WORLD ECONOMIC FORUM

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Living Happily Ever After: The Economic Implications of Aging Societies

Executive Summary of a Report
to the World Economic Forum
Pension Readiness Initiative
developed in partnership with
Watson Wyatt Worldwide

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Preface

At the World Economic Forum's Annual Meeting 2001, CEOs of our financial service industry member companies concluded there was a need for greater high-level, international attention to be paid to the economic and financial implications of the demographic challenges facing most industrialized countries. Increased life expectancy, the impending retirement of the baby boom generation and lower fertility in many countries are creating unsustainable pressures on public and private pension systems. But while this is a global problem, most of the policy debate is occurring in a national context with too little regard for the broader implications and opportunities for world economic growth and development. In addition, the discussion has largely overlooked the potentially significant distributional implications for living standards within national economies and how these are influenced by different policy choices.

Over the past two years, the Forum's Pension Readiness Initiative has combined leaders from our financial services and employment industry member companies with other experts from labour unions, international organizations, senior citizen groups and governments for the purpose of compiling a comparative assessment of the retirement system readiness of OECD countries and using it as a basis for high-level, public-private discussions about the need for greater action. We are pleased to issue the initiative's first report at our Annual Meeting 2004. The report has been developed in partnership with Watson Wyatt Worldwide and provides perhaps the most comprehensive analysis to date of the macroeconomic implications over the next few decades of current demographic trends in a wide range of countries. It also presents extensive cross-country data highlighting similarities and differences in the circumstances facing these countries as well as their approaches to policy reform. The report was conceived in the belief that a tangible cross-country comparison of policy performance and conditions set in the context of a broader discussion about the stakes for the world economy could help to spur greater understanding and consensus for action.

We would like to thank our partner, Watson Wyatt Worldwide, which conducted the research and drafted the report for the Pension Readiness Initiative. In particular, we would like to thank Sylvester J. Schieber for his intellectual leadership. He and Steven Nyce are the primary authors of the report. We also want to thank, CEO John Haley, Michael Orszag, and other members of the Watson Wyatt team for their dedication to the project. We extend our appreciation also to the representatives of the 15 Forum member companies who participated in the process over the past two years as well as the numerous academic, labour, international organization and other experts who contributed their time and thoughts. And we wish to recognize with appreciation the Forum's own Nabi Niang, Project Manager of the Pension Readiness Initiative, and Fiona Paua, who provided valuable economic insight.

This report would not have been possible without the authors having access to substantial data and other information from various people and organizations. The Organization for Economic and Cooperative Development was particularly generous with time and resources. In particular, we wish to thank Andre Laboul and Mark Pearson, Romain Duval, David Lindeman, Howard Oxley, Monika Quiesser, Jean-Marc Salou and Juan Yermo for the help and input they provided. We also thank Mandeep Bains and Kieran McMorrow of the European Commission for data support. Edward Whitehouse of Axia Consulting developed estimates of retirement program earnings replacement rates before and after taxation that are included in the report. The International Labour Organization's demographic projection model was used extensively in the analysis.

Throughout the body of the report there are several brief analyses on a variety of subjects that have been written by technical experts that help to illuminate the points being made. We are particularly grateful to: Professor Monika Bütler, Ecole des Hautes Etudes Commerciales, University of Lausanne; Stefan Engström, Stockholm School of Economics and Anna Westerberg, Ministry of Finance, Stockholm; Professor Tryggvi Thor Herbertsson, Institute of Economic Studies, University of Iceland, Reykjavik; Mr. Paul Hewitt, Deputy Secretary for Policy, Social Security Administration, Washington, DC; Dr. Estelle James, the Urban Institute in Washington, DC; Professor Alain Jousten, University of Liege, Liege; Professor Ronald Lee, University of California, Berkeley; Professor Florence Legros, University of Paris/Dauphne, Paris; Moshe Milevsky, York University and IFID Centre, Toronto; Professor Olivia Mitchell, Wharton School, University of Pennsylvania, Philadelphia; Todd Petersen, Help Age International, London; Professor John Piggott, The University of New South Wales, Sydney; Professor Timothy Smeeding, University of Syracuse and Luxemburg Income Study, Syracuse,

New York; Professor Kent Smetters, Wharton School, University of Pennsylvania, Philadelphia; Dr. James Vaupel, Max Planck Institute, Saarburcken; Mr. David Willetts, MP and Shadow Secretary of Welfare and Social Security, London; Larry Willmore, consultant, New York; and Juan Yermo, OECD, Paris.

The Pension Readiness Initiative is an example of the World Economic Forum's portfolio of initiatives that engage business with other stakeholders in work processes on specific global, regional or industry issues. These initiatives are being organized into a new Global Institute for Partnership and Governance to build upon the Forum's capacity to serve as an informal, independent platform for multistakeholder partnership in three dimensions: stimulating action, improving governance and expanding understanding through dialogue. In this spirit, we hope that this report will help to stimulate greater public-private discussion on ways to turn the challenge posed by demographic change in industrialized countries into an opportunity for expanded economic growth and social progress the world over.

Klaus Schwab
Executive Chairman
World Economic Forum

Richard Samans
Managing Director
Global Institute for Partnership and Governance
World Economic Forum

Geneva, January 2004

Executive Summary

"All the world's a stage, and all the men and women merely players; they have their exits and their entrances, and one man in his time plays many parts, his acts being seven ages."

—William Shakespeare
From *All the World's a Stage*

I. Introduction

Shakespeare's seven ages of life begin with youth and progress through old age, which he describes as a period of second childhood when we live in oblivion, our senses largely gone. In Shakespeare's day in the late sixteenth and early seventeenth centuries, few people survived to an age we would today consider the seventh stage of life, as life expectancy at birth would have been between 25 and 30 years. Of those who made it to old age, many had to continue working until shortly before their death in order to meet their basic needs. Today, life expectancy is three times that of Shakespeare's era in the developed world and is nearing that in many of the developing countries. And when most people reach the final stage of their lifetimes today, what we now call retirement, their senses are still vitally intact and their lives are not all that different from those they lived before crossing into old age. But as our life expectancies have lengthened, our societies have grown older. As we look to the future, we expect them to grow older still.

II. Population Developments in a Global Context

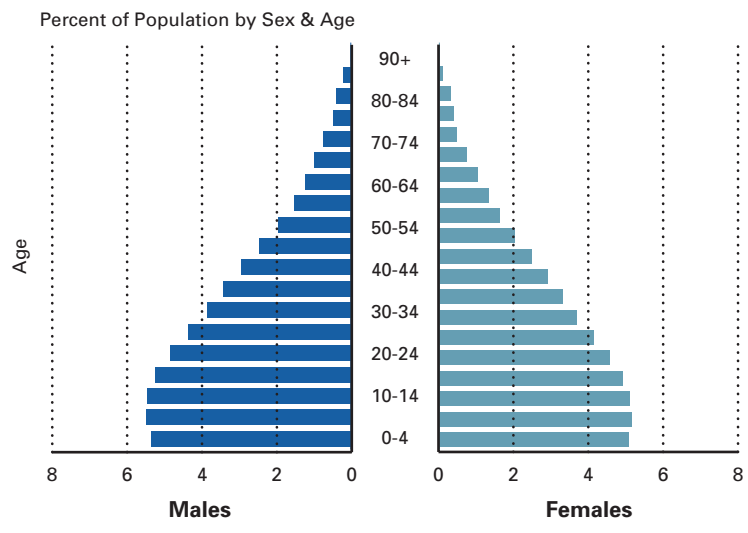
The aging of the populations in the developed economies of the world is the result of two demographic phenomena. First, people today live longer than they did in the past, partly because fewer succumb to illnesses when they are young, and partly because they live longer after reaching old age. Second, fertility rates are declining across most of the developed world and, to a lesser extent, the developing world.

The aging of societies is overwhelmingly good news. For centuries, human beings have strived to eliminate or control diseases and conditions that led to premature death, such as smallpox, polio, and malaria. Our forebears at the beginning of the last millennium could not in their wildest imagination have predicted the accelerated advances in hygiene and health sciences during the twentieth century, and the difference they would make to our lives. More recent advances against heart disease, cancer, and chronic conditions are not only extending life, but improving its quality as well. For many people today, old age does not end their accomplishments or enjoyment of life. Advances in the wealthy nations have generally spread to less wealthy societies, improving the quality of life and life expectancies for those citizens as well. Falling fertility rates have also largely been perceived as good news, averting a future in which population growth could outstrip the resources of our planet.

Societies are aging in almost every country in the world today — but some countries are getting older much faster than others. Most countries fall into one of four evolving population structures, which are highly correlated with their stage of economic development.

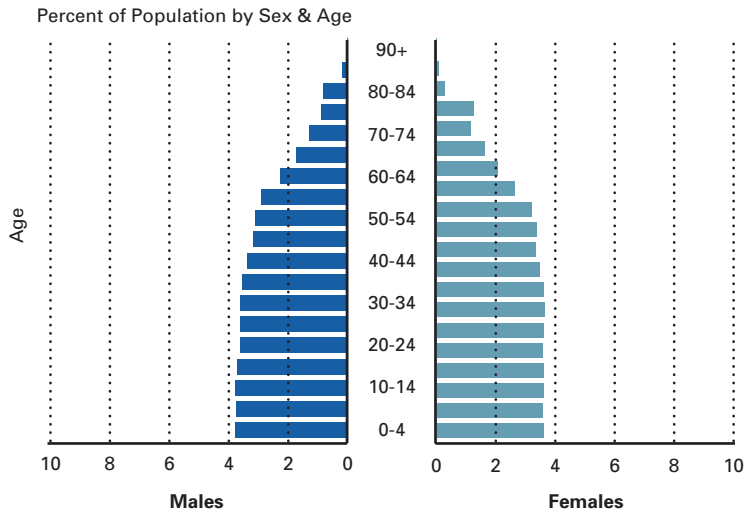
In the least developed countries, fertility rates remain high and the aging phenomenon is in the earliest stages. For example, Pakistan's fertility rate is approximately 5.1, down slightly from 6.3 30 years ago but still extremely high by comparison to more developed countries. Assuming a gradual further decline in fertility rates, the expectation is that Pakistan's population in 2030 will still bear a striking resemblance to the classic pyramidal form that

Taken from Figure II-3: Pakistan's Population Structure in 2030



Source: United Nations, Population Division, *World Population Prospects: The 2000 Revision.*

Taken from Figure II-4: Mexico's Population Structure in 2030



Source: United Nations, Population Division, *World Population Prospects: The 2000 Revision.*

almost all countries' populations assumed a century ago (see the figure above, taken from **Figure II-2** in the report). The population aging in less developed countries over the next quarter century will be moderate, as they take advantage of progress in public health and medical care to reduce mortality rates.

In another group of countries, primarily those at an intermediate stage of economic development, fertility rates have dropped off significantly over the past couple of decades and are expected to fall to replacement rate levels — or lower — in the coming decades. Increasing prosperity has led to improved public health measures and health delivery systems, which in turn have improved life expectancy. The combination of declining fertility rates and increasing life expectancy is aging the populations in these countries. Mexico is a good example. Its population today looks much like we expect Pakistan's to look in 25 years. A quarter century from now, these mid-developmental countries are projected to still have a pyramidal population structure at the oldest ages, but to be far more rectangular at the younger ages.

