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# The WDA – HSG Discussion Paper Series *on Demographic Issues*

## The Graying of Global Population and Its Macroeconomic Consequences

*by David E. Bloom, David Canning  
and Günther Fink*

*No. 2010/4*



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# **The Graying of Global Population and Its Macroeconomic Consequences<sup>1</sup>**

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February 2010

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<sup>1</sup> An earlier version of this paper was presented in July 2009 at a workshop at Edinburgh Napier University, funded by the Royal Society of Edinburgh. The authors are grateful to workshop participants for helpful comments. The authors also acknowledge receiving helpful assistance from Poting Cheung, Helen Curry, and Larry Rosenberg. Support for this research was provided by grant number 5P30AG024409 from the National Institute on Aging, National Institutes of Health.

## **The Graying of Global Population and Its Macroeconomic Consequences**

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### **Abstract**

Population aging is emerging as a major demographic trend in many countries, with potentially important implications for a variety of macroeconomic issues. Notwithstanding these challenges, population aging will likely have a comparatively modest effect on economic growth. Although the changed age distribution would be expected to cause the labor force participation rate to decrease, the ratio of labor force to population will actually increase in most countries. This will occur because the lower youth dependency rate and the increased rate of female labor force participation – both of which may reasonably be expected to follow from the fertility rate declines that are driving population aging – will counterbalance the shifting of adults toward older ages at which labor force participation and savings rates are lower. Behavioral and policy responses to population aging – including higher savings for retirement, a higher rate of human capital accumulation, alternate pension funding plans, and (possibly) increased migration from labor-abundant to labor-scarce countries – also suggest that population aging need not necessarily significantly impede economic growth.

Keywords: aging, economic growth, population.

## **The Graying of Global Population and Its Macroeconomic Consequences**

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Population aging is emerging as a major demographic trend in many countries, with potentially important economic implications. The share of the population aged 60 and over is expected to increase dramatically in every country in the world between 2000 and 2050. There has been a good deal of public dialogue on the topic of population aging and its economic effects, and much of it is highly alarmist. For example, Peter Peterson, the former CEO of Lehman Brothers, Secretary of Commerce, and Chairman of the New York Federal Reserve Bank, described global aging as a “threat more grave and certain than those posed by chemical weapons, nuclear proliferation, or ethnic strife” (Peterson, 1999). Peterson’s concern, as well as that of others, is that many countries are about to be flooded with a wave of elderly individuals. This large group of elderly persons is expected to consume substantially more than it contributes and to thereby alter the income trajectories that people and nations have come to expect.

This article examines the nature and magnitude of these population forecasts and reviews evidence on the effects of population aging on national economic performance. Although population aging is certainly occurring and will have potentially profound implications for a variety of macroeconomic issues, we argue that it will likely have a relatively modest effect on economic growth due to concurrent declines in youth dependency and increases in female labor force participation and human capital accumulation. Behavioral and policy responses to population aging – including higher savings for retirement, alternate pension funding plans, and (possibly) increased migration from labor-abundant to labor-scarce countries – also suggest that population aging will not significantly impede economic growth.

