

Chapter 9

Demography and Ageing

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1 INTRODUCTION

Longer life expectancy has been a long-cherished dream throughout history, and today we can expect to live longer than ever, with many of us remaining healthy well beyond the age of 80. It is a great achievement to be celebrated. However, longer life expectancy also increases the proportion of the elderly in the total population, a trend known as population aging. Besides increased life expectation, declining fertility plays an important role in determining the level and speed of population aging. Developed regions of the world have been experiencing population ageing for more than 40 years, and this trend is expected to continue for several decades. Furthermore, a growing number of developing countries will experience population ageing in the first half of the 21st century.

Population ageing represents a major challenge that is unprecedented in human history: a shrinking working population is forced to support a growing number of economically inactive persons. This phenomenon gives rise to a multitude of pressing issues. How long will declining fertility persist in years to come? How rapidly will the number of older people grow? How high will the proportion of the elderly be in, say, 2050? What socioeconomic impacts can be expected as a result of population ageing? Is economic growth slowed down in an ageing world? What policies should be pursued to maintain economic growth to allow all segments of society to benefit? Can younger people no longer achieve a higher standard of living than their parents? Will a vast majority of older persons have to live on an inadequate income? How great are the increased costs required to support an increasing number of retirees? Who shares them and when? How are

they shared? Can the cost-sharing be equitable between different generations? Will the existing social security system for pensions be financially sustainable in the long run? Is it possible for us to avoid any adverse economic effects by reforming social security pensions? Do we indulge the present at the expense of children living and unborn? What will be a time-consistent policy for social security pensions, given the significant uncertainties about the likely shape of the world decades into the future? Are we wise enough to find solutions to the difficulties arising from longer life expectancy?

This chapter addresses these problems, identifying what is known and what is not known. The chapter particularly addresses two questions; firstly, how significant is demographic ageing, and secondly, whether there are any effective solutions. Section 2 deals with demographic trends and future prospects from global and regional perspectives. Section 3 examines the economic implications of population ageing. Section 4 discusses pension funding issues, and Section 5 gives concluding remarks.

2 DEMOGRAPHIC TRENDS AND PROSPECTS

2.1 Global and Regional Demographic Perspectives

In 2004, the total world population reached 6.4 billion persons. Its current annual growth rate is estimated at 1.3 per cent, considerably lower than its peak value of 2.1 per cent during 1965-1970. This slowing of global population growth has been primarily due to the almost universal reduction of fertility in recent decades. The number of countries with fertility levels above five children per woman dropped from 55 in the early 1990s to 34 10 years later. In contrast, the number of countries with below replacement levels of fertility increased from 51 to 62 over the same time period. It is also important to note that although most of these low-fertility countries are in the developed regions, the number of countries in the developing regions with below-replacement fertility doubled to 20.

Because of such reduced population growth rates for the world as a

whole in the late 20th century, the outlook today is substantially different from the one that demographers had a few decades ago. The 20th century was a century of explosive population growth, consequently causing unprecedented impacts on various socioeconomic aspects. In contrast, the 21st century is likely to see the end of world population growth and become the century of population ageing (Lutz, Sanderson, and Scherbov 2004).

Despite the lower fertility projected for the majority of populations and the increased mortality risks for some, the population of the world is projected to increase from 6.1 billion in 2000 to 8.9 billion by 2050, as shown in Figure 1. This is an expected net increase of 2.8 billion persons during the first half of the 21st century.

(Insert Figure 1 about here)

These projected net additions suggest that the potential still exists for significant population growth in the next few decades. It should also be stressed that population dynamics among the regions of the world will be increasingly diversified. At present, the population of the more developed regions is growing at an annual rate of 0.25 per cent, approximately one-sixth of the 1.46 per cent annual rate for the less developed regions, and almost one-tenth of the 2.4 per cent for the 49 least developed countries. It is important to note, as can be seen in Figure 1, that the population of the more developed regions is projected to decline after 2030, amounting to 1.22 billion persons in 2050, which is only marginally larger than 1.19 billion persons in 2000. This implies that most of the net additions to the world population will be in the less developed regions, with their proportion of the world population increasing from 80 per cent in 2000 to 86 per cent in 2050. Among the more developed regions, the population share of Europe will fall from 12 per cent in 2000 to 7.1 per cent in 2050, as depicted in Figure 2, while that of North America will change little at approximately 4 per cent for the next 50 years.

(Insert Figure 2 about here)

The total fertility rate for the developed regions is expected to decline slightly from 1.58 children per woman in 1995-2000 to 1.56 in 2005-2010. It is anticipated, however, that it will recover gradually to 1.85 by 2050. In contrast, in the less developed regions as a whole, fertility stood at 3.11 in 1995-2000 and is projected to decline to 2.22 in 2030-2035, further declining to reach 2.04 by 2050. It is also interesting to note that approximately three-fifths of both developed and developing countries are currently concerned about their level of fertility for totally opposite reasons. According to United Nations' projections, 28 out of 48 developed countries are concerned about the persistence of below-replacement fertility, while 84 out of 146 developing countries report that their fertility is too high (United Nations 2004).

Life expectancy at birth was 75 years in the more developed regions in 1995-2000, whereas it was 63 years in the less developed ones. The gap between the two groups of countries is expected to narrow over the next 50 years, reaching 82 years for the former and 73 for the latter. It should be noted, however, that a few recent studies on mortality point to the high likelihood that life expectancy for countries in the developed regions will improve at a considerably faster rate than anticipated (Keilman 1997, for example).

The United Nations' report *World Population Policies 2003* finds that high mortality is the most significant population concern for developing countries; more than 80 per cent of developing countries list infant and child mortality, maternal mortality and HIV/AIDS as the most imminent population and development concerns. These mortality risks will be directly influenced by the degree to which modern medical care services and public health measures become available to the poverty-stricken segment of the population in the developing countries, making it difficult to predict future conditions with any certainty.

(Insert Figure 3 about here)

This report also finds that the most significant demographic concern of developed countries relates to low fertility and its consequences, including population ageing and a decrease in the working-age population. The population in the more developed regions has been ageing at a rapid rate over the past few decades. In 1950, the proportion of persons aged 60 years old and over was 12 per cent, as shown in Figure 3. By 2000, it had overtaken that of children aged 0-14 years (19 per cent versus 18 per cent) and by 2050, it is expected to be double that of children (32 per cent versus 16 per cent). Consequently, as shown in Figure 4, the median age in the more developed regions rose from 28.6 years in 1950 to 37.3 in 2000 and is expected to reach 45.2 years in 2050.