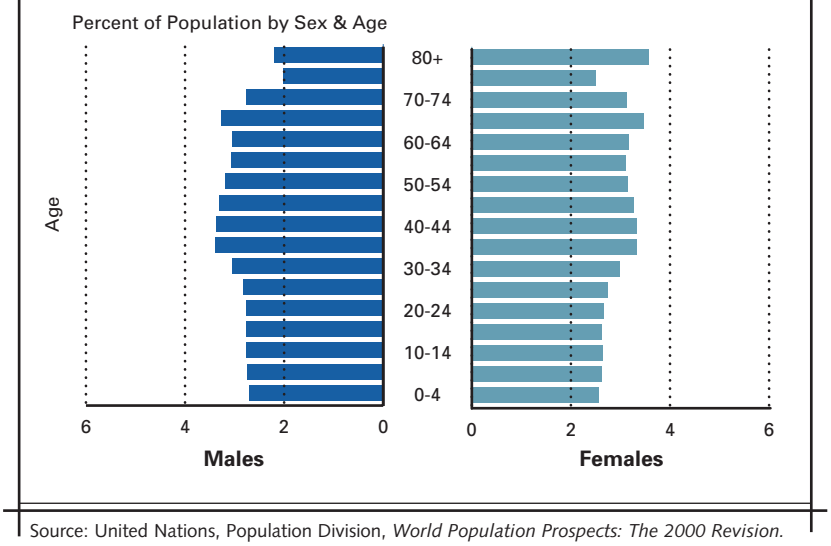
In the world's developed economies, the pattern expected to evolve in Mexico over the next couple decades has largely played itself out. The population structures in countries like Australia and Canada today are projected for Mexico 25 years from now. A few highly developed countries still have relatively high fertility and immigration rates, so their populations will continue to square up in coming decades. For most developed countries, however, fertility rates have fallen below replacement levels of 2.1 children per woman of child-bearing age to the 1.6 to 1.8 ranges. In some cases, immigration rates are robust enough to sustain slight population growth over the longer term. And improving longevity means that populations continue to grow for some time as the elderly populations grow larger. Canada is an example of this set of countries, and the following figure reflects its anticipated age and gender structure in 2030.

In another set of countries in the developed world, fertility rates have plunged to levels that would not have been believed a half century ago. In Italy and Spain today, fertility rates are below 1.2. In Germany and Japan, they hover between 1.3 and 1.4. In these countries, we see an evolving inversion of the classic pyramidal age structure of earlier days. Unless current demographic

patterns change radically and very soon, the age structure in these countries will evolve along the lines anticipated for Italy, shown in the figure below. For the most part, immigration rates are not high enough to make up for the low fertility rates, and many of these countries are likely to see their populations start to shrink during the next decade or two. In Japan, this may already be underway.

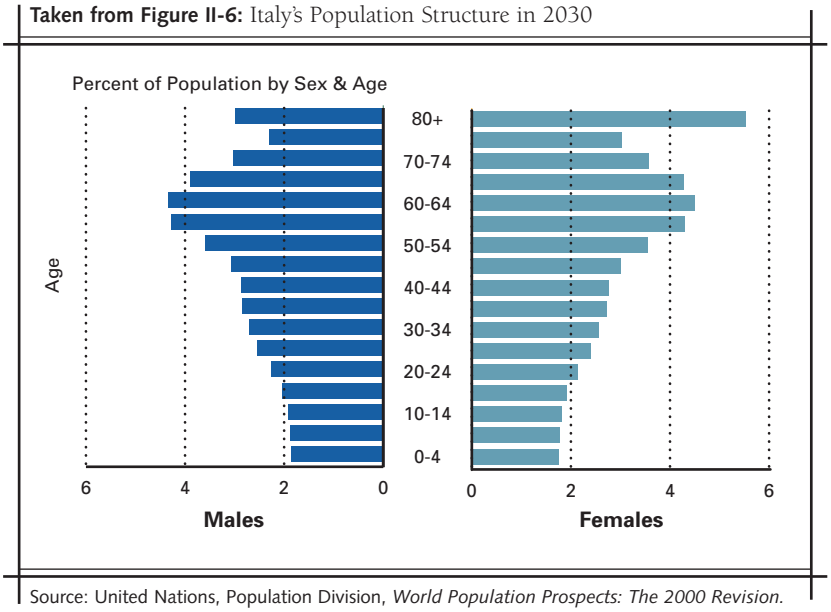
Although most countries can be classified into one of these four evolving population structures, there are some notable outliers. Even though China and some of the Eastern European former Soviet bloc countries do not have highly developed economies, their fertility patterns and evolving age structures look like those in more highly developed countries. An outlier in the other direction is the United States, where fertility rates today are roughly at population replacement levels and immigration rates are the highest in the developed world. The U.S. population is expected to grow more rapidly and be considerably younger than those in other developed countries over the coming decades.

Taken from Figure II-5: Canada's Population Structure in 2030



Source: United Nations, Population Division, *World Population Prospects: The 2000 Revision.*

Taken from Figure II-6: Italy's Population Structure in 2030



Source: United Nations, Population Division, *World Population Prospects: The 2000 Revision.*

III. The Economic Implications of Aging Societies

Another welcome phenomenon, largely of twentieth century origins, which accompanied the aging of our societies was the evolution of organized retirement programs. To a large extent, these programs owe their existence to rising worker productivity and standards of living, and the idea that these advances should be shared between workers and older members of society, who became largely expendable in the production of economic goods in industrialized economies. Pension systems across the world are organized in a variety of fashions, but in every case they are consumption allocation mechanisms, whereby a portion of the goods and services produced by workers are distributed to the older people who have completed their working careers.

Much of the discussion about aging societies has focused on the organization of pension plans in various countries and whether or not they are "funded" or financed on a "pay-as-you-go" basis, whether they are defined benefit or defined contribution plans, whether they are "wage indexed" or "price indexed," and so forth. The underlying premise of this analysis is that while these issues are important, they are secondary to the larger context of population aging and the challenges it will pose.

Table III-1: Labor Force Participation Rates of Selected Age Groups within National Populations in 2000

	Percent of age group in labor force			
	50–54	55–59	60–64	65+
Australia	75.8%	60.7%	34.7%	5.8%
France	82.2	58.8	14.5	1.3
Germany	81.1	66.0	21.7	2.6
Iceland	93.7	88.6	81.3	20.9
Italy	61.9	38.7	19.2	3.3
Japan	82.3	76.1	55.5	22.7
Netherlands	74.6	56.5	19.5	3.0
Sweden	87.8	81.5	52.3	–
Switzerland	87.2	65.1	65.1	9.5
United States	80.3	68.8	47.1	12.6

Sources: International Labor Office, Bureau of Statistics, LABORSTA database on labor statistics, current through 2001, United Nations Population Division, *World Population Prospects: The 2000 Revision*, and OECD, *Corporate Environment Database.*

Table III-2: Average Retirement Ages for Men and Women in Selected OECD Countries

	Males		Females	
	1980	2000	1980	2000
Belgium	61.1	58.1	57.5	55.5
France	61.3	58.8	60.9	58.4
Germany	62.2	61.0	60.7	59.3
Iceland	69.3	67.2	65.8	65.2
Italy	61.6	59.7	59.5	57.0
Japan	67.2	66.6	63.9	64.6
Netherlands	61.4	59.9	58.4	56.8
Sweden	64.6	64.4	62.0	63.1
Switzerland	65.5	64.5	62.4	–
United Kingdom	64.6	62.9	62.0	60.1

Sources: The 1980 estimates are from Sveinbjorn Blondal and Stefano Scarpetta, "The Retirement Decision in OECD Countries," OECD, Economics Department Working Papers, No. 202, February 1999; the 2000 estimates were developed by authors off of Blondal and Scarpetta's 1995 estimates applied to the population age structures in the respective countries in 2000.

The aging phenomenon goes beyond the structure and financing of government programs to larger macroeconomic concerns about falling productivity and standards of living. The point is that virtually everyone is a consumer and, for the most part, all consumers collectively depend on workers to produce the goods and services they consume. Retirement systems allow older people to continue to consume without directly contributing to the productive capacity of the economy. The abbreviated **Table III-1** shows that there is considerable variation in labor force participation rates of older people across the countries shown.

The labor force participation rates in various countries directly relate to the average retirement ages. For a selected set of countries, the estimated average retirement ages for men and women are shown in **Table III-2** for 1980 and 2000. The table illustrates a couple of important points. The first is that between 1980 and 2000, the average retirement age in most countries has declined. The second point is that the average retirement age for women tends to be somewhat younger than it is for men. Both might be important considerations in evaluating policy options for the future.

Much of the increase in life expectancies in developed economies over the last quarter century has accrued to the older population. People living longer and retiring earlier increases the retirement period in two dimensions. **Table III-3** reflects the implications of projected additional increases in life expectancy at the retirement ages now prevalent across most of the developed countries that comprise the Organization for Economic Cooperation and Development (OECD). The estimates assume that recent retirement patterns by age will persist and use life expectancy at the average retirement age for each country to estimate the duration of retirement.

Tables III-1, III-2, and III-3 show why pension costs are expected to explode in many countries over the coming decades. In Switzerland, the typical male works until nearly age 65. In Belgium, the average male is retired and completely out of the workforce by age 58. In the United Kingdom, the comparable age is 62, in France it is 59. In Iceland, the average man works until age

69. The most significant reason for these variations in retirement patterns is the structure of the retirement systems. In Belgium, the average male retiree has a remaining life expectancy of 22 years when he retires. In France, the average life expectancy at the typical retirement age is 20.5 years. In Iceland, it is 13.7 years, in Switzerland it is 16.6 years, and in the United Kingdom it is 18.0 years. All else remaining equal, a male retiree in Belgium will cost about 60 percent more in retirement benefits than one in Iceland simply because of the different lengths of retirement in the two countries.

The aging of the populations in the developed economies of the world is expected to significantly increase the retiree populations over the next two or three decades, as reflected in the abbreviated **Table III-4** from the report. Growing elderly populations will significantly increase the macroeconomic costs of our retirement systems. If we consider these costs in the context of retirement, when older people quit working and contributing directly to the production of goods and services, we face the prospect that the historical rates of improvement in standards of living might slow or even decline. If that occurs, the workings of retirement systems become extremely important, because they will be the means of allocating slowing improvements or declines in living standards across the various segments of society.

If one changes the focus of concern about aging costs from the narrow specifics of the pension system to sustaining economic growth and improving living standards, population aging becomes a labor supply issue. This reorientation recasts the issue of a 60-year-old retiree from how much his pension costs to how much output and general welfare have been lost because he or she is not working. Thinking about this across national boundaries, the variation in age structures will be important from country to country, but the variation in labor force participation at various ages will carry equal weight (see Table III-1). In this light, the organization and structure of our retirement programs must be carefully considered.