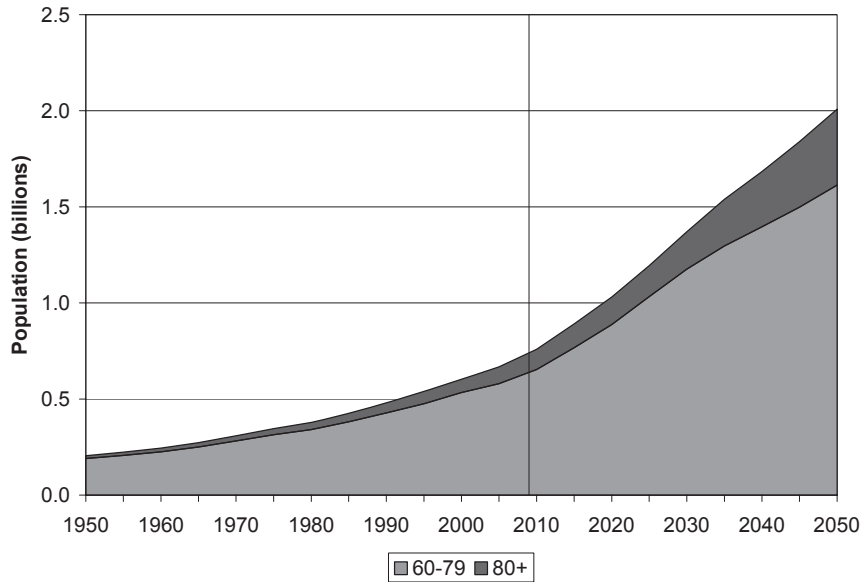
### **1. Global Population Aging**

Figure 1 shows the trend in the global population of people aged 60 and over.<sup>2</sup> In 2009, 680 million people worldwide were in this age group, representing 11 percent of world population, a fraction that is not very different from the 8 percent this age group represented in 1950. However, current population projections suggest that there will be a sharp acceleration in the number and share of the elderly. According to the latest estimates, the population aged 60 and older will increase from 680 million to 2 billion by 2050; over the same time the share of people over 60 will increase from 11 to 22 percent. While the world population is projected to be 3.6 times as large in 2050 as it was in 1950, the number of these who are 60 and over is expected to increase by a factor of 10, and those 80 and over will increase by a factor of 27 (UN, 2009).

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<sup>2</sup> The figures in this paper cover the time frame 1950–2050. Therefore, some of the underlying data reflect past trends and others are projections. Projections involve assumptions about future fertility and mortality, around which there is considerable uncertainty that these figures do not reflect.

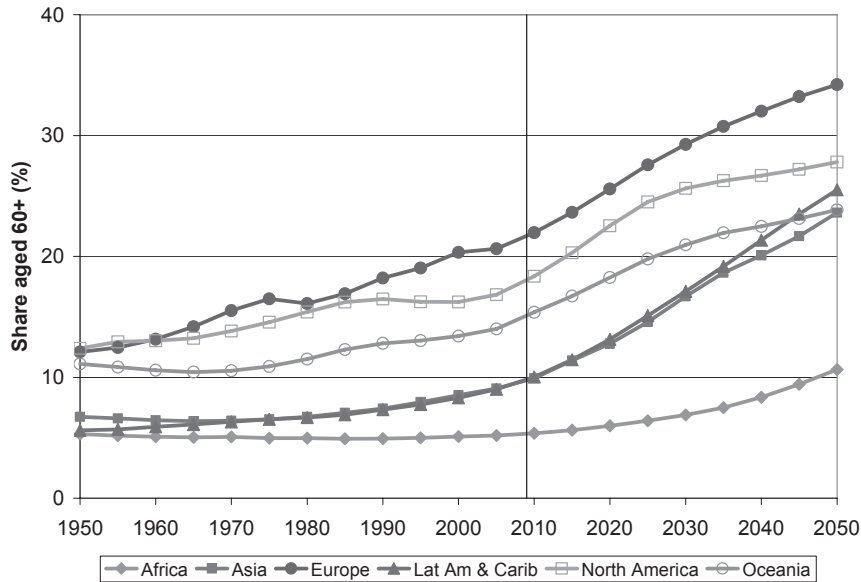
**Figure 1**  
**Projected Acceleration of Population Aging**



Source data: United Nations, 2009

Of course, these global averages mask considerable heterogeneity both across and within regions. Figure 2 highlights this heterogeneity across regions, showing the share of the population aged over 60 in different regions. At present this share ranges quite widely, from 5 percent in Africa to 22 percent in Europe. By contrast, there is much less heterogeneity with respect to the time trends. Population aging will take place in all regions in the coming decades as the 5–22 percent range today is projected to become an 11–34 percent range in 2050 (UN, 2009).