(Insert Figure 4 about here)

Until recently, many of the governments of developing countries perceived population ageing as an issue only for developed countries. However, as depicted in Figure 3, the proportion of older persons aged 60 and over in developing regions increased from 6 per cent in 1950 to 8 per cent in 2000, and the tempo of population ageing is anticipated to accelerate in the years to come. By 2050, the proportion of older persons is expected to rise to 19 per cent, highly comparable to that of contemporary developed regions. The median age in these developing regions had changed only marginally from 21.4 years in 1950 to 24.3 years in 2000 (United Nations 2002), but it is expected to increase by almost 11 years to reach 35 by 2050, as shown in Figure 4. Subsequent to the United Nations' designation of 1999 as 'The Year of Older Persons', many developing countries have been increasingly concerned about various population ageing problems that require more focused attention in the process of formulating long-term development plans (Ogawa 2003).

Population ageing will result in a rapid increase in the number of

people aged 60 and over. At the global level, the number will rise from 606 million in 2000 to 1.9 billion in 2050, as presented in Figure 5. Because of their sheer population size, the developing regions are expected to undergo a substantially larger increase in the number of old persons than the developed countries. The older population in developing countries is projected to increase more than four times from 375 million in 2000 to 1.5 billion by 2050.

(Insert Figure 5 about here)

Population ageing has been most marked in Europe. By 2050, those aged 60 and over will account for more than one-third of its population. At present, by country, the population of Japan is the oldest in the entire world, with a median age of 41.3 years. Japan's population is expected to remain the oldest in the world over the next half century, with a median age reaching 53.2 years in 2050.

A number of East and Southeast Asian countries including Japan, the Republic of Korea, China, and Singapore, will face very rapid population ageing in the next 50 years. The driving force behind such rapid ageing is an unprecedentedly fast decrease in fertility. . These four countries have all experienced a similar decline in fertility, although the time period for each differs considerably. In the case of Japan, the total fertility rate declined by 50 per cent, from 4.5 children in 1947 to 2.0 children in 1957. Comparable reductions in fertility were recorded in : Singapore from 1966 to 1976, the Republic of Korea from 1971 to 1981, and China from 1973 to 1983. This decline in fertility is a serious cause of concern to policy makers. In 2003, the total fertility rate was well below replacement level in all these countries: 1.19 children for the Republic of Korea, 1.25 for Singapore, and 1.29 children for Japan. The corresponding figure for China in 2004 is estimated to be 1.69 children. Furthermore, there is no definite indication of a recovery in fertility rates in the foreseeable future.

As a consequence of their rapid reduction in fertility, these Asian countries enjoyed or are still enjoying the so-called 'demographic bonus', the mechanism of which works as follows. In the process of slowing population growth, the labor force continues to grow some years after fertility has started to decline, thus increasing the percentage of the population engaged in productive activities. Moreover, as a result of reduced fertility, more economic resources can be allocated to those in the labor force in order to equip them with better physical capital. In addition, increased economic resources facilitate improvements not only in the coverage of the education program but also its quality (Mason 2001).

It is important to bear in mind that the patterns of population ageing are broadly similar in most countries, but the timing differs substantially. For example, among the more developed regions, Japan, Germany, and Italy are forerunners, having the highest old-age dependency ratios at the present moment, followed by other EU countries. The population of the United States, by comparison, is relatively young among developed countries. These differences in the stages of population ageing among various countries will be sure to stimulate international movements of capital, goods and labor, moderating any possible adverse economic effects arising from population ageing within each country.

The number of international migrants increased worldwide by 21 million persons between 1990 and 2000, the majority of whom moved from developing to developed nations (United Nations 2004). On the one hand, a sizable proportion of these international migrants are making substantial contributions to their host nations. On the other, it is often the case that international migration entails the loss of qualified human resources for many developing countries and may become a source of political instability and socioeconomic tensions in a number of developed countries of destination.

2.2 Alternative Population Projections

The medium variant of the United Nations population projection provides a

useful base for gaining a rough perspective on population change at global, regional, and national levels. It is often the case, however, that national population projections prepared by each country produce more reliable and realistic estimates than those prepared by the United Nations, as they are usually based on a relatively rich data set compiled from population censuses and numerous sample surveys.

In their population projections, the United Nations applies the same set of assumptions on future longevity and fertility to countries at comparable development stages. For example, in the case of the medium variant of the most recent population projection prepared by the United Nations, the total fertility rate is assumed to become 1.85 in 2045-2050 for all developed countries. However, in their national projection, the government of Japan assumed a fertility rate of 1.39 in 2050. As a result, Japan's own estimates of its future demographic trajectory is considerably more problematic than the United Nations' projection.

2.3 Remaining Issues

There still remains a reliability issue with demographic projections. Short-run demographic projections are likely to be more accurate in comparison to economic projections, but longer-run projections are far from satisfactory. One of the primary reasons for this is a lack of reliable statistical data, especially in the less developed regions where long time-series data on mortality, fertility, and migration are least likely to be available.

In order to enhance the reliability of projected results, there is a long list of research studies that need to be conducted. For example, it is not entirely clear why some countries have a lower fertility rate than other countries, and why some regions within each country have lower fertility than others. Still controversial are the links between the social security system and fertility, and the link between female labor force participation and fertility. Least known are the quantitative effects of global ageing on migration. Another area for investigation is whether any family-friendly

policies will induce a steady increase in fertility.

3 ECONOMIC IMPLICATIONS OF POPULATION AGEING

This section considers how population aging is likely to affect the economic well-being of each country; if patterns of likely losers and winners can be discerned, and how policies adopted can influence economic outcomes.

3.1 A Closed Economy

Economists usually discuss the effects of ageing in two ways: adopting either a macroeconomic approach, or individualistic one. The macroeconomic approach often implies a pessimistic view on population ageing, while the individualistic approach is more likely to induce an optimistic scenario.

