, 40

percent have participated in informal education. In addition, employers show favorable attitudes toward older workers; a 2004 survey revealed that employers regard older people and younger people as equally good workers. Not surprisingly, the rate at which firms retain employees over age 60 in their workforce is the highest among OECD countries. Finally, no formal regulation exists on part-time work, and according to a general provision in collective agreements, part-time workers are to be treated equally to full-time workers on a pro rata basis.

The experience of other countries confirms the importance of many of these policies in encouraging longer work lives. In Austria, an increase in the early retirement age from 60 to 62 for men and from 55 to 58 for women led to increased employment by 9.75 and 11 percentage points among affected men and women, respectively. After taking into account some rise in claims for unemployment benefits and additional tax revenues, a one-year increase in the early retirement age for a typical birth-year cohort resulted in a reduction of net government expenditures of €107 million for men and €122 million for women (Staubli and Zweimüller 2013). Conversely, a study of the Norwegian early retirement program concluded that, by a conservative judgment, at least 50 percent of retirees benefiting from the program would have stayed in the labor force if there had been no such scheme (Bratberg, Holmås, and Thøgersen 2004).

In Germany, three different public training programs (lasting between six and eight months) for unemployed individuals resulted in increased employment probabilities (by six, seven, and five percentage points, depending on the type of training) and earnings for men aged 50 and above. No effects were found for older women (Rinne, Uhlendorff, and Zhao 2008).

In Finland, an increase in the age of eligibility for unemployment benefits from 53 to 55 years resulted in an almost doubling of the probability of reemployment and savings of close to US$100 million for each age cohort turning 53 (Kyyrä and Ollikainen 2008). Similarly, a policy change requiring the unemployed elderly to formally report their job search efforts in the Netherlands resulted in an increase in the number of individuals finding a job by 6 percentage points for males and by 11 percentage points for females. This was accompanied by a smaller increase in the number of individuals using disability benefits (Lammers, Bloemen, and Hochguertel 2013).

A study in the United States by Gruber and Kubik (1997) found that each 10 percent rise in denial rates for disability insurance led to a 2.8 percent fall in labor force nonparticipation among 45- to 64-year-old males. Also, the denial rate increases effectively targeted their incentive effects to more able individuals, according to an anthropometric measure of disability.

Labor regulations can also create considerable disincentives for work, especially for older workers. Favoring incumbents at the expense of new entrants may make it particularly difficult for unemployed older workers to find new employment (see chapter 3). At the same time, though, the protection granted to incumbents might actually help older workers stay in work, especially if they are discriminated against. On balance, higher employment-protection legislation (EPL) in 2004 was associated with lower employment and hiring rates of men aged 50–64 (OECD 2011).

The few studies that examine whether this relationship holds if other determinants of employment are taken into account show mixed results. Deelen and Bourmpoula (2009) find that an index of the strictness of EPL for older workers is negatively related to their participation and employment rates and positively related to unemployment duration (they use a panel regression for 28 OECD countries). By contrast, Langot and Moreno-Galbis (2013) find that strict EPL increases employment rates among older workers in OECD countries, although the reverse is found for younger workers. Setting labor regulations in a range where the effects on employment or productivity are modest and distributional effects minimized would help maintain the contestability of labor markets.

It is also difficult to determine whether different aspects of employment protection have different effects on employment. While early results from the literature suggested that severance pay in industrialized economies had important negative effects on labor markets, recent studies and in-depth reviews of the literature suggest that severance mandates, unaccompanied by other labor regulations, appear to have little impact on employment flows or employment levels (Holzmann et al. 2011). Nonetheless, severance pay requirements may help protect older workers by raising the cost of—and hence decreasing incentives for—firing them.

In some countries in Europe and Central Asia (Bosnia and Herzegovina, for example), the labor costs of older workers are above average due to seniority wages (wages increase with age irrespective of a worker's productivity growth). Higher seniority wages are correlated with a low hiring rate of older workers (OECD 2011). An aging workforce means that seniority wages are increasingly unsustainable. It is not possible for employers to pay a growing number of older workers more than their productivity is worth when a declining number of younger workers are paid less than their productivity. Shifting the remuneration system from seniority toward performance would limit this negative effect.

Promoting Entrepreneurship at Older Ages

Entrepreneurship tends to decline with age (see chapter 4). Findings from the Global Entrepreneurship Monitor (GEM) database suggest that older workers tend to have a limited interest in entrepreneurship. Unless this issue is addressed, the pool of nascent entrepreneurs will shrink as the workforce ages. Unfortunately, it is unclear exactly why older individuals have less interest in entrepreneurship. Social norms that view entrepreneurship as more appropriate for the young could be partly responsible. Behavioral factors such as status quo bias or increasing risk aversion with age could also matter.

However, the lack of interest in start-up activity among older workers may reflect a rational choice. Opening and running a business can be physically demanding, so that health and physical mobility could constrain old-age entrepreneurship. Technologies (such as information and communication technology) that make it easier to run a home-based business would help. More generally, older individuals may have lower entrepreneurial ability and thus anticipate lower returns to entrepreneurship than do younger individuals. Determining whether more limited entrepreneurship among older workers reflects social and personal biases or rational choices requires more research and carefully evaluated pilot programs. Similarly,

the observed relationship between education and old-age entrepreneurship in Europe and Central Asia may suggest a role for skills training, although more research is required to understand what skills are needed. Alternatively, this relationship may not indicate that training would promote entrepreneurship, as education could also be a proxy for wealth, social networks, or managerial experience.

One promising fact is that entrepreneurship by older workers is becoming more common in other parts of the world, especially the United States, with the 40s or 50s increasingly viewed as a good age for entrepreneurship due to greater industry experience. For instance, among surviving businesses in the United States, the average age of the founders when they set up the business is now 40 years (Wadhwa et al. 2009). A 50-year-old+ entrepreneur is twice as common as an under 25-year-old entrepreneur. GEM data also support this view. The peak age for start-up activity and new business ownership occurs later in the United States than in other parts of the world. Furthermore, unlike in other parts of the world, older entrepreneurs in the United States are not more likely than younger entrepreneurs to be necessity driven. Thus, social norms can change. Programs that promote the idea of entrepreneurship among older people (for example, disseminating examples of successful older entrepreneurs) could therefore be effective. Another largely unexamined but promising idea is that old age and youth are complements in entrepreneurship, with age contributing through experience, managerial acumen, and market knowledge. This suggests that promoting mixed-age entrepreneurial teams could capitalize on the complementary skills of old and young entrepreneurs, with the older partner acting as a mentor.

Enabling More Productive Work Lives during Old Age

One concern is whether aging will constrain productivity (see chapters 3 and 4). An important issue is whether an aging workforce in Europe and Central Asia will slow convergence to the higher productivity levels of Western Europe (see figure 7.7a), a process that has been particularly evident among countries in Central Europe and the Baltics. At the same time, microeconometric studies show that productivity over a worker's lifetime seems to peak in the late 40s. As the median age of the populations in Europe and Central Asia increases, there might be productivity gains at hand. A key policy for increasing productivity is improving the quality of education. As shown in figure 7.7b, the relation between quality of education and median age is similar to the one of total productivity and median age (7.7a). However, there are some important differences: some countries in Europe and Central Asia are not seizing the opportunity of aging. With lower population growth and smaller cohorts, it can become easier to improve educational outcomes. Estonia and Poland, for example already seem successful; Bulgaria and Romania, less so. This section focuses on other important steps for improving productivity, including firm interventions, skills development, and innovation policies (see box 7.2).

Changes in firm policies can improve the productivity of older workers, as shown in box 7.2. Such policies can be divided into five groups: (1) workplace adjustments; (2) reassignment to age-specific tasks; (3) mixed-age working teams; (4) reduced work time; and (5) training. Using a large matched employer-employee survey, Göbel and Zwick (2012) find that workers aged 50 and older experience

FIGURE 7.7

Productivity and quality of education in Europe and Central Asia lag behind Western Europe

● Western Europe
● Central Europe and the Baltics
● Western Balkans
● Eastern Partnership and Russian Federation
● Young countries

a. Gross value added per worker

(scatter plot, Gross value added per worker, 2012 vs. Median age, 2012)

b. Quality of current education

(scatter plot, PISA score in science, 2012 vs. Median age, 2012)
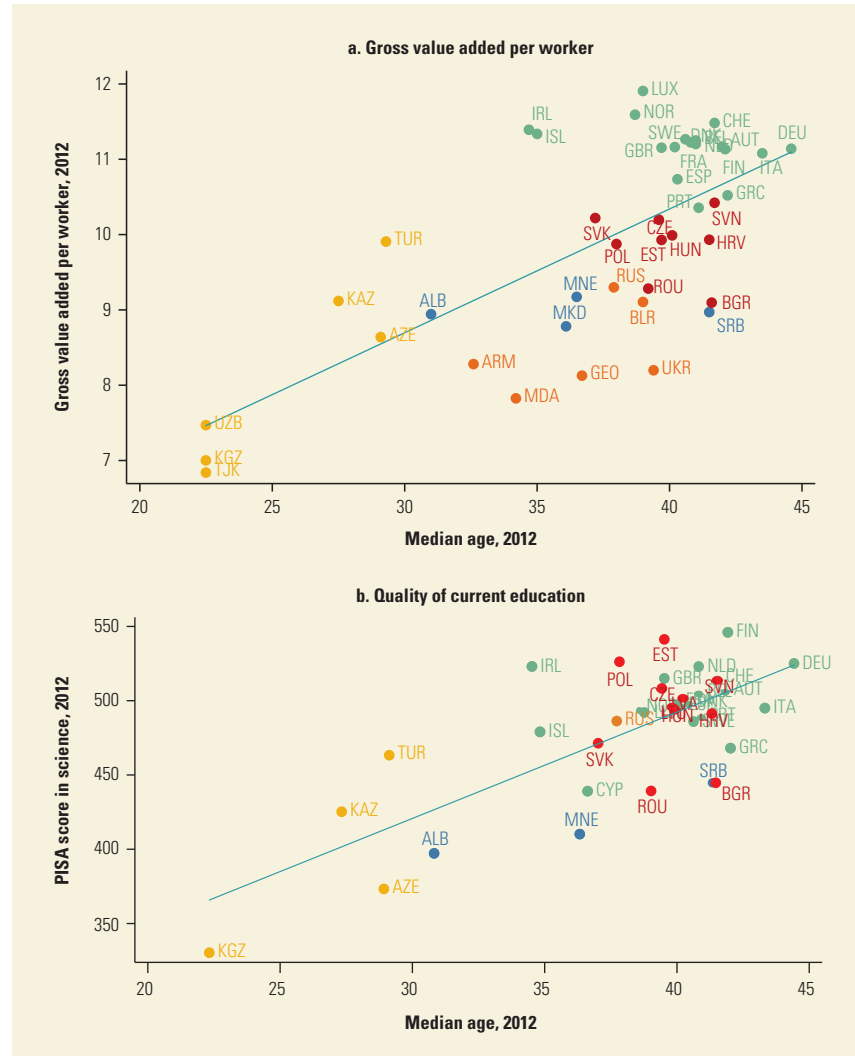
Sources: Median age from World Population Prospects: The 2012 Revision; gross value added per worker from WDI; PISA (Programme for International Student Assessment) scores from PISA International.

only a small decline in productivity and that firms that use at least one of these measures have higher productivity (both overall and among older workers) and a flatter productivity profile over workers' ages.[1] The productivity gain for workers aged 55–59 is somewhat less than for those aged 50–54. In companies with workplace adjustments for older workers, the relative productivity not only of older workers but also of workers aged 40–45 is significantly higher than in companies without such adjustments. This finding suggests that there might be some spillover effects from these investments to prime-aged workers (Schwarz et al. 2014).

