Under Funding of National Retirement Systems:

The Reality and the Risks of Current Policies

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Abstract

The problem of aging societies in the developed economies of the world and the potential to raise national pension costs has been a matter of public discussion for some years now. Recent projections of the costs of these systems suggests that many developed countries still have not undertaken necessary policy changes to constrain these programs at what appear to be fiscally sustainable levels. The analysis in this paper suggests that the underlying assumptions in recent cost projections may be underestimating the true future costs that many of the developed societies will face as their populations age. The analysis also suggests that ability to restrict these plans through normal democratic political processes will become more difficult the longer policymakers wait to address them.

En los países desarrollados el problema del envejecimiento de la población y su correspondiente incremento potencial en los costos de las pensiones públicas ha sido, por muchos años, tema de debate a escala nacional. Las proyecciones recientes de los costos de dichos sistemas sugieren que en muchos de los países desarrollados aún no han implantado las estrategias financieras necesarias para contener dichos costos en niveles razonables que sean fiscalmente sustentables. El análisis del presente estudio sugiere que las hipótesis utilizadas en las proyecciones pueden subestimar los costos que realmente se presentarán en los países desarrollados a medida que su población envejezca. Asimismo, este estudio observa que la habilidad de restringir este tipo de programas a través de procesos democráticos se complica mientras más tiempo difieran los legisladores para resolverlo.

Le problème du vieillissement des sociétés dans les économies développées du monde et les possibilités d'augmentation des coûts des régimes nationaux de retraite font l'objet d'un débat public depuis maintenant quelques années. De récentes projections de coûts de ces régimes semblent indiquer qu'un grand nombre de pays développés n'ont pas encore entrepris les changements qui s'imposent en vue de maintenir les coûts de ces programmes à des niveaux acceptables sur le plan fiscal. Si l'on en croit l'analyse présentée dans ce document, les hypothèses fondamentales utilisées dans les projections de coûts récentes sous-évalueraient les coûts futurs réels que devront absorber de nombreuses sociétés développées au fur et à mesure que leurs populations vieillissent. L'analyse laisse aussi entrevoir que plus les décideurs politiques attendent avant de restreindre ces régimes, plus il leur sera difficile de le faire dans le cadre des processus politiques démocratiques.

Das Problem des Alterns der Gesellschaften in den entwickelten Wirtschaftssystemen der Welt und die damit einhergehenden steigenden nationalen Pensionkosten sind seit einigen Jahren Gegenstand öffentlicher Diskussion. Gegenwärtige Kostenschätzungen für diese Systeme besagen, daß viele Industrieländer noch nicht die notwendigen methodischen Veränderungen zur Begrenzung dieser Programme vorgenommen haben,

um sie auf eine steuerlich vertretbare Stufe zu stellen. Die Analyseergebnis sagt aus, daß die den Kostenschätzungen zugrundeliegenden Annahmen die wahren Kosten in der Zukunft unterschätzen könnten, da sich viele der entwickelten Gesellschaften auch weiterhin mit einem Altern der Bevölkerung konfrontiert sehen werden. Die Analyse besagt weiterhin, daß die Möglichkeit, diese Pläne durch normale demokratische, politische Prozesse einzuschränken immer schwieriger werden wird, je länger Politiker warten, diese zu thematisieren.

Introduction

The World Bank's 1994 landmark report *Averting the Old Age Crisis* sounded the alarm bells about the cost of population aging and left no doubt about the precarious state of many public retirement systems (James). The study highlighted such problems as over reliance on pay-as-you-go funding in certain countries, lack of coverage of significant segments of the workforce in others; benefit structures that caused inefficient economic behavior in many cases, and inefficient use of assets in many plans that were funded. All these problems were examined within the context of population aging.

The World Bank's 1994 report included an estimate of how much the G-7 countries (Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States) would each have to increase taxes to finance their existing national pension programs over the long run. The simple average of the required tax increases across the countries was 6.56 percent of GDP. Late last year, the European Commission (EC) and the Organization for Economic Cooperation and Development (OECD) released a new set of projections on the costs of aging in the developed economies. For the G-7 countries, these new projections suggest that considerable progress has been made in reining in the future costs of the national retirement systems in the developed world. The simple average of the increase in pension spending in the seven largest market economies in the world is expected to be only 2.30 percent of GDP higher in 2050 than in 2000.

While the new EC and OECD projections suggest progress is being made in bringing national retirement program costs under control, they also raise a number of issues that merit consideration. The first of these is the magnitude of the projected costs that many countries are facing according to the new estimates. The second is that a

careful look at the assumptions underlying these new projections suggests they might be based on an optimistic outlook regarding the factors that determine the costs of retirement programs. This assessment suggests that policy analysts and policy makers in some of the developed economies might be downplaying the implications of their aging societies in order to avoid making hard political choices at this time. If that is the case, it raises a concern about the risks national retirement systems pose for the political apparatus making retirement policy in each of the countries involved. In the following sections of this paper, each of these concerns will be addressed in turn.

The Projected Costs of National Retirement Systems

The OECD's latest estimates of the increase in the national pension, health care and long-term health costs for the elderly populations in selected countries are presented in Table 1. The data available in some of the countries are not sufficient to completely fill out the table, but the pattern of anticipated growth in those countries would likely be similar to those with complete data. On its face, the prospect that many of the developed countries of the world might nearly double their spending on their elderly populations over the coming decades seems daunting.

One of the results of modeling the retirement systems in the major developed countries around the world has been a growing awareness of the potential problems an aging population can pose. This awareness has motivated a number of countries to adopt new policies that will ameliorate the burden that retirement obligations will impose on their economies. The fact that there is greater awareness on the part of policymakers about the problems associated with aging societies or that they have adopted policies to deal with the phenomenon raises the question of whether the developed countries are

doing enough to respond to the challenge aging populations pose. The answer to the question in particular cases, in part, depends to whom it is addressed. And a problem in answering the question is that there is no universally accepted objective measure of the level of cost for supporting the elderly that is appropriate.

Some countries have clearly done a great deal more than others in modifying the structure or the generosity of their retirement systems with the goal of reducing the prospective burden of aged dependency to tolerable levels. But then, some countries face a much larger aged dependency problem than others. For example, the aged dependency ratio in Italy, Japan and Spain in 2050 is projected to be about twice that of the United States. It may not be as crucial that the United States adopt policies to deal with its aging or that it is done as soon as those countries with a more serious aging problem. But then again, the United States has such a relatively expensive health system with attendant costs for its aged dependents that might more than offset any benefits it accrues from having less aging dependency.

In the European Union, the members are subject to the Stability and Growth Pact that requires that they run their government budgets "close to balance or in surplus." The expectation that each member of the EU will abide by this agreement gives this set of developed economies, all with aging populations, a unique cross national interest in addressing the problem of rising aging obligations. It is not a coincidence that the EC and OECD have made the major contribution in helping detail the costs of aging across the developed economies involved. Both the EC and OECD are based in the heart of the EU. One is exclusively made up of its members and the other is significantly comprised of them.

