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## The economic consequences of population aging

### Report on a technical policy seminar

Over the past year, the debt crisis in Europe and the United States (US) has prompted many policymakers to seek options for reducing government expenditures. Some are concerned that expanding elderly populations will increase fiscal pressure on government-sponsored pension and healthcare systems. Such concerns have prompted a consideration of pension and healthcare reforms, including changes in the retirement age.

In other regions of the world, policymakers will face challenges of expanding elderly populations in a more difficult context—with weaker financial institutions and at lower levels of economic development. Although economists and policymakers differ in their views on the fiscal consequences of population aging, many would agree that one of the most important public-policy challenges of this century is to provide pensions and healthcare for rapidly growing elderly populations without placing unacceptable burdens on other age groups or jeopardizing economic growth.

On 19–20 September 2011, the United Nations Population Fund (UNFPA) and the East-West Center (EWC) held a Technical Policy Seminar on the Economics of Aging. The seminar was designed to assess: (1) the role of the public sector in an aging and uncertain world; (2) the implications of population aging for social, economic, and population policy; and (3) remaining gaps in knowledge that need to be addressed.

In opening the seminar, Werner Haug emphasized that developing economies facing the fiscal and institutional challenges associated with population aging will have a very short timeframe in which to act. Some leaders have turned to the United Nations (UN) for assistance in formulating appropriate programs and policies, and UNFPA is currently working to develop a shared understanding of the economic and fiscal consequences of population aging and to map out a coherent response. The technical policy seminar was designed to contribute to this effort.

## Changing population age structures

Populations are becoming older, with fewer children and more elderly, in every region of the world. This process of population aging is primarily the result of fertility decline. Over the past 40 years, total fertility rates (average number of births per woman) have gone down in all the world's most populous regions (Figure 1). In Africa, Asia, and Latin America, this trend is expected to continue over the next 40 years. Increasingly in these economies and in the highly developed economies where fertility is already low, gains in life expectancy are also contributing to population aging.

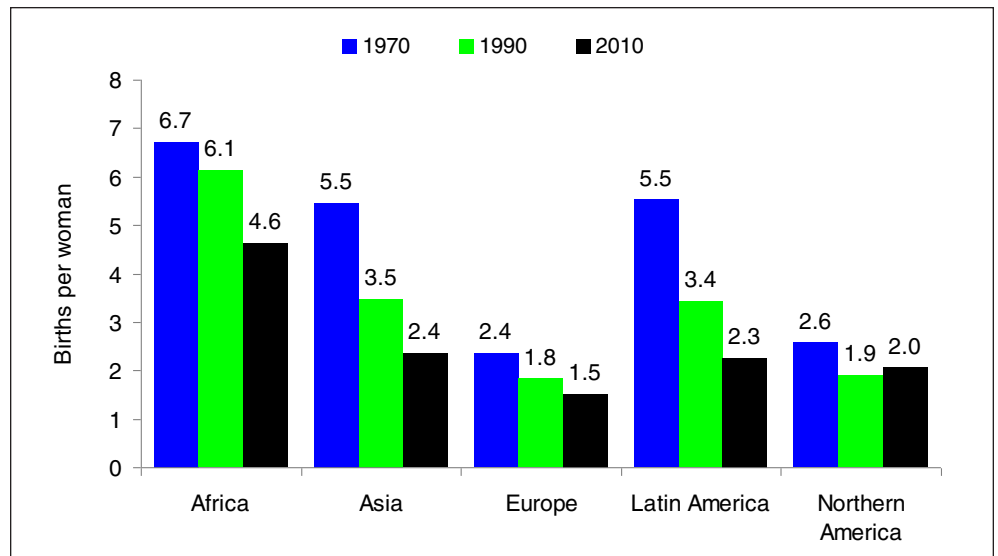
Today, in roughly half the world's economies, the population at working age is growing more quickly, in absolute numbers, than the population of children or the elderly. This creates a potentially favorable age structure for economic growth.

Among the economies covered by the National Transfer Accounts (NTA) project, this demographic process has hardly started in Nigeria. In 2010–15, the United Nations estimates Nigeria's total fertility at 5.4 children per woman and life expectancy at birth at 53 years (United Nations Secretariat 2010). High fertility and low rates of infant and child mortality result in a very young population, with 43 percent in the working-age group of 20–64, compared with 53 percent age 0–19 and only 3 percent at age 65 and above (Figure 2a).

By contrast, the process of population aging is well underway in Brazil, with a total fertility rate in 2010–15 at 1.8 children per woman and life expectancy at birth at 74 years. Fifty-nine percent of Brazil's population is in the working-age group, compared with only 34 percent age 0–19 and 7 percent age 65 and above (Figure 2b).

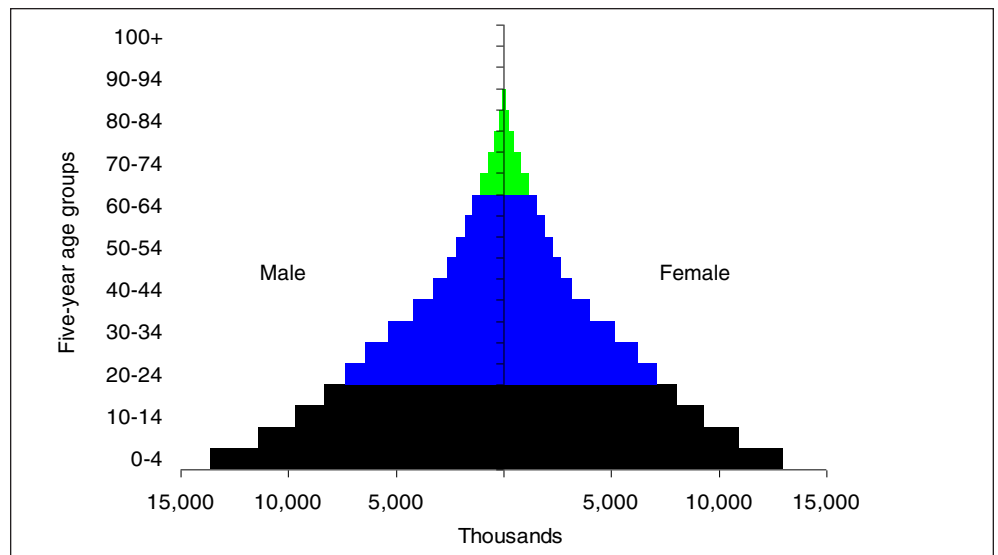
The other half of the world—living in Europe, North America, and East Asia—has completed this phase of the demographic transition. In these societies, high life expectancies have combined with low—and in some cases very low—birth rates to change the age structure of populations still further. Often surprisingly quickly, these populations will come to consist of very few children, not many workers, and many old people.

Japan exemplifies this stage of demographic change, with total fertility in 2010–15 estimated at only 1.4 children



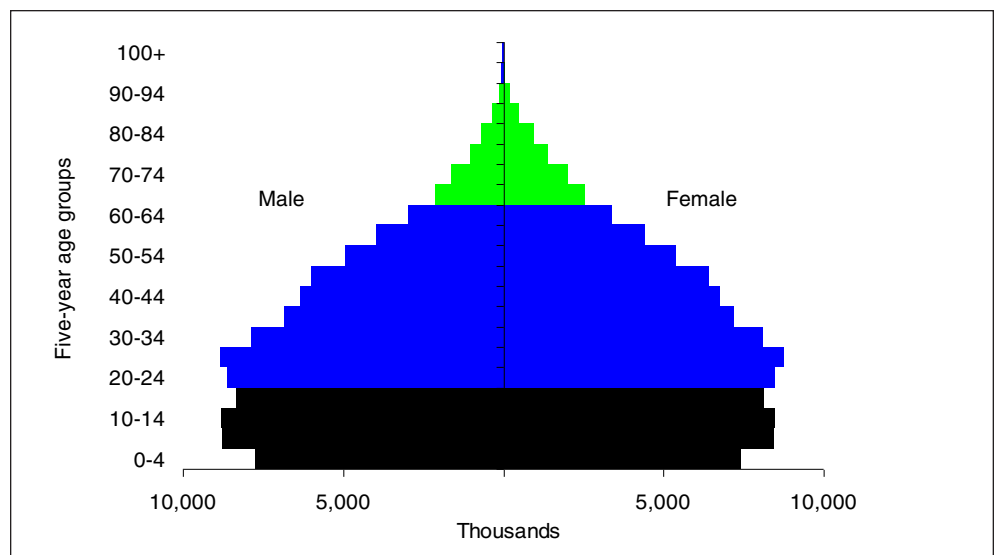
**Figure 1. Total fertility rates in major regions of the world, 1970, 1990, and 2010.**

Source: Mauricio Soto, presentation at the Technical Policy Seminar on the Economics of Aging.



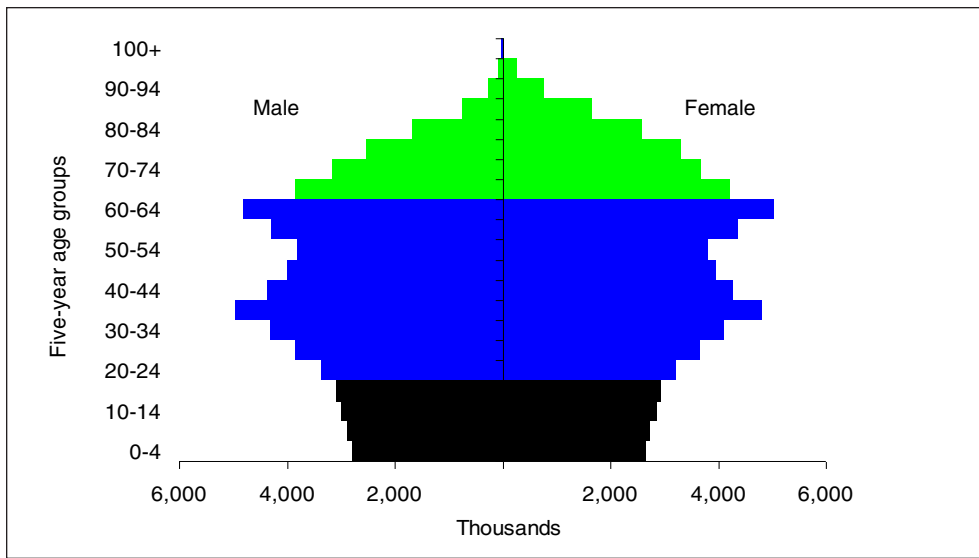
**Figure 2a. Age and sex structure of the population of Nigeria, 2010.**

Source: United Nations Secretariat 2010.