The availability of pensions and health benefits plays an important role in when workers retire. In a number of countries, income from ongoing linkage to the workforce provides

Table III-3: Current and Projected Average Retirement Period in Selected OECD Countries

	Males			Females		
	2000	2010	2030	2000	2010	2030
Belgium	22.0	23.1	24.8	29.8	30.9	32.5
France	20.5	21.4	23.2	26.7	27.5	29.0
Germany	19.4	20.2	22.1	25.3	26.6	28.2
Iceland	16.9	17.4	18.7	22.7	23.6	25.2
Italy	19.5	20.1	21.4	27.0	27.8	29.1
Japan	16.3	17.3	18.9	23.5	24.7	26.8
Netherlands	21.0	21.6	23.0	28.0	28.8	30.2
Sweden	18.7	19.4	20.6	23.2	23.9	25.4
Switzerland	16.6	17.2	18.4	24.3	24.9	26.2
United Kingdom	18.0	18.9	20.5	23.8	25.0	26.8

Sources: Estimated by the authors based on average retirement age estimates for 1995 from Sveinbjorn Blondal and Stefano Scarpetta, "The Retirement Decision in OECD Countries," OEDC, Economics Department Working Papers, No. 202, February 1999, and the United Nations life expectancy projections from *World Population Prospects: The 2000 Revision.*

Table III-4: Estimated and Projected Retiree Populations as a Percentage of the Total Population for Selected Years

	Inactive population 55+ as percent of total population				Percent growth in percentage retired 2000–2030	Change in percentage retired 2000–2030
	2000	2010	2020	2030		
Australia	16.2%	18.9%	22.4%	25.3%	56.4%	9.1%
France	21.6	24.6	28.4	31.7	46.6	10.1
Germany	23.5	26.3	30.7	35.8	52.4	12.3
Iceland	10.5	11.7	14.4	17.8	69.4	7.3
Italy	25.9	29.3	33.9	40.1	54.7	14.2
Japan	17.6	22.6	26.4	29.6	67.9	12.0
Netherlands	19.4	23.3	28.2	32.7	68.3	13.3
Sweden	20.5	23.8	27.7	31.0	51.2	10.5
Switzerland	19.7	23.9	29.5	34.3	74.5	14.7
United States	14.3	16.1	19.6	22.3	55.8	8.0

Sources: International Labor Office, Bureau of Statistics, LABORSTA database on labor statistics, current through 2001, United Nations Population Division, *World Population Prospects: The 2000 Revision,* and OECD, *Corporate Environment Database.*

Table III-6: Disposable Income by Source of Income for People Ages 65 and over during the Mid-1990s for Selected Countries

	Mid-1990s		
	Wage or salary	**Capital**	**Social transfers**
Canada	20.7%	44.1%	35.2%
Finland	13.7	6.8	79.6
Germany	10.3	16.7	73.0
Italy	33.0	1.8	65.2
Japan	63.9	6.3	29.7
Netherlands	12.7	47.0	40.3
Sweden	8.1	10.1	81.7
United Kingdom	14.1	43.0	42.9
United States	29.6	39.8	30.6

Source: OECD, *Ageing and Income* (Paris: OECD Publication Service, 2001), p. 28.

Table III-7: Relative Role of Private and Public Pensions for Men Retired at Early and Normal Retirement Ages

	Percent of men who are:		Benefits as percentage of average disposable income of the working-age population for:	
	Beneficiaries of own public pensions	**Beneficiaries of own private pensions**	**Beneficiaries of own public pensions**	**Beneficiaries of own private pensions**
Men ages 60–64				
Canada	85.6	63.2	19.2	46.3
Germany	99.3	19.2	66.8	2.1
Italy	98.6	4.2	86.3	2.1
Japan	99.4	15.1	56.8	4.1
Netherlands	7.6	95.2	7.3	–
Sweden	78.6	73.3	63.3	51.6
United Kingdom	41.9	80.1	0.2	47.8
United States	77.0	60.9	27.2	40.9
Men ages 65+				
Canada	99.8	60.7	41.0	30.6
Germany	100.0	16.4	79.3	4.6
Italy	97.5	5.2	75.0	4.2
Japan	99.3	12.8	65.2	2.5
Netherlands	95.0	82.7	50.2	52.5
Sweden	100.0	88.2	87.8	25.8
United Kingdom	99.0	80.7	27.2	36.6
United States	96.8	54.4	39.6	27.8

Source: OECD, *Ageing and Income* (Paris: OECD Publication Service, 2001), p. 172.

substantial income to people generally considered to be beyond retirement age in other countries. For example, **Table III-6** shows that 70 to 80 percent of all income for people over the age of 65 comes from social insurance programs in Finland and Germany; in Sweden, it is slightly over 80 percent. In Canada, the Netherlands, the United Kingdom, and the United States, where funded pensions are much more common, a significantly smaller share comes from social transfer programs and a larger share from capital-based sources, including funded pensions. In Japanese households with an elderly person, nearly two-thirds of income still comes from wage or salary sources, but this reflects the fact that the elderly in Japan are more likely to live with younger family members than the elderly in other developed countries.

The sources of income for the elderly shown in Table III-6 reflect the variations in the extent to which various countries rely on government-mandated retirement systems versus employer-sponsored plans. **Table III-7** shows the relative reliance on public versus private pensions for male retirees in the late 1990s. The conclusion is that, generally speaking, where public pensions are rich, private pensions are spare, and where the public plans are leaner, private pensions tend to be more substantial.

One reason for the complementary sizing of public and private pensions relates to income adequacy. Providing a rich employer-sponsored pension for rank-and-file workers in a country like Germany would not make much sense, because retirees already receive very generous public pension benefits that enable them to retire quite comfortably.

The story behind Table III-7 can be largely explained by looking at the approaches taken by the developed countries in setting up their retirement systems. Germany has

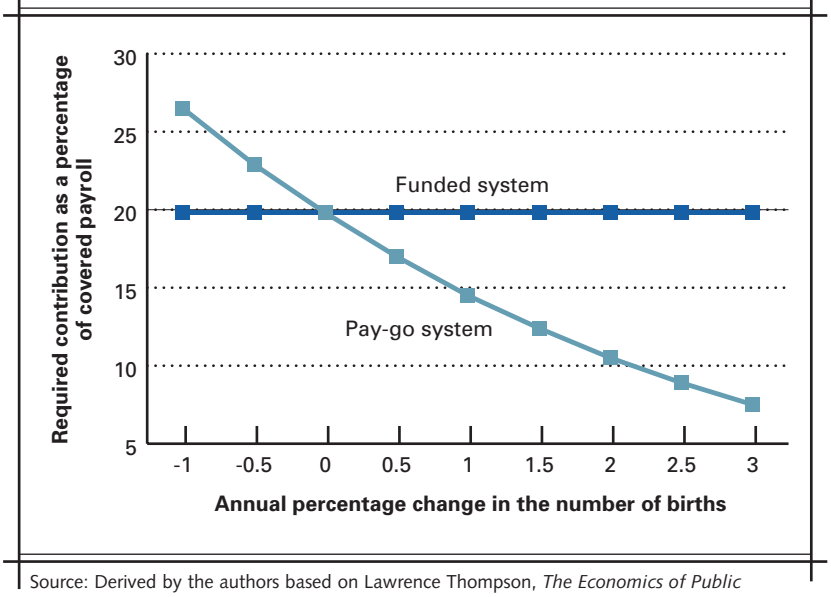
traditionally had a rich public pension, so its private pensions are relatively modest. The United States has traditionally had a much smaller public pension, so its private pensions are much larger. In Germany and other similar countries, the very generous public pensions serve as a disincentive for workers to save more themselves. In countries like the United States, which have large private pensions, changes to the public pension system may not affect retirement behavior to the extent desired because so many workers rely more on private plans for their retirement security.

IV. Pensions and Aging Populations

When Otto von Bismarck established the first national retirement system in Germany in the late nineteenth century, he set the retirement age at 70. By the end of the 1930s, most of the major economies of the world had national retirement systems of one sort or another, and in most of them, the eligibility age was lower.

Although many national retirement systems were originally structured to be funded, most of them moved to pay-as-you-go (pay-go) financing by the early 1970s. Policymakers were eager to provide expanded benefits to retirees in the decades after World War II, and favorable demographic conditions made it possible to do so without imposing a disproportionate tax burden on workers. **Figure IV-7** shows the cost of a hypothetical pension system under alternative birth rate scenarios, stated as a percent of workers' annual pay. The funded pension system will be constant regardless of the rate of growth or contraction in the number of births, whereas the pay-go system becomes steadily cheaper as birthrates rise. During the baby boom periods in many countries after World War II, the demographics often favored pay-go pensions.

Figure IV-7: Contribution Rates Required to Finance Hypothetical Retirement Systems under Alternative Assumptions about the Rate of Change in Births



Source: Derived by the authors based on Lawrence Thompson, *The Economics of Public Pensions* (Washington, D.C.: The Urban Institute, 1998).

In a pay-go system, if a society has high fertility rates, relatively steady labor force participation rates across the working-age population, and no more than moderate increases in the life expectancy of retirees, there will always be a successively larger pool of workers to support retirees. When fertility rates fell off in most developed countries by the mid 1960s, however, some 20 years later the number of new workers stabilized or started to decline. Some 40 years after entering the workforce, the baby boom generation would become the "elder boom" of the twenty-first century, and aged dependency under pension systems would skyrocket, as reflected in **Table IV-4** (next page).

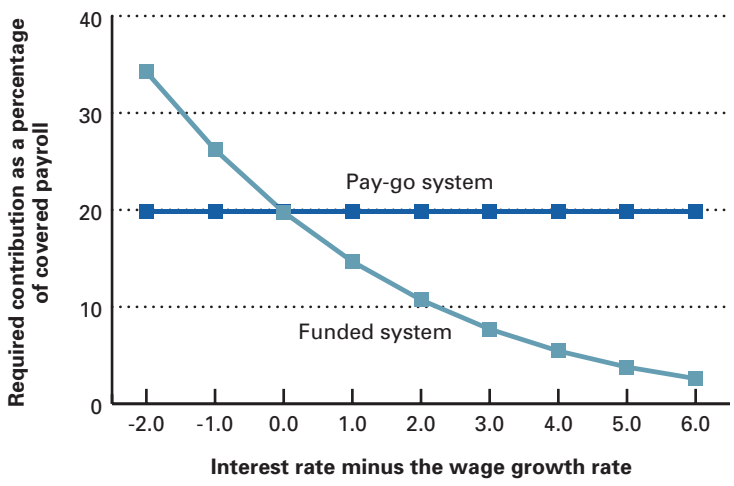
In the pay-go pension world, the cost of retirement benefits increases in direct proportion to the increase in retiree dependency, assuming benefits remain a relatively constant share of workers' pay levels. After World War II, many national pension systems were structured to hold the relationship between benefits and pay levels relatively constant over time, so there is a general sensitivity to increasing aged dependency in most cases. A notable exception is the United Kingdom's basic pension, where benefits are expected to decline over time in rough proportion to the rate of increase in aged dependency.

Table IV-4: Estimated Retiree Populations as a Percentage of Workers Historically and Projected for Selected Years

	Retiree to worker dependency ratios			Percentage increase from 2000–2030
	2000	2010	2030	
Australia	28.0	32.6	49.2	75.6
France	44.1	50.1	73.9	67.6
Germany	43.4	49.1	79.5	83.3
Italy	53.9	62.7	100.4	86.4
Japan	30.0	41.2	58.3	94.5
Netherlands	32.9	40.5	67.5	104.9
Sweden	39.9	46.2	67.4	69.1
Switzerland	23.7	30.8	47.5	100.2
United Kingdom	25.8	28.9	41.3	60.0
United States	24.5	26.6	42.0	71.4

Sources: Projections are computations by the authors based on data from the International Labor Office, Bureau of Statistics, LABORSTA database on labor statistics, projections are from United Nations, Population Division, *World Population Prospects: The 2000 Revision.*

Figure IV-11: Contribution Rates Required to Finance Hypothetical Retirement Systems under Alternative Assumptions about the Excess of Interest Rates over Wage Growth



Source: Derived by the authors based on Lawrence Thompson, *The Economics of Public Pensions* (Washington, D.C.: The Urban Institute, 1998).

Both funded and pay-go pensions that base benefits on earnings levels during workers' careers are more expensive in higher wage growth scenarios than where wages grow more slowly. Where these two types of plans differ is in their response to interest rates or rates of return paid to financial assets. In pay-go pension systems, interest rates have virtually no effect on pension costs because there are no funds on which to earn interest. But interest returns drive down the cost of funded retirement plans, because high interest rates drive up the returns on assets in the plan. At least in a partial equilibrium context, the cost of a pay-go pension is driven by wage growth, but the cost of a funded plan is driven by the interaction of wage growth and interest rates.

Using the simplified pension cost model and the hypothetical plan used earlier, the relationship between pay-go and funded plan costs is shown across a range of differences in interest rates and wage growth rates in **Figure IV-11,** assuming a zero interest rate throughout. In this formulation, when wage growth exceeds interest rates, the pay-go system is cheaper. Where interest rates exceed wage growth, the funded system is more economical. There is a slight sensitivity in the cost of the funded system if the interest rate assumption is varied in deriving cost estimates like those reflected in Figure IV-11, but the difference is minimal over a significant range of interest rate assumptions.