The impact of the different kinds of measures varied. The first three measures significantly increase the productivity of older workers, while the increase in productivity from the latter two is not statistically significant. Reassignment to age-specific jobs has a statistically significant impact on this oldest group of workers but

BOX 7.2 Innovations at BMW and CVS to Improve the Productivity of an Aging Workforce

The workforce of German luxury automaker BMW was aging. Massive firing or forcing early retirement were viewed as undesirable, because BMW prides itself on being a dependable employer, and large-scale dismissals of older workers could have political repercussions. Thus, BMW explored how to address the challenges of aging through an experiment at its Dingolfing plant. Staff members on a particular assembly line—for rear-axle gearboxes for medium-size cars—were selected to match the expected average worker profile of 2017, when the average age would be 47 (versus 39 in 2007). Almost 40 percent of workers on the so-called "2017 line" were aged 50 or older, while a typical 2007 assembly line consisted of only 20 percent of workers of that age.

After considerable initial resistance to the project—referred to as the "pensioners' line" among staff—management was able to win over enough young and old workers to staff the project line. Based on an earlier study and a series of workshops, staff came up with a list of 70 specific interventions, most of them physical changes at the workplace designed to reduce wear and tear on workers' bodies. These ranged from installing wooden flooring (to reduce strain on knees and joints) to using chairs, orthopedic footwear, adjustable worktables, angled monitors, magnifying lenses, large-handled gripping tools, stackable containers, and manual hoisting cranes. These workplace adjustments were complemented by job rotations that ensured that the physically most demanding tasks were limited to three hours per shift and by stretching and strength exercises with a physiotherapist at the beginning of shifts and during breaks. All of these interventions cost only

€40,000, half for salaries of staff attending workshops and half for equipment and salaries of an ergonomist and a physiotherapist.

In the course of one year, the productivity level of the line increased by 7 percent, bringing it up to par with the plant's average. Quality defects quickly fell to expected levels and, later on, fell even further. Absenteeism due to sick leave and rehabilitation dropped from an above-average 7 percent to a well-below-average 2 percent. For BMW, the experiment showed that productivity challenges coming from its aging workforce could be addressed successfully. Many follow-up projects were successfully implemented in a number of other plants throughout its global production chain.

CVS, a large pharmacy chain in the United States, has taken innovative steps to improve customer service, which in retail is key to productivity, by attracting and retaining older workers. Older workers were used to mentor younger employees and help older customers. Flexible work programs were created to accommodate the lifestyles and needs of older workers and to reward them for their life experiences. CVS has more than doubled the number of employees aged over 50 in the past years.

The BMW and CVS examples give hope that productivity levels of an aging workforce can be sustained through targeted interventions. Further study is required to determine which interventions delivered results and whether their success was indeed driven by the specific interventions, as opposed to idiosyncratic factors—related, for example, to motivation of workers, excitement of participants, successful industrial relations, and so on—that cannot be easily replicated in other circumstances.

Source: Schwarz et al. 2014.

not on younger groups. Mixed-age work groups, finally, have a significant, positive effect not only on the oldest group of workers but also on the relative productivity of younger workers, aged 20–30. This finding points to important complementarities of knowledge and experience between older and younger workers.

Lifelong Learning, Skills Development, and Training

Over the past two decades, the rapid pace of technological change and changes in business organization have spurred an active debate about the key labor competencies needed in a dynamic labor market. Evidence from OECD and emerging economies suggests that in a constantly changing economic environment, many jobs (particularly in the service sector) have become less routine and more interactive, with implications for skill requirements. The study of Autor, Levy, and Murnane (2003) first documented the implications of changes in the demand for skills in the United States in the form of a rise in jobs that require nonroutine (cognitive) analytical and interpersonal skills (which they call "new economy skills") and a decline in jobs intensive in routine cognitive, routine manual, and nonroutine manual (physical) skills. These trends have been corroborated in many Western European economies and some emerging economies (see chapter 4).

Changes in the demand for skills and the rapidly advancing demographic outlook in many countries in Europe and Central Asia further underscore the need to develop effective adult education and training systems. Currently, the participation rates in continuous education in Europe and Central Asia are much lower than in the EU-15. Only about 10–20 percent of employees participate in continuous vocational training activities in Estonia, Hungary, and Poland, whereas the lowest share for the EU-15 is 26 percent in Italy. Similar proportions can be observed if the share of the working-age population participating in any educational activity is considered. Hungary has the lowest rates of participation, with only 4.4 percent of the population aged 55–64 continuing to learn, whereas in the EU-15 this share varies from 22 percent (in the United Kingdom) to 35 percent (in Italy). But more important, the few rigorous evaluations of these programs in the region show a mixed record, with largely zero or modest effects on earnings and productivity.

> **Productivity does not decrease after youth; studies show that it actually peaks in the late 40s. In addition, workplace adjustments, reassignment to age-specific tasks, mixed-age working teams, and lifelong learning have been effective in helping firms adjust to an aging workforce.**

Moving forward, fundamental changes along three key directions would improve education, training, and lifelong learning systems: (1) stronger policy coordination among government, training providers, and the enterprise sector, with a sound regulatory regime for the development of private provision; (2) appropriate incentives for firms to engage more in training of adults and older workers; and (3) a concerted effort by employers, governments, and workers to invest more effectively in training at older ages.

Recent findings from various disciplines and from evaluations of training programs suggest that these changes cannot be age blind. Neurological, psychological, and education studies challenge many long-held views about adult learning and the effectiveness of adult training. As scientists look deeper into how brains age, they have found that different abilities tend to follow relatively independent paths over the life cycle. Some abilities, like the performance and speed of solving new tasks, are strongly reduced at older ages, while other abilities, like verbal capacities and word fluency, remain at a high functional level until late in life (see chapter 4). As people pass middle age, the brain gets better at recognizing the central idea, the big picture, and, if kept in good shape, can even find solutions much faster than a younger brain. Prior experience and knowledge play a much more powerful role in how older workers learn new skills than in younger individuals.

New insights from this research and promising interventions suggest that with appropriate training strategies, mature brains can learn new skills. Recent evaluations of a range of public and private workforce training strategies in the United States, focused largely on the needs of adults, have been shown to produce returns as high as 10–26 percent when program effects are followed over longer periods than in previous evaluations of training programs. Key features of promising strategies to train older workers include establishing clear links to employers beforehand—to ensure relevance but also to overcome any reluctance to hire older workers—and competence-based training organized as a series of shorter modules and fully built on recognition of prior learning. As noted in chapter 4, older workers can use the tacit know-how and maturity (stronger noncognitive skills) derived from experience and aging to add new skills and contribute effectively to age-diverse teams.

It is important for governments, employers, and training providers to undertake serious impact evaluations of new training initiatives. These should include cost-benefit analysis and provide for learning about the duration of program effects. Most evaluations of active labor market policies in Europe provide only a year or two of follow-up. The available evidence for the United States suggests that sometimes the effects of training remain remarkably steady over time for years after an intervention, other times they fade out, and other times they appear only belatedly.

Innovation Systems

Perhaps aging does slow down great invention (see chapter 4). But given the mysterious nature of such creativity, it is unclear whether there is much scope for policy action in this sphere. Meanwhile, the region has a pressing institutional challenge in the science and technology (S&T) sector—not unrelated to aging—which clearly needs to be addressed. As discussed in a recent World Bank report, the Soviet-era legacy is still affecting the S&T sectors in most countries in Europe and Central Asia, and they have not been reformed to meet the needs of a more market-oriented economy (Goldberg et al. 2011). Research and development (R&D) institutions still suffer from rigid hierarchical systems, poor commercial links, and an aging cohort of researchers. Unlike OECD countries, the majority of R&D expenditures are still made by the government, not by private industry.

The aging of the S&T sector is reflected in its low productivity and relative isolation from international trends. One piece of evidence is based on the citation patterns of U.S. patents generated by indigenous inventors, as compared to comparable inventions generated in other parts of the world (Goldberg et al. 2008). Indigenous patents in Europe and Central Asia make fewer citations to the existing state of the art than comparable patents from other parts of the world. The patents they cite are generally less likely to be cited by others. The number of indigenous patents granted in the region is also low relative to the level of R&D investment.

So far, international co-invention has allowed the region to mitigate these issues: in 2005, 60 percent of U.S. patents granted to the ECA-7 (Bulgaria, the Czech Republic, Hungary, Poland, Russia, Slovenia, and Ukraine) were co-invented with international researchers. But as its cohort of researchers continues to age, it is not clear how long even this rate of co-invention will be sustained. As research is increasingly

collaborative, young researchers in Europe and Central Asia will want to move to countries where R&D institutes are less "old" and isolated. Thus, not reforming innovation systems could make them age even faster than the general population. Reforms that increase links with industry and with the international research community would improve the productivity of research systems in the region.

The Fiscal Challenge of Aging Populations

Containing the rising costs of pensions, health care, and long-term care in the region's aging economies would require significant changes. For the most part, the solutions are well known, but inertia over the past two decades has prevented their implementation in many countries. Indeed, it could be said that aging simply adds a sense of urgency to a lagging reform agenda. Yet there is still time to make vital reforms that will enable the pension, health care, and long-term care systems to absorb the impact of aging populations in Europe and Central Asia. This section highlights the most pressing issues that require attention and reviews lessons learned from other countries.

Funding longer lives is a challenge not only in raising the resources to finance the increasing demand for pensions, health care, and long-term care but also in mobilizing them from a shrinking share of the potentially economically active population. This task is particularly problematic for those countries where social security funds are the prime source of revenue, with contributions levied on the earnings of workers. These constitute half the countries in the region, covering more than half its population. The urgency would also be great for many aging countries with an already high level of public debt (figure 7.8).