**Figure 2b. Age and sex structure of the population of Brazil, 2010.**

Source: United Nations Secretariat 2010.



**Figure 2c. Age and sex structure of the population of Japan, 2010.**

Source: United Nations Secretariat 2010.

per woman and life expectancy at 84. Fifty-two percent of Japan's population is in the working-age group, while only 18 percent are young, and 23 percent are elderly (Figure 2c).

Over the next 40 years, populations will become older in all the most populous regions of the world (Figure 3). In Africa, Asia, and Latin America, the proportion under age 20 will decline, and the proportion age 65 and above will increase, although there is considerable variation within Asia. In Europe and Northern America, the proportion of children is already small, but the proportion of elderly will increase. This shift in the relative size of population age groups is occurring and will continue to occur at unprecedented speed. In Japan, for example, the fastest-growing

segment of the population is centenarians—over the past 50 years, the 100+ age group has grown at an annual rate of 13 percent.

### Why does population age structure matter?

Changes in the age structure of a population assume economic importance because of a fundamental feature of the economic life-cycle—working-age adults produce more through their labor than they consume, while children and the elderly consume more than they produce. This economic pattern is only possible because resources flow over time and across generations through a complex system of social, economic, and political institutions.

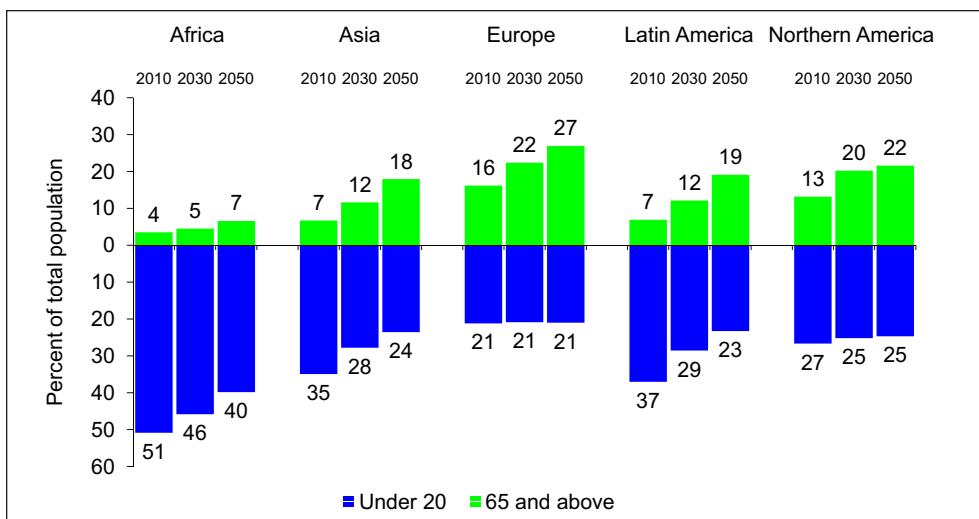
In the past, the main challenge was to provide for the resource needs of children because they were such a large component of the population. This is still the case in many low- and middle-income economies. As populations age, meeting the resource needs of the elderly becomes more challenging. In many economies today, however, populations have become increasingly concentrated in the prime working ages—the period of life during which more is being produced than consumed. This has potentially favorable implications for standards of living and economic growth.

Conventional analysis of the economic implications of population aging relies on fixed age groups that often classify dependents as those under age 15 or age 65 and above. This is a useful starting point, but Ronald Lee and Andrew Mason presented the alternative NTA approach. NTA recognizes variations in the extent of dependency among people of different ages by examining actual labor income and consumption for each one-year age group.

Labor income is a broad measure that reflects variation across age in labor force participation, unemployment rates, hours worked, and wages. NTA defines labor income comprehensively to include the value of most productive work: the earnings of employees, employer-provided benefits, taxes paid to the government by employers on behalf of employees, the proportion of entrepreneurial income that is a return to labor, and the estimated value of unpaid family labor.

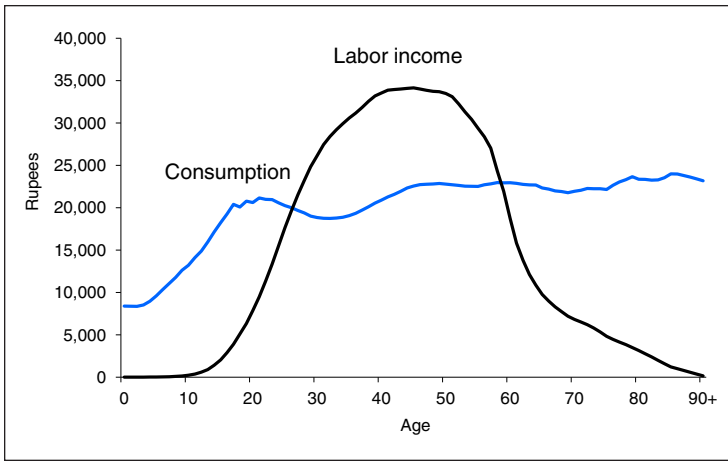
Consumption in NTA includes goods and services from both public and private sources. Separate estimates of public and private consumption are constructed for every NTA economy in three categories—education, health, and other goods and services. This provides comprehensive estimates of human-capital spending by age for economies at widely varying levels of development—estimates that are not available from other sources.

One current shortcoming is that NTA estimates of labor income do not include the value of time associated with child-rearing and other at-home activities that do not produce market goods or services. As a consequence, women's labor is not fully documented, and consumption and transfers of nonmarket goods and services are undervalued. NTA researchers are currently exploring how to incorporate the value of these elements more fully.



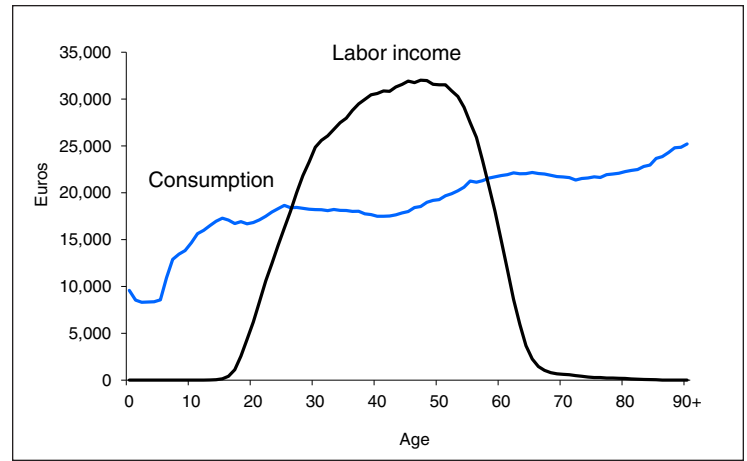
**Figure 3. Percentage of total population under age 15 and age 65 and above in major regions of the world, 2010 and projected for 2030 and 2050.**

Source: United Nations Secretariat 2010.



**Figure 4a. Per capita labor income and consumption by age in India, 2004.**

Source: Mason and Lee 2011.



**Figure 4b. Per capita labor income and consumption by age in Germany, 2003.**

Source: Mason and Lee 2011.

Keeping in mind these limitations, the NTA approach reveals remarkably similar patterns among economies at widely different stages of economic development. In India and Germany, for example, per capita consumption exceeds labor income for two long periods of life (Figure 4). These bracket a surprisingly short period—little more than 30 years—during which more is being produced than consumed.

Striking differences occur, however, when population age structure is combined with per capita values to estimate consumption and labor income for an economy as a whole. The lifecycle deficit, defined as consumption in excess of labor income, is particularly high for the young in India and for the old in Germany (Figure 5). The extraordinary differences between India and Germany are driven primarily by differences in population age structure, with many children in India

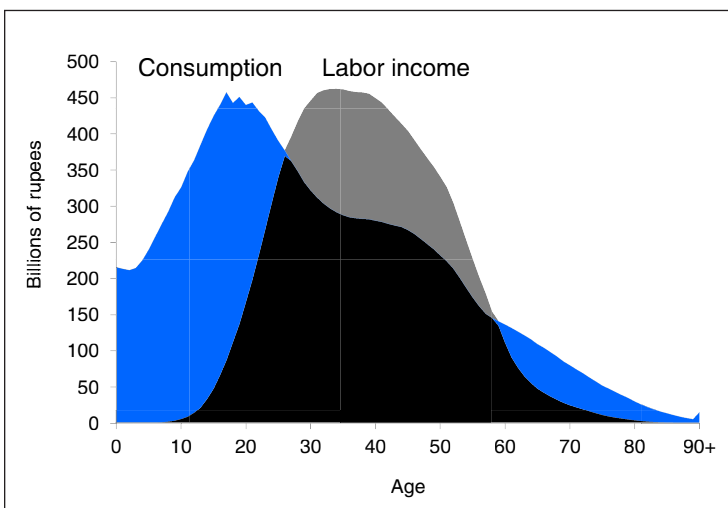
and many old people in Germany. In addition, in high-income economies such as Germany, the elderly tend to consume a great deal of healthcare, reinforcing the effect of the population age structure.

The age patterns of consumption and labor income that make up the economic lifecycle reflect the goals, institutions, economic conditions, social consensus, and policies that are unique to each society at each point in time. Societies differ, for example, in how much education they provide to children and how much they spend on the healthcare needs of their elderly. They differ in the age at which young people enter the labor force and the success of their transition into productive employment. They differ in attitudes and policies concerning retirement, and they differ in levels of disability at old age.