Table IV-5 shows the rates of return on bonds in a number of our study countries during the 1950s, 1960s, and 1990s. Of the 13 countries shown, five had negative rates of return during the 1950s and only two with positive returns had rates over 1 percent per year. During the 1960s, seven had negative real rates of return over the decade. For these same 13 countries, real bond returns were positive for all of them during the 1990s. In 12 of the 13 countries, real bond returns exceeded 5 percent per year during the 1990s.

Under the baseline simulation of a hypothetical pension plan used to analyze the comparative costs of a funded versus pay-go pension, the plan that costs 19.77 percent of pay at zero percent real wage growth will costs 26.21 percent of pay with 1.0 percent real wage growth and 34.23 percent with 2.0 percent real wage growth, assuming

other variables affecting cost remain constant. Within this context, it is important to consider the financing structure of national retirement systems in light of workers' wages over time. Although we could not locate good data on actual wage growth rates across countries dating back over the past half century, we did find estimates of the growth rates in labor productivity dating back to the 1960s across most of the study countries. These labor productivity growth estimates are a reasonable proxy for wage growth rates, especially in the market-based economies.

The economic underpinning of real wage growth in an economy is increasing worker productivity. The rates of increase in productivity over the last several decades in a number of developed countries are shown in **Table IV-6.** The overall pattern of productivity changes over the period is probably best summarized by the median rates of increase in productivity shown at the bottom of the table. Since the 1960s, productivity growth rates have been mixed. They declined steadily in a number of the most rapidly aging countries, such as Italy, Japan, Spain, and Switzerland. The medians in the developed countries have dropped since the 1960s, hovering fairly steadily around the 1.35 to 1.40 level.

In the 1960s, with low interest rates and high productivity improvement rates, implying rapid wage growth, economic conditions favored pay-go pensions over funded plans. On the demographic side, the high fertility rates also created a favorable environment for pay-go systems. In the latter part of the twentieth century, however, these conditions reversed in virtually all the developed countries. Low fertility rates tend to drive up aged dependency ratios, thus increasing pension costs for pay-go plans. The changing demographics were further exacerbated by economic conditions, specifically the increasing returns

Table IV-5: Real Bond Returns for Selected Countries and Selected Periods (Amounts in table reported as percent per year)

	1951–1960	1961–1970	1990–2000
Australia	-2.49	1.88	11.02
Canada	0.18	1.01	9.76
France	0.60	0.19	9.61
Germany	2.69	2.92	7.36
Ireland	-0.44	-4.97	8.51
Italy	0.68	-3.85	7.63
Japan	0.89	6.08	6.56
Netherlands	0.76	-1.13	5.97
Spain	0.72	-1.62	7.55
Sweden	-2.00	-0.51	9.24
Switzerland	1.60	-0.65	4.32
United Kingdom	-0.62	0.75	7.24
United States	-2.06	-1.92	6.08

Source: Global Financial Data, *Stocks, Bills, Bonds and Inflation: Total International Investment Returns, 1995–2003,* at http://www.globalfindata.com/march1/ht.

Table IV-6: Historical Compound Annual Growth Rates in Real Gross Domestic Product per Worker for Selected Periods in Various Countries

	Compound annual growth rate during period in percents			
	1960s	1970s	1980s	1990s
Australia	2.65	0.89	0.68	2.11
Canada	–	0.77	0.86	1.63
France	4.61	2.31	2.11	1.07
Germany	–	–	1.55	1.43
Italy	5.54	2.92	1.48	1.02
Japan	8.54	3.71	2.92	0.78
Netherlands	3.58	1.28	0.22	2.18
Sweden	3.24	0.78	1.19	1.41
Switzerland	3.04	0.84	0.50	0.04
United Kingdom	2.27	1.41	2.07	2.01
United States	2.10	0.88	1.82	1.79
Median for the developed countries	3.41	1.41	1.34	1.40

Source: World Bank, *World Development Indicators.*

to capital and slowing increases in worker productivity. This combination of demographic and economic changes has shifted the advantage in financing toward funded pensions

By now, the phenomenon of aging populations and their implications for pension costs seems to be relatively well known, especially

in the world's developed countries. The World Bank, the OECD, the European Commission (EC), and governmental policymakers in various countries have devoted considerable effort to studying the implications of population aging for public retirement systems. Although their approaches have varied, countries as diverse as Canada, Germany, Sweden, and the United Kingdom have all enacted public policies to encourage greater funding of their pension systems. Several countries, including Germany, Sweden, the United Kingdom, and the United States, have adopted measures to reduce the benefits paid out by their public pension programs.

Despite these efforts, there is a widespread belief among policymakers and the public that not enough has been done to constrain future pension costs. France was wracked by worker strikes and protests against proposed pension reforms during the summer of 2003, but the government stuck by new rules that would require public employees to work longer to qualify for a full pension. In the fall of 2003, Gerhard Schroder threatened to resign as Chancellor of the German government unless members of his party would support new social security rules.[1] An important element of political debate in the 2004 national elections in the United States is the social security pension. The government in Japan has submitted another round of pension reform proposals for consideration in 2004 that portends further significant cutbacks in benefits and an increase in payroll taxes from 13.85 to 18.35 percent of earnings by 2017.

The focus on demographic changes and pension costs, however, does not address the economic distributional issues raised by population aging and how policymakers could react to those issues. Also, relatively little has been said about the potentially significant effects of population aging on economic performance, particularly in the oldest societies.

V. Labor Supply and Economic Output

From the earliest systematic study of economic behavior, economists have sought to explain production output in terms of its inputs. They have come to depend on a model linking an economy's total output to the supply of workers, capital, and technology. In this model, labor supply and labor productivity are crucial explanatory variables. Labor productivity is simply total output divided by hours of labor. If labor productivity levels rise over time, it means output is growing faster than labor supply. Increases in labor productivity can be attributed to expansions in the capital stock available to labor, the improved quality of labor, and innovation or technology.

In the developed economies of the world, both labor supplies and labor productivity have increased regularly, although not necessarily consistently, over most of the period since World War II. **Table V-8** shows that the historical pattern of productivity improvement has been somewhat mixed from country to country. Among the largest developed countries, the patterns in France, Germany, Italy, and Japan have been of improving labor productivity, but the rates of improvement have been declining over the last three decades. The patterns in the United Kingdom and the United States have also been of improving labor productivity, but the rates of improvement have declined in some decades and increased in others. Among the G-7 countries, only Canada has shown a steady pattern of improvement since the 1970s.

From the 1960s through the 1990s, most developed economies also registered steady growth in their labor supplies. Toward the end of the 1960s and into the 1970s, labor supply growth in many countries picked up speed as the baby boom generations began

their working careers. The post-war increases in fertility rates were somewhat larger in Australia, Canada, New Zealand, and the United States than in the other developed countries, and labor force growth in those countries from the 1960s to the 1980s was higher, too. In several countries, women began entering the workforce in greater numbers at around the same time, which accounts for some of the labor supply growth reflected in **Table V-9.**

The combination of labor productivity improvements and labor force growth has resulted in steady decade-to-decade economic growth and rising standards of living in the economies of the developed world. The rates vary somewhat from decade to decade and from country to country, but GDP per capita consistently increased across the last four decades in all developed nations, as reflected in **Table V-5** (next page).

Long-term patterns of the sort reflected in Table V-5 tend to create expectations of further improvements in living standards. Most people hope for increasing prosperity, if not for themselves then for their children and grandchildren. And certainly most young adults aspire to improve their lot. Improving the status of generations across time typically implies economic expansion. So while most people may aspire to increasing output per capita, that may become increasingly difficult to achieve given the demographic developments ahead.

The history of labor force growth that has persisted over at least the last half century in many developed countries is likely to be reversed in the relatively near future. Assuming that people continue to conform to the working patterns of recent years, the aging populations may create workforce contractions in several countries during this decade or the next. Table V-9 suggests this could begin to occur in Italy, Japan, Sweden, and Switzerland in this decade and accelerate in the next, while also spreading across a number of other countries as well. In the 2010s, roughly two out of every three countries will experience a reduction in labor supply under our baseline projections. Even in Australia, Ireland, and the United

Table V-8: Compound Annual Growth in Labor Productivity for Various Countries in the OECD over Selected Decades

	Compound Annual Growth in Labor Productivity				
	1960s	1970s	1980s	1990s	Late 1990s
Australia	2.66	1.59	0.96	2.05	2.27
Canada	2.26	0.85	0.97	1.50	1.59
France	–	2.72	2.08	1.23	1.15
Germany	4.25	2.56	1.28	1.49	1.09
Italy	6.21	2.57	1.65	1.54	1.02
Japan	8.63	3.57	2.84	1.12	1.46
Spain	–	3.95	1.88	1.31	0.80
Sweden	3.95	1.13	1.44	2.49	2.11
Switzerland	3.21	1.24	0.29	0.65	1.23
United Kingdom	2.94	1.75	1.95	1.93	1.52
United States	2.26	0.81	1.31	1.48	1.96

Sources: *OECD Economic Outlook* — Source OECD.

Note: 1991–2000 are for Combined Germany.

Table V-9: Compound Annual Growth in Labor Supply for Various OECD Countries over Selected Decades

	1960s	1970s	1980s	1990s	2000s	2010s
Australia	2.49%	1.96%	2.32%	1.34%	1.08%	0.52%
Canada	2.66	3.60	1.75	1.17	0.94	0.21
France	0.94	0.93	0.57	0.57	0.21	-0.34
Germany	0.15	0.43	0.86	0.69	0.15	-0.54
Ireland	0.00	1.10	0.66	2.87	1.98	0.71
Italy	-0.52	0.84	0.52	0.10	-0.13	-0.85
Japan	1.34	0.92	1.23	0.58	-0.13	-0.42
Spain	0.83	0.64	1.21	0.98	0.89	-0.01
Sweden	0.67	0.99	0.54	-0.45	-0.36	-0.43
Switzerland	1.47	0.13	1.93	0.36	-0.21	-0.75
United Kingdom	0.07	0.57	0.68	0.28	0.24	-0.10
United States	1.74	2.60	1.64	1.13	1.15	0.59

Source: *Watson Wyatt's estimates of United Nations (2000);* The OECD Labour Market Statistics Database at http://www1.oecd.org/scripts/cde/members/LFSDATAAuthenticate.asp.

Notes: The labor force projections allow female LFPRs to rise by each cohort's growth rate averaged over the two 5-year periods of 1990–95 and 1995–2000. For example, 55–59-year-old females between 2000 and 2005 are assumed to increase their rate of LF participation based on the average of their participation changes between 1995 and 2000 when they were 50–54 years old, and between 1990 and 1995 when they were 45–49 years old. Participation rates for women were capped at males' labor force participation rates for countries where female LFPRs grew more rapidly.

Table V-5: Compound Annual Growth in GDP per Capita for Various OECD Countries over Selected Decades

	1960s	1970s	1980s	1990s
Austria	4.05	3.54	2.07	1.74
Canada	3.07	3.04	1.56	1.64
France	4.47	2.66	1.84	1.34
Germany	3.71	2.70	2.10	2.33
Italy	4.97	3.10	2.16	1.44
Japan	9.01	3.25	3.51	1.07
Netherlands	3.74	2.08	1.62	2.31
Sweden	3.91	1.60	1.87	1.39
Switzerland	3.23	1.19	1.54	0.18
United Kingdom	2.29	1.81	2.47	1.88
United States	2.92	2.25	2.16	2.25

Sources: *UN Population Projections — 2000 Revision;* an unpublished series of projections provided by the OECD; *OECD Economic Outlook,* OECD, June 2001.