The views that the EC and OECD develop about the appropriate responses to aging are undoubtedly affected by a set of countervailing pressures from their members. On the one hand, each country has a vested interest in making sure that the others do not pursue policies that would adversely affect them while at the same time wishing to pursue policies in their own home countries that meet the needs and desires of their own local populations. In this regard, it is unacceptable that a member of the EU simply ignore the claims future aged dependency will impose on its economy under the assumption that they will simply use deficit financing to cover the cost as it arises. Such an approach would impose a drain on savings, diverting them from productive investment that would contribute to economic growth and would drive up interest rates. Both would have adverse effects on other member countries. The alternative of simply driving up contribution rates is also unacceptable because of its implications on labor costs and the adverse incentives on labor supply.

At the same time there are pressures across the membership of the EU to control programs supporting the elderly, the long history of social democratic institutions and sense of social solidarity within the societies there cannot be ignored. The historical goals of adequacy of benefits, social redistribution, and rights to access to health care services are fundamental principles in these societies.

The cross national concerns about the potential increasing costs from aging dependency have led the EU to be proactive in addressing the issue. A recent report by the Director General for Economic and Financial Affairs (2001) noted:

> There is a growing recognition that there are benefits to addressing issues related to ageing populations at EU level, with the result that the issue has featured prominently on the agendas of several recent European Council's (Stockholm of March 2001, Nice of December 2000 and Lisbon of March 2000). A

> comprehensive approach has been taken drawing upon the report *Maintaining Prosperity in an Ageing Society* (OECD, 1998), which policies through which societies can transfer resources to a rapidly growing number of retired persons without creating major economic and social strains. Such an approach recognizes that budgetary sustainability in light of ageing populations must be accompanied with sustainability.

The European Council has established a Committee on Social Protection to develop policies to address both the budgetary and social concerns that bear on the matter of costs associated with aging in the member countries. The treaty establishing the EU relegates the development of pension and health policy within member countries to those countries themselves under its "subsidiarity" principle. This policy notwithstanding, the European Council has agreed that the "open method of co-ordination" be extended to pensions. It has also put a report, released in December 2001 on the quality and sustainability of the pension systems, on the agenda for discussion at the next European Council meeting to be held in Barcelona in March 2002.

In the December 2001 report the authors conclude (p. 213):

> Member States have already launched a wide range of reforms with the aim of tackling the ageing problem which they collectively face. Notwithstanding the reforms undertaken up until the end of the 1990s, the latest estimates of the effect on growth and on public expenditure on pensions confirm that the impact of ageing will be so significant and widespread that additional reforms will still be needed in order to address the associated growth loss and to put the public finances on a sounder footing. In this regard, the design and structure of public pension systems play a crucial role in determining the scale of the budgetary growth impact of ageing and consequently a discussion on the relative merits of individual pension systems is of the utmost importance.

The European Commission's earlier report (2001) reviewed the budget plans of the EU members against the standards in the Stability and Growth Pact from both a short-term and intermediate-term perspective. In virtually all of the cases, they included comments in their country reviews on the sustainability of the national pension system

under current law. In a number of cases, they also included comments about the costs that would be associated with aging under the health care system. In 10 of the 15 country reviews, there was a recommendation that further adjustments would likely have to be made to the pension system for the country to stay in compliance with the Stability and Growth Pact over the longer term. This conclusion was based on the modeling of the pension systems done by the EC and included assumptions that other non-age related functions of the various governments would continue to operate in the future at roughly the same size as currently relative to size of the national economy.

Outside of the original European Union members that have been the focus of the EC analysis, the countries that we have evaluated in various parts of this analysis include the Czech Republic, Hungary and Poland, Australia and New Zealand, Japan and Korea, and Canada and the United States. The Eastern European countries in the list are undertaking so many reforms as they transition to market based economies that it is difficult to assess the long-term viability of their governmental sponsored retirement systems. Many of these countries have adopted far more significant retirement system reforms than most of the developed countries around the world have thus far. Australia has undertaken fundamental reform of its retirement income system that would seemingly reduce its costs significantly in the face of an aging population. New Zealand has not been able to craft politically sustainable reform of its pension system thus far and faces essentially the same challenges as a number of Western European countries, albeit with a slightly less severe aging problem. Korea has a much younger population than most so its pension financing problems are delayed accordingly. Japan is already in the throes of rapid aging and has shown a remarkable willingness to adjust its retirement system to

make it more affordable. But there are a host of other structural social and economic issues that raise concerns over the long-term viability of its system. In North America, Canada has accelerated the increase in payroll tax rates to fund its system and reduced some benefits that put its pension commitments on much sounder footing than just a few years ago. But there are still concerns over whether Canada has gone far enough in providing for benefits in its current system. In the United States, an increase in the normal retirement age is now being phased in but there is nearly universal agreement the pension system is not sufficiently funded to sustain benefits for the retirement of the baby boom generation. There are no signs of consensus on how the US system will be adjusted in response to the current underfunding.

This set of conclusions about the viability of the pension systems across the developed economies suggests that the majority of countries have not yet addressed the challenges of aging populations. The picture drawn by the EC relative to the EU countries is clear. Ignazio Visco (2001), who has directed the project at the OECD in developing the projections on aging costs in the developed economies, in looking at the broader spectrum of developed economies reaches the same conclusion. He observes that "the need to continue responding as early as possible to the economic and fiscal pressures associated with ageing populations is, therefore, not reduced when the most recent reforms introduced in OECD countries are taken into account" (p. 99).

Assessing the Projections on the Costs of Aging

When national retirement programs operate in a deficit situation, or one that is anticipated, bringing them back into balance presents public policymakers with difficult choices because they either have to raise someone's taxes or cut someone's benefits to do

so. Given that the cost increases for national retirement systems that are anticipated in most of the developed economies will occur some time out in the future, there may be some pressure to create as positive a scenario as possible about the prospects on future cost increases. A little reading between the lines of the EC's and OECD's analyses of their projections of long-term retirement costs in the developed world could lead one to believe they have been under some pressure from member states in this regard.

We have analyzed the underlying assumptions that form the basis of recent aging-related cost projections for the major developed countries around the world. We looked closely at the demographic, behavioral, structural, and economic assumptions underlying the OECD projections (Nyce and Schieber, 2002). This analysis finds that the EC and the OECD have come to the reasonable conclusion from their work that the systems of support for the aged in the developed economies need to be significantly reformed and the sooner the better. However, the analysis also suggests that the EC and OECD may have underestimated the magnitude of cost increases many of the developed economies will face.

Demographic Assumptions Used in Projecting Aging Costs

The OECD countries are now face to face with a major shift in the underlying age structure of their populations, with more of their population concentrated in the older age brackets and fewer in the younger age brackets. This change, a result of a drop in birth rates following a baby boom in the immediate aftermath of World War II, coupled with significant increases in life expectancy over much of the twentieth century, means that the populations of many OECD countries will not only be growing older but will be growing at a much slower rate. The aged dependency ratio, the ratio of retired people in

a society to the number of people working there, is a major determinant of national retirement program costs; underlying assumptions about the future demographic composition of a population are therefore extremely important in estimating national retirement obligations. In this case, the important assumptions include life expectancy, fertility and net immigration that underlie the EC and OECD estimates of the costs of population aging.

Life Expectancy. The OECD countries have all experienced significant increases in life expectancy over the past half-century. In general, increasing life expectancy results from more infants and children reaching adulthood and prolonging the life of people at advanced ages. Major advances in medical technology and its application have resulted in a continuing trend towards increasing life expectancy. Indeed, most of the additional years added to life over the last few decades of the twentieth century were concentrated in the older age groups. And it is here that further improvements in life expectancy will largely be realized in the future.