The macroeconomic approach assumes a following production function (F).

$$Y=A \cdot F(L,K)$$

where Y is national output (or gross domestic product, GDP) of a country, L the labor force, and K the capital stock. As the population ages, the relative size of the labor force over the total population will be reduced. In some countries, the labor force will even decrease in absolute size. Unless this is compensated by an increase in total factor productivity (A) and/or an increase in the capital stock, the national output will decline. The economic presence of these countries in the world will then shrink. This line of thinking implies a pessimistic view.

Smaller countries are not necessarily poorer ones, however. An individualistic approach considers *not* the absolute size of national output, *but* the per capita output (Y/N), where N is the total population.

$$Y/N=A \cdot f(L/N, K/L)$$

Per capita output can even increase in spite of a shrinking population with a falling national output, if labor force participation (L/N) or the capital labor ratio (K/L) increases. People can be wealthier even when the population is ageing or declining. This can be a cause for optimism, and thus the absolute size of the population does not always matter in an individualistic context. What really matters is labor force participation, capital intensity and the speed of increases in factor productivity. Economic implications will vary depending on different speeds of changes in these factors. Astute policies can bring about preferable results by affecting these factors.

The first important factor is labor force participation. Labor force participation rates vary among different age- and gender-groups, which are dominated by labor market entry and exit ages along with child-raising circumstances. They can be increased by earlier labor market entry ages through structural education reform and later labor market exit ages through pension reform. Pensions often have the incentive effect of inducing early retirement (see Chapters 10 and 16 of this volume). Pension reform to encourage later retirement is crucial for an ageing society, to minimize economic damage resulting from population ageing. Female labor force participation can rise, if child-raising does not deter women from engaging in paid employment. The established gender roles between men and women in employment and work within the home need to be reconsidered, and difficulties in reconciling paid employment with child care responsibilities can be mitigated through more family-friendly policies.

The second important factor is capital intensity. Population ageing will have a negative effect on increases in the labor force, directly leading to a higher capital labor ratio. If population ageing induces a lower saving rate, then it will usually reduce the capital labor ratio through decreased investment. Overall changes in capital intensity is then determined by these two opposing factors. Empirical studies verify their net effect, which differ country to country.

A simple lifecycle model implies that population ageing will lead to a decrease in national saving rates (Modigliani and Brumberg 1954). Still controversial is its empirical evidence, however, since in some developed countries no reduction in savings has been observed (Börsch-Supan 2003). National savings depend on not only a retirement motive (individuals saving for their own retirement), but also on other saving motives including precaution, bequest, education, and housing. National savings depend on the public-private mix of pension schemes. More prefunding for retirement through increased private initiatives might induce more savings. It should be remembered, however, that a higher saving rate means sacrificing consumption to some extent, possibly leading to lower utility or well-being. The maximum per capita consumption is attained when the economy is on the Golden Rule (Phelps 1966). A higher saving rate will be necessary if the existing capital labor ratio is below the optimal level on the Golden Rule. If not, people will opt for a lower rate of savings (Auerbach and Kotlikoff 1983).

The third important factor is productivity. Productivity growth can bring higher economic well-being even with an aging population. There is no reliable data currently available, however, on age-specific labor productivity. Higher productivity may be possible through human capital investment (a higher quality of education) and market-oriented job training with fuller labor mobility. Needless to say, technological innovation is also significant in this area. An aging economy needs stronger incentives for building a higher innovative capacity. More research is urgently needed to enable us to understand whether ageing societies are likely to suffer from a productivity decline.

3.2 An Open Economy

People in a country with an ageing population can enjoy capital income from foreign direct investment. GNP (gross national product) is larger than GDP if foreign direct investment creates large returns. GNP might be the more relevant indicator of when the country enjoys a substantial income from foreign direct investment. Capital usually moves with much less friction

than labor across countries. With a deregulation policy on foreign direct investment, an country with an older population can benefit from greater returns from direct investment than countries whose population is just beginning to age, or is still relatively young. Moreover, international nature of the flow of capital may lessen the possible melt-down of the asset market when the baby boomers decumulate their assets after retirement. .

Thus, the degree of capital mobility is quite crucial. Obviously, there is home bias in international portfolio choice, due to capital market frictions including tax provisions, different levels of information on country risks, and instabilities in global financial markets. An open economy also facilitates the international flow of goods and services, through which domestic consumers usually benefit. This too could mitigate the economic difficulties induced by population ageing in any country. Migration is the other positive source of well-being for people in an ageing country. Our understanding is still quite primitive, however, as to how much global ageing will affect migration.

In summary, smoother international movements of capital, goods and services, and labor can moderate any adverse economic effects of population ageing (Börsch-Supan 2004). Deregulations for stimulating these international movements will be required, together with reforms of existing socio-economic systems which were established when the country had younger populations. Overall, we understand the basic channels through which population ageing will exert economic effects, but lack intensive empirical research studies that would generate more specific quantitative data for individual countries with aging populations.

4 AGING AND PENIONS FUNDING

As ageing becomes a global phenomenon, the big challenge for the 21st century will be to provide an adequate income to older persons in ageing societies. In a few decades time, the overwhelming majority of the world's older populations will live in developing countries which at present have no or only limited social protection in old age. Establishing and extending

appropriate social security programs will be an absolute priority in the national agenda of these countries.

The situations is quite different in developed countries. Most of them set up social security programs when their populations were young enough, thereby providing an adequate retirement income to the majority of retirees. The coverage of social security is a comparatively minor issue in these countries at present, although a growing number of atypical employment patterns and migrant workers are inducing serious drop-out, thus threatening the base of participation in some countries. Instead, they will face the prospect of unsustainable pension obligations as their population ages. Some economists warn that, if governments continue on the course they have currently set, people in most developed countries will see sky-rocketing rates of social security contributions, drastically reduced retirement benefits, high inflation and a ruined domestic currency (Kotlikoff and Burns 2004). These difficulties form the so-called 'demographic time-bomb'.

Can pension reforms ensure that the old age security systems of developed countries will be financially sustainable in the long run? To do so, developed countries need to contain the increasing costs of social security pensions, while maintaining adequacy of pension benefits. This section addresses these problems, highlighting gaps and disputed issues in our current knowledge..