What, then, did the EU-15 countries do to sustain the fiscal stability of their pensions and health system in the face of a shrinking economically active population? Of course, broader policy measures enacted in response to population aging

FIGURE 7.8

Debt levels are lower in most, but not all, countries in Europe and Central Asia

● Western Europe
● Central Europe and the Baltics
● Western Balkans
● Eastern Partnership and Russian Federation
● Young countries
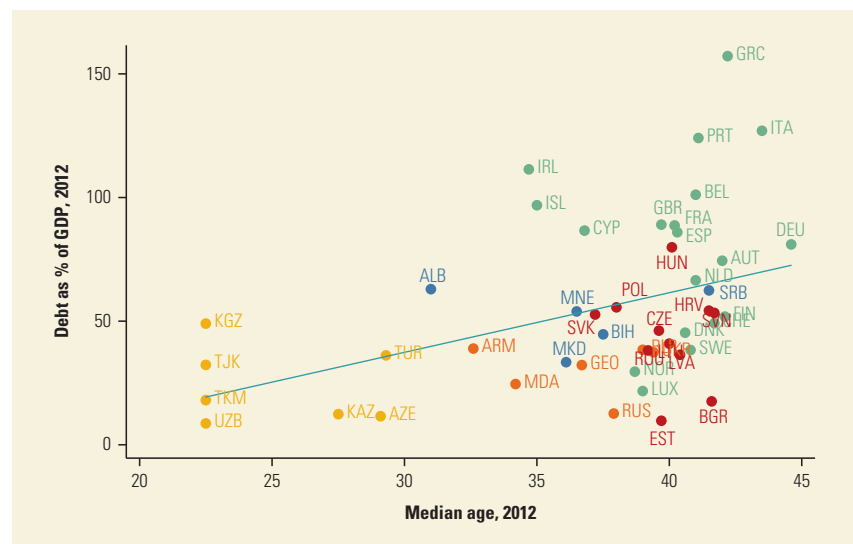
Sources: Median age from World Population Prospects: The 2012 Revision; debt as share of GDP from World Economic Outlook.

can ease the pressures on social security and health systems. The most important of these measures included more liberal immigration policies and increases in retirement ages. The focus of the present section is on the policy options for mobilizing resources to support longer and healthier aging in the context of increasing costs and a shrinking share of the working-age population. In addition, it looks in greater detail at the policy options for financing long-term care, which is traditionally covered only in part by health financing systems. While this section draws primarily on the experiences of EU-15 countries, it includes examples from other countries that have implemented reforms in response to their aging populations.

Funding Pensions

Among government spending programs, pensions are the most vulnerable to aging. With current benefit levels—in particular, with the current statutory retirement ages—future spending appears increasingly unsustainable in some countries, while pension benefits are likely to decline compared to the average wage (see chapter 3). In a recent report, the World Bank put forward specific recommendations on reform priorities (see Schwarz et al. 2014). The first priority is to ensure that all elderly—that is, those above the statutory retirement age—receive at least a basic benefit that will keep them from falling into poverty. The estimated costs of such a minimum pension for all, assuming that the benefit is paid to everyone above the age of 65 at a level of 20 percent of GDP per capita, would be around 5 percent of GDP in most countries in Europe and Central Asia by the year 2050.

A second priority is to provide disability pensions for those too sick to work. Assuming that disability rates remain at current levels, overall costs by 2050 would range between 1 and 2 percent of GDP in most countries. The third priority is to provide additional retirement income to those who have contributed to an earnings-related pension scheme. This top-up to the basic pension would be fairly substantial in the high-income OECD countries (about 6 percent of GDP by 2050) because of extensive coverage, but less so in Europe and Central Asia because of the low current coverage rate of the younger generation. The final priority is survivor pensions, a relatively minor spending item, especially considering that labor force participation should increase in the future.

If the effective retirement age were to rise to 65 and benefit levels were to stay where they are today (meaning that the basic benefit plus the top-up together would equal today's benefit levels), pension expenditures would rise significantly until 2050, to above 10 percent of GDP in many countries in Europe and Central Asia (see figure 7.9). Given that even today many countries struggle to finance their pension spending, some reductions in spending seem inevitable.

What can countries do? There are many reasonable suggestions that would yield savings, ranging from means-testing the basic (noncontributory) pension benefit to better controlling disability benefits or reducing the size of contributory and survivor benefits. However, the impact of all of these proposals on finances is practically insignificant when compared to an overall increase in retirement age beyond the age of 65. This does not necessarily mean completely reversing the achievements of social security systems of the past decades. Rather, it would bring countries back to expected retirement periods as observed in the 1970s and 1980s, or around 15 years of remaining life expectancy at the age of effective retirement. Such a reform

FIGURE 7.9 If the effective retirement age were to rise to 65 and benefit levels were to stay where they are today, pension expenditures would still rise significantly, 2050
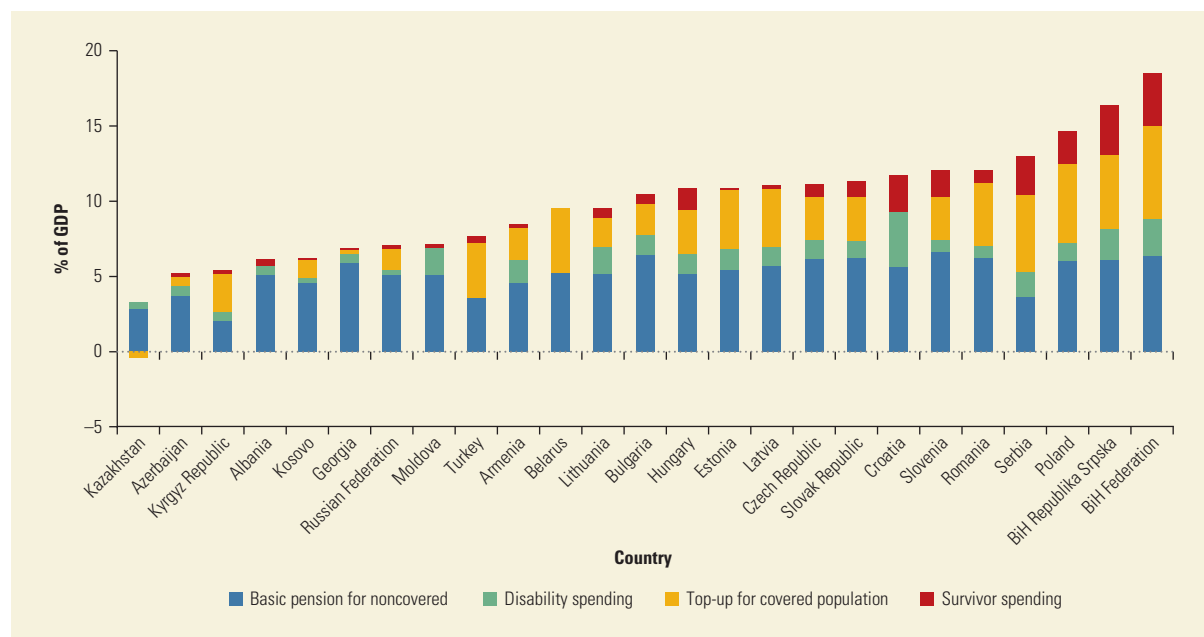
Sources: Schwarz et al. 2014; data of national statistics offices; Eurostat; World Population Prospects: The 2012 Revision.
Note: The Federation of Bosnia-Herzegovina (BiH Federation) and BiH Republika Srpska, which together make up the country of Bosnia and Herzegovina, have separate pension systems and are treated as separate data points in the figure.

would significantly reduce projected pension expenditures for the year 2050 to much more sustainable levels, while still ensuring adequate social protection, consumption smoothing, and poverty prevention. High-income and transition countries could afford to provide more or less the same benefit levels as today (just for a shorter time) at a cost of only 9 and 7 percent of GDP, respectively.

Aging and Health Expenditures

The interaction among health, aging, and cost is integral to predicting the impact of longer life expectancies on public expenditures. Health dominates concerns on the fiscal implications of aging. For instance, the European Commission has predicted that out of an increase of 4.5 percent of GDP in age-related public expenditure in Europe between 2010 and 2060, 1.1 percentage points would be spent on health care and 1.5 percentage points on long-term care (European Commission 2012).[2] But detailed country analysis of health costs has shown that aging, on its own, plays only a minor role in driving health costs. This section examines common misperceptions about the cost of healthy aging, both for health care and for long-term care.

Longer lives are not necessarily costlier lives. Globally, health costs tend to rise after the age of 50 (Meerding et al. 1998; Fuchs 1999; Mendelson and Schwartz 1993; Hagist and Kotlikoff 2005). Age-specific profiles of public health expenditures consistently show a J-shaped curve: with the lowest spending in younger life, rising after middle age, and peaking in the elderly, with an unexpected decline in per capita spending on the "oldest old" (see figure 7.10 for Poland).

FIGURE 7.10 Public health expenditures are peaking at old age, with an unexpected decline for the "oldest old"
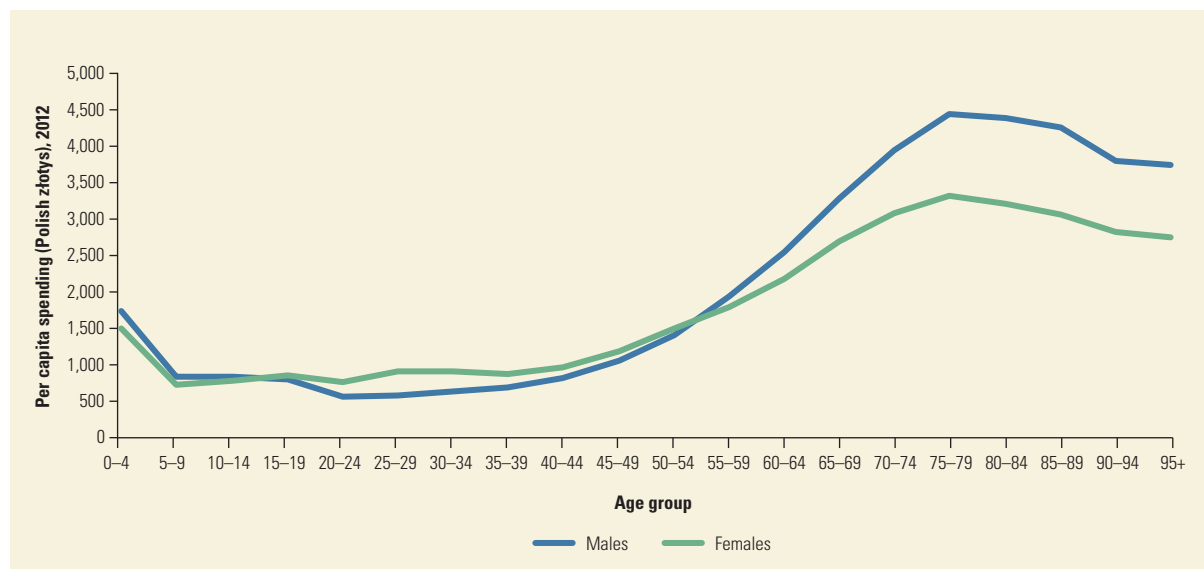
Source: Data provided by the National Health Insurance Fund in Poland.