The EC and OECD estimates of future retirement costs consistently assume that there will be a slowing of the rate of improvement in life expectancy in coming years compared to the last half century. Although the OECD assumptions that further improvements in life expectancy will slow appear reasonable, there is reason to believe otherwise. In particular, we are living in a period of stunning breakthroughs in biomedicine, with substantial advancements in areas such as genetic research. In fact, many demographers and health scientists expect that these developments will add greatly to overall longevity in the future.

Taking the United States as an example, the Census Bureau estimates a significantly larger U.S. population over 85 years old in 2050 than the Social Security Administration. The Census Bureau is only concerned about estimating the population and its characteristics in the future. The Social Security Administration's projections underlay its estimates of future pension costs that are the basis of policymakers' deliberations on the national pension program in the United States. Three prominent demographers, who have analyzed the U.S. situation for the National Institute on Aging, yet another arm of the federal government, expect that by 2050 there will be over twice as many individuals 85 years and over in the United States than currently projected by either of the other government agencies (Watson Wyatt, 2000). There is clearly reason to question whether the expected declines in rate of improvement in life expectancy may lead to a gross underestimation of the extent of population aging.

Fertility Rates. The extent of population aging in the future will largely depend on the number of births in a given country. For most developed countries, a population is able to replace itself if the total fertility rate is at least 2.1 births per woman. The replacement rate must be greater than 2.0 since not all children survive to adulthood and also because male birth rates are typically slightly higher than females.

The postwar baby boom was followed by a drop in fertility that has contributed significantly to population aging in the developed world. Indeed, from the late 1950's to the present, fertility rates have dropped precipitously across the OECD. Only the United States maintains a level close to replacement while the remaining countries are far below levels needed to support a stable population over time. In fact, a number of major

societies in the world now have birth rates below 1.5 births per woman; if these birth rates hold, the populations of these countries will decline in the future.

The OECD projections however, are based on the expectation that fertility rates will in fact rebound from their current low rates over the coming decades as we show in Table 2. For the majority of countries in the OECD, fertility rates are projected to rise from their recent lows to between 1.5 and 1.8 by 2050, with most of the increase occurring over the next two decades. But how reasonable is it to expect that fertility rates will reverse course across most of the OECD in the coming decades? Since the explosion in birth rates in the middle of the last century, there has been a steady and persistent decline in fertility rates. The United States is one of the rare exceptions reporting a slight increase throughout the 1980's and 1990's, mostly attributed to an increase in birth rates among white women. However, for most of the other societies in the OECD, national trends have shown no evidence of rebounding from recent low fertility levels or even of leveling off. This certainly raises concerns whether expectations of a rebound in fertility rates might be overly optimistic.

Net Immigration. Some countries may look to use immigration to help offset the effects of their relatively low fertility rates. In Germany, for example, a government commission recently recommended that it should restructure its policies to encourage immigration of technical workers in response to labor shortages. Yet at the same time Germany still has relatively high unemployment levels that have exacerbated traditional cultural resistance to fully integrating foreigners into its society (Finn, 2001).

One problem with the assumption that immigration can be an effective antidote to low fertility rates in the developed world is that competition for skilled workers from

other countries is likely to be much more intense than in the past. Today, many less-developed countries contain an excess supply of labor, making it effective for working-age people there to migrate towards the better opportunities provided by the developed economies. But fertility rates are now falling in many less developed countries. If these countries develop economically while their own declining fertility rates tighten domestic labor supply, these countries will become more attractive places to work.

Another problem with the assumption that immigration will counteract low fertility rates is the sheer number of immigrants required to stabilize the populations in most developed countries. We have estimated how much immigration would have to increase in various countries in order to offset declining fertility and the results do not give cause for great hope. For example, in Table 3 we show that Australia would have to realize immigration 2.5 times its actual immigration rate, Austria 44.2 times its rate, and so forth for them to offset their low fertility rates. The United States is the only country in the developed world where immigration more than offsets the extent to which native fertility rates fall below stable population levels.

It does not seem possible that the domestic populations would be willing to tolerate the massive infusions of foreigners into their societies required to offset low birth rates in most developed countries. There are already signs of resentment of "foreigners" in several European countries. Japan's immigration is significantly higher now than it has been in prior decades, but it is still miniscule by comparison to most other developed countries and the prospects for significant increases in immigration are limited.

Population Projections. As we look to the next fifty years, we see a remarkably different demographic picture than what we have experienced over the past fifty years.

The OECD projects that nearly half the developed countries of the world will have population declines over the next half-century. Our assessment is that the demographic assumptions underlying the EC and OECD projections of future costs associated with aging populations result in a somewhat rosier view of the future than what most of the countries will actually face.

To the point: if historical rates of longevity improvement persist, there will be many more people at advanced ages and if fertility trends persist, there will be many fewer young people. In aggregate, the OECD populations in 2050 will be remarkably different than those suggested by the OECD's current projections. The populations might not be all that much different in size, but they will be much older on average than we now seem to be assuming. From the perspective of realistically anticipating the costs associated with aging in our societies that could make all the difference in the world.

Behavioral Assumptions Used in Projecting Aging Costs

Demographics certainly are one of the main forces behind the level of aged dependency in a society, but the work behavior of able-bodied people may be of equal importance. Estimates of the future cost of retirement programs are dependent on assumptions about labor market behavior. Increasing the labor force participation of people who are able to work but for various reasons chose not to, could go a long way toward alleviating some of the fiscal pressures of population aging.

An examination of labor force participation rates reveals that rates for women are on the rise while those of men are on the decline. Clearly, something very different is driving the work behavior of women and men. In the case of the declining labor force participation rates of men, the maturing of the retirement systems in developed countries

over the second half of the twentieth century is largely behind the trends. With the exception of Japan at the younger age, all of the countries posted declines in their male labor force participation rates over the period of 1960 to 1996.

The declines in male labor force participation recorded across the broad age range have been largely concentrated among men aged 55 to 64 as we show in Table 4. Declines in the labor force participation rates of men aged 65 and over, not shown here, were also significant for men these ages, but had a relatively small impact on total labor supply levels in most cases. Though male labor force participation was on the decline over the last 30 years, women aged 20 to 64 posted a remarkable increase in their attachment to the workforce in most of the developed countries as we show in Table 4. In the most dramatic case, the percentage of women in the labor force in the Netherlands increased by 82 percent between 1970 and 1990, while in Canada it jumped by 68 percent and by 55 percent in Spain.

In the United States, women between the ages 20 and 64 were nearly 40 percent more likely to be in the labor force in 1990 than in 1970. The biggest surge in labor force participation came as the baby boom cohorts of women reached working age. While the baby boom women have had consistently higher labor force participation rates than earlier generations of women, the data suggest that the increasing labor force participation rates of women have peaked, and are not likely to increase appreciably in the future. Overall, labor force participation rates of US working-age women might continue to rise slightly as older cohorts of women with lower participation rates are replaced by younger ones with higher rates. However, if the daughters of the baby boomers do not work at appreciably higher rates than the baby boomers themselves,

further increases will be limited. In most of the OECD countries where the data is available, the rate of increase in women joining the labor force in the 1990s was less than it had been in the prior two decades. This suggests the pattern we have seen in the United States is likely to be similar to what has been happening in other developed countries.