Perhaps the most important generational feature of any economy is the

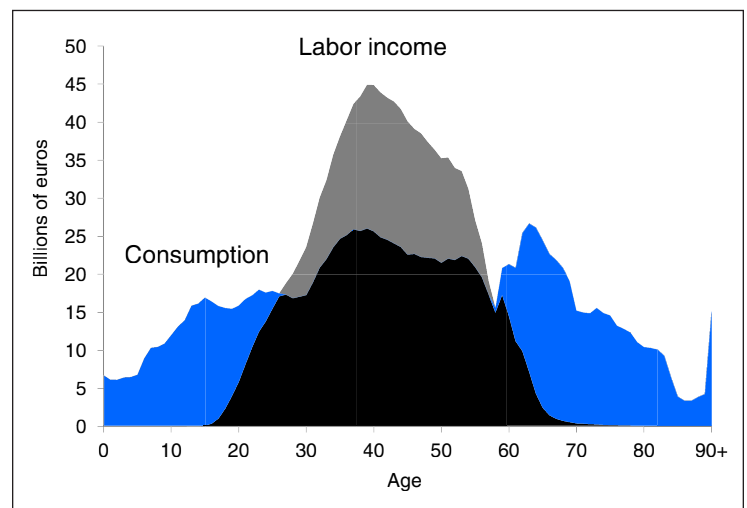
resource flows between age groups that underlie the economic lifecycle. As with the age patterns of consumption and labor income, these flows are influenced by the unique features of each society. But for each age group in any society, the gap between consumption and labor income must equal the total of three resource flows: (1) net private transfers that occur primarily within families plus (2) net public transfers that occur through government taxes and programs plus (3) asset-based reallocations that include the use of asset income plus any dis-saving or selling off of assets.

Estimates of the relative importance of private transfers, public transfers, and assets, available from the NTA website ([www.ntaccounts.org](http://www.ntaccounts.org)), provide important insights into changing social patterns and the effects of public policy. Both families and governments may support the young and the old by transferring resources, and



**Figure 5a. Aggregate labor income and consumption by age in India, 2004.**

Source: Mason and Lee 2011.



**Figure 5b. Aggregate labor income and consumption by age in Germany, 2003.**

Source: Mason and Lee 2011.

in both cases the support comes primarily from working-age adults. Families are generally the primary institution supporting children. The role of families in old-age support is more varied—very often, older family members provide more support to the young than they receive.

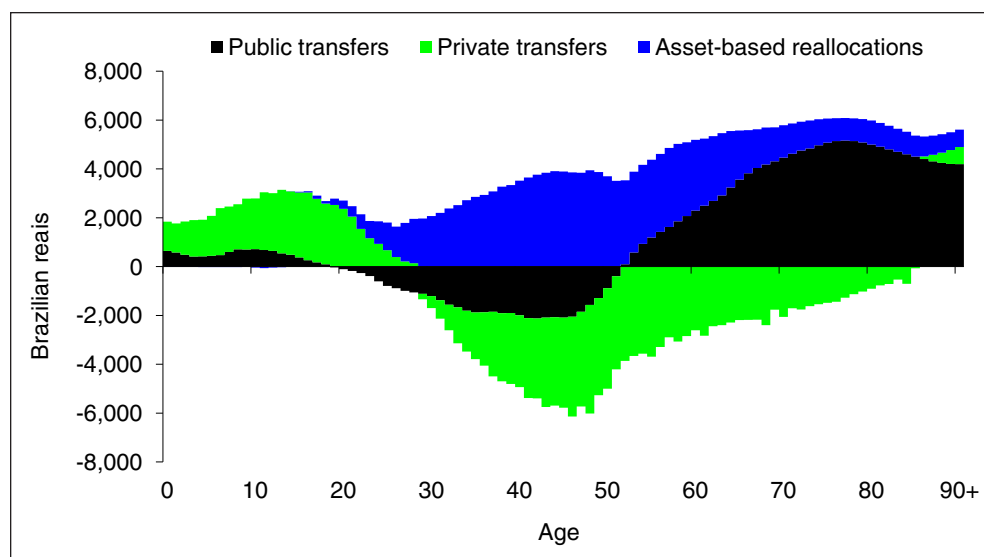
Governments at the local, regional, and national level play an important role by imposing taxes, most heavily on working-age adults, and providing benefits to all age groups, but particularly to the young and the old. Education, pensions, and healthcare are important examples of public programs that transfer resources between age groups.

In addition to relying on income from their labor and from transfers, people fund their own consumption and the support they provide to others through income earned from assets and, in some cases, from spending down their savings. They may accumulate assets during their working lives or acquire assets through gifts or bequests, most often from family members.

Support systems for children and the elderly vary widely, and these systems have changed a great deal over time. In traditional settings in the past, children relied on their families and perhaps their villages for support. Children also often began working at early ages, and the elderly often worked and supported themselves until they died. The role of assets is less clearly understood, but the accumulation of capital in the form of housing, farms, and other businesses produced returns that helped support all family members. In such situations, governments could play a useful role by maintaining the security of assets and providing an efficient and equitable legal environment, but they provided very limited direct support to children or the elderly.

With social modernization and economic development, support systems have changed in two ways: Public transfers to children have become more important, primarily in the form of education, and family transfers to the elderly have diminished. In some economies today, the elderly rely to a great extent on large-scale public transfer systems. In other economies, they depend much more on assets accumulated over their lifetimes.

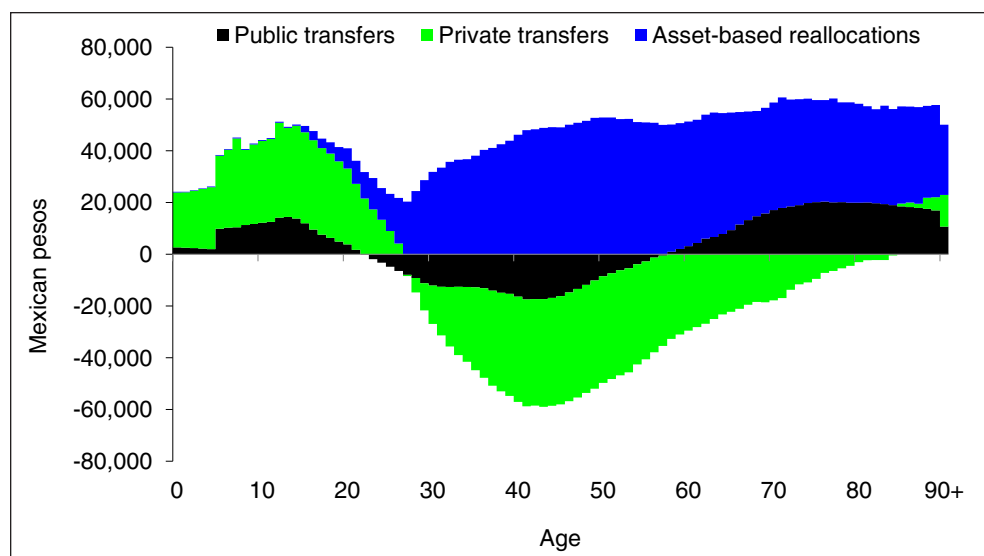
Brazil and Mexico illustrate common patterns but also reveal some striking differences (Figure 6). In both economies,



**Figure 6a. Per capita public and private transfers and asset-based resource flows by age in Brazil, 1996.**

Source: Calculated from data on the NTA website ([www.ntaccounts.org](http://www.ntaccounts.org)).

Note: Negative values for net public and private transfers occur when an age group is giving more than it is receiving.



**Figure 6b. Per capita public and private transfers and asset-based resource flows by age in Mexico, 2004.**

Source: Calculated from data on the NTA website ([www.ntaccounts.org](http://www.ntaccounts.org)).

Note: Negative values for net public and private transfers occur when an age group is giving more than it is receiving.

families provide most of the consumption needs of children through private transfers. And in both, the elderly provide more resources to their families than they receive, at least up to their mid-80s. But in Brazil, the elderly receive much larger public transfers than do the elderly in Mexico, primarily in the form of pension benefits. Brazilians become net beneficiaries of public transfers at age 52, while Mexicans pay more in taxes than they receive in public benefits until age 58. And throughout old age, Brazilians receive significant pension

income. The elderly in Mexico continue to work longer than the elderly in Brazil and tend to support themselves largely through asset income.

The key point from such an analysis is that both population age structure and the special features of the economic life-cycle in each society have important economic and policy implications. An analysis of all these factors helps provide a basis for understanding how policy might influence the relationship between age structure and economic behavior in the future.

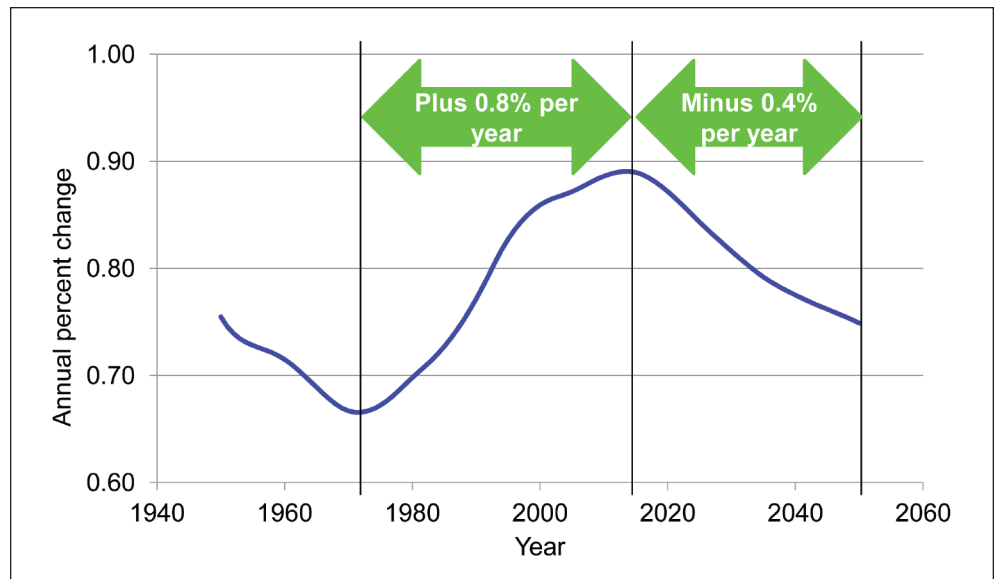
## Population aging and the macro economy

NTA measures the direct effect of population age structure on economic growth in terms of the support ratio—the effective number of producers relative to the effective number of consumers. The effective number of producers is the sum of the population in each one-year age group weighted to incorporate estimated age differences in labor force participation, hours worked, unemployment, and productivity. The effective number of consumers is the population in each age group weighted to incorporate age differences in consumption.