**Figure 2**  
**Share of 60-and-over population by region**



Source data: United Nations, 2009

There is also considerable heterogeneity within regions. For example, Scotland's population is aging much more rapidly than the population in most other parts of the United Kingdom or Europe as a result of consistent out-migration of working-age adults, low levels of fertility, and increasing longevity (Hollywood, Brown, Danson, and McQuaid, 2007; Lisenkova, Mosca, and Wright, 2008).

Table 1 shows the ten countries with the highest shares of people aged 60 and over in 2005 and those projected to have the highest shares in 2050. Japan currently has the largest old-age share in the world, with 27 percent of the population aged 60 and over. By 2050, the UN projects that this figure will rise to 44 percent. Japan's trajectory, however is not unique; by 2050, more than 70 countries, representing about one third of the global population, are expected to have an old-age share exceeding Japan's share of 27 percent today. It therefore seems clear that much of the world is heading into uncharted waters with respect to population aging.

**Table 1**  
**Countries with the Highest 60-and-over Population Shares, 2005 and 2050**

2005		2050	
	%		%
Japan	27	Japan	44
Italy	25	Republic of Korea	41
Germany	25	Singapore	40
Sweden	23	Germany	40
Greece	23	Bosnia and Herzegovina	39
Bulgaria	23	Italy	39
Latvia	22	Cuba	39
Portugal	22	Portugal	38
Belgium	22	Bulgaria	38
Austria	22	Poland	38

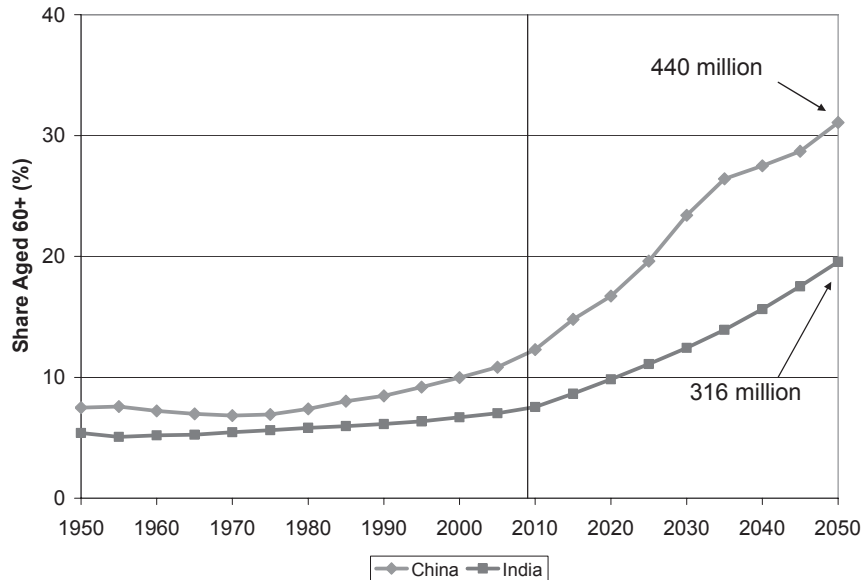
Source data: United Nations, 2009

Note: Figures for 2050 exclude Hong Kong, Macau, and countries with population less than 250,000.

The phenomenon of population aging is not limited to wealthy industrial countries such as Japan, South Korea, and Spain, but also affects the two largest developing countries, India and China. As Figure 3 shows, people in their 60s, 70s, 80s, and 90s will comprise 20 percent of India's population and 30 percent of China's by 2050 – adding up to over three-fourths of a billion people, more than the total 60-and-over population of the world today. The high old-age share will have significant implications for government finances, the need for and delivery of health care, and economic security of the elderly.