4.1 Growing Anxieties

Most developed countries have a pay-as-you-go defined benefit system for social security pensions. This system was a success story when the economy enjoyed a relatively high speed of growth with relatively young populations. It has been effective in reducing poverty among the elderly and also in providing people with a stable standard of living after retirement. Since 1980 or a little earlier, however, the pay-as-you-go defined benefit plans for pensions have been facing serious and growing criticisms in these countries. Among others issues, the financial burden is becoming very severe with the

declining rate of economic growth associated with population ageing. The system is losing popularity with younger people.

It is becoming difficult and undesirable for these countries to increase the contribution rate for social security pensions. Contributions to social security pensions operate as 'penalties on employment'. Further hikes in the contribution rate run the risk of damaging domestic companies that are facing mega-competition on a global scale, with adverse effects on the economy, including a higher unemployment rate, lower economic growth, lower saving rates and so on. Hikes in the contribution rate will also induce an incentive compatibility problem. For younger cohorts, the internal rate of return in the social security pension system is likely to be relatively low or even negative, leading contributors to find that their participation in the system does not pay. The Japanese case gives a typical example (Takayama 2003).

Another criticism leveled at the current pay-as-you-go defined benefit plan is that it exerts perverse redistribution effect. Through a massive transfer of income by social security pensions, the rich elderly are becoming richer, while other elderly people are still suffering from a low income. Political resistance to cutting the benefits level or to further increasing the normal pensionable age has been very strong. Many people feel that the government is breaking its promise with them, leading to a loss of credibility, as people increasingly mistrust the commitment of their governments to providing them with an adequate retirement income.

4.2 Pension Debate

The publication of the World Bank's *Averting Old Age Crisis* in 1994 prompted a heated debate on pensions world-wide. It identified three functions of old age security programs: redistribution, saving, and insurance, claiming that each function should be separated. It proposed a recipe involving three pillars: a publicly managed mandatory first pillar to combat poverty, a privately managed mandatory savings second pillar and a third voluntary saving pillar.

The 1994 World Bank approach faced immediate counter criticisms by social security experts who contended that the recipe would require individuals to bear significant risks (Beattie and McGillivray 1995). A rejoinder followed (James 1996) and a vast literature has been built up dealing with all aspects of retirement income provisions (Arnold, Graetz and Munnell 1998; Diamond 1996; Feldstein 1998; Fultz 2002; Gill, Packard and Yermo 2004; Gruber and Wise 1999; ILO 2001; OECD 1998, among others). The debate centered on the design of the second pension pillar. The World Bank held a conference on new ideas about old age security five years later, in order to re-examine both the evidence and the thinking on pensions and retirement security (Holzmann and Stiglitz 2001).

There are several points of agreement which seem to have been reached through the pension debates of the past ten years. First, the pay-as-you-go defined benefit system has been working not as a pure insurance system but rather as a tax-and-transfer system involving huge amounts of income transfers between generations. To some extent it is a problem between managers and trade unions, but mainly is a problem *between generations*. This produces a political difficulty: older people are committed voters while younger people and future generations currently have decidedly weak or no political powers. The interests of future generations are likely to be neglected in the political arena.

Second, the nature of the intergenerational contract is difficult for many people to understand. Maintaining a fixed rate of replacement in gross income terms is by no means 'a contract.' It is actually quite risky, pushing its costs entirely onto actively working generations or future generations. The benefits and contributions in pay-as-you-go defined benefit plans need some flexibility to respond to changing circumstances. The replacement rate embedded in the law is less a 'promise' in a strict sense, but the starting point of an ongoing process of adaptation to a changing and unpredictable world. Constant adjustments will be required to keep the system viable, and these will be viewed as 'political risks' (Diamond 1996).

Considerable efforts have already been made in some developed

countries including Sweden, Germany and Japan to prevent political risks in the future. An automatic balance mechanism or a sustainability factor has been introduced to adjust pension benefits to respond flexibly to never-ending changes in demographic and economic conditions (Heller 2003; Settergren 2001; Takayama 2005). Financial sustainability is often accomplished at the price of income adequacy after retirement. For instance, the United Kingdom succeeded in reducing social security benefits by 1996 to make the system financially sustainable. The system may face another problem of political sustainability in the future, however, since its benefit level will not be sufficient for many people to maintain a decent life after retirement.

Third, social security pensions are consumption allocation mechanisms, by transferring resources from workers to pensioners when pensions are paid. Under the pay-as-you-go system, the transfer is direct through contributions or taxes paid by workers. Under the funded scheme, pensioners liquidate their accumulated assets by selling to workers. In both cases, the disposable income of workers is reduced by the amount of resources transferred to retirees.

Supporting an increasing number of retired persons is possible if output grows. Economic output depends crucially on the supply of workers, and thus increasing the labor force participation of elderly persons, women and young adults will be required to maintain this supply (see Chapter 12 of this volume). In the light of this, we need to approach the question of funding from the perspective of circumventing constraints on economic growth. We must ask which revenue sources will slow down growth the least. Is the answer a wage (or payroll) tax or not? It should be remembered that the tax on consumption does not function as a direct levy on the saving and investment that powers the economy. It will make sense in some countries to fund part of the increased costs of a greying society by raising the rate of consumption-based tax.

Fourth, people in the more developed countries are increasingly concerned with the 'taste of pie' rather than the 'size of the pie' or the 'distribution of the pie' (Takayama 2003). When it comes to social security pensions, the most important question is whether or not they are worth

buying. It has become of secondary concern how big or how fair they are. The basic design of the pension program should be incentive-compatible. Contributions should be much more directly linked with old-age pension benefits, while an element of social adequacy should be incorporated in a separate tier of pension benefits financed by other sources.

The incentive-compatibility problem can be avoided with the notional defined contribution (NDC) plan, which has already been introduced in Sweden, Italy, Poland and Latvia. It will demonstrate to the public that everybody will get a pension equivalent to his/her own contribution payments. 'Every penny counts' was the selling phrase in Sweden when the NDC plan was advocated in early 1990s. Unfunded DC schemes can make transparent the relationship between contributions and benefits, thereby deterring evasion and other distorting behavior, and can also eliminate undesirable redistribution within the same cohort of individuals (Holzmann and Palmer 2005).