The support ratio changes in a systematic way over the demographic transition. China's support ratio, for example, declined between 1950 and the early 1970s because high fertility resulted in large numbers of children (Figure 7). Since then, the support ratio has risen sharply with a steep drop in fertility, providing an impetus for economic growth. Within a few years, however, China's support ratio is expected to decline again as a larger share of the population reaches old age.

Studies of changes in the support ratio in East Asia provide evidence that favorable changes in age structure have contributed to the region's economic success (Bloom and Williamson 1998; Mason 2001). Other studies have shown that a rise in the support ratio has led to higher per capita income in a wide range of developing economies (Bloom and Canning 2001; Kelley and Schmidt 2001).

Over the next 20 years, many developing economies will experience very significant increases in their support ratios—throughout Africa and in many economies of Latin America and South and Southeast Asia (Table 1). For these economies, policymakers will face two broad challenges. The first is to insure that the increase in the potential workforce leads to greater employment in productive jobs. The second is a longer-term issue—to prepare for the day when the support ratio declines and expansion of the elderly population becomes the dominant demographic trend. Support ratios in Latin America, for example, are projected to decline after 2030, falling to lower levels in 2050 than they were in 2010.



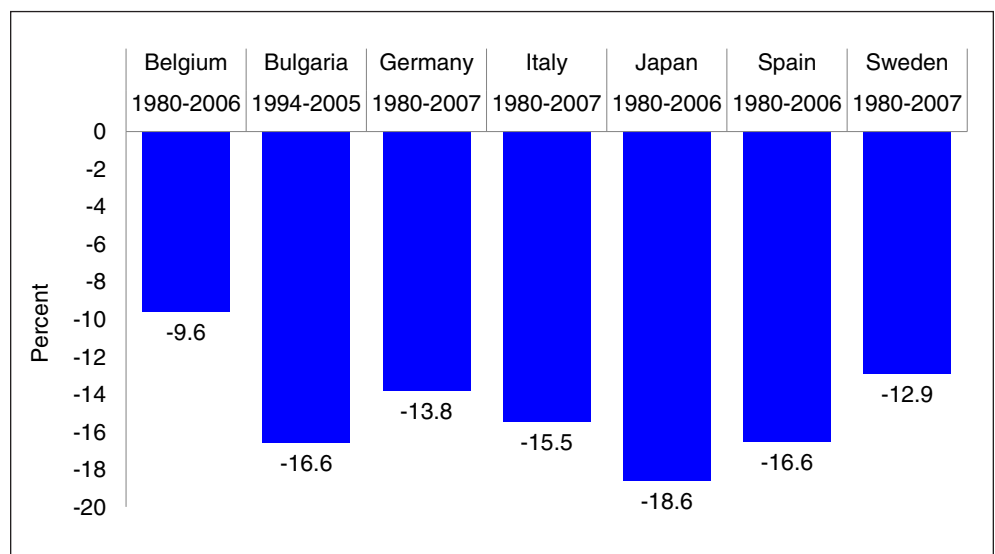
**Figure 7. Changes in the support ratio in China, 1950–2050.**

Source: Andrew Mason, presentation at the Technical Policy Seminar on the Economics of Aging.

In other economies, where the support ratio has reached its peak or has already begun to decline, policymakers also face two challenges. The first is how best to sustain economic growth when the number of workers is declining relative to other age groups. For some economies, the drag on growth from a declining support ratio could be substantial. For example, between 2010 and 2050, China is projected to experience a net annual decline in its support ratio (Figure 7) that will depress annual per capita growth by 0.4 percent in the absence of offsetting changes.

The second challenge is how to sustain or reform public programs that address the needs of growing elderly populations. The support ratios for Japan, Germany, South Korea, and Spain, for example, will decline by an annual average of 0.65 percent or more over the next four decades. Other things being equal, the resources available from taxpayers are clearly posed to rise more slowly than the support needed by children and the elderly.

Although several studies have shown that favorable changes in population age structure can contribute to economic



**Figure 8. Change in labor share of income in seven European economies over the past two decades.**

Source: Michael Herrmann, presentation at the Technical Policy Seminar on the Economics of Aging, based on data provided by M. Charpe and R. Torres, International Institute for Labor Studies, International Labor Organization (ILO).

growth, the links between the size of the working-age population and a robust economy are far from automatic. Indeed, many economies have been unable to achieve strong economic growth even with favorable changes in the support ratio (Mason 2005).

As Michael Herrmann pointed out during the technical policy seminar, an increase in the working-age population does not necessarily lead to an increase in employment. In fact, average labor productivity—the amount produced per worker—is a far more important component of total output than the size of the labor force per se. To meet the challenges of population aging, policymakers need to ensure that growing working-age populations are supported by robust employment rates and rising labor productivity.

Understanding the role of demographic change, employment rates, and labor productivity can help shed light on several important policy issues: (1) why the demographic dividend has been larger in some economies than in others; (2) how policies can build on expanding working-age populations to achieve economic growth; and (3) what policies might reduce adverse economic effects when the relative size of the working-age population begins to decline.

During the seminar, Heiner Flassbeck stressed the importance of maintaining strong economic growth and robust employment rates throughout the demographic transition. Potential economic gains will only be realized if growth in the working-age population is accompanied by growth in the number employed.

Eventually, as pension and healthcare costs rise with expanding elderly populations, workers may have to set aside as much as 25 percent of their wages to support their old age. They will only be willing to do this if wages are rising and if they feel confident that the funds they set aside today will be available, with appreciation, in the future.

Michael Herrmann observed that labor income in many advanced economies has remained stagnant or gone down in recent years relative to the return on capital (Figure 8). If economic growth is stagnant and unemployment or underemployment is high, as is the case today in many economies, workers will be unwilling or unable to set aside funds for current retirees or to save for their own retirement.

**Table 1. Support ratios for 23 economies, 2010 and projected for 2030 and 2050.**

Region and Economy	Base Year	Support Ratios (effective number of producers per 100 effective consumers)		
		2010	2030	2050
<b>Africa</b>		66	75	86
Kenya (KE)	1994	63	71	79
Nigeria (NG)	2004	69	79	93
<b>East Asia</b>		88	80	68
China (CN)	2002	89	82	75
Japan (JP)	2004	78	71	60
South Korea (KR)	2000	94	84	71
Taiwan (TW)	1998	93	84	65
<b>South and Southeast Asia</b>		92	96	95
India (IN)	2004	92	100	100
Indonesia (ID)	2005	97	103	99
Philippines (PH)	1999	83	91	94
Thailand (TH)	2004	97	90	85
<b>Latin America</b>		90	92	86
Brazil (BR)	1996	84	87	78
Chile (CL)	1997	94	91	85
Costa Rica (CR)	2004	93	95	87
Mexico (MX)	2004	95	100	94
Uruguay (UY)	2006	85	87	85
<b>Europe &amp; US</b>		84	75	69
Austria (AT)	2000	90	77	70
Finland (FI)	2004	82	73	71
Germany (DE)	2003	83	70	63
Hungary (HU)	2005	86	82	73
Slovenia (SI)	2004	76	64	56
Spain (ES)	2000	90	79	67
Sweden (SE)	2003	78	72	69
United States (US)	2003	89	82	81

Source: Calculated from data on the NTA website ([www.ntaccounts.org](http://www.ntaccounts.org)).

Note: The effective number of producers sums the population in each one-year age group, weighted to incorporate age differences in employment and productivity estimated for the base year. The effective number of consumers sums the population in each one-year age group, weighted to incorporate age differences in consumption estimated for the base year.

## Population aging and employment

Changes in population age structure over the demographic transition strongly influence the potential supply of labor relative to the population as a whole. Changes in the size of the working-age population do not necessarily lead to corresponding changes in the employed workforce, however, because of fluctuations in labor-force participation rates and hours worked. Much of the discussion in the policy seminar addressed how policy and non-demographic factors influence levels of employment.

The most direct link between age structure and the supply of labor is labor-force participation, which, in large part, reflects decisions to enter or to leave the labor market. These decisions are influenced by factors such as employment conditions and the availability of jobs, educational needs and opportunities, attitudes towards female employment, and policies and practices regarding older workers.

Labor-force participation depends largely on three important demographic groups: the young, women, and the elderly. The young are affected by policies and practices that determine the age at entry into the labor force—policies and practices that vary widely. In low-income economies, young people tend to enter the labor force at early ages, but their earnings are often very low. In the long term, many economies would probably benefit more if young people could delay their entrance into the labor force and continue their education.

Today, large numbers of young adults in both low- and high-income economies are neither in school nor productively employed. This problem is particularly pronounced because of the current economic downturn, but youth unemployment and underemployment appear to be a more systemic, long-term problem in many economic settings. Steps to improve employment rates for young people include job-training programs and other interventions intended to increase their employability, as well as policies that promote economic growth, job creation, and new employment opportunities.

Women are the second group with a strong influence on overall labor-force participation. Many economies have seen rapid increases in female labor-force participation in recent decades, facilitated in part by lower rates of childbearing.

Policies that enable women to remain in the labor force while they raise children include maternity and childcare leave and assistance with childcare through daycare centers, after-school programs, or monetary support for childcare at home.

The third group that influences overall labor-force participation rates consists of older workers. Today, many economies have mandatory retirement ages that curtail work in the formal sector, while others have pension and tax systems that create incentives for workers to retire early (Gruber and Wise 1999). For older people who are healthy, Rob Vos stressed the potential value of lifelong learning and other programs that encourage active participation in the labor force and in the broader community.

One of the major points of discussion among policy analysts is whether increased flexibility in employment practices, including job sharing and part-time work, could increase labor-force participation, particularly for women and older workers. Current policies in some economies make it difficult for women to continue in the workforce after they have children. Seniority-based wage systems make it expensive for firms to retain older workers, and policies that make it difficult for employers to reduce their workforce when economic conditions are unfavorable may discourage them from adding jobs when times are good.