**Figure 3**  
**Population Aging in China and India**



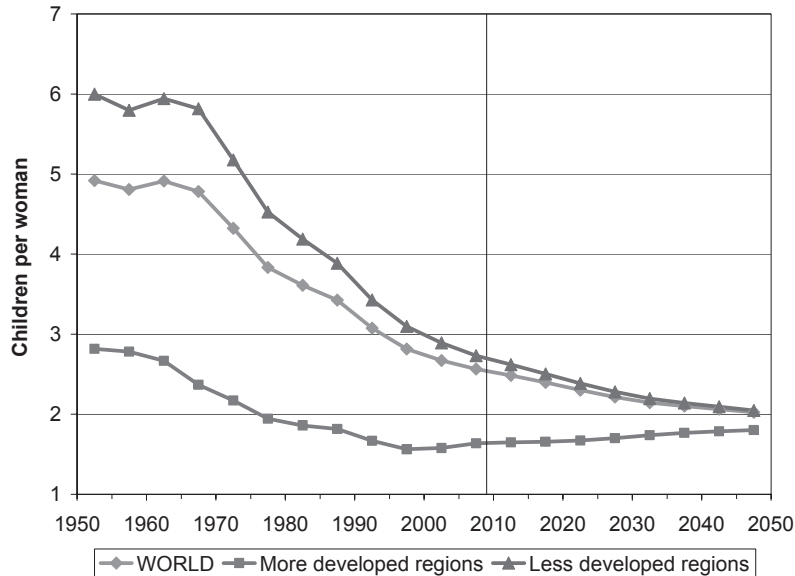
Source data: United Nations, 2009

## 2. Why Population is Aging

Demographers focus on three main drivers of population aging: age dynamics, fertility decline, and longevity increase. Age dynamics refers mainly to past variations in birth and death rates and how these play out in the evolution of a country's age structure. A good example of this is the baby boom in the United States, which took place between 1946 and 1964, and led to very large cohorts that are now swelling the ranks of the 60-and-over population.

The second major reason for rising old-age-shares is declining fertility rates. This phenomenon, which has taken place, or is still taking place, in most countries in the world, means that the share of older people will automatically increase, other things equal. Figure 4 plots actual and projected fertility rates (the average number of children born to a woman over her lifetime) over time. In general, 2.1 children per woman is considered to be the long-term replacement fertility rate for developed countries. The total world fertility rate fell quite sharply from about 5 children per woman in 1950 to a little over 2.5 in 2008. It is projected to drop further, to about 2, by 2050 (United Nations, 2009). This decrease is largely attributable to changes in fertility in the developing world and can be ascribed to a number of factors, including declines in infant mortality, greater levels of female education, increased labor market opportunities for women, and the provision of family planning services (Bloom, Canning, Fink, and Finlay, 2009; Bongaarts and Feeney, 1998; Tyers and Shi, 2007).

**Figure 4**  
**Declining Fertility**



Source data: United Nations, 2009

Figure 4 highlights the extent of demographic differences in the world. Among countries classified as developed in 2008, fertility rates have fallen to below the long-run replacement level. Several countries have dropped even below 1.5 children per woman. Current fertility rates are 1.2 in South Korea, 1.3 in both Singapore and Japan, and between 1.2 and 1.4 in a number of countries in Eastern Europe.

Rising life expectancy is the last of the three main reasons why the share of the elderly in the population is increasing. Over the last five decades, life expectancy increased by twenty years from 46 years in 1950–55 to 66 years in 2000–05. Global life expectancy is projected by the UN (2009) to rise by another decade over the next half century to 76 years.

A large group of researchers is investigating human lifespan today, and there appears to be a general agreement that the increases in life expectancy will continue. However, substantial disagreement prevails regarding the magnitude of these future changes. One school of thought – associated mainly with the work of James Vaupel (Oeppen and Vaupel, 2002; Vaupel and Gowan, 1986) – holds that life expectancy will reach 100 years in the latter half of this century in several of the wealthy industrial countries. An opposing school of thought contends that life expectancy will increase by only .5 years per decade and is not likely to exceed 85 in the medium to long term. For example, Fries (1980) and Carnes, Olshansky, and Grahn (2003) argue that the age ceiling is fixed so that old-age mortality is largely unchangeable. A third school of thought – associated with the work of Ronald Lee (2003) and John Bongaarts (2006) – contends that life expectancy will increase about 1.5 years per decade, with no ceiling.