On the other hand, the NDC plan does have some disadvantages. Risks will be entirely on the shoulders of pensioners as there is no risk sharing between old parents and their children. Nor will it be easy for NDC plans to provide social security in the event of the invalidity or death of the breadwinner. Furthermore, the *notional* rate of return is usually set to equal wage increases, long-term averages of which are likely to be lower than long-term interest rates. If this is to be the case in the future, NDC benefit levels will be potentially lower than those under real DC plans.

4.3 Strengthening Private Initiatives

The majority of people in almost all developed countries are reluctant to accept further increases in taxes and/or social security contributions. Under these circumstances, people must be encouraged to become self-reliant after retirement. With stronger tax incentives, private initiatives will grow in due course. If this occurs, the future picture of distribution of income after retirement may be quite different.

Obviously the funded defined contribution scheme has some advantages

such as understandability (or transparency) and offers a flexible response to increasing diversity of life-style (increasing heterogeneity, increasing freedom to choose the place of work, working hours, and working periods, widening choices of no-kids, divorce, and remarriage, etc.). It also encourages people to be responsible and self-reliant, penalising irresponsible behavior that imposes cost on others, especially on future generations who have no political influence today.

Funded defined contribution plans will face several difficulties, however. First, the market rate of return is quite volatile in the short-term, producing large differentials. The rate of return from the financial market may decline with the ongoing population aging, and with an ample supply of funded money. It is not inflation-proof. Consequently insured people will face an investment risk (Campbell and Feldstein 2001). The income disparity after retirement will widen, and an increasing proportion of the elderly will suffer from low income. Some of the current retirees, namely asset-holders, will also suffer loss from a possible decline in the market rate of return on their assets.

Second, we must have appropriate regulations for funded schemes. We can learn from experiences of the Anglo-Saxon countries, but so far our knowledge about them remains insufficient. A particular gap in understanding concerns institutions against investment risks (see Chapter 25 of this volume). Third, the problem of administrative costs (Shoven 2000) will particularly affect low-income earners who will be forced to accept a relatively low rate of return.

Voluntary prefunding seems inevitable. Better instruments to minimize risks involved in the funded system are needed, as well as better understanding of individual behaviors induced by different provisions, the macro economic impacts, and the distributional outcomes from increased prefunding.

4.4 No Single Solution

Each country faces the dilemma that policy makers seek to make pensions

the vehicle for too many policy objectives. Japan, Singapore and China are typical examples (Takayama 2005; Asher 2005; Chen 2005). This runs counter to the standard theory of policy assignment, which suggests that each policy objective can be best attained only if it is matched with a different policy instrument.

Different objectives are often competing. Promoting later retirement may induce higher unemployment for younger people. Encouraging occupational and individual pensions can lead to early retirement. Tax smoothing or advance increases in the contribution rate for sound financing in the long-term will cause higher unemployment in the short-term. Financial sustainability often comes at the price of income adequacy in retirement. Solutions will be different depending on which objective is more important.

For an ageing society, increased costs are inevitable to secure a stable income for people after retirement, and to prevent poverty. We have no painless solutions for the future; no reforms without tears. The type of pain that we will have to bear will be different from country to country. It depends on a whole host of variables: the potential for economic growth; the balance between solidarity and self-reliance; perceptions about income disparity after retirement; understanding of intergenerational equity; the credibility of the government commitment; regulatory competence against investment risks, and the development of the capital market, and so on.

5 CONCLUSION

Aging is taking place on a global scale in the 21st century. The economic implications of ageing can be seen in both a pessimistic and an optimistic light, depending on different analytical frameworks, each country's specific conditions, and policies to be adopted. Increasing and smoother international movements of capital, goods and services, and labor can moderate any adverse economic effects of population ageing. Overall, higher economic growth can mitigate the difficulties in ageing societies, and employment with increasing

labor force participation of elderly persons, women and young adults carries the crucial key to financing adequate retirement income in the future.

Providing adequate income to senior citizens is a big challenge for the world with its aging populations. Enormous efforts will be necessary for developing countries to extend the coverage of social protection in old age in order to prevent insufficient retirement income for the vast majority of older people. Developed countries have been struggling to contain social security pension costs with the focus on increasing the normal pensionable age and introducing an automatic balance mechanism, together with giving a minimum income guarantee to older persons. Scenarios of bankrupt schemes for social security pensions will turn out to be overly simplistic and groundless. There are no magic bullets, however. No painless solutions for the future. No single policy will be sufficient on its own in addressing the long term challenges.

No one can claim to see clearly all the changes that lie in the decades ahead, but the challenge is hard to ignore. Missing from the picture is a more explicit consideration of economic consequences arising from population ageing. Missing as well, is a far greater commitment to research on the magnitude of the principal long-term risks in an ageing society, their sensitivity to key assumptions, and their implications.

In the end, life is still risky. We have to realize that we cannot completely eliminate all the risks associated with living longer. What we can do is to make greater efforts to control these risks at a minimum level.