An individual's decision to enter the labor force is contingent on many factors. Predicting future trends in labor force participation is equivalent to estimating the future behavior of individuals, which often times is mere guesswork. However, it is still instructive to analyze how labor force participation rates are expected to change in the future because of the important role they play in estimating pension costs levels.

Labor force participation for males age 20 to 64 are projected to continue to decline in most developed countries during this decade as shown in Table 5, but in most cases the projected declines are quite marginal. In a handful of cases, however, the labor force participation rates of men are expected to increase. Beyond 2010, it appears there is an anticipated slowing in the rate at which male participation in the labor force has been declining in most countries. Between 2030 and 2050, there is an expected increase in the labor force participation rates in several countries.

For women, the changes in female labor force participation rates anticipated over the coming decades are much more dramatic than for men as shown in Table 5. Over the whole projection period, the labor force participation rates of women in all but two of the smaller countries are expected to increase significantly. Much of the prolonged growth in female labor force participation continues a period of transition where exiting cohorts of women are replaced by generations that were born into a dual worker society. The most

pronounced changes are expected in countries that currently have relatively low female participation, especially Italy and Spain.

In combination, the projected increase in the labor force participation rates of women will more than offset the declines for men with the net result that overall participation of the populations from age 20 to 64 is expected to rise gradually. At first glance, the assumptions about the future labor force participation rates for men and women appear reasonable and achievable without any significant changes in public policy. However, what is not apparent is that in the midst of rapid population aging, the underlying trends in labor force participation are in fact declining. Within the population aged 20 to 64, labor force participation rates fall off at advanced ages and the average age of people within this age bracket will be increasing in coming decades in most developed countries. That means that the behavioral effects implied in Table 5 will have first offset the demographic effects of an aging population before leading to increased participation rates for women.

It is important to keep in mind, however, that the effects of higher female labor force participation rates in the long term are significantly tied to the demographic assumptions discussed earlier. The female population considered in Table 5 is restricted to women at least 20 years of age and no more than 64. If the rebound in fertility in many of the developed countries discussed earlier does not come to pass, the required demographic response will ultimately be much larger than reflected there because there will be fewer working age men and women to support the elderly population. Another consideration in assessing the likelihood of the assumptions is the potential interaction of demographic and behavioral factors. Here the question is whether the assumed higher

rate of female labor force participation and the increasing fertility rates are compatible. If not, one of the other assumptions almost certainly is overly optimistic.

In these labor force projections, the high fertility rates will start feeding a growing pool of potential workers into the working age populations by 2020 reducing the aged dependency ratio in several of the countries. By 2030 and 2040 this assumed growth in the pool of potential workers becomes a significant share of the total projected working age population in some countries. If the assumed rates of higher fertility are not realized in fact, the real pool of workers will be much smaller than being estimated in the projections. If fertility has been overestimated, an even larger behavioral response will be required to offset the effects of growing aging dependency in developed countries.

An examination of the assumed behavioral change in labor force participation rates for men aged 55 to 64 between 2000 and 2050 in Table 6 reveals that for many countries assumed participation rates of older men will hold steady at current rates or continue to decline slightly for most countries. In a small number of cases, however, the assumptions seem overly aggressive. This is most particularly so in Austria where the labor force participation rate of men aged 55 to 64 is expected to increase nearly 18 percent this decade and by a whopping 88 percent by 2050. Germany, Italy, and the Netherlands are also projecting significant increases in the work behavior of men in this age range during the current decade. Thus, there is reason to question whether it is realistic to expect such changes in work behavior in the future.

On the positive side, the low labor force participation of people who could still be easily absorbed into the productive sectors of developed economies. There is tremendous opportunity for workforce expansion by increasing the labor force participation rates of

people in their late 50s and early 60s. It is hard to make a case that the majority of people in these age ranges could not continue to be productively employed in their domestic labor markets if the appropriate incentives were put in place to encourage them to do so. In Japan, 84 percent of the men ages 55 to 64 are still employed. Given some of the structural economic problems plaguing Japan an argument could be made that some of these workers are likely underemployed, but Korea, New Zealand, and Norway all have male labor force participation rates above 70 percent at these ages. No one has pointed to any of these countries as places where high rates of hidden unemployment exist. At the other end of the spectrum, Austria and Belgium have labor participation rates under 40 percent for males ages 55 to 64. In Sweden, 65 percent of the women from ages 55 to 64 continue to work compared to less than 20 percent in Austria, Belgium, and Italy.

Structural Assumptions Used in Projecting Aging Costs

In addition to the demographic and behavioral assumptions underlying projections of the cost of population aging, certain assumptions are made that relate to the actual operation of retirement benefit systems. While current projections have greatly improved, it is still possible that retirement models may not adequately reflect the relationship between the growth in benefits and the financing sources over time. Consider a country with a system that runs largely on a pay-as-you-go basis that is financed by taxes on workers' pay and where benefits are based on the workers' earnings history. Benefits in this type of system are typically based on lifetime earnings indexed to the growth in earnings or prices over a person's work history.

There are two possible situations where average benefits under these systems might grow more rapidly than the rate of average wage growth. The first is where the

systems continue to mature in a way that the formula linkage between benefits and wages does not hold. The second is where the formulaic basis of benefits is not tied to the financing basis and the two do not grow on a corresponding basis. Watson Wyatt's analysis suggests that the projections of national retirement costs for many developed countries are affected by both of these conditions.

Nyce and Schieber (2002) show that in the United States, the earnings adjusted average wages used to compute the Social Security pension benefit are rising more rapidly than average wages in the overall economy. This means that newly awarded benefits are likely growing more rapidly than the average wages that are taxed to generate the overwhelming majority of the revenues supporting the U.S. national pension. They attribute this to two factors. One is that the taxable wage base was raised a number of years ago. As the number of years of covered earnings used in computing average benefits increases, it results in the growth in average covered wages that is higher than the growth in average wages in the overall economy. A similar phenomenon is occurring because the higher rates of labor force participation of women is resulting in faster growth in their average lifetime wages than average wages overall. The U.S. system uses the 35 highest years of covered wages in determining Social Security pension benefits. For workers with fewer than 35 years of earnings, years with no earnings adding up to 35 total years are included at zero wages. As women extend their working careers, their average career earnings are rising more rapidly than their average earnings each year because they are replacing zero-wage years with positive-wage years. The combined effect of these two phenomena in the U.S. case have resulted in average lifetime wages of new retirees growing at a rate of 0.5 percent per year faster than average wages generally

in recent years. In the case of the U.S. retirement pension system, it appears that the actuaries who value the system each year are considering this phenomenon. It is not clear that is the case in all systems.

The analysis of the growth in pension benefits exceeding the rate of growth in the financing base supporting them suggests that this is a temporary phenomenon, albeit one that might extend over several decades. In the case of publicly financed retiree health care benefits, there is reason to believe that a similar phenomenon exists and may well persist over time. In most countries with pay-as-you-go retirement systems, a substantial portion of the benefit is based on earnings or income levels, which also serves to define the base against which much of the tax supporting the systems is levied.

In the case of health care, however, the benefit is based on the health status of the retiree population at a point in time, the standards of service delivery for treating various health needs of that population, and the price of services in providing such treatment. There is no direct tie between the benefits provided in this case and the financing base to pay for them.