It is thus tempting to infer that health care expenditures will rise sharply with an aging population, threatening the sustainability of public health care. Yet this assumption relies on a snapshot of health care costs in time: just because the elderly consume more than the middle-aged today does not mean that they will tomorrow (Raitano 2006). Taking into account death-related health costs and the improvement of health status with life expectancy can dramatically alter estimates of changes in health care expenditures as populations age (see chapter 3).

For health costs, age at time-to-death is important—not time from birth. It has been consistently shown in OECD countries that health expenditures spiral in the last few years of life and particularly in the final year (Lubitz and Riley 1993; Spillman and Lubitz 2000). As individuals near death, their worsening health status tends to unleash a whirlwind of increasingly intensive treatment and frequent hospitalizations that is more concentrated than at any other period in their lives. Being close to death is often accompanied by increased morbidity and disability, necessitating not only costly medical interventions but also support for daily living. Studies in the United States have estimated these so-called death-related costs to be about 25–30 percent of total Medicare[3] health expenditures (Lubitz and Riley 1993; Hogan et al. 2001). European studies have found similar end-of-life spending shares (Polder, Barendregt, and van Oers 2006).[4] The share of end-of-life expenditures in overall health care spending is quite stable over time (Hogan et al. 2001; Riley and Lubitz 2010). The majority of these costs are incurred from hospital and nursing home care (Polder, Barendregt, and van Oers 2006) and reflect the necessity of managing multiple severe illnesses often suffered by patients around the time of death (Hogan et al. 2001).

As age and death are correlated, age is often blamed for this increase in health costs whereas the causative factor is really proximity to death. Indeed, age-specific mortality rates are more important in determining health care costs than age

alone. This explains the decline in health costs in the "oldest old": those who survive until the very oldest ages are usually in better health and less frail than those who die earlier.[5] As age at death is delayed due to decreasing mortality rates and lengthening life expectancy, the age distribution of health care costs will also change, with aging postponing these costs rather than compounding them.

Time-to-death is obviously a critical factor that will determine the impact of aging on health care costs. Total lifetime health expenditures for individuals in good health at age 70 are not necessarily greater than expenditures for less healthy people, despite the longer remaining life of the healthier group (Lubitz et al. 2003). However, longer life expectancy could increase overall lifetime expenditure if morbidity expands, leading to recurrent costs that accumulate over the extra years of life. Such an expansion of morbidity in the elderly would boost health costs, making it important that people take action now to improve their health status. Health promotion efforts focused on those aged 65 years and younger will pay enormous dividends in the future. If Europe and Central Asia can move toward a scenario where extra years of life are lived mainly in good health, then health care costs and demands on health services are likely to be limited throughout life, regardless of life expectancy. Adjusting for death-related costs and potential healthy aging significantly decreases the impact of aging in health expenditure projections (Raitano 2006).

The ripples of baby boomers' aging[6] will bring increased deaths in Europe and Central Asia in coming years, raising death-related health care costs. However, the rise in deaths is manageable: Europe and Central Asia will have to absorb a rise of just about 0.2–0.3 percent more of the population dying annually by 2050 (see figure 7.11), and hence the impact of the increase in death-related costs on the overall budget is not extreme. The Western Balkans and Southern European countries face a bigger challenge, with an increase in deaths equal to 0.4 percent of the population during the same period. Of course, along with rising deaths, this is also a period of shrinking births, which will contribute to decreased expenditures (births are relatively expensive). If these aging populations continue to form an "unhealthy bulge," then the larger cohort of baby boomers with poor health status will increase the strain on health services.

How countries adopt medical technological advances remains the critical driver of cost pressures in health systems (Smith, Newhouse, and Freeland 2009; Newhouse 1992). Indeed, 25–75 percent (averaging around 50 percent) of the growth in health expenditure in high-income countries is driven by technological changes (Sorenson, Drummond, and Khan 2013), far surpassing any impact of aging.[7] Age-specific public expenditure patterns show considerable variation in the slope of spending profiles at older ages. Spending on those aged 75 or older is only around twice that of the 50- to 64-year-old reference group for Austria, Germany, Poland, Spain, and Sweden. In the United States, by contrast, spending rises steeply with age, until spending on the oldest old (80+) is 12 times higher than the reference group. This is partly due to the fact that the data reflect only public spending, which is focused on older age groups (the U.S. government concentrates public support on those aged 65 and over through Medicaid and Medicare) (Hagist and Kotlikoff 2005). But the sharp rise in health costs at older ages in the United States relative to other countries is also due to the expansion in the use of more intensive

FIGURE 7.11 The ripples of baby boomers' aging will bring increased deaths in Europe and Central Asia
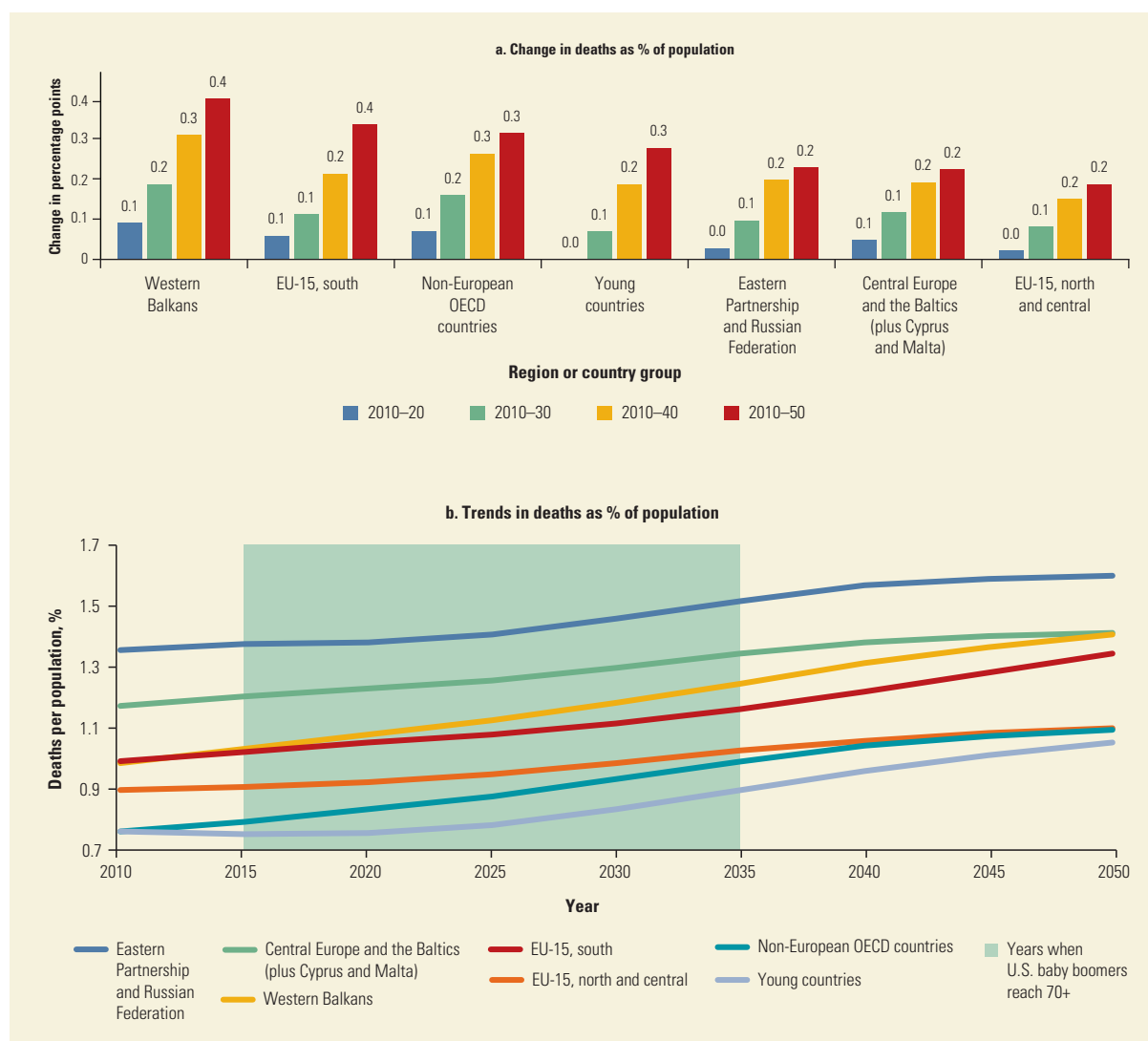
Source: Based on World Population Prospects: The 2012 Revision.
Note: The non-European OECD (Organisation for Economic Co-operation and Development) country group comprises Australia, Canada, Japan, the Republic of Korea, New Zealand, and the United States.

interventions, as noted by many studies on U.S. health costs. By contrast, Poland has a relatively flat age-specific spending profile, and per capita spending on health is low compared to other OECD countries. The challenge for Poland and other countries in Europe and Central Asia is to manage health demands as per capita GDP rises. As Zweifel, Felder, and Meiers (1999) put it, aging should not become the "red herring" that distracts from the hard choices: these center on how best to use technology and on the scope of health benefits packages.