Even with supportive policies, retirement for many older workers is less a matter of choice and more a consequence of the natural decline in ability and the rise in specific disabilities that come with aging. David Canning sounded an optimistic note by pointing to the improvements in health that will allow adults to work to an older age in many economies. Naohiro Ogawa was more cautious. While pointing to dramatic improvements in life expectancy, he observed that it remains an open question whether the elderly in Japan and other East Asian economies are also enjoying more years of good health.

For the elderly who remain healthy, working longer will only be an attractive option if they are productive and are earning wages that are commensurate with their level of productivity. Young and old workers and women often earn low wages, even when they work fulltime.

Sang-Hyop Lee showed that older workers in many economies tend to have low productivity and earn low wages. As would be expected, working longer has a

larger effect on income in economies where older workers earn relatively high wages. This is the case in most European economies. In Mexico, by contrast, in 2004 36 percent of people age 65–75 were still in the labor force, but their average wages were low. Raising the average retirement age in this situation does not have a large effect on the financial resources available to the elderly. Ryan Edwards pointed out that, within a single economy, there are strong individual-level differences in decisions about when to leave the workforce, often related to social-economic class.

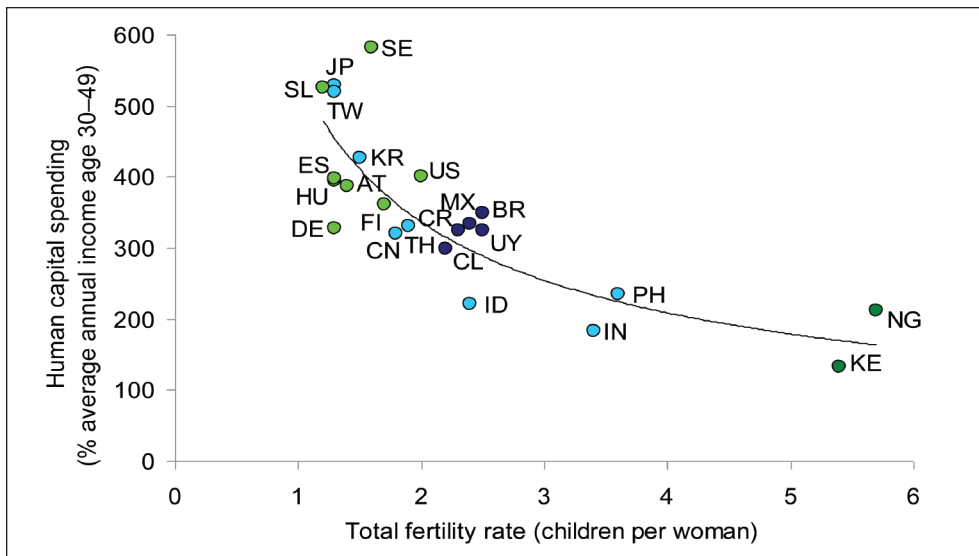
Many of the policy options discussed during the seminar addressed the issue of labor supply under conditions of population aging, particularly by enabling older people to choose to work. Michael Herrmann noted that in a situation of high unemployment, raising the retirement age will expand the working-age population but not necessarily the number of fully employed workers. This naturally leads to the question of whether the real problem for groups with low employment rates might be the availability of jobs—the demand for labor rather than the supply. Certainly, economies experience periods, such as the present, during which many people who want to work cannot find employment. In such a situation, policies that encourage or facilitate an increase in the supply of labor are unlikely to have a favorable effect.

Heiner Flassbeck and Detlef Kotte emphasized the importance of maintaining consumer demand to support both immediate economic recovery and long-term employment growth. Austerity measures designed to reduce debt and increase saving rates are, from their perspective, exactly the wrong approach for dealing with both the current economic crisis and the longer-term issues of population aging and employment.

## Population aging and investment in human and physical capital

Policies that encourage economic growth, higher productivity, and higher income for workers are key components of any successful response to population aging. Today, economic recovery and restoring full employment are essential, but in the longer term, investment in health and education and in infrastructure and other physical capital will be key factors in raising labor productivity and accelerating economic growth.





**Figure 9. Trade-off between fertility and human capital spending.**

Source: Mason and Lee 2011.

Note: Human capital spending is total spending per child given per capita health spending at age 0–17 and per capita education spending at age 0–24 in the base year. To enable meaningful comparisons, human capital spending is expressed as a percentage of the average annual labor income of prime-age (30–49) adults in each economy. See Table 1 for country designations. Light blue dots are for Asia; dark blue dots are for Latin America; light green dots are for Europe and the US; and dark green dots are for Africa.

### Investment in child health and education

Increased spending on children’s health and education has been one of the most important benefits of population aging. In low-fertility economies, human-capital spending on each child is about four times the average annual labor income of a prime-age (30–49) adult, while in high-fertility economies human-capital spending per child is only about twice the average annual labor income of this age group (Figure 9). As the process of population aging progresses and working-age populations become smaller relative to the number of elderly retirees, increasing human capital spending is one of the most promising strategies available to offset the anticipated decline in the support ratio. With greater spending on the health and education of children, future generations of workers should be more productive, even if there are fewer of them.

Although education is essential, programs that focus on child health are also important. In stressing the economic benefits of investing in children’s health, David Canning reported that malaria prevention and vaccination against measles and tetanus produce long-term gains in education and lifetime earnings. Improved nutrition in early childhood has similar benefits.

### Investment in adult health

Investment in adult health can have an important influence on worker productivity and economic growth. Health affects worker absenteeism, educational performance, and the acquisition of skills. And disability and physical decline affect decisions to leave the workforce as well as the productivity of those who remain employed.

Investments that maintain health at older ages also provide important economic benefits. Labor-force participation and wages do not decline just because people are older, but also because older people have declining health and rising rates of disability. These trends lead to greater needs for healthcare and long-term care. To the extent that the link between age and health can be altered—allowing for healthy aging—some of the adverse effects of population aging will be moderated. If poor health (morbidity) can be compressed to the last years of life, the prospects for delaying retirement and controlling healthcare costs could be significantly improved.

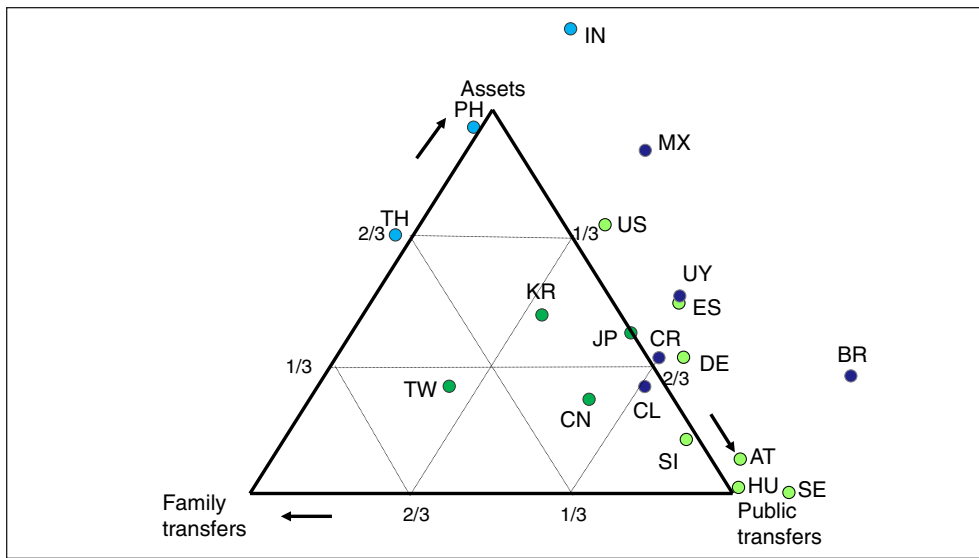
### Are today’s older populations staying healthy?

The health status of older adults has important implications for the economic impact of population aging. Elderly people who are healthy incur fewer healthcare costs and are more likely to remain in the workforce.

Trends in health status and levels of disability have been studied extensively in the United States (US) and more recently in other high-income economies. In the 1970s, disability levels in various age groups in the US appeared static, but from the mid-1980s to the early 2000s, disability appeared to be declining for all but the oldest age groups.

Over the past 10 years, however, the picture has become more complex. Disability rates in the US have continued to decline among those 85 and older, but they have been relatively flat for those 65–84, and appear to be rising modestly for those 55–64 (Freedman et al. 2011). Rising disability rates in the working-age population appear to be associated with increasing obesity (Battacharya et al. 2008).

The evidence from other economies paints a mixed picture. Recent studies concluded that during the 1990s activities-of-daily-living (ADL) disability rates went down in Denmark, Finland, Italy, and the Netherlands but went up in Belgium, Japan, and Sweden (Lafortune et al. 2007; Robine et al. 2008).



**Figure 10. The old-age support system: Public transfers, family transfers, and asset-based flows as a proportion of the lifecycle deficit (gap between consumption and labor income) at age 65 and above in 17 economies in a recent year.**

Source: Mason and Lee 2011.

Note: See Table 1 for country designations. Light blue dots are for South and Southeast Asia; dark blue dots are for Latin America; light green dots are for Europe and the United States; and dark green dots are for East Asia.

### Investment in physical capital

Although participants in the seminar agreed on the importance of productive investment in promoting economic growth, they did not agree on the relationship between investment and saving. Ronald Lee and Andrew Mason contended that as populations age, households will prefer to increase the amount of assets they hold in order to meet their retirement needs. This response will be strongest in economies where the elderly rely heavily on their own financial resources during retirement, and it will be weakest in economies where the elderly rely on transfers from their adult children or the government.

NTA provides useful data on the role of assets as a source of support for the elderly in a wide range of economic settings. Apart from labor income, the elderly rely on three sources of support to fund their consumption: on public transfers, including pensions and publicly funded healthcare less taxes; on private transfers, typically from younger family members, less transfers that the elderly make to their families; and on assets, which include real assets such as farms, businesses, and homes, and financial assets such as stocks, bonds, mutual funds, publicly and privately funded pensions, and personal savings.