Older people typically consume significantly more health care on average than younger ones. Not only do older people use more health care but we know that the relative size of the older population is expected to grow. These two factors may fuel an explosion in health care costs over the coming decades. The EC has made its projections for future increases in health care expenditures assuming that the cost of health services will grow in the developed economies of the world at either the rate of growth in per capita GDP or per capita productivity. The problem with the projections is that they only measure the impact of anticipated demographic changes under two limited sets of

assumptions about health costs growth rates and do not take into account other factors. Most notably they are ignoring the effects of technology or excessive price inflation in the health sector, both of which are likely to drive up future health expenditures more rapidly than national per capita measures they are using.

One of the important reasons that health costs have risen in most countries in recent decades has been changes in health care utilization rates. Increasing utilization is driven by several factors, including the evolution of health technologies--there are simply more things that medical providers can do to keep people alive and functional than in the past--and the overall growth in incomes as research identifies a positive relationship between income level and health consumption. It is also due to the way developed countries finance health care in that the large majority of services are paid for through insurance mechanisms. When consumers are shielded from the prices of the goods or services they purchase, the demand levels are typically higher than when they have to pay directly for what they buy.

The net result of these pressures in combination with population growth is that health consumption in most developed countries has been growing relative to the rest of the economy as shown in Table 7. We believe that it is impractical to assume that the excessive price inflation will not persist in the future or that we will not continue to experience further increases in per capita utilization of services. For this reason, we believe that the current method of valuing these long-term costs in most developed countries is leading to substantial underestimates of the costs that are likely to occur.

Economic Assumptions Used in Projecting Aging Costs

In addition to making demographic, behavioral and structural assumptions in order to project future age-related costs, analysts also have to make certain assumptions about the economic impact of public policies, including assumptions about unemployment and labor productivity. These economic assumptions have enormous implications for future cost estimates of retirement programs.

Unemployment Outlook. Raising the labor force participation rates of women and older workers could go a long way toward increasing the numbers of workers in aging economies. However, our analysis suggests that this would be much more easily said than done. Another option is to reduce unemployment rates, again no easy task.

Many of the OECD countries have experienced marked increases in unemployment rates since the 1970s; Germany for example, encountered over a ten-fold rise in its unemployment rate between 1970 and 2000. Some of the increase was likely due to the reunification of East and West Germany, but France, Italy and Spain have each had similar increases in their unemployment rates. Japan, which has historically maintained low rates of unemployment, has also begun to report increases in its unemployment rates.

Some argue that high levels of unemployment are the result of labor market rigidities. Economies that rely on strict rules regarding employment protection, fixed-term contracts, minimum wages, working time and employees' representation rights on work councils, company boards and the like, create less efficient labor markets resulting in higher rates of unemployment.

Differences in macroeconomic policy may also play a role in unemployment. Favorable U.S. macroeconomic policy for example, led to confident expectations about economic growth that stimulated investment and thus rising productivity, which in turn led to higher profits, wages, and employment levels. In contrast, the 1990s for much of Western Europe were characterized by restrictive macroeconomic policies driven by budgetary requirements outlined in the Maastricht Treaty that had to be met for membership in the European Union. These policies resulted in relatively high interest rates and relatively low rates of fixed investment, especially investment targeted at economic expansion.

Whether unemployment is due to labor rigidities or macroeconomic policy may be academic in the overall scheme of population aging. Increasing pension costs are likely to exacerbate the price on job creation that such rigidities impose. Increasing claims that programs for the aged impose on governmental budgets might severely limit policymakers ability to support expansionary macroeconomic policies.

In an aging society where the costs of supporting retirement plans are rising, the fixed costs associated with hiring and keeping a worker will increase. As such, more and more workers with marginal human capital will be rendered economically unemployable because their potential marginal product will not match the cost of giving them a job. From this perspective, the potential costs associated with population aging would seem to suggest future unemployment rates might rise rather than fall.

Enhancing Labor Force Productivity. A second set of economic assumptions underlying aging-related cost projections relates to the ability of an economy to utilize existing workers more effectively, otherwise referred to as improving productivity. The

historical pattern of productivity improvement is somewhat mixed across the developed world. Among the very largest countries, France, Germany, Italy, and Japan have shown a consistent pattern of declining rates of productivity improvement over each of the last three decades. The United Kingdom and the United States have shown a mixed pattern with some declines from one decade to the next and increases in others. While Canada shows a steady pattern of improvement, the majority of the OECD countries we looked at show the pattern of consistently declining rates of improvement. Despite these patterns, the OECD assumes that productivity will turn around in all the G-7 countries and most of the OECD countries, the OECD assumed rate of increase in productivity for the current decade exceeds the measured rates for the 1990s as we show in Table 8.

Such projections may come to pass, but it may also be a case of wishful thinking. Labor market rigidities, which if removed would allow employers to use their workers more effectively, will not be easily eliminated. In many cases, the rigidities are there because of strong political support from organized labor or other groups, and it is typically the workers with substantial tenure that reap the benefits of labor market rules. As older voters make up a larger and larger share of the total population, they will flex their political muscles to pressure governments to maintain policies favorable to them.

Much of the discussion about the new economy has focused on the explosion of technological improvements adopted by employers in recent years, especially those in information technology. While there has been a perceptible quickening in productivity growth in the U.S. over the latter half of the 1990's, the increase may not be as significant as conventional wisdom would have it. Outside of the manufacturing sector, for example, the annual increase in worker productivity over the period was only 1.50

percent. Within the manufacturing sector, it was 4.58 percent for durable manufacturing. But a closer look reveals that annual productivity increases were only 1.82 percent for firms producing goods other than computers—and 41.70 percent for those producing computers. The explosion of output and productivity growth in the latter half of the 1990s was almost entirely due to the production of computers.

The story in other parts of the developed world might be different than in the United States, but all the major economies had to deal with the Y2K the same way the United States firms and other entities did. Their computer sectors undoubtedly benefited to some extent from the phenomenon in a way that is not likely to carry over indefinitely. Without good cause, it is difficult to see the basis for assuming that the trends in labor productivity, dating back more than a quarter century in many cases and almost a half-century in some, will be substantially reversed during the coming decade.

The Political Risks in Aging Societies

We think the EC and the OECD have come to the reasonable conclusion from their work that the systems of support for the aged in the developed economies need to be significantly reformed and the sooner the better. However, we believe the EC and OECD may have underestimated the magnitude of cost increases many of the developed economies face from population aging under the programs now in effect. In some regard, the latter phenomenon might simply be a manifestation of the political risks the developed economies face in operating their national retirement systems. There is ample reason to believe, however, that the political risks that might already be coming into play in the social policy arena will be heightened as populations age.

The discussion thus far suggests that the policy analysts and policymakers in the various countries for which aging populations might pose cost concerns have a set of conflicting goals that they are attempting to balance. On the one hand, they cannot ignore their social democratic principles that led them to set up their social insurance programs in the first place. On the other, they cannot ignore the implications of costs for retirement programs that have the potential to stifle long histories of economic growth and improving standards of living. Balancing these goals is complicated by the time spans over which retirement benefits are earned and delivered. Policymakers are being encouraged to adopt changes to their retirement systems today in anticipation of aging populations with the expectation that such changes can be phased in gradually, giving workers long lead times to adapt to the changes. But many voting citizens, especially those in retirement or near retirement age, look at these programs from a cash-flow perspective and see that current benefits are being sustained by taxpayers' willingness to pay the fare now needed to cover operating costs. This perception of program costs puts pressures on policymakers to defer program changes until the public sees a clear cut need to adopt them.