The health benefits package determines how health technology interacts with aging. Although technological innovations have the potential to improve health status while creating cost efficiencies, costly product innovations to alleviate

FIGURE 7.12 The supply of medical technology generates rising demand
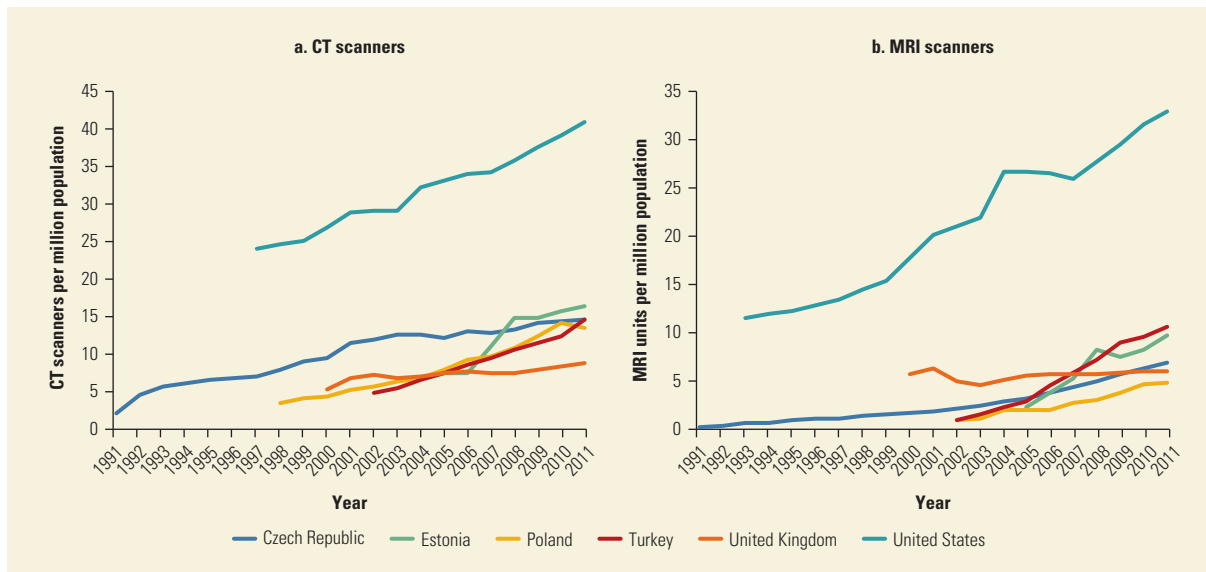
Source: OECD Statistics.
Note: CT = computed tomography; MRI = magnetic resonance imaging.

diseases appear to have overshadowed cost-saving processes and preventive innovations in recent decades (a trend that contributes to the magnitude of death-related costs) (Zweifel 2003; Baumol 2012).

This is particularly true in many countries in Europe and Central Asia, where the supply of technological solutions generates demand beyond previous levels and cost-control mechanisms are weak. Figure 7.12 shows the increase over 20 years of two types of high-cost scanners used in selected countries. The United Kingdom (with relatively strong cost containment through a single-purchaser, tax-funded public health system and specific prioritization mechanisms) and the United States (with little cost containment and with far higher health care expenditures than other OECD countries) are included for the purposes of comparison. While the optimal number of scanners in a population differs due to differences in disease burden and variation in medical practice, acquisition of high-cost technology tends to push up health spending because of changing patient and clinician expectations in the absence of strong regulations on appropriate use. While countries in the region had fewer scanners per person than the United Kingdom and the United States in the early 2000s, the number of scanners has consistently risen since then. In fact, the Czech Republic, Estonia, and Turkey all had more computed tomography (CT) and magnetic resonance imaging (MRI) scanners per person in 2011 than the United Kingdom, despite substantially lower public health expenditures.

As a consequence, health expenditure is rising about 1–2 percent faster than GDP per capita in Europe and Central Asia. There are substantial sociopolitical and ethical pressures to invest in these new technologies but also to use health technology assessments that limit their use to those that are cost effective and to follow

smarter procurement procedures. These cost-control mechanisms are underused in Europe and Central Asia, and efforts to implement them now to limit technology-driven growth in health costs would far outstrip any impact of aging on health care expenditures.

Funding Health Care

Again, funding longer lives is a particular challenge for social health insurance systems, which rely on earnings-based contributions from the shrinking workforce to fund the costs of a growing elderly population. When revenues fall short of rising costs over sustained periods of time, systems have traditionally responded with increases in contribution rates. However, concerns over the impact of higher costs on the formal labor market and employment, as well as on the competitiveness of local firms and the economy as a whole, have encouraged European countries to look for alternative financing sources.

Many countries have adopted changes to their contribution systems. Some have modified the relationship between the employer and employee contribution rates, shifting the financial burden toward the employee. For example, in 2009, Germany locked in the employer contribution, allowing increases only to the employee contribution. The Netherlands went a step further and introduced a flat-rate premium, capped at 3 percent of household income. Alternatively, countries have changed contribution floors and ceilings. For instance, both Estonia and Hungary lifted their social health insurance contribution ceilings. While this particular reform measure has the effect of improving equity (Thomson, Foubister, and Mossialos 2009) through higher contributions for higher-earning individuals, it also enhances incentives for wealthier segments of the population to evade contributions, thus diminishing the net effect on revenue.

Countries have also attempted to strengthen enforcement of contributions to maximize revenues from current collection mechanisms. Estonia, Hungary, and Romania, for example, shifted the responsibility for collection from their national health insurance funds to the central government tax agencies (Thomson, Foubister, and Mossialos 2009). Merging the databases on tax collection and social health insurance contributions allows these countries to exert further control over evasion. Going a step further, Hungary implemented an online information system available in all health facilities, which allows staff to verify affiliation and contribution status of every patient. While noncontributing clients are not refused medical care, they are reported to the tax agency, which is then able to collect contributions retroactively for up to five years (Ribe et al. 2012).

Aside from reforming existing contribution mechanisms, countries have complemented mandatory contributions by additional sources of public funding to increase the resource base for health while reducing taxes on labor. One policy option is earmarking tax revenues for health. For example, in 1991 France lowered employee contributions to below 1 percent of wages and offset the decrease in revenue by introducing a tax levied on income called *La contribution sociale generalisée* (Sandier, Paris, and Polton 2004). Later, the French government replaced most of the employee portion of the payroll tax levied on wages with La contribution sociale generalisée, which had grown to 34.6 percent of the health insurance scheme's revenue by 2000 (Thomson, Foubister, and Mossialos 2009).

"Sin taxes," or taxes levied on goods that are harmful for health such as tobacco or alcohol, are often used as another form of earmarked taxes for health. In 2006, Romania introduced sin taxes on alcohol and cigarettes, which have generated revenues to fund a number of important national health programs (Vlădescu et al. 2008). While sin taxes reduce harmful behaviors, which are generally more prevalent among lower socioeconomic groups, they tend to be regressive, having a greater impact on the poor. More generally, when taxes are earmarked for health, they limit the flexibility of government budgets.

Countries usually resort to using general taxes to complement earnings-based contributions. In most of the traditional social health insurance systems in Europe, general tax revenues constitute a significant source of cofinancing, ranging from 6 percent in France and 8 percent in Germany and the Netherlands, to 32 percent in Austria. One challenge is how to feed tax revenues into the social health insurance system, where multiple health insurance funds collect and retain their own social security contributions. Both Germany and the Netherlands have begun pooling all funds at the national level, which are then allocated among the individual insurers (Thomson, Foubister, and Mossialos 2009). Germany uses general tax revenues to subsidize the premiums of enrollees who have children (Lisac 2006). In the Netherlands, these revenues are used as health care allowances in the form of transfers paid monthly to individuals with earnings below a certain income threshold (Thomson, Foubister, and Mossialos 2009; WHO 2007).

While social health insurance systems are particularly prone to the effects of aging on revenues, broadening the financing bases of systems financed through general taxes may also be necessary to pay for the increases in demand for health care. The trend of complementing social health insurance contributions with general taxation is in line with good practices of taxation in European countries. For example, in its most recent country-specific recommendations, the European Commission called on its member states to further shift the tax base away from labor to taxation that is less detrimental to employment and growth, such as environmental and recurrent property taxes.

Measures to expand the revenue base for health should also meet the general principles of fiscal and economic sustainability. Governments can often create additional fiscal space to meet growing health needs, potentially shifting budgets from sectors that will face reduced needs when the population ages, for example, education and unemployment insurance. At the same time, governments often cannot avoid ratcheting up cost-control measures, including deductibles and copayments, to manage demand and spending ceilings to control overall expenditure growth.

Funding Long-Term Care

Health financing systems traditionally cover only the health and nursing costs of long-term care. Social care or welfare often provide additional services but targeted to the most disadvantaged populations, typically the poor and disabled. Making comprehensive long-term care, including nursing, personal, and domestic care, affordable for all those who need it is a major challenge. Countries that provide such comprehensive services typically spend between 2 and 3.5 percent of GDP on long-term care.

FIGURE 7.13

Different models exist for financing long-term care
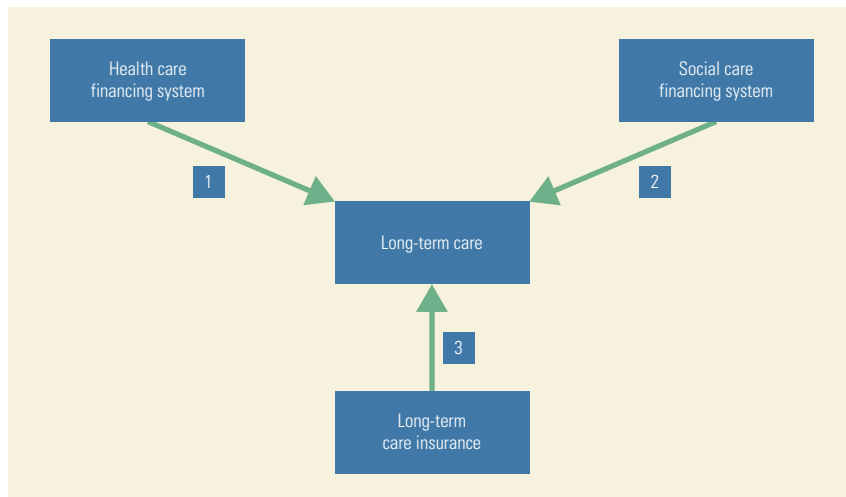
There are currently three approaches to expanding long-term care benefits to the entire population, while financing the bulk of the costs with a single financing mechanism (figure 7.13). The first integrates long-term care into the health financing scheme. In practice, this model is found only in countries with social health insurance systems. For example, in Belgium, the social health insurance system finances nursing and personal care, and local social welfare centers pay board and lodging for the elderly.

The second model provides long-term care through the social care system, financed from tax revenues. This model is typical in Nordic countries, where local municipalities are responsible for health and social care. They finance care from local taxes, complemented with grants from the central government to adjust for differences among municipalities in revenues (tax bases) and costs (demography). Local governments in all Nordic countries provide nursing and personal care, while those in Denmark and Sweden also cover domestic care.

The third model covers long-term care under a stand-alone social insurance scheme. Some of these systems, for example in Germany and Japan, require members to contribute from their income after retirement. Benefits typically include a comprehensive set of long-term care services. Some systems, such as Japan's (see box 7.3), limit benefits to the elderly and exclude disabled people. Other countries that have adopted this model include Luxembourg and the Netherlands.

Of these three models, countries typically adopt one that builds on their health and social care systems to take advantage of existing financing arrangements. For example, in countries adopting model 2, the same government body managing revenues for health care (for example, the local municipalities in Nordic countries) is also responsible for managing those for long-term care. Similarly, in countries adopting model 3, the existing health financing institutions (the sickness funds in Germany, for example) typically operate the new long-term care scheme.