Table V-10: Growth in Real GDP at Historical Productivity Growth Rates under Current Workforce Patterns

	Real GDP Growth — OECD Estimates		Productivity Growth	Estimated Growth in GDP at 1990s Productivity Growth	
	2000–2010	2010–2020	1990s	2000–2010	2010–2020
Austria	2.26	2.15	1.99	1.94	1.21
Canada	2.22	2.17	1.50	2.44	1.71
France	2.00	1.89	1.23	1.45	0.89
Germany	2.21	2.09	1.49	1.64	0.95
Italy	2.28	2.03	1.54	1.41	0.70
Japan	1.22	0.94	1.12	0.99	0.70
Netherlands	2.09	1.98	1.27	1.64	1.18
Spain	3.05	2.79	1.31	2.20	1.30
Sweden	2.39	2.44	2.49	2.12	2.06
United Kingdom	2.22	2.28	1.93	2.17	1.82
United States	3.10	3.11	1.48	2.63	2.07

Sources: *OECD Economic Outlook* — Source OECD Database; an unpublished database from the OECD; an unpublished database from Eurostat; United Nations Population Division, *World Population Prospects: The 2000 Revision;* The OECD Labour Market Statistics Database at http://www1.oecd.org/scripts/cde/members/LFSDATAAuthenticate.asp.

Notes: See Table V-9 for a description of labor force growth. GDP growth in the 2000s is based on OECD/EC projections. Future periods represent GDP growth necessary to maintain standards of living growth consistent with the 2000s.

States, which are expected to have relatively persistent labor force growth in the coming years, labor supply growth rates during the 2010s will be half those of the current decade. Employers in the developed countries may face considerable challenges in finding sufficient numbers of talented employees to run their operations. The potential alternative is economic stagnation or even economic decline, depending on the severity of the workforce contraction.

There are sound reasons for concern about whether some analyses of the aging phenomenon and projections of its implications have been based on overly optimistic assumptions about labor force and productivity growth.[2] Our projections in this study are based on assumptions that worker productivity will continue to grow at the 1990s rate, and that the labor force will conform to current labor force participation patterns applied to a changing population structure. Our projections of the growth rate for total output in many of the developed economies falls somewhat below the OECD's projections (see **Table V-10**). Of the countries included in the table, only Canada's growth rates are consistent with the EC/OECD's expectations. Over the coming decade, however, the slowdown in labor supply growth will become a significant drag on economic growth, with several countries such as France, Germany, and Spain expected to achieve rates that are less than half of the OECD's projections.

If population aging leads to slower or negative growth of labor supplies in the developed economies and that slows economic growth, declines in rates of improvement in living standards will follow. This would not necessarily occur if total population growth were slowing to the same rate as labor force growth, or contracting in the cases where the labor force is getting smaller. But the populations in virtually all of these countries will not begin to contract for some time due to their evolving demographic structures. If the rate of improvement in living standards is slowed due to the demographic transition underway, then the loaded question many societies will have to answer is: Who will bear the brunt of the slowdown? The character of the retirement

systems in many countries will likely have a lot to do with how they answer that question.

In many countries, retirement benefit levels are tied to workers' productivity levels through some form of wage indexing. Even where pension benefits are tied to general growth in income levels or to price indexing, the disproportionate growth in the cost of health benefits consumed by retirees tends to increase the cost of total retiree benefits at rates approaching those of wages. If retirees largely depend on pensions that grow with worker productivity or wages, pension systems may actually insulate retirees from the slowdown in economic growth that is likely to flow from population aging and slower labor force growth. As retirees become a larger share of the population, they potentially could divert more of the benefits of productivity growth — meaning higher standards of living — from the active workforce. This would place a growing real burden on workers and their dependents. The implications of what we are talking about are reflected in **Table V-12.**

It could become increasingly difficult to spur workers onto ever higher levels of productivity if there is no real return in it for them. The first two columns in the table show the growth rates in total per capita consumption across several countries, given output levels consistent with current labor force patterns applied to future populations, and assuming that 1990s productivity improvement rates are achieved through this decade and the next.

In allocating the output produced under these assumptions, we assumed that the elderly would realize income growth rates consistent with rates of improvement in worker productivity. Again, this is consistent with the pension structures that are prevalent in a number of developed countries. The right-hand two columns in Table V-12 show the rate of improvement in income or consumption rates for the elderly population under this scenario, for the current and next decades.

Table V-12: Annual Growth in per Capita Consumption over the Coming Decades Apportioned between the Elderly and Non-Elderly Population with the Non-Elderly Population Treated as a Residual

	Total Consumption per Capita		Active Workers and Dependents per Capita		Elderly Population per Capita	
	2000–2010	2010–2020	2000–2010	2010–2020	2000–2010	2010–2020
Australia	2.03	1.64	2.08	1.61	2.05	2.05
Canada	1.55	0.91	1.63	0.87	1.50	1.50
Denmark	1.80	1.73	1.83	1.70	2.07	2.07
France	1.07	0.71	1.08	0.63	1.23	1.23
Germany	1.47	1.02	1.53	0.95	1.49	1.49
Italy	1.37	1.09	1.40	1.00	1.54	1.54
Japan	0.79	0.81	0.84	0.76	1.12	1.12
Spain	1.42	0.91	1.50	0.88	1.31	1.31
Sweden	2.67	2.22	2.85	2.24	2.49	2.49
Switzerland	0.61	0.16	0.73	0.12	0.65	0.65
United Kingdom	1.98	1.52	2.05	1.48	1.93	1.93
United States	1.67	1.09	1.74	1.10	1.48	1.48

Sources: OECD National Accounts — Source OECD Database; an unpublished database from the OECD; an unpublished database from Eurostat; United Nations Population Division, *World Population Prospects: The 2000 Revision;* also see Figure V-2.

Notes: The growth in total consumption is based on the feasible rates of output growth from Table V-10. This assumes historical productivity growth rates under our baseline projections of labor force growth. Per capita consumption for the elderly population (ages 60+) is assumed to grow at the 1990s productivity growth rate. Consumption of the non-elderly (ages 0–60) is treated as the residual.

We assume that what is left of national output after the retirees get their share is allocated to the working-age population and its dependents. The middle two columns in Table V-12 show the rate of growth in the working-age population's consumption, given the residual of total output available after the allocation to the elderly. In this scenario, the standards of living among the elderly are going to be improving at somewhat higher rates than among the working-age population in a number of cases during this decade. The estimates here suggest that this will occur in Denmark, France, Italy and Japan during this decade, but has the potential to spread to most developed countries in the 2010s.

In the abstract, the allocation of output along the lines suggested in Table V-12 is

Table V-13: Annual Growth in per Capita Consumption over the Coming Decades Apportioned Between the Elderly and Non-Elderly Population with the Elderly Population Treated as a Residual

	Total Consumption per Capita		Active Workers and Dependents per Capita		Elderly Population per Capita	
	2000–2010	2010–2020	2000–2010	2010–2020	2000–2010	2010–2020
Australia	2.03	1.64	2.37	2.10	0.40	-0.12
Canada	1.55	0.91	1.93	1.54	-0.15	-1.28
France	1.07	0.71	1.36	1.21	0.04	-0.82
Germany	1.47	1.02	1.84	1.57	0.38	-0.38
Italy	1.37	1.09	1.80	1.57	0.14	-0.05
Japan	0.79	0.81	1.74	1.35	-1.78	-0.30
Spain	1.42	0.91	1.73	1.41	0.40	-0.50
Sweden	2.67	2.22	3.28	2.69	0.87	1.11
Switzerland	0.61	0.16	1.27	0.92	-1.47	-1.65
United Kingdom	1.98	1.52	2.30	1.92	0.87	0.31
United States	1.67	1.09	1.90	1.63	0.51	-1.05

Sources: see Table V-12.

Notes: The growth in total consumption is based on the feasible rates of output growth from Table V-10. This assumes historical productivity growth rates under our baseline projections of labor force growth. Consumption for the non-elderly population (ages 0–60) is assumed to grow at the rate of productivity growth plus the growth in the labor force. Consumption of the elderly (ages 60+) is treated as the residual.

no better or worse than any other suggested distribution of output. The potential issue likely to arise, however, is that with the slowdown or even shrinkage of growth in the labor supply, the primary factor driving economic growth will be improving worker productivity. Workers may be less than enthusiastic about increasing their levels of output when they are losing ground in their own living standards relative to those who have withdrawn from the workforce.

Several countries have already taken or proposed actions to limit the liability that pension systems will place on workers. For example, the United Kingdom's basic pension is indexed on the basis of prices rather than wages. One option proposed by a recent presidential commission for reforming social security pensions in the United States would do the same thing. Several other countries, including Germany, Italy, and Sweden, have already adopted a range of measures to restrict the growth of their retirement systems. Some of the pension systems that have an explicit link to wages may be largely de-linked through repeated adjustments to benefit levels over time.

To the extent that policymakers limit the implications of population aging on pension costs, it will protect workers from the demographic transition that is underway. Insulating workers from the economic implications of changing demographics, however, has the potential to adversely affect standards of living for the elderly, probably through an erosion in their benefits. To see the implications of this scenario, consider the results presented in **Table V-13.**

Table V-13 contains the same sort of information included in Table V-12, except here we assumed that workers and their dependents would realize improvements in their consumption rates consistent with improving productivity, and that the residual of total output would be allocated to retirees. In this case, the news is contained in the right-hand two columns of Table V-13. Where the entry has a negative sign, it suggests that standards of living among the elderly will be falling. The significant benefit reductions to pensions that have already been adopted in Japan suggest that this scenario may actually be underway in at least one case. And now the Japanese government has suggested that the replacement of average wages will be reduced from 59 to 50 percent by 2017.

The two right-hand columns in Table V-13 suggest that if policymakers respond to population aging by simply driving down the income levels of the elderly, such policies could lead to significant declines in standards of living among the elderly across much of the developed world over the next decade. The phenomenon could become widespread in the next decade. The prospect of solving the aging challenge by pushing more and more of the elderly into substandard income levels is hardly one to embrace with cheer.

The ultimate choices we face may boil down to either allocating a shrinking output among competing segments of society, or pursuing policies that sustain economic growth and allow all segments of society to share in it. One option that must remain on the table, given its direct linkage to economic growth, is how to grow labor forces despite the demographics now unfolding across much of the developed world. To this end, a number of countries have taken steps over the past decade to raise the retirement eligibility age in their public retirement programs. Countries such as Sweden, the United States, and Belgium have all taken measures to raise the normal retirement age under their programs. Other countries, such as Germany, have enacted policies that slowly increase the eligibility age for unreduced early retirement benefits. This reduces older individuals' incentives to retire early. These policies could increase the labor supply and simultaneously decrease the number of older dependents who must be supported by improvements in workers' productivity. Reductions in the ratio of retirees to the total population are not limited to public policy solutions. The private sector also can design solutions into their benefits programs to sweeten the incentives for older individuals to remain in the workforce.[3]

VI. Aligning Labor Demand and Supply

If the developed economies of the world wish to sustain rising standards of living but labor productivity growth rates are topping out, certain fundamental labor force behavior patterns will have to change. Efforts to entice more workers into the labor force must focus on groups that traditionally have had low workforce participation. In most countries, these groups would be working-age women, younger retirees, and young adults. We developed a set of scenarios where we estimated how much these groups would have to change their labor force behavior in order to fill the upcoming gap in productive capacity due to demographic changes.

In reality, of course, the wage rate and interest rate are equilibrium outcomes. A body of literature in pension economics and finance has applied general equilibrium models to assess the impact of different policy scenarios.