Human nature being what it is, there is a tendency to put off doing things that are perceived as adverse or burdensome as long as possible. It becomes even more tempting to put things off if one can get someone else to ultimately bear the burden of doing the adverse thing. This human characteristic is accentuated in democratic political situations where policymakers have to periodically stand for reelection. If voters favor public programs that provide them benefits and resist programs that cost them money, programs that cost them money in one election period but provide them benefits in another offer

policymakers opportunities for political arbitrage. The potential to provide benefits in one period but transfer the costs to a later one can enhance a policymaker's ability to be reelected. Public retirement programs financed on a pay-as-you-go basis in the sort of demographic situation that most developed societies now face are natural for this sort of political arbitrage to take place.

The Politics of Self Interest and National Pension Programs

Our impression is that many politicians, especially those that make it to the national stage in their countries, generally like doing what they do enough that they try to maintain or enhance their positions from election to election. They do this by servicing the needs of the electorates that they serve. James M. Buchanan, who won a Nobel Prize in economics for his theories on public choice , that is economic and political decision making, based his theory on the assumption that the "average" or "representative" individual is motivated by self interest in expressing preferences concerning collective choices. He cites his being influenced by Knut Wicksell, a late nineteenth and early twentieth century Swedish economist, who believed that if you wanted to improve politics you could not do it by improving politicians, they would act according to their own self interests.

Buchanan (1962) concedes that his public choice model is foreign to the "idealist theory-philosophy of political order," that people pursue policies because of the common good or some other higher purpose than their own self interest. Buchanan argues these other perspectives belong in the area of moral philosophy and that we should not look to them as guidelines for structuring our political institutions but as guidelines for an

individual ethic. Sorting out which of these two models is the correct one in explaining the organization of democratic states is an empirical task.

Buchanan and Gordon Tullock (1962, 192-197) develop an example in their analysis that is quite relevant to the issue at hand. The example focuses on the variability of income across a worker's lifetime. A worker expecting that he will have some good years of income and some bad, might be willing to buy insurance in the good years to augment his income in the bad years in the interest of maximizing his utility across time. At the outset of the working life, however, the worker will have inadequate resources to finance adequate insurance to maximize his utility over his lifetime. Private insurance providers will not have the ability to enforce contracts to implement an adequate income insurance program in such a world.

In such a setting, the individual may be led to the point of collectivizing the redistribution of income to accomplish the result that private insurance fails to provide in this case. The mere collectivization in this case does not change the fact that the contingency was not insurable in a private market and thus participants in the program have to accept the costs of being included. As the plan is being devised, the individual has to make sure the rules are going to be equitably and universally applied across all workers in the society.

Once a system of this sort is underway, there is a potential problem that a coalition of people participating in it could vote to impose net taxes on other participants in order to enhance their own benefit from participating in it. This creates the potential for the system to become too large—that is the cost of participating in the system would be higher than the participant would choose in the interest of maximizing his utility.

Buchanan and Tullock conclude that, "The amount of redistribution that unrestrained majority voting will generate will tend to be greater that that which the whole group of individuals could conceptually agree on as 'desirable' at the time of constitutional choice" (194).

The national retirement program movement dates back to the late eighteenth century when the first system was set up in Germany. This movement spread across much of the world over the next four decades although many of the systems were relatively limited in their coverage and benefits at the time of World War II. After the war there was a rash of new contributory plans or tiers added to existing systems. Britain (1946), Switzerland (1949), the Netherlands (1957), Sweden (1960), Norway (1966), and Canada (1966) created new pay-go elements to their systems. The remainder of Europe, Japan, and the United States all significantly expanded their pay-go programs (James et al, 1994). The opportunity to provide full retirement benefits on an extremely generous basis to initial beneficiaries without seemingly disadvantaging workers was simply too good to pass up for most democratic governments. The major flaw in the thinking of the time was the sustainability of the conditions that made pay-go programs efficient.

In 1958, Paul Samuleson, who would become a Nobel laureate in economics, characterized the pay-go financing of a retirement program in the context of what he called the "consumption loan model." Under this model, he explained that when workers pay taxes to finance the benefits for current retirees, they surrender current income that could be used to finance their own consumption. Under the life-cycle model, the money would go into an account to finance consumption after retirement. Samuleson explained that in the pay-go model, the consumption foregone by current workers is, in essence,

"loaned" to current retirees. Workers are willing to make such a loan on the condition that future workers will repay it when the current generation of workers reaches retirement.

Samuelson worked through the calculus of a national pay-go retirement system to determine how these systems worked in comparison to the traditional savings model from the perspective of how workers fared under the alternatives. He determined that the return that workers received on their contributions under these systems was the sum of the rate of growth of real wages covered by the system and the rate of growth in the workforce covered by them. He demonstrated that national pay-go retirement systems might actually be more economically efficient over the long term than funded alternatives under certain conditions.

In Samuelson's analysis, there were two important characteristics of the population. First, he assumed there would be more people in each succeeding generation and second, each succeeding generation of workers be more productive than prior generations. The increases in worker productivity result in each generation of workers being paid a higher wage than prior generations. With time, the aggregate size of contributions in a national retirement system would grow because of the growth in the numbers of workers and the higher wages on which their taxes—i.e., their consumption loans—are levied. Each generation of retirees receives more benefits from the generations behind it than it transferred to prior generations.

In February 1967, Paul Samuelson wrote an article for *Newsweek* magazine (p. 88) describing how this system worked. He wrote:

> The beauty of social insurance is that it is actuarially unsound. Everyone who reaches retirement age is given benefit privileges that far exceed anything he

> has paid in. And exceed his payments by more than ten times as much (or five times, counting in employer payments)!
>
> How is it possible? It stems from the fact that the national product is growing at compound interest and can be expected to do so for as far ahead as the eye cannot see. Always there are more youths than old folks in a growing population. More important, with real incomes going up at some 3 percent per year, the taxable base on which benefits rest in any period are much greater than the taxes paid historically by the generation now retired.
>
> Social security is squarely based on what has been called the eighth wonder of the world—compound interest. A growing nation is the greatest Ponzi game ever contrived.

In the late 1950s and the 1960s when Paul Samuleson developed his description of the consumption loan model and wrote the article in Newsweek, the population structure in most developed countries was consistent with his assumptions of steady growth. There were a few highly developed countries, such as Italy, Germany, and Japan, that were beginning to experience the ramifications of declining fertility rates, but were still not far enough along in that process to be important from the perspective of retirement dependency relative to the size of their workforces.

It is the change in the future outlook relative to what Samuleson expected when he was analyzing his "consumption loan" model that has raised concerns about the pay-go approach for national retirement system financing. His analysis still applies, but it portends very different benefits for current participants in the national retirement systems than those he predicted. Instead of each generation receiving relatively positive returns on lifetime contributions, younger generations are now facing marginally positive returns in many cases and possibly negative returns in some. National retirement systems that seemed reasonably sized a decade or two ago, now may be exceedingly large from the perspective of workers who have to support them. But following Buchanan's public

choice model, the self-interested voting behavior of participants in these systems may make them impervious to change. In order to demonstrate the risks of this being the case, we have developed a simple voting model where each birth cohort in the developed societies are expected to vote in accordance with their self-interest in regard to public policies on national pensions.