Countries tend to favor managing the funds for long-term care separately from health and social care, whether it is by creating separate budget lines (model 2) or

BOX 7.3 "Golden" Care for the Elderly in Japan

Over the past 50 years, Japan has achieved the highest life expectancy in the world. Social expectations and preferences have rendered home-based care the traditional approach to long-term care for older people in Japan, with informal care provided by their children. However, the increased labor market participation by women reduced the availability of family members who can provide care, increasing the demand for formal, residential care. In 1989, the government addressed this problem by introducing the Gold Plan, a scheme that provides universal health care and long-term care for older people based on physical and mental need and shifts care from institutions to the community (Campbell and Ikegami 2003). The plan is paid for by mandatory long-term social insurance premiums from those aged 40 and over and a means-tested copayment. The scheme balances the imperative to provide care and manage costs through incentives for doctors to manage patients at home and a shift to choice and competition for provision of long-term care services. The system has so far proven sustainable and is widely accepted by the population.

creating a new insurance scheme (model 3). Indeed, the Belgian example of model 1 remains the exception among countries with social health insurance systems. On the one hand, this ring-fencing prevents funds dedicated to long-term care from being used for other purposes, such as compensating for budget shortfalls in other areas of health and social care. Moreover, clearly linking budgets with benefits may create a sense of entitlement that helps generate support from the public for measures to collect the necessary funding. On the other hand, this ring-fencing combined with different reimbursement rates for health and social care creates incentives for patient shifting. For example, hospitalized patients may be discharged inappropriately early back into long-term care to free beds for cases with higher reimbursement rates under the health care financing system.

To date, only a few countries rely on a single mechanism to finance comprehensive long-term care; most draw on different mechanisms for different services. In Scotland, for example, the tax-financed health care system covers nursing care, whereas the social care system finances the cost of personal care in both institutional and home care settings. In the Czech Republic and Italy, the health financing system covers institutional care, while the government pays non-income-related cash allowances to cover the cost of home care.

Only a few countries with mixed models provide comprehensive coverage of long-term care for the entire population. Typically, health systems provide for nursing care, while social care systems or other financing mechanisms ensure access to additional means-tested long-term care services for the severely disabled and for the poor. For example, Switzerland provides a means-tested cash allowance to cover the cost of personal care in addition to covering universal, in-kind nursing care (at home and in an institution) through its mandatory health insurance. Complementary financing mechanisms may also be available for some, but not all, income groups, often with benefits decreasing with income. For example, France's general councils fund a cash allowance, *L'Allocation personalisee d'autonomie*,

for disabled people over the age of 60 with the benefit amount varying according to need and income (OECD 2011).

Some countries promote voluntary long-term care insurance to fill gaps and accelerate progress toward comprehensive population coverage. However, as with voluntary old-age pension and health insurance, demand for voluntary long-term care insurance has been limited because the receipt of benefits is uncertain and in any event far in the future. These issues are typically compounded by a general trust in family solidarity. Germany, for example, introduced voluntary long-term care insurance in the mid-1980s, but by 1993 only 250,000 contracts had been purchased despite a rapidly growing number of individuals in need of long-term care (Costa-Font and Courbage 2012).

Thus, mixed models tend to face a number of challenges. Gaps in the coverage of services and population groups means that needs are not met or that families draw down their income and assets until they drop below deprivation levels that entitle them to benefits. In addition, multiple financing mechanisms aggravate the challenge of care coordination, in particular for persons suffering from multiple chronic conditions. Finally, multiple financing mechanisms also tend to result in higher administrative costs.

The predominance of mixed models seems to be the result of countries' moving through different stages along a common pathway toward comprehensive long-term care coverage, depending on their demographic profiles and economic conditions. Countries where demand for long-term care is low rely heavily on their health care systems and informal out-of-pocket expenditures to cover the cost of caring for the elderly and disabled. Countries with a growing demand for formal care but limited capacity to raise revenues may expand systems that cover comprehensive long-term care for the poorest individuals with high needs. As economic conditions improve and aging accelerates, countries may expand eligibility or provide complementary services to include individuals with lower needs and higher incomes. At some point, countries may opt to consolidate these various mechanisms into one universal and comprehensive model of financing for long-term care consistent with the existing structures of health and social care financing.

> **Preventing poverty and excessive inequality at old age requires policies to address disadvantages at younger ages, such as investments in education and health.**

Managing the Risks of Poverty and Inequality

A growing elderly population does not necessarily lead to higher poverty and inequality. So far, old-age poverty has not been particularly higher than poverty of the population or that among the younger age groups. As seen in figure 7.14, in most countries in Europe and Central Asia, the difference between relative poverty among the old (65+) and among the young (15–24) is insignificant. In already aging countries such as those in Central Europe and the Baltics, as well as Western Europe, old-age poverty is significantly lower than poverty among the young.

Nevertheless, some trends associated with aging and certain policies expected of aging societies can pose risks. A major trend to consider is households' living arrangements. The occurrence of elderly living in elderly-only households is more common to Europe and Central Asia than to other regions. One reason is the generosity of the pension system in many countries, which keeps old-age poverty

In Central Europe and the Baltics, as well as Western Europe, old-age poverty is significantly lower than poverty among the young

● Western Europe
● Central Europe and the Baltics
● Western Balkans
● Eastern Partnership and Russian Federation
● Young countries
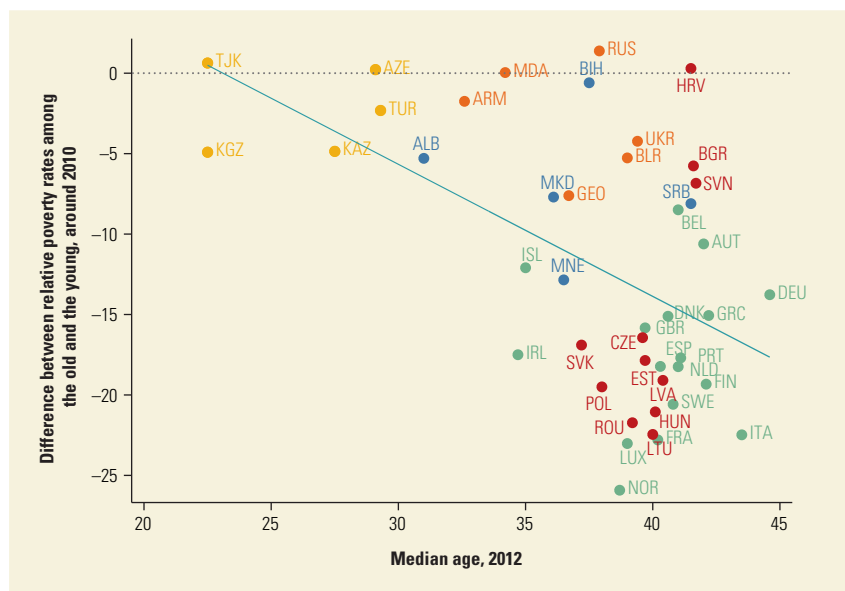
Sources: Median age from World Population Prospects: The 2012 Revision; poverty rates from ECAPOV Harmonized Data.
Note: In contrast with the usual poverty head count ratio, the relative poverty rate uses a poverty line specific to each country and computed as 60 percent of the country's median income (or consumption depending on data availability).

rates low and allows the old to be independent. Another is the relatively high, and increasing, female labor force participation in Europe and Central Asia. It is reasonable to expect that with greater longevity and with less generous pensions, more elderly will have to move in with their children. Given the high burden and opportunity costs of elderly care, children often have to make a trade-off between coresiding with their elderly parents and providing time or financial transfers remotely (see, for example, Pezzin, Pollak, and Schone 2014). An expansion of home- or community-based care would help address the long-term care of the elderly without placing too much burden on their children and imposing tremendous costs on either the government or the families. For low-income families who cannot afford external caregivers, subsidized access to these services should be considered (Lippi Bruni and Ugolini 2013).

Another risk to poverty is pension adequacy. Although some recent reforms may help enhance the financial sustainability of the pension system, they could limit the ability of pensions to protect the elderly from falling into poverty. Key priorities in any reform include ensuring a basic benefit that keeps all elderly out of poverty, disability pensions, and survivor pensions (see earlier discussion of costs of these provisions). Cost-saving mechanisms that complement the measures discussed and do not sacrifice the poverty protection function of pensions are available. One is to provide the basic benefit only to elderly not covered by the contributory pensions, assuming the contributory system would capture the better-off individuals and the benefits sufficient to keep them out of poverty. Another is to means-test the basic benefit, limiting it to only low-income households and linking it with the social assistance system (as some countries in Europe and Central Asia have already done through their guaranteed minimum-income programs).

Finally, disability and survivor benefits can also be reformed to limit eligibility and avoid providing disincentives to work.

On the consumption side, an aging society will increase the relative demand for certain products such as health services, housing, and leisure and will decrease the relative demand for clothing, transport, and equipment (Lefèbvre 2006; Albuquerque and Lopes 2010). These changes will trigger shifts in the relative prices of the age-related products. Since some of them such as health care are goods of first necessity, the rise in their market value will increase the vulnerability of old, poorer households. To secure supply, governments can rein in such price increases in the future by encouraging investments in those goods and services in high demand by the growing elderly population.

By protecting people from falling into poverty, these actions would also contribute to limiting the income-polarizing trends of aging societies. Furthermore, by aligning social pension provisions with other social safety net schemes, governments can minimize overlaps among some pensioners and leakage to higher earners.

Interventions in the labor market can also prevent inequality from widening. With the expected increase of the returns to labor in aging societies relative to the returns to capital, governments can provide more incentives and support for the old to work longer and take advantage of potential wage gains. Raising the retirement age can be one such incentive. At the same time, support can be given to ensure that the opportunity to work longer is available to all. As the size of the older workforce as well as the share of skilled workers among them increases, competition can be fierce for the active old. Some good practices in keeping older people employed, such as disincentives for early retirement, favorable attitudes toward older workers, and flexible labor regulations, have been discussed in earlier chapters.

Education is an important tool for leveling the playing field, not only for the young but also for the old. Providing low-skilled workers with educational opportunities to upgrade their skills throughout their working lives would help address the wage gap between low- and high-skilled workers, which is large and increasing with age. This would involve expanding training, lifelong learning, and skills development activities (as outlined above), while targeting low-skilled workers in routine or manual jobs where skills and demand quickly decline at old age. New insights that mature brains can learn new skills with appropriate training strategies support the usefulness of regular training that helps low-skilled workers adopt new skills and catch up with fast-changing technology.

Finally, inequality can be passed from one generation to the next, through intergenerational transfers and support. There is an extensive literature showing that households with higher lifetime income have higher saving rates, accumulate larger wealth, and leave even larger bequests (see De Nardi 2004), and such bequests can account for a major part of income disparities. Policies that would limit the rise in inequality include estate and inheritance taxes (Bevan and Stiglitz 1979; Piketty 2014; Cagetti and De Nardi 2004) and efforts to ensure that children, regardless of socioeconomic background, have similar opportunities to accumulate human capital. Interventions can range from education subsidies to universal access to health care, many of which have been proven successful at reducing inequality.