Analysis of NTA data shows that sources of old-age support are extra-

ordinarily diverse (Figure 10). In Europe and Latin America, public transfer systems, including pensions and publicly funded healthcare, provide about two-thirds of the consumption needs of the elderly. In Brazil, Austria, Sweden, and Hungary, the elderly rely almost exclusively on public transfers.

Within Asia, private transfers are important in China, Thailand, Taiwan, and South Korea, but not in Japan. In those economies lying along the right side of the triangle in Figure 10, net private transfers are close to zero. In those lying outside the triangle to the right, the elderly actually give more to their children and their grandchildren than they receive.

The extent to which the elderly rely on assets for support varies widely. In several economies, assets fund from one- to two-thirds of their lifecycle deficit. In a few economies, including the United States, the elderly are even more reliant on assets.

One surprising feature of these results is that in low-income economies where public transfer systems are poorly developed, the elderly rely more on assets than on transfers from their children. A number of considerations should be kept in mind, however. First, these patterns are strongly influenced by groups with the most income. Second, the elderly who are poor undoubtedly have few assets, but they also have children who can provide

little support. Third, in situations where the elderly tend to live with their adult children, it is inherently difficult to determine whether they are relying on their children (and their labor income) for support or whether the children are relying on their elderly parents (and assets they accumulated during their working years).

In considering the relative merits of transfers versus assets as sources of support for the elderly, Lee and Mason argued that higher saving will lead to greater investment, to higher productivity and wages, and to higher standards of living (Lee, Mason, and Miller 2003). In the right circumstances, they contended, the increased saving and investment that accompany population aging will lead to a “second demographic dividend.” In addition to benefits for the domestic economy, an increase in the demand for assets may also lead to higher demand for foreign assets, supporting productivity gains in the receiving economies.

Detlef Kotte, Heiner Flassbeck, and Michael Herrmann, on the other hand, contended that higher saving rates do not necessarily lead to higher productive investment. Investment can be financed through expansionary monetary policy, and saving can be the result of investment rather than the other way around. They emphasized that higher saving can reduce consumption of—and demand for—goods and services, which could discourage investment, slow output growth, and have a negative effect on employment. The result would be to weaken the capacity of the working-age population to support a larger number of dependents.

The big question is whether the assets that people accumulate are actually invested productively: What are governments and private institutions doing with the money that people are saving? Are they making investments that will promote economic growth, raise worker productivity, and sustain high employment rates in the future?

Thus the participants did not agree on one important question: Whether higher saving or higher consumption is better for economic growth. They did agree on two other points, however. First, increasing saving in the midst of a deep recession is ill-advised and is very unlikely to lead to more rapid economic growth. And second, creating a favorable investment environment is essential to meeting the needs of an aging society.

## The impact of population aging on pensions and healthcare systems

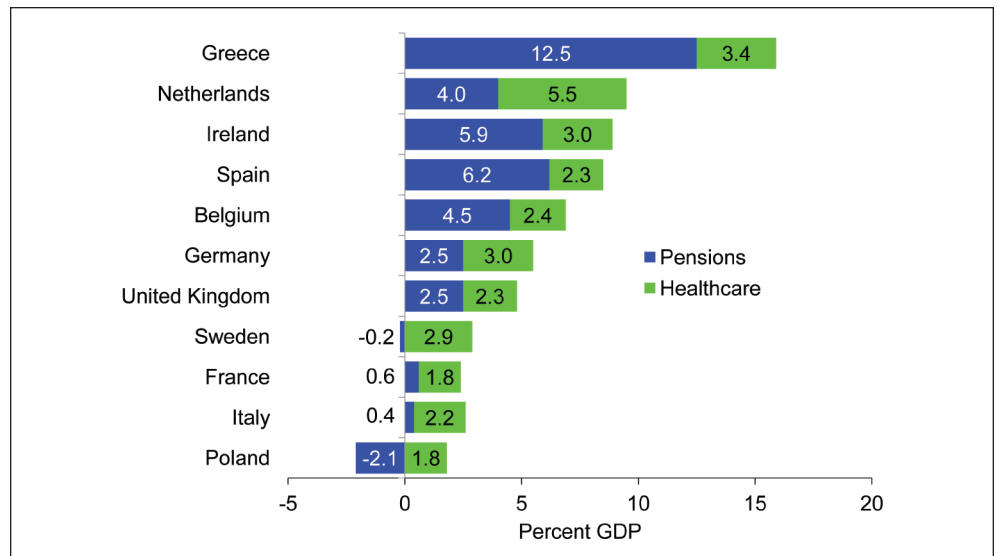
Populations today are aging at very different rates, and the pension and healthcare systems that serve them also differ widely in terms of design and coverage. Over the next decades, there may be some saving in healthcare and education as the number of children diminishes. But many economies will face fiscal pressure as the number of taxpayers who fund public programs declines relative to the number of elderly who rely on pensions and healthcare benefits. Rob Vos showed that the combined costs of pensions and healthcare programs are projected to increase over the next 50 years in 10 European economies and decline, only slightly, in one (Figure 11).

Economic growth generally leads to increases in tax revenues that can be used to support pension and healthcare programs. But program costs are also likely to rise with economic development.

Six main factors will determine the level of aggregate expenditures:

- Changes in population age structure that influence eligibility for benefits and the utilization of publicly funded goods and services
- The proportion of the population that is covered by pension and healthcare systems
- The generosity of the benefits provided
- Prices of goods and services, particularly in healthcare
- Technological developments that affect costs and the demand for healthcare
- Regulations and inefficiency that influence administrative costs

Richard Hinz showed that pension coverage is closely correlated with economic development (Figure 12), and he speculated that coverage by healthcare systems probably follows a similar pattern. Hinz presented research that he conducted with Asta Zviniene projecting aggregate expenditures on pension and healthcare benefits for four scenarios over the next 60 years. Their model is designed to illuminate the consequences of expected demographic and economic trends, both with pension and healthcare programs unchanged and with specific policy adjustments.



**Figure 11. Projected changes in budget costs related to population aging in 11 European economies as a percentage of GDP, 2010–2060.**

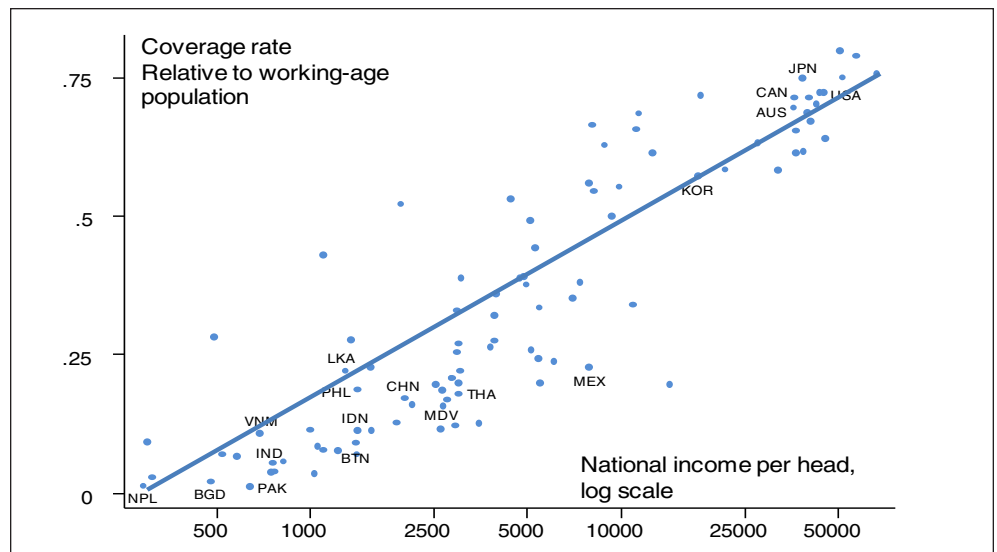
Source: Rob Vos, presentation at the Technical Policy Seminar on the Economics of Aging.

The first scenario represents high-income economies with relatively old populations and mature pension and healthcare systems. These tend to have very high coverage rates. Virtually all workers are contributing, and virtually all of the elderly are receiving benefits. Examples include Japan, Australia, New Zealand, Canada, the US, and most European economies.

The second scenario describes economies that are experiencing population aging along with rapid economic growth. These include the “Asian Tigers”—South Korea, Taiwan, Brunei, and Singapore. Their pension and healthcare systems are relatively immature.

The third scenario represents low-income economies with much younger populations, such as those of Africa, South and Southeast Asia, and parts of Latin America. These economies have generally introduced pension and healthcare systems quite recently, and coverage tends to be low.

The fourth scenario describes middle-income economies—such as China, Malaysia, Chile, Mexico, and Russia. These economies are beginning with the low coverage and low levels of benefits characteristic of low-income settings but have populations that are aging as rapidly as in many high-income economies.



**Figure 12. Pension coverage and per capita GDP.**

Source: OECD and World Bank 2009.