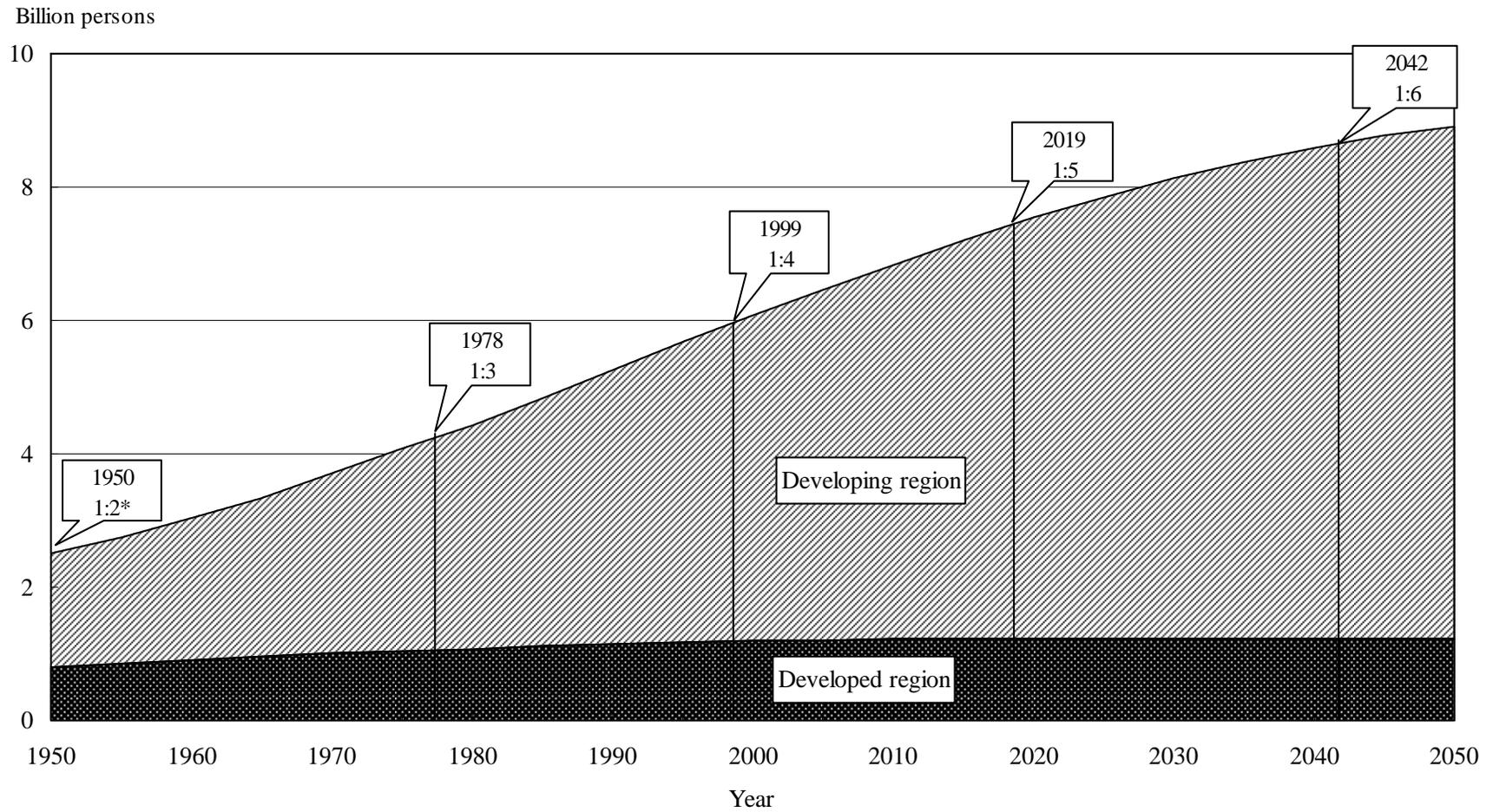
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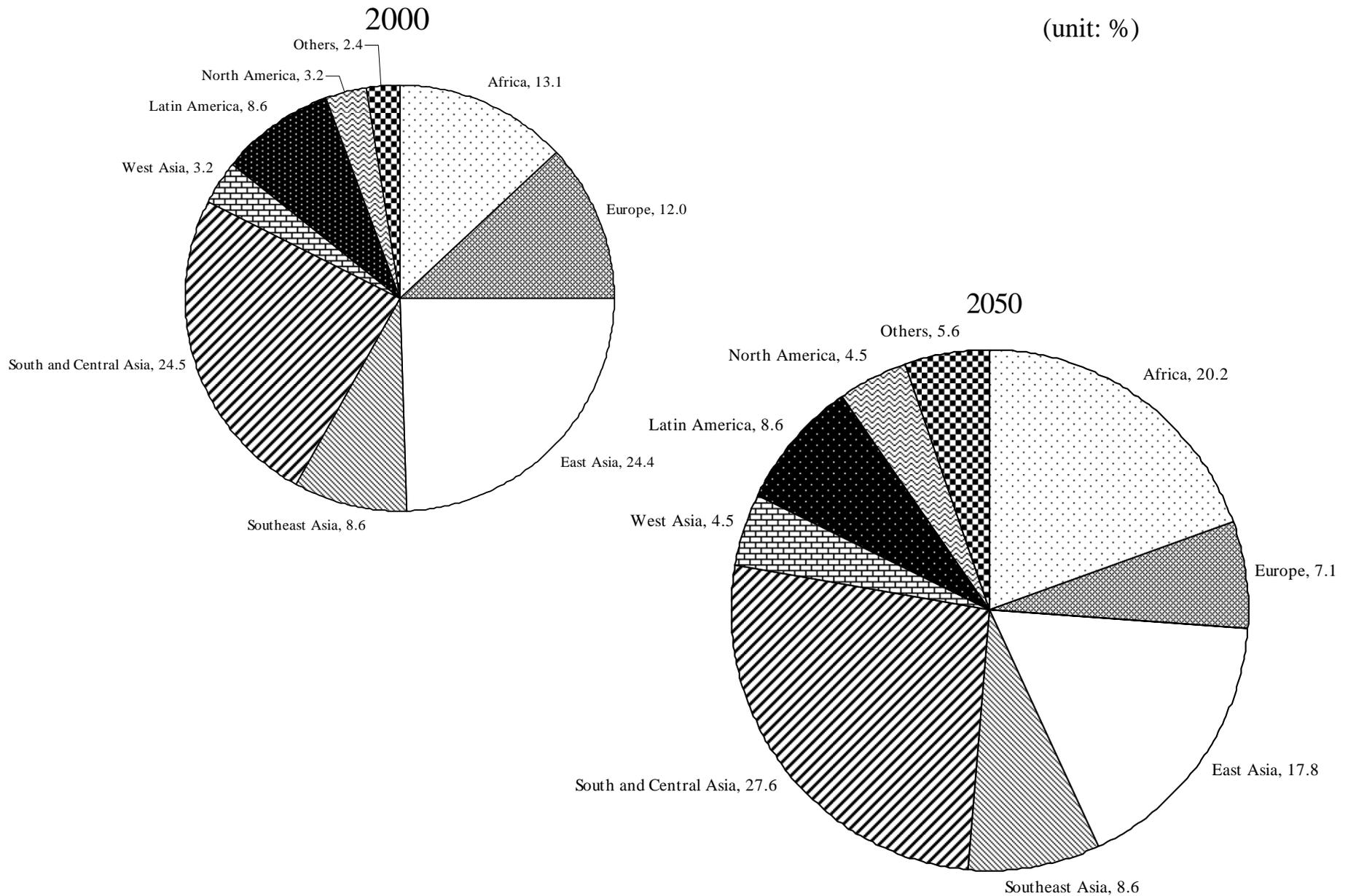
Figure 1. World population growth, 1950-2050



* Indicates ratio of population size in the developed region to population size in the developing region.