What Priority for What Country?

The final questions to ask, then, are, How big is the policy challenge, and what should the priority be for each country in the region? This is not an easy question to answer for a set of 27 countries. A detailed answer would require a proper assessment of each country's policy on many dimensions. Clearly, such an exercise is beyond the scope of a regional report like this one. Even a less detailed comparison of policies across countries would quickly run into data constraints and necessarily be incomplete.

Hence, instead of attempting an incomplete—and possibly somewhat forced and opaque—assessment across countries based on actual policies, we attempt a simple but transparent assessment based on readily available outcome data across the eight dimensions discussed below (and also mentioned in the main overview).

Voter Participation of the Young versus the Old

The conclusion of chapter 6 on political economy is that with the exception of some few policy areas, changing policy preferences are not so much due to aging per se but to the experiences of each individual cohort. In that sense, the concerns about a "gerontocracy" might be exaggerated. Nevertheless, in some key policy areas, like education and pension policies, there seems to be a genuine aging effect. Increasing support for reforms may require encouraging younger people to actively participate in the political discourse, voice their concerns, and express their interest. As a measurement of outcome, the gap in voter participation between the 55–64 age group and the 25–34 age group has been chosen, since those data are more or less readily available from most countries.

Total Fertility Rate

In this chapter's discussion of rebalancing demographics, the first policy section argues that a return to normal population growth will require that fertility rates rebound to more sustainable levels. Some higher-income OECD countries and Western European countries have shown that this is feasible, with reconciling family and career goals for women as the main policy ingredient. Other policy measures, in particular cash benefits like birth grants, seem to have a lesser effect or at best an impact on the timing of births but not so much on total fertility.

Expected Years of Healthy Life at Birth

The second policy section on rebalancing demographics argues that enabling healthy aging would help countries return to normal population growth. Many countries in the region have not realized the gains of increased life expectancy to start with. More people living longer lives will, somewhat counterintuitively, also help stabilize demographics, but the real challenge is not only to increase life expectancy but also to increase the expectancy of healthy years of life. This will require many significant changes in the way health systems improve health service, particularly a refocus on prevention and behavioral change with regard to diet and

alcohol and tobacco consumption. As a measure of outcome, this chapter uses expectancy of healthy life years at birth.

Net Immigration Rate

The final policy section on rebalancing demographics argues that returning net immigration rates to more sustainable levels, which in the case of countries in Europe and Central Asia means a change from net outflows to net inflows of migrants, would help address population aging. The key here is not to focus on preventing emigration but rather to embrace immigration as part of the solution. As a measure of outcome, the chapter uses current net immigration rates.

Dependency Ratio and Longer Work Lives

The policy section on addressing the economic consequences of aging considers how to ensure that increased life expectancy translates into longer work lives. A host of policy issues, ranging from retirement age to labor laws, are discussed. To the extent that life expectancy has not significantly increased—or at times actually decreased—over the past decades, longer work lives might not be a priority yet. Nevertheless, the ratio of inactive to active people in the adult population is a key number for assessing what share of the population has to support how many inactive people—including retired people—in an economy. Hence, as a measure of outcome, this chapter uses the adult population dependency ratio, measured as the ratio of inactive to active people in the population aged 15 and older.

Productivity

Another conclusion is that increased productivity can be one of the key channels for mitigating some of the possible negative economic effects of aging, in particular, to counteract a possible decrease in income per capita due to a shrinking labor force. Again, a host of policy interventions, ranging from adult learning to firm-level interventions, are discussed, arguing that an aging workforce does not result in a decrease in productivity but rather in a shift of comparative advantages to new opportunities. As a measurement of outcomes, this chapter uses the PISA scores related to scientific subjects. This index is widely used to compare quality of education across countries and gives a good indication of the skill level of the young people entering the labor force.

Gross Public Debt as a Share of GDP

Aging economies might face fiscal challenges from increased expenditures due to pensions, health care, and long-term care and decreased revenues due to a shrinking workforce. Clearly, countries with lower debt have more fiscal space to address some of the future challenges stemming from the retirement of the large baby-boomer cohort. As a measurement of outcome, this chapter uses the current gross public debt as a share of GDP.

Relative Old-Age Poverty

The final conclusion of the policy section is that aging societies face a risk of increased inequality and old-age poverty. Many countries, though, have comprehensive pension systems in place that contribute to avoiding old-age poverty. The challenge is to make those systems also sustainable under changed demographic realities. This last dimension is an attempt to capture the ability of each country to protect the elderly, regardless of the country's general level of development. To be able to compare poverty between countries as different as Sweden and Tajikistan, and to capture the specific protection of this particular age group, the chapter uses the difference in the share of poor between the 65+ age group and the very young (15–24 years old), defined with a relative (country-specific) poverty line.[8]

Clearly, this list of outcomes represents a compromise between what one ideally would have chosen and the data that are readily available for a wide range of countries. Some of these indicators, like relative old-age poverty, directly measure outcomes of older cohorts; others, like the debt-to-GDP ratio or net immigration rate, measure the outcomes for the whole population. Table 7.2 displays the values of these indicators for each country. The median age is included as an additional key measurement.

All countries of Europe and Central Asia are benchmarked against each other and against the benchmark countries of Western Europe and the Baltics to illustrate how countries are doing on each of these outcomes. To allow for comparison across outcomes and to provide a sense of how important each challenge is in relation to other challenges for each country, a z-score is calculated for each outcome as a standard deviation from the average. That is, the higher the z-score for each outcome, the further away the country is from the average and hence the bigger the challenge of that particular outcome for a particular country.[9] Finally, the average z-score across all outcomes for each country indicates the overall challenge for that country and is listed in the last column of table 7.2. Table O.1 in the main overview gives the results of this scoring exercise across all countries and outcomes, including the benchmark countries. Table 7.2 (as well as table O.1 in the main overview) also offers a color coding based on the severity of the challenge. For each country, the challenge is coded orange if for that particular outcome the country is in the upper quartile (biggest challenge), is coded yellow if it is in the middle two quartiles, and is coded green if it is in the lower quartile (least challenge).

Overall, the policy challenges related to aging seem, by a significant margin, highest for Moldova. For Moldova, this is driven mostly by the high inactivity of the adult population and the significant outmigration from the country. The
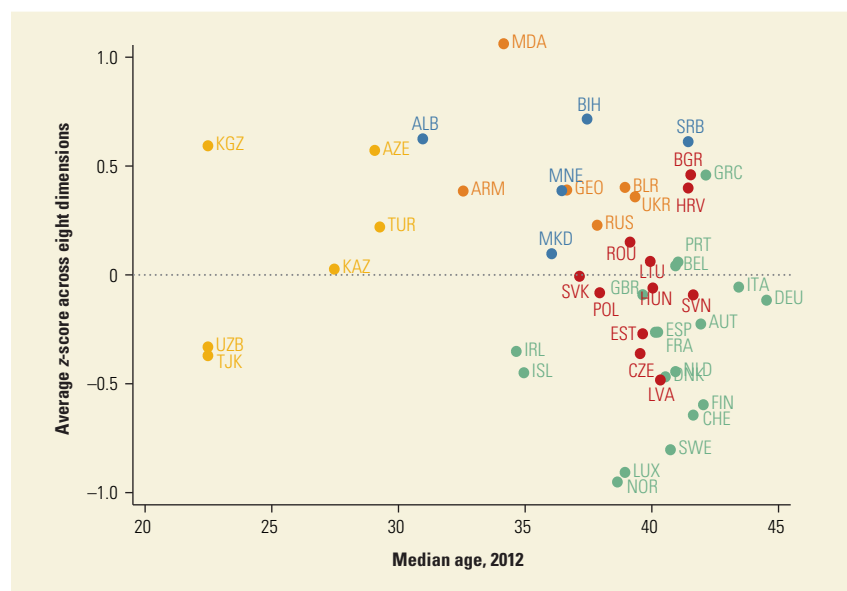
FIGURE 7.15

Many countries in Europe and Central Asia face high policy challenges but are already relatively old and have not much time left for reforms

- ● Western Europe
- ● Central Europe and the Baltics
- ● Western Balkans
- ● Eastern Partnership and Russian Federation
- ● Young countries

Source: Authors' calculations.
Note: The *y*-axis is a simple average of the *z*-scores of the eight indicators: voting participation gap between old and young, total fertility rate, healthy life expectancy, net immigration, adult dependency ratio, PISA (Programme for International Student Assessment) scores in science, gross debt as share of GDP, and relative old-age poverty.

Western Balkan countries of Albania, Bosnia and Herzegovina, and Serbia also face significant challenges, especially in inactivity, health, migration, fertility, and education. Serbia, as one of the older countries, might have the biggest need for swift reforms.

At a first glance, it might be somewhat surprising that aging also poses a high challenge for many of the relatively young countries in Europe and Central Asia, like Albania, Azerbaijan, the Kyrgyz Republic, and Moldova. Figure 7.15 depicts the outcome of the scoring exercise against countries' median age. In the case of these countries, a low median age is often correlated with lower levels of development. It is important to keep in mind, though, that these countries still have more time to address their challenges precisely because they are still young. This is not the case for many of the Central European and Western Balkan countries, in particular Bosnia and Herzegovina, Bulgaria, and Serbia: they are already as old as the benchmark countries, but their challenges by and large are much starker. Nevertheless, there are some benchmark countries, notably Greece, which also face challenges along many dimensions.