An important related question is whether the increases in lifespan will be accompanied by general increases in old-age well-being and productivity. If the average age at death is postponed, but not the general physical and mental decay of the average person, increases in life expectancy add little value from the perspective of an individual, and may further aggravate the burden on the health care system. On the other hand, if advances in medicine postpone not only death, but also the onset of chronic disease, the potential increases in individual and aggregate welfare are large. This phenomenon, known as the “compression of morbidity,” means that the years people spend ill are compressed into a smaller part of the life cycle. Although there is not yet agreement, most of the evidence does suggest that morbid years have in fact been compressed over the last decades (Fries, 1980, 1989; Crimmins, 2004; Crimmins, Saito, and Ingegneri, 1997; Costa, 2002).

### **3. Population Aging and Economic Performance**

One question that naturally emerges from the large observed shifts in age structure concerns the effects of population aging on nations’ economic performance. Many authors, such as Peterson (1999) and Dychtwald (1999), as well as Lisenkova et al. in this issue, argue that population aging will diminish the productive capacities of nations. In general, these studies highlight the importance of labor and capital to the production of output and the creation of value. Their central contention is that there are strong life-cycle patterns related to work and saving. Since senior citizens do not work and save as much as younger adults, these studies predict that population aging will lead to a depletion of resources and will have large negative effects on economic growth.

Although the logic of this argument is sound, the narrow scope chosen in this type of study causes them to overstate the magnitude of the economic burden associated with population aging. This is so for two reasons: first, the exclusive focus on the elderly completely neglects other important differences in the age structure that are highly relevant for economic growth and development. Second, most existing studies assume individuals’ behavior to be constant and thus fail to consider a host of behavioral and policy adjustments that will naturally occur in response to population aging. Taking account of these two points leads to a significantly more positive economic outlook for an aging world.

One key factor for economic growth is the relative and absolute size of the labor force. The global labor force participation rate (i.e., the total labor force divided by the population aged 15 and over) is projected to fall 4.3 percentage points from 2000 to 2040, from 66.4 to 62.1.<sup>3</sup> Some scholars find this predicted change alarming. However, from a broader perspective, this decline represents less than half of a standard deviation in the cross-country distribution of the labor force participation rate for 2000. Moreover, a second accounting indicator provides a very different picture. The size of the labor force, when expressed as a ratio to total population (instead of to the population aged 15 and over), will actually increase, from 46.5 percent to 48.6 percent (Bloom, Canning, and Fink 2009). This change is due to falling fertility in developing countries. In other words, the increase in elderly dependents will be more than offset by a decline in youth dependents. This offset suggests that population aging does not pose an

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<sup>3</sup> Data for past labor force participation are from International Labour Organization, 2007. Projections are based on United Nations medium-fertility population projection and age- and gender- specific participation rates in 2000.

imminent economic crisis for the world. It is more accurately viewed as, at most, a modest issue for particular economies (such as the OECD).

This basic point – that despite an increasingly elderly population, the labor force is likely to be a larger share of the total population – is one reason to not be too pessimistic about the effects of population aging.

Behavioral change and institutional adaptation are two more reasons for viewing population aging as a manageable phenomenon from an economic perspective. Aging populations generally are associated with increased labor force participation of women, increased human capital accumulation among the young, and increased savings. These behavioral responses may be even stronger when supported by childcare, retirement, and immigration policies that allow for desirable adjustments in the labor market.

Declining fertility has led to, and will continue to lead to, greater female labor force participation. Bloom and colleagues analyze data for 97 countries during 1960 to 2000 and show that for every unit reduction in fertility, women tend to work two years more over their lives (Bloom, Canning, Fink, and Finlay, 2009).<sup>4</sup> Based on UN fertility assumptions for 2040, this translates into a 3 percentage point boost in the female labor force participation rate.

Second, fewer children generally mean healthier, smarter, and better-educated children as parents divide their resources among fewer offspring. Insofar as health, cognition, and education translate into higher adult productivity, lower fertility rates thus induce a further boost to economic growth (Bloom and Canning, 2000).