While the equilibrium models, such as that used by the EC, do provide a sophisticated approach to quantifying the implications of aging populations, they rely on deep structural parameters that can be difficult to calibrate and interpret.[4] Often times the economic consequences of aging are lost in these more complex models. For example, if the aging phenomenon results in slower labor force growth in a country, the general equilibrium models would simultaneously estimate the wage effects and, in turn, their implications on the labor force behavior of older people, working-age women, and young adults. These changes would affect aggregate output levels and the distribution of output. We do not disagree with this approach to modeling evolving economies or with the results from such approaches. Indeed, these efforts generally suggest a slowdown in the rate of growth in output as a result of population aging in many developed economies, and significant financial stresses resulting from the combination of population age structures and publicly financed retirement systems.

Our approach for this analysis builds off the equilibrium solutions to the more multifaceted models, using a partial approach to analyze the impact of aging populations on a country's standards of living and, more importantly, how the effects are distributed between the retiree and non-retiree segments of the population. Our intent is to clarify and highlight the influence of aging demographics on

Table VI-3: Increases in Prime-Age Female Labor Force Participation Rates Necessary to Offset Projected Labor Shortfalls over the Coming Decade

	Male LFPR 25–54 in 2000	Female LFPR 25–54 in 2000	Needed Female LFPR 25–54 in 2010
France	94.1	78.4	92.1
Germany	95.9	77.0	95.0
Italy	90.6	57.9	77.4
Japan	97.1	66.5	75.3
Netherlands	93.4	71.4	94.8
Spain	92.9	63.1	92.9
Sweden	90.6	85.6	86.6
Switzerland	96.7	78.0	92.2
United States	91.6	76.8	89.3

Sources: See Table V-10.

Table VI-4: Increases in Old Age Labor Force Participation Rates Necessary to Offset Projected Labor Shortfalls over the Coming Decade

	LFPR 55+ in 2000		Needed LFPR 55+ in 2010	
	Males	Females	Males	Females
France	18.2	11.5	27.7	24.2
Germany	29.6	14.0	42.7	21.4
Italy	21.8	6.8	37.1	15.6
Japan	57.5	28.4	62.4	30.0
Netherlands	25.9	10.0	36.3	20.0
Spain	26.0	8.5	41.7	20.9
Sweden	36.3	25.7	41.6	28.8
Switzerland	45.1	29.2	54.1	36.7
United States	40.0	25.7	51.9	39.8

Sources: See Table V-10.

Table VI-5: Increases in Younger Workers' Labor Force Participation Rates Necessary to Offset Projected Labor Shortfalls over the Coming Decade

	LFPR 20–29 in 2000		Needed LFPR 20–29 in 2010	
	Males	Females	Males	Females
France	74.5	64.1	96.7	82.3
Germany	84.4	72.5	111.6	95.5
Italy	73.2	56.6	118.5	91.1
Japan	85.1	71.2	97.4	81.6
Netherlands	88.9	81.5	108.9	99.6
Spain	78.4	67.6	120.4	105.1
Sweden	78.2	70.8	89.9	80.2
Switzerland	84.3	72.7	99.6	85.3
United States	87.5	75.2	105.4	90.6

Sources: See Table V-10.

economic growth and the potential burden it will impose on many developed societies' fiscal budgets under a number of scenarios with varied population parameters, workforce activity rates, and worker efficiency.

It is not uncommon for people seeing the potential implications of population aging on economic activity to conclude that countries will have to increase their immigration rates or extend the working lives of workers. We are attempting to calibrate the changes that would be required in these and other areas to actually resolve the dilemmas that population aging will create in the respective economies included in the analyses.

As a result, this study presents a consistent set of parameters to compare the impact of aging on many of the developed countries' growth prospects over the coming decades. While this method is a more stylized approach and does not capture some important interactions and feedback mechanisms that will affect countries' economic outcomes, the estimates in this report are consistent with many other studies on this subject. In particular, unless countries can find ways to either increase productivity growth rates or entice additional workers into the labor force or older workers to delay retirement, many developed societies will face the prospect of slower or even declining rates of standards of living growth over the coming decades. In this regard, our results are consistent with those of contemporary general equilibrium analyses of the same issues.

In each of the three scenarios, we estimated how much that segment of the population would have to change its behavior to close the production gap estimated under the baseline scenario. These results are presented in **Tables VI-3**, **VI-4**, and **VI-5**. In the abbreviated tables presented in the Executive Summary, we have focused on countries where significant changes would be required during this decade.

In the scenarios where we considered increasing female labor force participation rates, reported in Table VI-3, we estimated that labor force participation rates of women between the ages of 25 and 54 in France would have to increase from 78 percent in 2000 to 92 percent in 2010. While this may not be achievable, policymakers may want to investigate what can be done to attract more women into the workforce.

In the scenario reported in Table VI-4, the labor force response would come solely from the older segments of society. In Germany, for example, this scenario estimates that the labor force participation rates of males 55 and older would have to increase from about 30 percent in 2000 to 43 percent by 2010, and female rates would have to increase from 14 to 21 percent to close the production gap. Again, we do not believe these changes are achievable in such a short time frame, but they provide perspective for policymakers to consider in responding to the macroeconomic challenges posed by changing demographics.

The third scenario focuses on increasing the labor supply of young adults. We are not advocating increasing rates of child labor or eliminating advanced education. It is a fact, however, that the labor supply rates of young adults in their 20s are highly varied across the developed economies, and the advanced education systems in several countries are delaying the entry of potentially productive workers into their careers. Obviously, young workers cannot close the economic productivity gap alone, as Table VI-5 indicates, since in some cases their labor force participation rates would have to rise well above 100 percent to do so.

While looking to any single group may not be a realistic solution, raising labor force participation rates for all three groups — women, the elderly, and younger individuals — may hold considerable promise. In order to test this, we developed another scenario where we assumed that the labor force participation rates across these three groups would rise to the equivalent of the average rates in the five countries with the highest rates across all of the OECD countries. **Table VI-7** suggests that raising labor force participation rates for women, the elderly, and younger individuals to levels equivalent with the average of the Top-5 developed countries would create an ample labor supply to meet output growth expectations over the coming decade.

Table VI-7: Percentage of Labor Demand Met in 2010 at Median of the Top-5 Labor Force Participation Rates

	All 15 and over	All 55 and over	Women 25 to 54	All 20 to 29
France	1.18	1.11	0.97	0.98
Germany	1.08	1.06	0.97	0.96
Italy	1.29	1.13	1.03	0.95
Japan	1.08	0.98	1.03	0.99
Netherlands	1.03	1.08	0.97	0.96
Spain	1.12	1.08	0.97	0.94
Switzerland	0.98	1.00	0.98	0.98
United States	0.98	0.99	0.98	0.96
Median Top-5 LFPR				
Males	77.5	57.5	–	88.2
Females	59.9	29.2	85.0	77.7

Sources: See Table VI-10.

It is important to think about the results in Table VI-7 in the context of the earlier discussion surrounding Tables VI-3, VI-4 and VI-5. For example, Table VI-7 suggests that Germany could completely close its potential production shortfall this decade by increasing the labor force participation rates of people over the age of 55 to the average rates realized in the Top-5 countries. But as the earlier discussion suggested, older workers' participation rates are very unlikely to increase by enough to resolve the coming workforce shortfall. The point in Table VI-7 is that we are much more likely to achieve the necessary workforce gains by encouraging participation among women, the elderly, and young adults, rather than focusing on one segment alone. Another approach that could

Table VI-9: Increase in Immigration Required to Offset the Extent Fertility Falls below Population Replacement Levels

	Average total fertility rate 1995–2000[a]	Average births 1995–2000 (000s)	Additional births at TFR=2.1[a] (000s)	Average net immigration 1995–2000 (000s)	Multiple of current immigration to offset low fertility
Australia	1.8	1250	42	95	0.4
Canada	1.6	1782	111	144	0.8
Denmark	1.7	328	15	14	1.1
France	1.7	3649	172	39	4.4
Germany	1.3	3815	470	185	2.5
Italy	1.2	2623	393	118	3.3
Japan	1.4	6160	616	56	11.0
Netherlands	1.5	935	75	32	2.3
Spain	1.2	1823	273	37	7.4
Sweden	1.5	441	35	9	3.9
Switzerland	1.4	367	38	4	9.6
United Kingdom	1.7	3530	166	95	1.7
United States	2.0	19983	200	1250	0.2

Source: Derived by the authors from 1955–2000 based United Nations Population Division, *World Population Prospects: The 2000 Revision.*

[a]The fertility rate reported here is rounded from the actual rates reported by the United Nations. The additional births that would have occurred if the total fertility rate were 2.1 were derived using the actual rates reported by the United Nations.

ameliorate some worker shortages and stimulate economic growth is to increase immigration rates. But immigration alone cannot make up for the low fertility rates in many developed countries. As **Table VI-9** suggests, in many countries, current immigration rates would have to skyrocket, increasing by several multiples in some countries — Germany by 2.5 times current rates, France by 4.4 times, and Japan by 11.0 times — to make up in immigration what they lack in birth rates over the long term. In the short term, targeted immigration might help more than the table suggests. However, in many cases, the political reactions to existing immigration rates suggest that public policy devices to increase immigration would be politically disruptive. There is another side to this issue, however, in that shrinking labor forces could hollow out segments of labor markets, potentially fueling illegal immigration.

If countries cannot achieve the labor force participation rates necessary to offset the drag on economic growth caused by aging populations, the other alternative is to find ways to enhance productivity. One way this could occur is through increased capital investment. To a certain degree, capital complements the existing pool of workers by making them more efficient.

But there are limits to the extent that capital can substitute for labor, as is evidenced by the declines in the capital-to-output ratios for several of the most rapidly aging developed countries in recent decades (see **Table VI-13**). Japan's capital efficiency has deteriorated most significantly. Whereas Japan's capital-to-output ratio was only 1.31 in 1970, by 2000 Japan needed more than twice that amount of capital to produce a unit of output. While capital efficiency has deteriorated for many countries in recent years, countries such as the United States and the United Kingdom have shown marginal improvements.

Alternatively, effective human capital management is a key to increasing worker productivity. Some of the factors identified in this research suggest that public policymakers can adjust the national regulatory environment so as to increase productivity. The research on organizational behavior clearly shows that effective management of human resources on the part of individual employers can also enhance productivity.

VII. Retirement Policy in a Larger Economic Context

As populations in the industrialized societies age, national governments will face significant budgetary challenges in financing their public retirement schemes. In the developed nations today, these programs are largely financed through payroll taxes and pay out a defined benefit. The demographic transition that is occurring in nearly all industrialized societies today, where old age dependency ratios are rising rapidly, will significantly

Table VI-13: Ratio of Business Sector Capital Stock to Output for Selected Periods

	Canada	France	Germany	Italy	Japan	Spain	U.K.	U.S.
1970	1.66	1.58	1.82	2.43	1.31	1.36	3.50	1.45
1975	1.64	1.69	2.15	2.68	1.75	1.50	3.45	1.51
1980	1.73	1.75	2.21	2.57	1.93	1.81	3.36	1.48
1985	1.82	1.89	2.41	2.72	2.20	1.95	3.08	1.47
1990	1.83	1.91	2.35	2.74	2.25	1.95	2.87	1.42
1995	1.81	2.09	2.52	2.92	2.61	2.22	2.89	1.37
2000	1.51	2.05	2.46	3.06	2.84	2.22	2.90	1.32

Source: Authors' calculation from the OECD, *Source OECD,* Economic Outlook Database.

increase the percent of GDP these programs consume and the share of tax revenues required to sustain them.

Many of the financial pressures result from the inherent design of pay-go pension systems. High payroll taxes to finance public pension and health care programs have probably already led to efficiency losses in the labor markets of industrialized societies. This is partly due to the widening gap between the contributions workers pay into these programs versus the benefits they will receive. Workers who are unhappy with their own cost/benefit ratios may look for ways to circumvent the system, either by working less or by working "under the table" for unreported income. One of the most striking socioeconomic effects supporting this conclusion is the way these programs have encouraged older workers to withdraw from the labor market.