## Pension systems

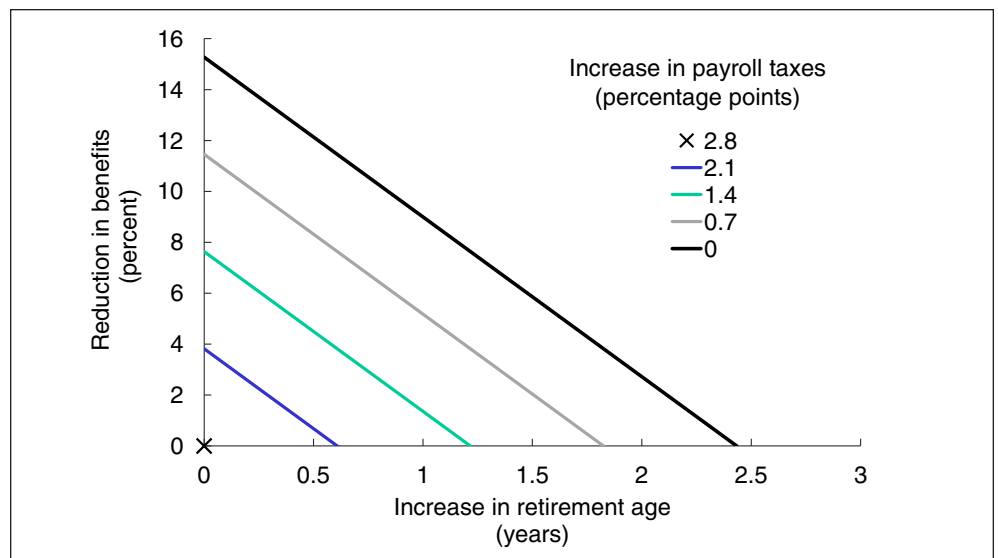
Hinz and Zviniene’s model suggests that if the effective retirement age remains at 60 and current benefit formulas remain unchanged, economies at every level of development will experience significantly higher costs. High-income economies with mature systems could see the share of their Gross Domestic Product (GDP) allocated to pensions triple by 2070, from 5 percent to 16 percent, due primarily to changes in population age structure. Newly high-income economies with rapidly aging populations could experience an even faster rate of cost increase—driven by population aging, expansion of coverage, and income growth—moving from 2 percent to 16 percent of GDP.

Lower-income economies could experience the dual impact of rising incomes and expanding coverage, also resulting in steep cost increases from 2 percent to 14 percent of GDP. Middle-income economies could experience cost increases from 4 percent to 16 percent of GDP, due to population aging as well as expanding coverage.

Not all participants in the seminar agreed that rising pension costs are a problem, noting that pension systems do not represent costs as such, but are merely channels to redistribute resources. Nevertheless, Hinz and Zviniene modify their simulation to illustrate how pension costs can be reduced by policy adjustments. These modifications show that:

- Raising effective retirement ages from 60 to 65 would have only a modest effect on costs. Longer periods of work, however, would produce higher revenues for pension systems that would help to alleviate fiscal pressures. In addition, the resulting increase in labor supply could potentially raise the level of GDP.
- Indexing pensions by price rather than by wages after the initial level of benefits is established at retirement, when combined with an increase in retirement age, could reduce the level of projected expenditures by nearly one-half.

The simulation results suggest that in some settings the design and evolution of pension-system parameters is potentially as important as the underlying changes in population age structure in determining future costs. Adjustments in benefits will



**Figure 13. Trade-offs between three approaches to pension reform: Raising the retirement age, reducing benefits, and increasing contributions.**

Source: Mauricio Soto, presentation at the Technical Policy Seminar on the Economics of Aging. Based on IMF 2012 (forthcoming).

be particularly critical in low-income settings where current individual-level benefits tend to be high—as much as 135 percent of per capita GDP, compared with 33 percent in high-income economies.

Using data from high-income economies, Mauricio Soto demonstrated the tradeoffs between three approaches to pension reform: curtailing eligibility (e.g., by increasing the retirement age), reducing benefits (for example, by indexing benefits to prices rather than wages), and increasing contributions (Figure 13). With no increases in payroll taxes and no cuts in benefits, average statutory retirement ages would have to increase by about 2.5 years over the next 20 years to keep spending on pensions constant in relation to GDP. Relying only on benefit reductions would require an average 15-percent across-the-board cut in pensions, while relying only on increased contributions would require an average rate hike of 2.8 percentage points.

To keep pension spending as a share of GDP from rising after 2030, additional reforms would be needed. For each decade, retirement age would have to increase by about one year, benefits would have to be cut by about 6 percent, or contribution rates would have to be increased by about 1 percentage point. Policymakers who wish to control pension costs need to assess how the various policy options would affect fairness and equity and determine the optimal approach for each economic setting.

Comparing data from 19 economies at widely different stage of development, Sang-Hyop Lee observed that raising the normal retirement age will have a limited effect in low-income economies, where many of the elderly continue to work but where their earnings are low. With economic development, workers tend to retire early, and raising the eligibility age for pensions triggers only a small increase in the actual average retirement age. In assessing the effects of pension policies on saving rates, Lee found that decreasing pension benefits produces a much larger increase in saving than raising the age at which workers are eligible to receive a pension.

Another option for pension reform involves switching from a “pay-as-you-go” or “paygo” system, in which retirees receive pensions that are funded by the current contributions of younger people who are still working, to fully or partially funded systems, in which pension benefits are based on the earlier contributions made by the individual retiree. This amounts to a shift from public transfers toward more reliance on assets. Indeed, a funded pension system functions as a type of saving plan that could, potentially, lead to productive investments in the economy.

Heiner Flassbeck described a crisis situation for the pay-as-you-go pension system in Kazakhstan in the late 1990s (Hoffmann et al. 2001). At that time, workers were paying 25 percent of wages for pension benefits, but the unemployment

rate was 20 percent and the government owed US\$600 million in pension arrears. In response, the Kazakstan government chose to shift to a fully funded pension system.

To improve the financial status of a pension system, Flassbeck recommends: (1) raising the age of retirement; (2) using general taxes to finance disability, survivors', and social pensions; (3) abolishing unjustified entitlements; and (4) introducing individually identifiable contributions. Any of these measures can be introduced within the framework of a pay-as-you-go system.

In the case of Kazakstan, he predicted that switching to a fully funded pension system would add considerably to administrative costs and would contribute little or nothing to capital investment because most of the pension funds would be invested in government bonds. When changing from a pay-as-you-go to a fully or partially funded system, the question is: Does additional saving lead to productive investment or not? If not, then changing the system does not help and may even make the situation worse.

Michael Hermann pointed out that fully funded pension systems may increase income inequality. Because they are based on long-term returns to investment, they may also be less reliable than pay-as-you-go systems. To minimize risk, pension funds often invest in government bonds, so in terms of investment, they are not all that different from pay-as-you-go systems that are also backed by governments.

Jorge Bravo agreed that in some cases, such as Kazakstan, switching to a funded pension system has not resulted in greater national saving or investment. Another example is the Argentinean pension system, whose funds were nationalized in 2009 and transferred to a state-managed pay-as-you-go system.

A well-managed pension fund, however, can make a positive contribution to national saving, investment, and growth. One example is Chile. As is often the case, when Chile's pension system was reformed, a large proportion (more than 40 percent in 1983) of the fund was initially invested in public debt. By the late 2000s, however, public instruments had declined to less than 10 percent of the fund as opportunities to invest elsewhere opened up.

Although it is difficult to disentangle causal effects, there is little doubt that

after Chile's funded system was introduced national saving and investment grew significantly. Chile's pension fund has become a major institutional investor, holding large shares of private-sector stocks and bonds, and a major supplier of medium- and long-term financing, including more than 40 percent of mortgages in the country. Because of other problems—such as limited coverage among low-income workers—the system was reformed in 2008 to introduce universal and minimum benefits.

Turning to another issue, David Canning reported on a study in 40 high- and middle-income economies designed to assess whether pension reform actually influences people to retire later. In every economy there is a trend for people to save more and retire earlier as their incomes increase. The optimal response to a longer healthy lifespan, however, would be to work longer. His findings show that pension systems that specify a young retirement age and provide generous benefits often lead to early retirement and low levels of saving. A package of reforms that includes removing incentives to retire early and switching to a fully or partially funded system can reverse this trend.

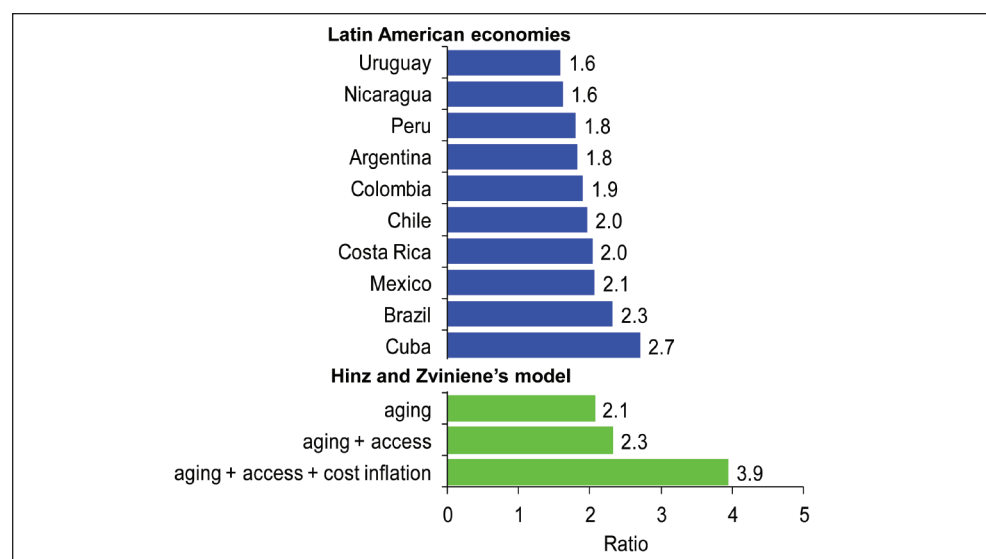
### Healthcare systems

Projections of future expenditures on healthcare are more complicated than projections of pension costs. The effects of demographic change interact with the expansion of access to healthcare that

generally accompanies economic growth, with age-related patterns of healthcare utilization, and with the relationship of healthcare consumption to income (healthcare as a “luxury good”). Based on observations in a variety of settings, Hinz and Zvinieni's model assumes that healthcare spending increases by 1.28 percent for every 1-percent increase in GDP.

Population aging and expanded access alone can lead to rising healthcare costs similar to those for pensions, with changes from the current situation much larger in low-income settings. But if healthcare consumption in today's low-income economies increases with aging and with rising incomes more rapidly than GDP, as it has in high-income settings, then the aggregate costs of healthcare could soon become a very large share of economic output, reaching as high as 34 percent of GDP. Together, healthcare and pension costs could equal as much as one-half of economic output within 60 years if there is no change in the generosity of programs or benefit formulas.