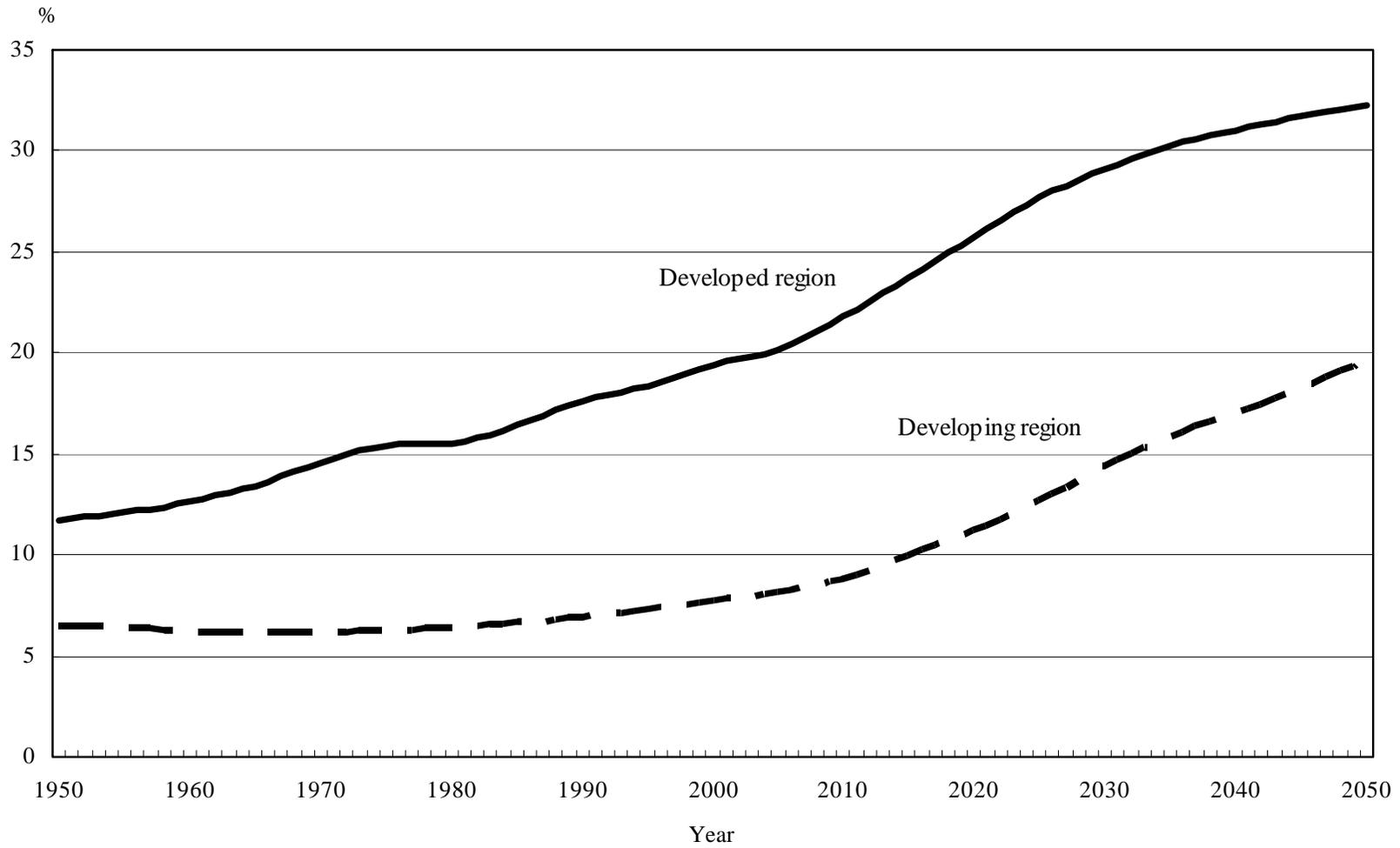
Source: United Nations, *World Population Prospects: The 2002 Revision*, 2003.

Figure 2. Population growth by region, 2000-2050



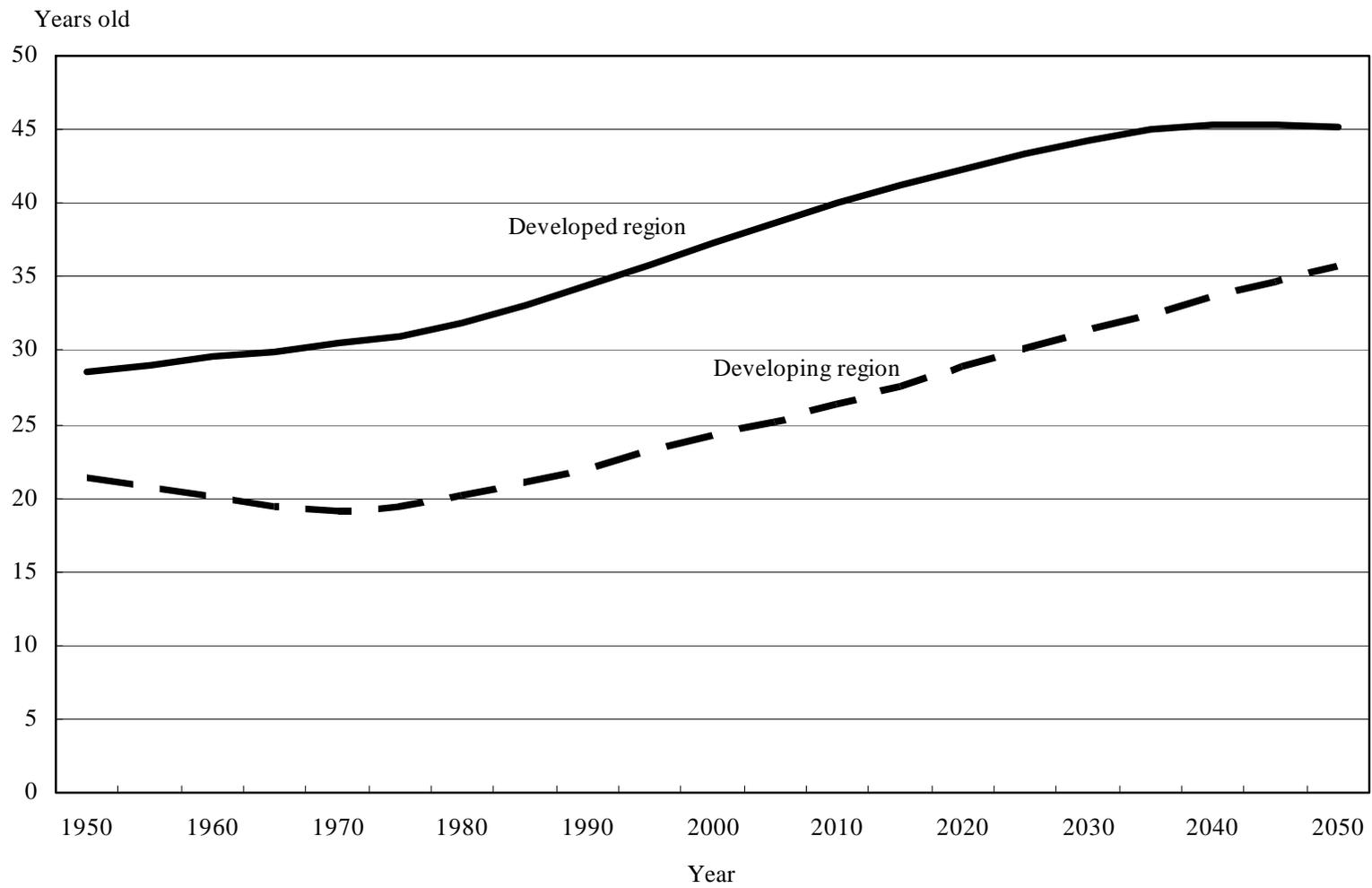
Source: United Nations, *World Population Prospects: The 2002 Revision*, 2003.