Many older workers retire from the labor force before the retirement plan's minimum entitlement age, living off of other types of income support until they reach the pension plan's normal retirement eligibility age. Dedicated schemes offering early retirement have made this possible in several countries. Other countries have transformed long-term unemployment schemes and disability programs into de facto early retirement programs, by making it much easier for older employees to qualify for entitlement. As a result of these changes, non-employment benefits have expanded to the point that in several developed countries, nearly one in three males ages 55 to 64 received non-employment benefits in 1995. In Austria, eligibility is above 50 percent.[5] Many public-sector programs even impose significant tax penalties on workers who continue working beyond normal retirement age (see **Table VII-6**). For example, in Austria in 1995, the penalty for a worker who retired at 64 rather than at 55 was 3.4 times average annual earnings. This is equivalent to an average implicit tax rate of 34 percent, in addition to all other taxes and work-related expenses a worker would have to pay on earnings from contin-

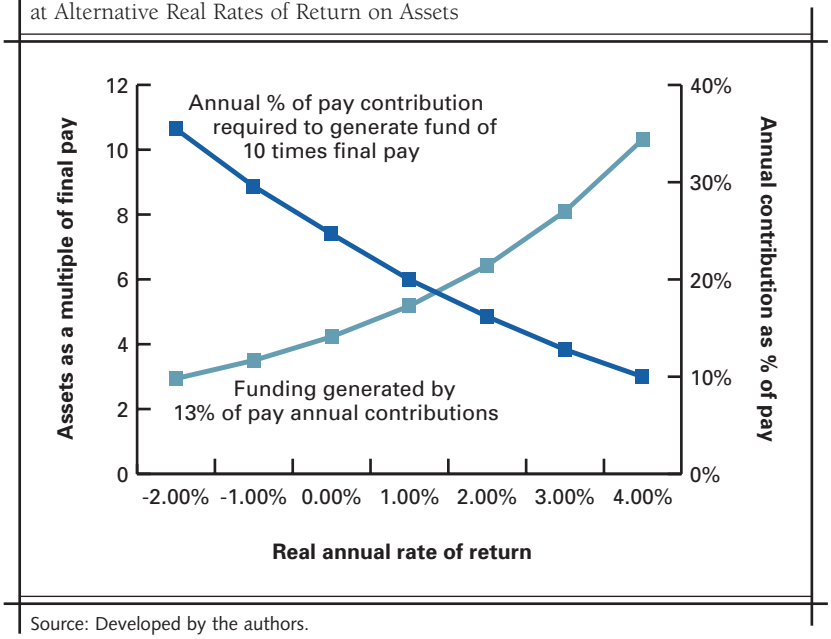
Table VII-6: Implicit Tax Rates from Postponing Retirement Due to Old Age Pension Programs

	Postponing retirement from 55–64		Postponing retirement from 55–69	
	1967	1995	1967	1995
Austria	-3.1	-3.4	-6.5	-7.0
Canada	1.5	-0.6	-0.1	-1.6
France	-0.2	-1.4	-1.2	-3.7
Germany	-0.4	-1.4	-2.9	-3.4
Italy	-3.0	-7.9	-4.5	-11.8
Japan	-1.0	-2.8	-2.1	-3.9
Netherlands	-0.9	-1.3	-2.3	-2.9
Sweden	0.9	-1.8	0.0	-3.3
Switzerland	0.2	0.0	-0.7	-1.5
United Kingdom	-0.6	-0.5	-1.4	-1.5
United States	-0.8	-1.2	-1.9	-2.5

Source: Sveinbjorn Blondal and Stefano Scarpetta, "The Retirement Decision in OECD Countries," OECD, Economics Department Working Papers, No. 202, February 1999.

Notes: The table shows changes in pension wealth measured as a multiple of annual earnings. For example, postponing retirement from 55 to 64 in the United States in 1967 implied that the pension wealth decreased by an equivalent of 0.8 times average annual earnings. This is equivalent to an average implicit tax rate of 8 percent, since annual earnings are assumed to be constant and normalized at unity.

Figure VII-3: Accumulated Assets at Retirement Based on a 13 Percent Per Annum Pension Contribution and Alternative Contribution Rates Required to Accumulate a Pension Balance of 10 Times Pay at Retirement at Alternative Real Rates of Return on Assets



Source: Developed by the authors.

ued employment. For individuals delaying retirement until age 69, the penalty is even steeper.

The labor market distortions that have been created by typical pay-go financed pension programs over the last few decades may well have intensified the fiscal challenges posed by aging populations. Recognition of this fact, along with the changes in the financial market operations in many developed societies, has significantly altered the terrain of pension financing. Many countries are shifting to funded schemes; examples include Chile and Australia on a relatively full basis and Canada and Sweden on a more limited basis. Funding these programs and privately investing the assets would increase savings and investments, which would likely boost productivity. This would go a long way to alleviate the financial burdens that are anticipated under the existing pay-go programs (see **Figure VII-3**).

While a shift from a pay-go to a funded system could have tremendous merit for the free flow of capital throughout the world, societies should be cautious about how rapidly they can make this transition. Embracing funding too enthusiastically over the next few decades could create a situation where national savings rise too quickly to keep pace with efficient investments. This could drive capital returns to even lower levels than would result from aging populations.

Occupational pension plans also have important effects on the efficiency of a country's labor markets, similar to that of a public retirement program. However, it is important to bear in mind that occupational plans are generally voluntary across most of the developed nations. These programs are designed to achieve very specific goals, such as to attract and retain top-performing employees and to encourage them to retire on a timely basis. As such, employer-based plans have also contributed to lower labor force participation rates among older people by offering workers attractive incentives to retire early, generally through early retirement subsidies. But, a general paradigm shift toward defined contribution programs in lieu of the more traditional defined benefit programs across many countries has peeled away some of these early withdrawal incentives.

Most of the discussion thus far has focused on how developed countries can deal with their own aging populations and stable or declining workforces within the confines of their own boundaries. However, developed economies have another option. If they cannot find adequate labor within their own borders to effectively use capital, they can export capital to other parts of the world where there are ample and growing supplies of workers. Industrialized economies can take advantage of more favorable economic opportunities elsewhere by shifting capital and the production capacity that goes along with it abroad. This would enable capital owners to repatriate returns on capital investments abroad in the form of goods and services. Thus, capital flows have the potential to ease the rising demand pressures for goods and services that are likely to ensue with the aging of the developed societies.[6] Funded

pension systems are much more conducive to the movement of capital to higher growth areas than pay-go systems, since the latter are tied to the domestic economy.

VIII. Risks Associated with Alternative Public Policies

As a result of population aging, the industrialized nations almost certainly face considerable economic challenges. The macroeconomic challenge will be to carry forward the improving standards of living achieved during the twentieth century into the twenty-first, equitably allocating these improvements across various segments of the populations. Throughout this study, we have seen that crucial elements in this allocation process are the retirement systems that transfer economic resources from workers to retirees. The sustainability of pension and health care programs will become the essential linkage between the macroeconomic prosperity of aging societies and the relative welfare of all segments of our societies.

The EC, the OECD, the World Bank and various other entities have projected that nearly all developed nations will incur significantly higher pension costs under their current policies. There is substantial evidence that most of these countries have yet to take measures to cope with these financial challenges without jeopardizing income adequacy for the elderly populations of the future.[7]

To meet the financial challenges ahead, the EC has identified a number of objectives that encompass three main goals: income adequacy for dependent populations; financial sustainability, not only of the pension systems but of the entities that support them; and modernization of the pension systems. Objectives for reforms include the need for countries with high debt ratios to adopt measures for budgetary consolidation. Relating more specifically to pensions, the EC argues that policies that promote longer working careers and higher workforce activity rates are an important strategy. In addition, the EC suggests that adapting public pension programs as well as secondary pillar schemes to more flexible employment and career patterns is important to providing diversified forms of pension income in retirement. But the EC also strongly emphasizes that the key to successful pension reforms is achieving a healthy balance between social and financial concerns, because effective reforms necessitate a holistic response.

Discussions about population aging often quickly devolve into a debate on how to reduce the costs of pension systems or the more general costs of government operations in the face of expected pension cost increases. An alternative approach is to consider policies that specifically target the deterioration of public budgets as a result of population aging and public pension schemes, and to explore policies and institutional changes that would promote economic growth and thus ameliorate the aging burden problem. While policies that promote economic growth in their own right help support rising standards of living, higher growth rates in output can also increase the scope of public budgets to finance public pension programs, which will likely reduce some of the pressures brought to bear by demographic developments.

One way countries can dampen the effects of population aging on pension costs is to devise ways to reverse the trend toward early retirement and create incentives for longer working careers. This is more than just a retirement issue, however, as many societies also have other segments of the population — namely women and younger workers — who have relatively low labor force participation rates. Across developed societies,

Table VIII-4: Growth in Standards of Living under Alternative Labor Force Scenarios

	Growth in GDP per Capita			Growth in GDP per Capita at 1990s Productivity Growth	
	1970s	1980s	1990s	Base LFPR 2000–2030	Top-5 LFPR 2000–2030
Australia	1.34	1.69	2.24	1.79	2.51
Austria	3.50	2.16	1.81	1.36	2.61
Canada	2.83	1.52	1.76	1.14	1.83
France	2.66	1.84	1.50	0.84	2.05
Germany	2.61	2.02	1.27	1.03	2.02
Italy	3.09	2.21	1.38	1.03	2.69
Japan	3.28	3.53	1.17	0.85	1.37
Netherlands	2.08	1.62	2.25	0.73	1.72
Spain	2.47	2.58	2.38	0.91	2.23
Sweden	1.60	1.87	1.40	2.25	2.91
Switzerland	1.19	1.54	0.18	0.22	0.70
United Kingdom	1.81	2.46	1.94	1.61	2.32
United States	2.12	2.23	2.21	1.29	1.78

Sources: *OECD Economic Outlook* – Source OECD Database; United Nations Population Division, *World Population Prospects: The 2000 Revision*; the OECD Labour Market Statistics Database at http://www1.oecd.org/scripts/cde/members/LFSDATAAuthenticate.asp.

Table VIII-5: Growth in Standards of Living under Alternative Labor Force and Productivity Scenarios

	Growth in GDP per Capita			One-Third Increase in 1990s Productivity Growth	
	1970s	1980s	1990s	Base LFPR 2000–2030	Top-5 LFPR 2000–2030
Australia	1.34	1.69	2.24	2.56	3.18
Austria	3.50	2.16	1.81	2.07	3.27
Canada	2.83	1.52	1.76	1.71	2.33
France	2.66	1.84	1.50	1.24	2.46
Germany	2.61	2.02	1.27	1.60	2.52
Italy	3.09	2.21	1.38	1.60	3.21
Japan	3.28	3.53	1.17	1.32	1.74
Netherlands	2.08	1.62	2.25	1.47	2.14
Spain	2.47	2.58	2.38	1.82	2.67
Sweden	1.60	1.87	1.40	2.85	3.74
Switzerland	1.19	1.54	0.18	0.55	0.92
United Kingdom	1.81	2.46	1.94	2.31	2.97
United States	2.12	2.23	2.21	1.85	2.27

Sources: See Table VIII-4.

some countries do a better job than others at enticing women and feeding younger workers into the labor force. In some sense, these countries can be seen as having the "best practice" levels of labor force participation. Countries that are able to attract more women and younger workers into the labor force and to encourage older workers to delay retirement will push up rates of economic activity, providing a boost to standards of living in their economies. As shown in **Table VIII-4**, Germany, Italy, Austria, and the United Kingdom could significantly boost their standards of living growth over the next 30 years, achieving rates similar to those in the 1970s and 1980s. However, Japan and Switzerland would need to resort to other avenues as well to outperform their current rates.