Tim Miller observed that Hinz and Zvinieni's forecasts for pension systems in middle-income economies match well with data for Latin American economies that have not undertaken pension reform. The model for healthcare, however, projects much higher costs than currently predicted for Latin America (Figure 14). Over the next 40 years, Miller and his colleagues estimate that healthcare costs will increase from 1.6 times in Uruguay



**Figure 14. Health expenditures as a share of GDP: Ratio of projected share in 2050 to that of 2010 for 10 Latin American economies, compared with Hinz and Zvinieni's model.**

Source: Tim Miller, written contribution to the Technical Policy Seminar on the Economics of Aging.

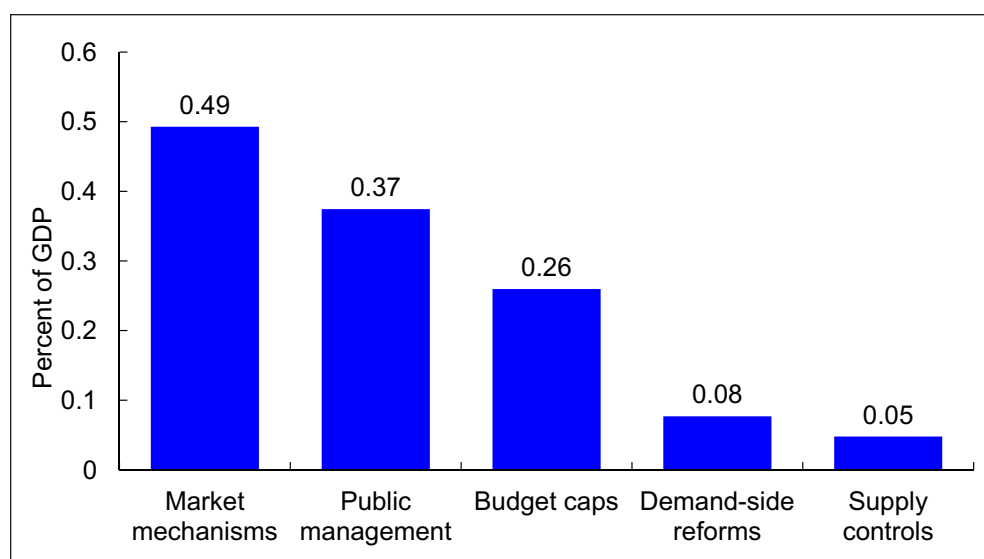
to 2.7 times in Cuba. This is similar to the results of Hinz and Zvinieni's model that include aging and access only, but not rising consumption that results in cost inflation. These comparisons suggest that: (1) In middle-income economies, expenditures on pensions and healthcare could double or triple relative to GDP; and (2) the fiscal impact of population aging is highly sensitive to policy reform.

Several speakers addressed the issue of rapidly escalating healthcare costs. All would agree on the importance of keeping costs under control by avoiding unjustified expenditures that are not linked to improvements in healthcare services. And no one would argue in favor of limiting expansion of the healthcare sector as long as it actually delivers more healthcare while contributing to higher employment, income, and economic growth. If people choose to spend a larger proportion of their resources on healthcare as they become wealthier and older, this will require structural change in the economy, but it is not, in itself, a source of concern.

Three policy issues arise, however. The first is that people may not actually be choosing to spend more on healthcare; rather, they may end up spending more as a distortion of priorities because they often do not pay for healthcare themselves. The second issue is that funding larger health sectors through higher taxes could undermine work or investment incentives.

The third issue concerns the inefficiency of many healthcare systems. David Canning argued that healthcare systems in many economies could potentially provide high levels of health at much lower costs than they do today. Particularly large gains could be achieved in the US. He described the potential cost savings that could be achieved by improving efficiency, without lowering the care provided, as the "good news" about healthcare.

Mauricio Soto estimated the average impact of five types of reform on public healthcare spending in 2030 as a percent of GDP: budget caps (including budget constraints and central government oversight); public management and coordination (including "gatekeeping" processes that require referrals for accessing specialized care and subnational government involvement); market mechanisms (including choice of insurers and



**Figure 15. Average impact of reform components on health spending by 2030: Decrease relative to the baseline as a percent of GDP.**

Source: Mauricio Soto, presentation at the Technical Policy Seminar on the Economics of Aging. Based on OECD Health Database and IMF staff estimates.

Note: Unweighted averages of the impact of reforms.

providers, private provision, and the ability of insurers to compete); demand-side reforms (including expansion of private insurance and cost sharing); and supply controls (including regulation of the healthcare workforce) (Figure 15).

The impact of these simulated reforms appears to be modest. They might well fall short of what would be needed to stabilize public-healthcare-spending-to-GDP ratios at moderate levels. This suggests that additional efforts may be needed to stabilize spending, or fiscal adjustments might be introduced that rely on cuts in other areas or increases in revenue.

It is important to note that the possible savings linked to various reforms are subject to uncertainty. Some reforms could be complementary, implying that the savings under any particular reform may be understated. But simultaneous reforms across different aspects of the health system might also be undesirable or counterproductive. Thus, the effect of the reforms across categories depicted in Figure 15 cannot necessarily be aggregated.

In discussing healthcare for Japan's aging population, Naohiro Ogawa emphasized a demographic change that goes beyond fiscal constraints. As in other East Asian economies, elderly Japanese traditionally lived with their adult children and were cared for by their middle-aged daughters or daughters-in-law. In 1950,

there were 31 women in Japan age 40–59 for every elderly person age 80 and above; in 2010, there were only three. Given this demographic reality, more of the elderly will inevitably be cared for in institutions. This transition from a home-based to a market-based system will make the costs of long-term care for the elderly more readily measurable and possibly very high.

Using the multibillion-dollar healthcare industry as an example, Michael Herrmann proposed that the macro-economic impact of population aging can be most appropriately understood as a process of structural change (Herrmann 2011). This process will create winners and losers among firms and will impose transitory costs on some workers, but it will not necessarily have a negative impact on economies as a whole.

Expansion of the healthcare industry can provide attractive investment opportunities, employment opportunities, and labor income. If markets function well, they should respond efficiently to these changes in demand and supply. Thus from a macro-economic perspective, Herrmann contended that it is not meaningful to say that healthcare expenditures amount to a cost within GDP. Rather, everything in a macro economy that is a cost to some is an income to others.

## Future directions

This seminar provided a useful opportunity to present findings from the NTA project to an audience of economists in academic institutions and United Nations agencies. Further presentations and discussion highlighted important policy concerns from multiple perspectives. Much of the discussion focused on the macro-economic effects of population aging, including structural changes in markets and the impact of older populations on patterns of saving and investment. The participants also discussed the impact of population aging on pension and healthcare systems, including forecasts of the level of fiscal pressure that can be expected and the pros and cons of various approaches to contain costs. These include:

- Relaxing mandatory retirement provisions
- Investing in education and health as fertility declines
- Indexing pension benefits to changes in prices rather than wages
- Switching from pay-as-you-go to partly or fully funded pension systems
- Reducing inefficiencies in the delivery of healthcare

Tim Miller mentioned that several groups have produced long-term forecasts of pension and healthcare costs. He suggested that it might be useful to ask various teams to produce models for comparison based on a common set of inputs.

In closing the seminar, Jose Miguel Guzman commented that much of the discussion concerned issues of population aging in high-income economies. He looks forward to another technical policy seminar on the economic effects of population aging that focuses on the problems facing developing economies.

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## Agenda

### Monday, 19 September 2011

**Opening remarks:** Werner Haug (UNFPA)

#### **Overview: population aging and economic challenges**

**Moderators:** Jose Miguel Guzman (UNFPA) and Edgard R. Rodriguez (IDRC)

**Presenters:** Ronald D. Lee (UC Berkeley) and Andrew Mason (EWC)

**Discussant:** Detlef Kotte (UNCTAD)

#### **Population aging and the macro economy**

**Moderator:** Michael Herrmann (UNFPA)

**Presenter:** Heiner Flassbeck (UNCTAD)

**Discussant:** Rob Vos (UN DESA)

#### **Pension systems and social protection**

**Moderator:** Michael Herrmann (UNFPA)

**Presenter:** Richard Hinz (World Bank)

**Discussant:** Mauricio Soto (IMF)

#### **Evening: Book launch for *Population aging and the generational economy***

### Tuesday, 20 September 2011

#### **Population aging and rising healthcare costs**

**Moderator:** Hania Zlotnik (UN DESA)

**Presenter:** David Canning (Harvard University)

**Discussant:** Naohiro Ogawa (NUPRI)

#### **Labor market challenges**

**Moderator:** Jorge Bravo (UN DESA)

**Presenter:** Sang-Hyop Lee (University of Hawaii)

**Discussant:** Ryan Edwards (Queens College)

#### **Wrap-up discussion**

## Participants

### Jorge Bravo

Chief, Population and Development Section  
United Nations Department of Economic  
and Social Affairs (UN DESA)

### David Canning

Professor, Department of Population  
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Harvard University

### Ryan Edwards

Associate Professor of Economics  
Queens College and the Graduate Center  
City University of New York

### Heiner Flassbeck

Director, Division on Globalization  
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United Nations Conference on Trade  
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### Jose Miguel Guzman

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Technical Support Division  
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### Werner Haug

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### Michael Herrmann

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### Richard Hinz

Human Development Network,  
Social Protection  
The World Bank

### Detlef Kotte

Macro-economic Consultant  
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United Nations Conference on Trade  
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### Ronald D. Lee

Edward G. and Nancy S. Jordan Endowed  
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### Sang-Hyop Lee

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### Andrew Mason

Senior Fellow, East-West Center  
Professor, Department of Economics  
University of Hawaii at Manoa

### Naohiro Ogawa

Director  
Nihon University Population Research  
Institute (NUPRI)

### Edgard R. Rodriguez

Senior Program Specialist  
International Development Research Centre  
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### Mauricio Soto

Technical Assistance Advisor  
International Monetary Fund

### Rob Vos

Director, Development Policy and  
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United Nations Department of Economic  
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### Sidney B. Westley

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**UNFPA, the United Nations Population Fund**, is an international development agency that promotes the right of every woman, man, and child to enjoy a life of health and equal opportunity. UNFPA supports countries in using population data for policies and programs to reduce poverty and to ensure that every pregnancy is wanted, every birth is safe, every young person is free of HIV, and every girl and woman is treated with dignity and respect.