Third, demographic projections indicate further gains in longevity, as discussed above, including most probably gains in years of healthy life. In addition to the increases in private welfare, increased longevity is also expected to provide a boost to savings rates as people accumulate more capital in expectation of longer future periods of retirement (Bloom, Canning, and Graham, 2003). In economic terms, savings translates into investment, which in turn fuels the accumulation of physical and human capital and technological progress, which drive economic growth.

Fourth, it appears natural for people to respond to longer lifespans by planning on longer working lives (Bloom, Canning, Mansfield, and Moore, 2007; Kulish, Smith, and Kent, 2006). This notion, however, has not been reflected in public policy. Social security systems in many countries offer strong incentives for retirement between the ages of 60 and 65 (Gruber and Wise, 1998; Burtless and Moffitt, 1984). In addition, Bloom, Canning, Fink, and Finlay (2009) have shown that life expectancy has increased substantially more than the mean legal retirement age in a large cross-section of countries since 1960. Taking advantage of the willingness of older people to work for more years will require reforming this aspect of social security systems. Tight labor markets of the future – expected as a result of smaller cohorts entering the labor market – will provide strong impetus for such reforms if employers want to keep or increase the absolute size of their labor force in the long run. Increases in the legal retirement age are

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<sup>4</sup> Causality inferences are reasonably strong here as these studies rely on the timing of changes in abortion laws as a plausibly exogenous and valid instrument for fertility.

probably not imminent as long as global unemployment remains high, but such increases may well follow on the heels of any global recovery.

Developed and developing countries will have to adopt different approaches to addressing age-related issues if they want to provide economic security of the elderly. Rich countries have effective institutional structures for transferring resources between income groups and between generations; pension systems are consequently much easier to design and implement. Although some countries like China generate significant private savings, developing countries generally lack the private resources needed for funded pension schemes and the institutional base for pay-as-you-go schemes. As a result, developing countries are often forced to rely more heavily on traditional family networks and continued employment by the elderly. These family structures are breaking down because of fertility decline, spatial mobility of young people, and increasing female employment (Bloom, Canning, Fink, and Finlay, 2009). Even though wealthy industrial countries certainly face a greater and more imminent challenge in terms of their elderly populations, those countries also possess much greater resources to address the issue.

International migration policies also have the potential to ameliorate the economic effects of population aging by allowing some of the young workers in labor-abundant developing countries to move to the more rapidly aging developed world. Cross-country disparities in income and demographics will likely increase the pressure for migration substantially. Rodrik (2002) argues that allowing greater migration has far more potential to promote global income growth than does further liberalization of trade and capital mobility. Similarly, recent analysis in Scotland and Ireland concluded that positive net migration is the only likely future source of labor increase in these countries (Lisenkova, Mosca, and Wright, 2008). Encouragingly, since 2004 Scotland has seen increased in-migration, mostly from the European Union's newest members. Some countries see ever greater potential for the positive effects of immigration. The UK Financial Services Authority chair Adair Turner (2006) classified the UK's pensions system as manageable and even sustainable, based on the key measure of "combined population replacement rate," i.e., the total fertility rate plus the permanent net immigration rate. In the UK, the combined rate of fertility plus immigration was 2.1 in 2006 – exactly the rate for long-term population replacement and pension system sustainability. However, substantial institutional barriers to immigration are likely to persist, with high unemployment and social tension undermining political support for migration reform.

Independent of the actual magnitudes of future migration flows, all the evidence presented and discussed in this paper suggests that there is no reason to believe that aging will become a major burden for economic growth in the foreseeable future. Without any doubt aging societies pose a major challenge to the design and implementation of government programs in general, and health and social security in particular; significant policy efforts and reform will be required to ensure the long-term sustainability of these programs. However, from a purely economic perspective, the graying of societies is not a bad thing per se. As long as the private and public sector are flexible enough to adjust to the newly emerging societal structures, aging is unlikely to have much effect on economic growth.

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*"Closing Speech of the 5th World Ageing & Generations Congress"*,  
No. 2009/3

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