TABLE 7.2 Country Ranking of Policy Challenges across Eight Outcome Dimensions

Rank	Country	Median age	Voting participation gap (old-young) (percentage points)	Total fertility rate	Healthy life expectancy	Net immigration (per 1,000)
1	Moldova	34.20	6.21	1.46	63	−5.88
2	Bosnia and Herzegovina	37.50	14.35	1.28	68	−0.26
3	Albania	31.00	10.40	1.79	65	−3.15
4	Serbia	41.50	12.47	1.37	65	−2.10
5	Kyrgyz Republic	22.50	18.36	3.10	61	−6.34
6	Azerbaijan	29.10	23.68	1.93	63	—
7	Bulgaria	41.60	18.96	1.53	66	−1.38
8	Greece	42.20	—	1.52	71	0.90
9	Belarus	39.00	14.00	1.48	64	−0.21
10	Croatia	41.50	10.35	1.50	68	−0.93
11	Georgia	36.70	20.26	1.81	65	−5.75
12	Montenegro	36.50	6.10	1.67	66	−0.81
13	Armenia	32.60	9.43	1.74	62	−3.36
14	Ukraine	39.40	12.33	1.46	63	−0.18
15	Russian Federation	37.90	13.76	1.53	61	1.54
16	Turkey	29.30	6.43	2.05	65	0.94
17	Romania	39.20	13.26	1.41	66	−0.41
18	Macedonia, FYR	36.10	2.53	1.44	66	−0.48
19	Lithuania	40.00	18.16	1.51	65	−1.87
20	Portugal	41.10	—	1.32	71	1.89
21	Belgium	41.00	—	1.85	71	2.71
22	Kazakhstan	27.50	15.17	2.44	60	—
23	Slovak Republic	37.20	8.20	1.39	67	0.55
24	Italy	43.50	3.12	1.48	73	2.96
25	Hungary	40.10	−2.13	1.41	66	1.51
26	Poland	38.00	9.93	1.41	67	−0.20
27	United Kingdom	39.70	25.14	1.89	71	2.86
28	Slovenia	41.70	10.10	1.50	70	2.13
29	Germany	44.60	11.21	1.42	71	1.33
30	Austria	42.00	7.13	1.47	71	3.54
31	Spain	40.30	—	1.50	73	2.57
32	France	40.20	13.87	1.98	72	2.03
33	Estonia	39.70	22.69	1.59	67	—
34	Uzbekistan	22.50	1.21	2.32	61	−1.39
35	Ireland	34.70	4.89	2.00	71	2.18
36	Czech Republic	39.60	6.98	1.55	69	3.75
37	Tajikistan	22.50	5.59	3.85	60	−2.46
38	Netherlands	41.00	—	1.77	71	0.60
39	Iceland	35.00	—	2.08	72	3.32
40	Denmark	40.60	—	1.88	70	2.68
41	Latvia	40.40	−13.98	1.60	65	−0.97
42	Finland	42.10	—	1.85	71	1.85
43	Switzerland	41.70	16.78	1.53	73	7.97
44	Sweden	40.80	−0.26	1.92	72	4.19
45	Luxembourg	39.00	—	1.67	72	9.74
46	Norway	38.70	—	1.93	71	5.98

Note: The color coding represents the severity of the challenge along a given dimension. Countries are ranked according to their z-score in each dimension (presented in figure O.1): ■ = an outcome in the upper quartile (biggest challenge); ■ = an outcome in the middle two quartiles; and ■ = an outcome in the lower quartile (least challenge). Kosovo and Turkmenistan are not included due to lack of data. PISA = Programme for International Student Assessment; — = data unavailable.

Adult dependency ratio (inactive over active)	PISA scores in science	Gross debt as share of GDP (%)	Relative poverty rate (old–young) (percentage points)	Average z–score	Country	Rank
1.50	—	24.54	0.04	1.06	Moldova	1
1.21	—	44.65	−0.60	0.72	Bosnia and Herzegovina	2
0.82	397	62.93	−5.29	0.63	Albania	3
0.91	445	62.42	−8.11	0.61	Serbia	4
0.49	330	48.98	−4.91	0.60	Kyrgyz Republic	5
0.52	373	11.60	0.22	0.57	Azerbaijan	6
0.88	446	17.51	−5.76	0.46	Bulgaria	7
0.88	467	157.19	−15.06	0.46	Greece	8
0.79	—	38.46	−5.27	0.41	Belarus	9
0.95	491	54.22	0.29	0.40	Croatia	10
0.55	—	32.29	−7.61	0.39	Georgia	11
1.00	410	53.97	−12.85	0.39	Montenegro	12
0.60	—	38.90	−1.75	0.39	Armenia	13
0.69	—	37.37	−4.23	0.36	Ukraine	14
0.57	486	12.65	1.38	0.23	Russian Federation	15
1.02	463	36.15	−2.32	0.22	Turkey	16
0.78	439	38.18	−21.73	0.15	Romania	17
0.82	—	33.43	−7.70	0.10	Macedonia, FYR	18
0.65	496	40.95	−22.45	0.07	Lithuania	19
0.64	489	124.08	−17.69	0.06	Portugal	20
0.89	505	101.15	−8.49	0.05	Belgium	21
0.38	425	12.39	−4.86	0.03	Kazakhstan	22
0.68	471	52.66	−16.90	0.00	Slovak Republic	23
1.04	494	126.97	−22.48	−0.05	Italy	24
0.93	494	79.84	−21.05	−0.06	Hungary	25
0.77	526	55.56	−19.50	−0.08	Poland	26
0.61	514	89.06	−15.83	−0.09	United Kingdom	27
0.73	514	53.34	−6.84	−0.09	Slovenia	28
0.67	524	81.04	−13.77	−0.11	Germany	29
0.64	506	74.42	−10.61	−0.22	Austria	30
0.68	496	85.95	−18.23	−0.26	Spain	31
0.78	499	88.73	−22.80	−0.26	France	32
0.62	541	9.71	−17.86	−0.27	Estonia	33
0.63	—	8.62	—	−0.33	Uzbekistan	34
0.66	522	111.41	−17.50	−0.35	Ireland	35
0.70	508	46.15	−16.44	−0.36	Czech Republic	36
0.48	—	32.33	0.63	−0.37	Tajikistan	37
0.54	522	66.52	−18.24	−0.44	Netherlands	38
0.35	478	96.85	−12.09	−0.44	Iceland	39
0.58	498	45.36	−15.11	−0.46	Denmark	40
0.66	502	36.42	−19.09	−0.48	Latvia	41
0.66	545	51.83	−19.33	−0.59	Finland	42
0.47	515	49.18	—	−0.64	Switzerland	43
0.56	485	38.32	−20.58	−0.80	Sweden	44
0.73	491	21.72	−23.02	−0.90	Luxembourg	45
0.53	495	29.52	−25.92	−0.94	Norway	46

Notes

1. Within the representative sample of German companies, about 50 percent used at least one of these measures for older workers in 2002. Interestingly, there does not seem to be much correlation between the different measures, suggesting that firms do not apply the whole range of instruments.
2. These estimates assume that health care expenditures are driven by a combination of changes in the population structure, an assumption that half of the future gains in life expectancy are spent in good health and a moderate impact of rising national incomes on health care costs. An aging population is expected to increase public spending for long-term care due to sharply rising frailty and disability at older ages, especially among the fast-growing population of the oldest old (aged 80+) (European Commission 2012).
3. Medicare covers mainly health spending for the population aged 65 and over.
4. For instance, in the case of the Netherlands, an analysis of health insurance data linked at the individual level with data on the use of home care and nursing homes and causes of death in 1999 finds that 11.1 percent of total expenditure of the included health services was due to final year-of-life costs or 26.1 percent for the retired Dutch population aged 65 years and older (Polder, Barendregt, and van Oers 2006).
5. Though rationing of care at older ages may also play a role. See, for instance, Brockmann (2002) for evidence from hospital claim files from a large German public health insurer on oldest-old patients receiving less costly treatment than younger patients for the same illness.
6. The start of the post–World War II baby boom differed across countries and endured for varying periods, as discussed in the first section. Broadly speaking, with the timing of the U.S. baby boom as a reference period (1946–64), this generation will begin to reach 70 years of age in 2016 and start to peter out around 2040.
7. Other nondemographic drivers include income and labor. Increased national income is generally correlated with increased health care spending in a country, independent of need, though there are many confounding factors—particularly national health strategies and policies—that influence health care spending by country (European Commission 2012). The way in which health systems and institutions are set up also has an important impact on health care spending: whether the bulk of health care is delivered by general practitioners or by specialists, in the community or in hospitals, methods of financing and incentivizing services, and the depth and coverage of benefits packages (European Commission 2012). In particular, labor acquisition and retention play a massive role in health care costs: the health workforce and the labor-intensive nature of health care pose a substantial financial burden in training and salary costs (Baumol 2012).
8. The relative poverty line is computed as 60 percent of the median income (or consumption, depending on data availability) in each country. The relative old-age poverty indicator is then computed by subtracting the poverty head count of the young (15–24 years old) from that of the 65+ age group. The choice of the very young as the comparison group is explained by the fact that, together with the elderly, they constitute the most vulnerable people in a society.
9. For some indicators, the direction is reversed: the lower the fertility, the higher the challenge, hence the higher the z-score.

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Population aging is occurring rapidly throughout Europe and Asia and poses immense challenges to national policy makers. This report addresses the key issues of how policies have to change so that longer healthy life spans are a positive force for increasing human well-being. *Golden Aging* shows that the goal should not be to maintain existing institutions at all costs but to put in place sustainable arrangements that lead to both economic and social success in an era of increasing aging.

David Canning, PhD, Richard Saltonstall Professor of Population Sciences and Professor of Economics and International Health, Harvard University

Golden Aging provides insight into the latest research on aging, productivity, and health. It employs these findings to develop a fresh look at the challenges and opportunities of aging societies. If we take adequate measures, we may find that older populations can be a source of innovation rather than a cause of obsolescence.

Ursula M. Staudinger, PhD, Robert N. Butler Professor of Sociomedical Sciences and Professor of Psychology; Director, Columbia Aging Center, Columbia University

Societies across Europe and Central Asia are aging, but people are not necessarily living longer. This demographic trend—caused by a decrease in fertility rather than improved longevity—presents both challenges and opportunities for governments, the private sector, and individuals alike. Some of the challenges are well known. Output per capita becomes smaller if it is shared with an increasingly larger group of dependent older people. At a certain point, there may not be sufficient resources to maintain the living standards of this older group, especially if rising expenditures on health care, long-term care, and pensions must be financed through the contributions and taxes paid by ever-smaller younger age groups. Working adults also contribute the most to the pool of savings. As the size of this group shrinks, savings will decline.

But these challenges can be transformed into opportunities. Consider these examples: As longevity increases, workers tend to stay in the workforce longer, and, with the right incentives, they will increase their savings. Many current workers, and perhaps even more in the future, will thus not necessarily become dependent once they turn 65. And with slower population growth and smaller young age groups, societies will have an opportunity to improve the quality of education and maintain productivity. Firms in some countries are already adapting by capitalizing on skills that appreciate with age. Cardiovascular diseases account for more than half the difference in life expectancy (above age 50) between the region and Western Europe for men and 75 percent of the corresponding difference for women. Healthier behavior and health systems focused on preventive care could, with no cost increase, dramatically reduce this risk. These opportunities are not to be missed.

As populations age, public discourse ranges from concerns about economic decline and fiscal sustainability of pensions and health systems to optimism about opportunities for healthier and more productive aging. The main contribution of *Golden Aging* is perhaps to show that demography and its consequences are not fixed. Much will depend on how people, firms, and societies adapt and how policy makers and institutions facilitate their behavioral adjustments. The future for Europe and Central Asia does not have to be gray—it can be a golden era of healthy, active, and prosperous aging.

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