Figure 3. Change in the proportion aged 60 and over in developed and developing regions, 1950-2050



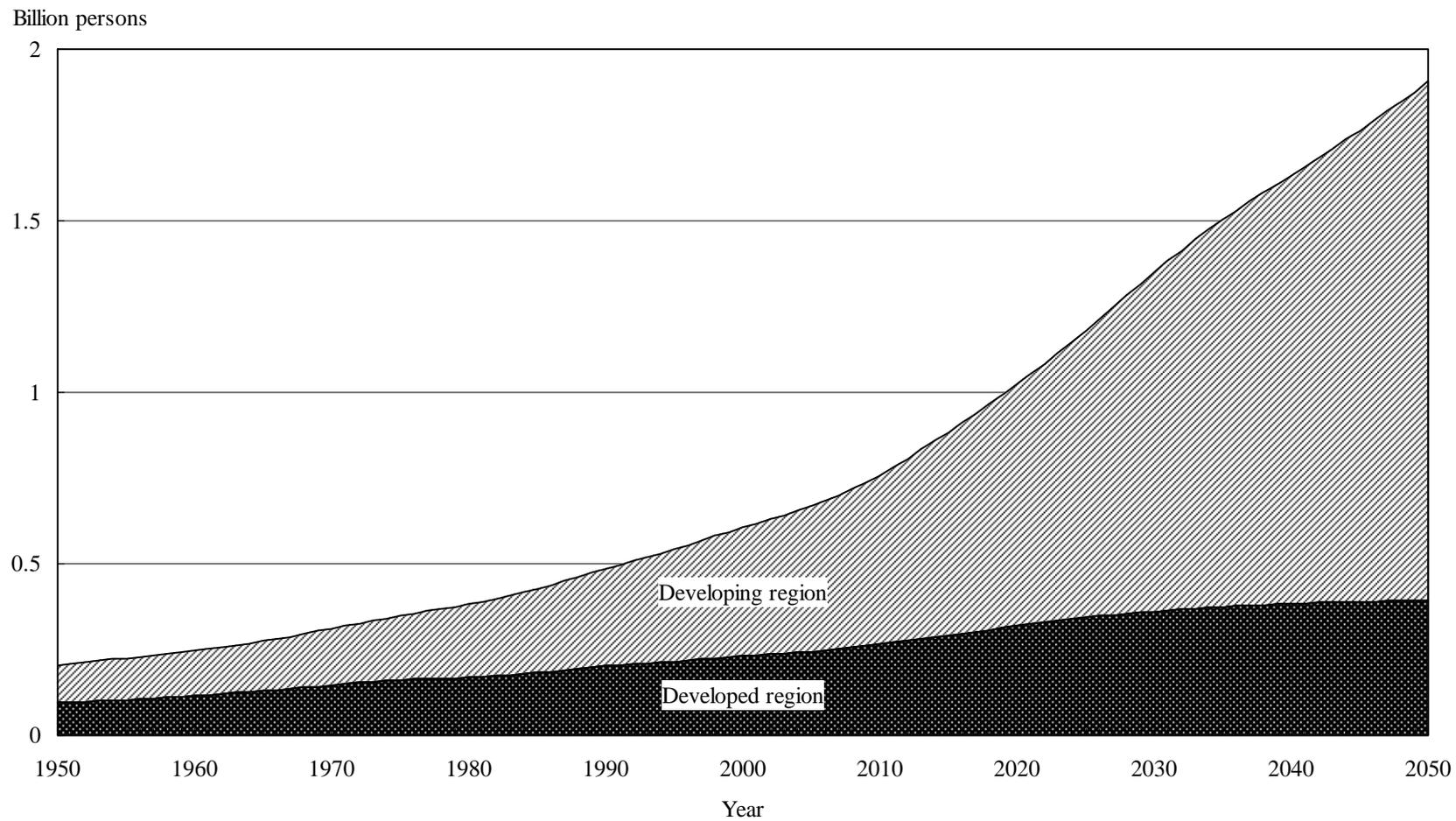
Source: United Nations, *World Population Prospects: The 2002 Revision*, 2003.

Figure 4. Change in the median age in developed and developing regions, 1950-2050



Source: United Nations, *World Population Prospects: The 2002 Revision*, 2003.

Figure 5. Growth of population aged 60 and over in developed and developing regions, 1950-2050



Source: United Nations, *World Population Prospects: The 2002 Revision*, 2003.