Countries that are able to successfully stimulate higher rates of labor productivity and thus boost their output levels could ameliorate some of the cost burdens anticipated from their aging populations. **Table VIII-5** shows per capita GDP growth between 2000 and 2030 for our baseline and "best practice" labor force scenarios, assuming countries could achieve a one-third increase in their 1990s productivity growth rates. Under this scenario, most countries would be able to maintain their 1990s growth in standards of living and some could even increase it. But even if policymakers figure out how to realign regulations and employer practices to achieve higher labor productivity rates, they will still face the challenge of diverting some of that increased productivity to a larger aged population. Increasing the tax burden for workers in order to meet the needs of a large elderly dependent population could serve as a disincentive for workers to make the efforts needed to become more productive.

Increasing labor force activity rates would be a positive achievement in its own right,

boosting economic growth and thus standards of living across the developed societies. But, how will this greater prosperity be divided among various groups in the society? Once again, we consider the implications of giving the benefits of productivity growth to retirees, with residual output being provided to the working-age population and its dependents. In **Table VIII-6a**, we estimate how higher rates of labor force activity affect the growth in per capita consumption. If countries adopt policies that trigger higher rates of employment across all age and gender groups, the economic growth will increase standards of living for workers and their dependents compared to the baseline scenario. In France, Italy, the Netherlands, and Spain, per capita consumption growth for the non-elderly population is more than three times that of our baseline scenario, while the pace in Germany and Austria will more than double between 2000 and 2030.

Combining advancements in productivity with higher labor force participation rates would provide an additional boost to the levels of affluence for both retirees and workers and their dependents, as the results of simulations in **Table VIII-6b** (next page) show. Per capita consumption growth for the non-elderly population is projected to more than double over the described period in many of the developed societies compared to the baseline scenario.

In the alternative scenario where workers retain the fruits of their productivity improvements and retirees receive the residual output, the increased labor force activity and productivity improvements also could ameliorate the aging burden in the developed economies. **Table VIII-7a** (see page xxvii) shows that under the baseline case, retirees in the developed nations could face widespread reductions in standards of living over the next quarter century. Retirees in roughly half of the nations in the table would actually face declines in per capita consumption between 2000 and 2030. However, adopting policies that entice higher labor force activity rates could significantly offset the deterioration in retirees' standards of living. In most countries, the income levels of the elderly would continue to grow under this scenario, although not nearly as rapidly as those of the non-elderly population. In fact, retirees in countries with relatively lower labor force utilization rates for particular segments of their population — Austria, France, the Netherlands, and Spain — could see their standards of living grow over a full percentage point per annum from the baseline scenario. But rates for the elderly still represent only a quarter to a third, at best, of income growth rates of workers and their dependents.

It would be natural to conclude that there ought to be a more equitable sharing of the added output that would result from this scenario. It is important to keep in mind, however, that this scenario entails attracting

Table VIII-6a: Annual Growth in per Capita Consumption Apportioned between the Elderly and Non-Elderly Population with the Non-Elderly Receiving the Residual

	Total consumption per capita	Active workers & dependents per capita	Elderly population per capita	Total consumption per capita	Active workers & dependents per capita	Elderly population per capita
	Base labor force growth and 1990s productivity			Best practice labor force growth and 1990s productivity		
	2000–2030	2000–2030	2000–2030	2000–2030	2000–2030	2000–2030
Australia	1.79	1.77	2.05	2.51	2.69	2.05
Austria	1.36	1.17	1.99	2.61	3.01	1.99
Canada	1.14	1.11	1.50	1.83	2.01	1.50
France	0.84	0.78	1.23	2.05	2.36	1.23
Germany	1.03	0.91	1.49	2.02	2.35	1.49
Italy	1.03	0.89	1.54	2.69	3.24	1.54
Japan	0.85	0.84	1.12	1.37	1.60	1.12
Netherlands	0.73	0.62	1.27	1.72	1.99	1.27
Spain	0.91	0.84	1.31	2.23	2.67	1.31
Sweden	2.25	2.27	2.49	2.91	3.18	2.49
Switzerland	0.22	0.16	0.65	0.70	0.88	0.65
United Kingdom	1.61	1.58	1.93	2.32	2.54	1.93
United States	1.29	1.30	1.48	1.78	1.93	1.48

Sources: See Table VIII-4.

Note: The growth in total consumption is based on the feasible rates of GDP growth. This assumes historical productivity growth rates under our (1) baseline and (2) alternative "best practice" projections of labor force growth. Per capita consumption for the elderly population (ages 60+) is assumed to grow at the 1990s productivity growth rate. Consumption of the non-elderly (ages 0–59) is treated as the residual.

Table VIII-6b: Annual Growth in per Capita Consumption Apportioned between the Elderly and Non-Elderly Population with the Non-Elderly Treated as a Residual

	Total consumption per capita	Active workers & dependents per capita	Elderly population per capita	Total consumption per capita	Active workers & dependents per capita	Elderly population per capita
	Base labor force growth and 1990s productivity			Best practice labor force growth and one-third improvement in 1990s productivity		
	2000–2030	2000–2030	2000–2030	2000–2030	2000–2030	2000–2030
Australia	1.79	1.77	2.05	3.18	3.37	2.73
Austria	1.36	1.17	1.99	3.27	3.68	2.65
Canada	1.14	1.11	1.50	2.33	2.51	2.00
France	0.84	0.78	1.23	2.46	2.77	1.65
Germany	1.03	0.91	1.49	2.52	2.85	1.99
Italy	1.03	0.89	1.54	3.21	3.76	2.06
Japan	0.85	0.84	1.12	1.74	1.97	1.49
Netherlands	0.73	0.62	1.27	2.14	2.42	1.69
Spain	0.91	0.84	1.31	2.67	3.11	1.75
Sweden	2.25	2.27	2.49	3.74	4.01	3.32
Switzerland	0.22	0.16	0.65	0.92	1.10	0.87
United Kingdom	1.61	1.58	1.93	2.97	3.18	2.57
United States	1.29	1.30	1.48	2.27	2.41	1.98

Sources: See Table VIII-4.

Notes: The growth in total consumption is based on the feasible rates of output growth. This assumes two scenarios (1) historical productivity growth rates under our baseline projections of labor force growth and (2) alternative productivity growth rates (one-third increase in 1990s rate) under our "best practice" projections of labor force growth. Per capita consumption for the elderly population (ages 60+) is assumed to grow at workers' productivity growth rate. Consumption of the non-elderly (ages 0–59) is treated as the residual.

ENDNOTES

[1]*The Economist*, "German and French Economic Reforms: A Long Hard Climb" (October 18, 2003), p. 49.

[2]Steven A. Nyce and Sylvester J. Schieber, "The Decade of the Employee: The Workforce Challenges Facing the Developed Economies of the World over the Next Ten Years," presented at Tenth Annual Colloquium of Superannuation Researchers, University of New South Wales, Sydney, Australia, July 2002.

[3]Ibid.

[4]See McMorrow, Kieran and Werner Roger (2003) "Economic and Financial Market Consequences of Ageing Populations," European Commission Economic Papers, No. 182, April.

[5]Sveinbjorn Blondal and Stefano Scarpetta. "Early Retirement in OECD Countries: The Role of Social Security Systems," OECD Economic Studies (Paris: OECD, 1997), No. 29.

[6]Boersch-Supan, Axel, Alexander Ludwig, and Joachim Winter. (2001) "Aging and International Capital Flows," *National Bureau of Economic Research*, working paper 8553, October.

[7]European Commission. (2003) "Joint Report by the Commission and the Council on Adequate and Sustainable Pensions," Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, March.

some people into the workforce who — assuming current labor force participation trends continued — otherwise would not be there. Certainly some portion of the additional income earned by these workers will be taxable and may be transferred to the elderly through retirement systems. But if we want to encourage greater work effort, it will be important for the incentives to work in the right direction. If we attempt to tax away a disproportionate share of this added productivity, the chances are great that we will never achieve it in the first place.

As shown in **Table VIII-7b**, most retirees will see advances in their standards of living as a result of the advanced economic growth. As such, a rising tide lifts all boats.

However, the pace of per capita consumption growth in many societies still falls short of their most recent increases in worker productivity. ■

Table VIII-7a: Annual Growth in per Capita Consumption Apportioned between the Elderly and Non-Elderly Population with the Elderly Population Treated as a Residual

	Total consumption per capita	Active workers & dependents per capita	Elderly population per capita	Total consumption per capita	Active workers & dependents per capita	Elderly population per capita
	Base labor force growth and 1990s productivity			Best practice labor force growth and 1990s productivity		
	2000–2030	2000–2030	2000–2030	2000–2030	2000–2030	2000–2030
Australia	1.79	2.18	0.26	2.51	2.91	0.95
Austria	1.36	2.11	-0.48	2.61	3.36	0.81
Canada	1.14	1.64	-0.60	1.83	2.33	0.07
France	0.84	1.26	-0.40	2.05	2.47	0.80
Germany	1.03	1.64	-0.39	2.02	2.62	0.62
Italy	1.03	1.64	-0.33	2.69	3.29	1.37
Japan	0.85	1.50	-0.65	1.37	2.01	-0.12
Netherlands	0.73	1.35	-1.13	1.72	2.35	-0.13
Spain	0.91	1.50	-0.56	2.23	2.81	0.79
Sweden	2.25	2.79	0.92	2.91	3.45	1.58
Switzerland	0.22	0.99	-1.60	0.70	1.46	-1.11
United Kingdom	1.61	2.07	0.31	2.32	2.78	1.02
United States	1.29	1.68	-0.23	1.78	2.17	0.24

Sources: See Table VIII-2.

Notes: The growth in total consumption is based on the feasible rates of output growth. This assumes historical productivity growth rates under our (1) baseline and (2) alternative "best practice" projections of labor force growth. Consumption for the non-elderly population (ages 0–59) is assumed to grow at the rate of productivity growth plus the growth in the labor force. Consumption of the elderly (ages 60+) is treated as the residual.

Table VIII-7b: Annual Growth in per Capita Consumption Apportioned between the Elderly and Non-Elderly Population with the Elderly Population Treated as a Residual

	Total consumption per capita	Active workers & dependents per capita	Elderly population per capita	Total consumption per capita	Active workers & dependents per capita	Elderly population per capita
	Base labor force growth and 1990s productivity			Best practice labor force growth and one-third improvement in 1990s productivity		
	2000–2030	2000–2030	2000–2030	2000–2030	2000–2030	2000–2030
Australia	1.79	2.18	0.26	3.18	3.59	1.60
Austria	1.36	2.11	-0.48	3.27	4.02	1.49
Canada	1.14	1.64	-0.60	2.33	2.83	0.55
France	0.84	1.26	-0.40	2.46	2.88	1.21
Germany	1.03	1.64	-0.39	2.52	3.12	1.12
Italy	1.03	1.64	-0.33	3.21	3.80	1.90
Japan	0.85	1.50	-0.65	1.74	2.39	0.26
Netherlands	0.73	1.35	-1.13	2.14	2.77	0.30
Spain	0.91	1.50	-0.56	2.67	3.24	1.24
Sweden	2.25	2.79	0.92	3.74	4.27	2.42
Switzerland	0.22	0.99	-1.60	0.92	1.68	-0.89
United Kingdom	1.61	2.07	0.31	2.97	3.42	1.66
Unites States	1.29	1.68	-0.23	2.27	2.67	0.71

Sources: See Table VIII-2.

Notes: The growth in total consumption is based on the feasible rates of output growth. This assumes two scenarios (1) historical productivity growth rates under our baseline projections of labor force growth and (2) alternative productivity growth rates (one-third increase in 1990s rates) under our "best practice" projections of labor force growth. Consumption for the non-elderly population (ages 0–59) is assumed to grow at the rate of productivity growth plus the growth in the labor force. Consumption of the elderly (ages 60+) is treated as the residual.

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