National Demographics and Voting Patterns

Individuals in democratic societies do not vote their respective interests at consistent rates across a variety of personal characteristics. When it comes to political support for governmental programs that provide benefits to the aged in a society, the voting habits of people at various ages might be particularly important in understanding the positions that policymakers take on these programs.

Table 9 includes a set of estimated voting rates in a number of European countries compiled on the basis of national elections held during the early 1990s, with the exception of the Netherlands where the data were collected on the basis of a parliamentary election in September 1989. These data were collected by survey and overall reported voting rates exceed official voting rates compiled by the governments in most of the countries. The authors of the report from which these were drawn surmise that in surveys people who do not vote often report that they have because of the potential negative stigma they might feel from telling the truth that they had not. We adjusted the data in Table 9 on a pro rata basis to reduce overall reported voting rates in each of these societies to comply with the official voting rates reported in the respective countries. We have similar data for Canada, the United Kingdom, and the United States although the age categories are slightly different in each case.

We took the adjusted voting rates that we derived as described and applied them to the projected age structures of the respective societies at various points in the future to show how the aging of the societies could affect the voting ages of the people in them in the future. Our results are presented in Table 10. In 2000, more than 55 percent of all the voters in all of the countries but France were under age 50. By 2030, more than half the voters in all of the countries will be 50 years of age or older. Whereas in 2000, between a quarter and 30 percent of the voters in all of the countries were age 60 or above, by 2030, around 40 percent will be this age in most countries.

It is naïve to assume that everyone in a democratic society votes purely their individual interests when they vote to elect their governmental policymakers. It is also naïve to assume people form their voting decisions on the basis of single issues such as political candidates willingness to vote one way or the other on social insurance policy. Finally, it is naïve to assume that policymakers, once elected, consistently vote in accordance with the desires of the majority of their electorate on any particular policy matter. However, it does not take a long stretch of the imagination to assume that people's own interests do affect their own voting behavior and candidate preferences, and that these have some influence on policymakers' decisions to support particular policies.

To put this into the context of national retirement programs, one needs to think about the relative perspective people at different ages in a society might have about a pension system that is underfunded. If they truly believe it is underfunded and that money does not grow on trees, they will realize that bringing the program back into balance will either require reductions in benefits or increases in revenues supporting the system or some combination of the two. It is likely that the preferences for one approach

or the other of bringing a pension back into balance in a country will vary for the individuals in the society based on their age at the time policy changes are being made.

It is likely that older people in most countries, those retired or very close to it, perceive that maintaining benefits is preferred over cutting them. While holding benefits constant almost certainly means that taxes supporting the programs will have to rise, for those retired or close to it, the added taxes will be relatively minimal or non-existent. Cutting benefits for these sorts of people means that they are going to get less in the way of benefits than they thought they had been paying for throughout their working lives. For younger people the situation is just the opposite. If they perceive that they are going to be asked to pay a higher price for a benefit that is worth less than the value of their future contributions for it, they would likely prefer that benefits be reduced rather than taxes be increased.

Undoubtedly there is some intergenerational concern in all societies—children do not want to see their parents living out an old age with inadequate incomes. And parents do not want to see their children facing such high tax rates that they cannot afford decent housing, getting married and having families, and providing adequately for their needs. But there are limits to the extent that one generation is willing to forego its own interests to support the other. The aging of the populations reflected in Table 10 suggests that in the future, the sizes of the voting populations that think staying with current benefits in the national retirement systems in the developed countries is likely to rise relative to those who might think benefit reductions are preferable to tax increases.

Sorting Out the Good Deals and the Bad Deals

At any point in time, an individual's perception about the public pension program largely depends on a basic economic question—how much more do I need to put into the program versus how much I will get out at retirement. More specifically, a person's perspective will come down to a comparison of the expected payout that he or she will receive relative to the value of contributions that he or she will have to pay into the program over their remaining working career.

It is important to keep in mind that we are not talking about eliminating the pension versus keeping it going, we are talking about whether people want to increase the contribution level to sustain current benefits or to cut current benefits to sustain the contribution rates. In this context, past contributions are sunk costs and it is the future contributions and benefits that determine whether a particular policy is a good or bad deal from the perspective of a particular participant in the system.

From an economic perspective, if the value of future benefits is greater than the value of the total remaining contributions they must make over their remaining lifetime, it is reasonable to assume that an individual would be in favor of preserving the current benefits provided under the program. On the other hand, if the expected benefits are less than the required contributions over the remainder of their career, it is likely that an individual would find the current program to be a bad deal; since their cost into the program is greater than the benefit they expect to receive already. In this situation, it is doubtful that this individual would favor a rising commitment to this program, most notably coming in a way that raises contribution rates into the system.

These varied perspectives have important implications for public retirement programs around the world. In order to understand the importance of population aging on the evolving politics of public pensions, we have estimated, in relatively crude terms, the ages at which individual workers would cross over from being losers with continued participation in their public pension programs to being winners. These breakeven ages are estimates of the ages at which the value of the contributions into these programs is equal to the value of the benefits they will receive.

Most of the national retirement systems throughout the developed world operate on a pay-asyou-go basis, or close to it, where the tax contributions of the working population are used almost immediately to pay the benefits to those people already retired. Such systems typically maintain a small contingency trust fund, simply because it is impossible to have revenues and benefits equal in any given year. Fundamentally, a pay-go system can be represented by a simple formula. On the one side of the equation, the amount of revenues taken in any given year is equal to payroll tax rate (t), charged to both employers and employees, multiplied by the number of workers (Nw) in the economy, and by the average wage (W) of workers from whom taxes are collected. On the other side, the cost of the program is determined by the number of people receiving benefits (Nb) under the program times the average benefit (B) provided to each of the beneficiaries. In a pay-go system, the two sides of the equation must be equal, as shown below:

$$t * N_w * W = N_b * B$$

The cost of the pay-go retirement system is generally considered in light of the payroll tax that is needed to sustain the program on an annual basis. With a simple

manipulation to the above formula, two very important ratios determine the cost of the program. The tax rate is the ratio of beneficiaries under the program to the number of workers contributing to it (N_b/N_w) times the ratio of average benefits to average wages (B/W).

$$t = (N_b/N_w) * (B/W)$$

The ratio of beneficiaries to the number of workers is often referred to as the dependency ratio, the number of retirees being supported by the working population. The ratio of average benefits to wages is often called the replacement ratio, reflecting how much of an average worker's earnings are replaced by the retirement benefit when he or she retires. If we look at the United States today, the current dependency ratio is slightly greater than 0.3 while the average replacement rate is roughly 0.4, meaning that Social Security replaces roughly 40 percent of the average person's income. In rough terms, this equates to the U.S. system costing around 12 percent of covered payroll. Given that the current payroll tax rate is 12.4 percent, this very simple model does a pretty good job at estimating the cost of these programs.

This model was the basis for estimating the value of contributions and the value of benefits for various age groups over the coming decades. First, if we estimated the contribution side, the amount of money an individual contributes into their retirement program for any given year as the product of annual earnings times the payroll tax rate. The individual's total contributions over the remaining career are the summation of all the annual contributions from the current period until retirement. For this exercise, we used age 65 as the retirement date. A number of countries have already undertaken

measures to encourage people to work longer, and we assumed that others would likely follow suit.

Using 65 as our normal retirement age means a 30 year old would contribute into their national program for the next 35 years, while a 50 year old would contribute for only 15 more years. To calculate the value of total contributions by age, we estimated earnings by age across these various countries. Since we do not have detailed earnings levels by age for all of these countries, we assumed that pattern of earnings at various ages would be similar to the age structure of earnings in the United States. To project the path of earnings over the remainder of an individual's career, we assume both a standard growth in earnings across the economy from year-to-year as well as a movement along the earnings distribution as individuals age. We applied these estimates of earnings for various age groups to the payroll tax rate for all remaining years of work and sum up these values to arrive at total contributions.

To estimate the total value of benefits that an individual will receive throughout retirement, we use a simple adjustment to the model described above. Many of the countries analyzed have made it quite clear that they would like to preserve these programs without any further increases in the payroll tax rate. As a result, we assume for our estimates of the average benefit that the payroll tax in these countries stays the same. If we assume the payroll tax rate to be constant, the average benefit would be calculated as follows:

$$B = t * W * (N_w/N_b)$$

The implication of this assumption is that we allowed the average benefit and ultimately the replacement rate to vary over time. With the severe aging of populations

around the world, the ratio of workers to beneficiaries is declining in every country over the coming decades. The result is that in order for these programs to remain in balance, the replacement ratios across these countries will be falling unless major changes are made to these programs or these countries are willing to take on rising levels of debt. While a number of countries are considering significant changes to their programs, we have not incorporated any of them into this analysis. In the case of the United States, by holding the payroll tax rate constant the replacement rate would have to fall from 40 percent today to 22 percent by 2050.

To estimate the value of benefits paid out under the program for a particular age group in any given year, we assumed the individual would receive the average benefit over his or her payout period. The payout period for an individual is the difference between the age of normal retirement and their life expectancy at a given age. As a result, we allow for improvements in life expectancy over the coming decades. Similar to the estimate of total contributions, the total value of benefits that an individual will receive is simply the summation of the average annual benefit paid out under the program over this period.

A comparison of the total value of benefits relative to the total required contributions across various age groups provides an assessment of the varied perspectives individuals will have about these programs. Table 11 reports the ratio of projected benefits relative to contributions for a number of different age groups in 2000. An obvious conclusion across all countries is that the relative value of lifetime benefits to remaining lifetime contributions increases with age. This occurs simply by the fact that

older individuals have fewer years of required contributions while getting ever closer to the payout period.

From this perspective, it is quite clear that many younger individuals will find these programs less favorable than the older population group. However, the age at which the total value of benefits is equal to the total value of contributions—what we call the breakeven age—varies quite significantly across these countries. One of the greatest differences is between Italy and the United States, which differ by over eight years. The United States in fact maintains the lowest breakeven age, indicating potentially greater support from the population for preserving the benefits under the program. However, in countries like Italy and Hungary, the severe aging of their populations have made the returns from these programs less favorable.

The impact of aging populations on the returns to these programs and thus on the sentiment of the politic can be seen by examining how the breakeven age changes over time. Table 12 provides a very similar picture but for age groups in 2020. The result for many countries, in particular for those experiencing the most severe population aging is an increase in the breakeven age over the coming decades. For example, the breakeven age for Spain increases over four years between 2000 and 2020. Whereas a 50-year-old in Spain in 2000 would generate a positive cash flow from the program, a 50-year-old in 2020 would still be paying more into the system than he or she can expect to receive. However, a few countries do in fact show slight declines in their breakeven age, indicating that the gains in life expectancy are greater than the burdens from the aging population. Table 13 provides more detailed estimates of breakeven ages for each of the

next three decades. The variation in the breakeven ages indicates that various age groups are likely to have very different experiences under these programs in the coming decades.

The Growing Risks of Pension Traps

Assuming that there is a relationship between voters' self interest under public policy and their voting preferences, we have applied the historical voting patterns in various countries to their evolving age structures to estimate the percentage of voters over time that fall above the pension breakeven levels we calculated. The results of our estimates are presented in Table 14 under two sets of voting-pattern assumptions. The left-hand set of numerical columns in the table is based on the assumption that future voting patterns by age will correspond with the historical patterns in each country. The right-hand set of columns is based on the assumption that people in each of the countries will vote at the same rate at every age.

Focusing first on the case where we assumed voting in the future would be similar to that in the past, over half the voters in many of the countries considered here are already above the age where they would be better off with public policies protecting current benefit levels. Over time, the percentage of voters in every country over the breakeven age increases significantly. We are not suggesting here that current voting patterns automatically imply that any country where the majority of voters would be better off protecting benefits as opposed to protecting tax rates will result in higher tax rather than benefit reductions. We are suggesting that that these countries are at risk of falling into a pension trap, however, where policymakers are more likely to raise taxes to protect benefits in the future rather than cut benefits to protect taxpayers. And over time,

the risk of benefits being protected at the expense of taxpayers will increase because of population aging.

Some of the results in this first set of estimates are surprising. For example, Italy with a relatively old population already has a much smaller proportion of its voting population over the breakeven pension age than the United States with a relatively young population, 44 percent versus 64 percent. There are two factors at play here. First, Italy's current pension system is much more out of balance than the U.S. system. That means that the implied benefit reductions relative to current levels will have to be larger and the system becomes a bad deal more quickly for people fairly far along their career path already. Second, the voting patterns in Italy and the United States are very different. In Italy, people at younger ages vote at higher rates than at the oldest ages. In the United States, the pattern is just the opposite. In Italy, the young voters will show their preferences in disproportionate numbers relative to their elder counterparts. In the United States, the elderly voters earn disproportionate attention because they vote at so much greater rates than their young counterparts.

In the right hand columns of Table 14, the skewing in voting patterns is eliminated by assuming that voters go to the polls at consistent rates at all ages. The effect for Italy is miniscule; that for the United States quite profound. This in itself is an important point in countries where people at different ages vote at different rates. In the United States, for example, if policymakers tilt heavily toward the elderly in their considerations of pension policy, there is some added probability that younger people may begin to vote at higher rates in order to avoid being burdened with the full cost of restructuring retirement systems that are out of fiscal balance.

Our analysis here has been limited to pensions. At the outset of the discussion we presented cost estimates for both public pension and health benefit plans for the elderly. That presentation suggests that, in many cases, the health systems in the developed countries are further out of balance than their pension systems. While we have not done the estimates on the health systems, our intuition is that the significant imbalances in these programs combined with pensions will likely make the combination of programs operate more like the pension case in Italy than that in the United States. If we are correct in this intuition, the political risks of retirement benefits being cut would be much higher than our analysis of the pension systems alone suggests.

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Table 1: Estimated Age Related Spending for Old-Age Pensions, Health Care and Long-Term Care as a Percent of GDP in 2000 and 2050 for Selected Countries

	Old-age pension		Health and long-term care		Pensions and health	
	2000	2050	2000	2050	2000	2050
Australia	3.0%	4.6%	6.8%	13.0%	9.8%	17.6%
Austria	9.5	11.7	na	na	na	na
Belgium	8.8	12.1	6.2	9.2	15.0	21.3
Canada	5.1	10.9	6.3	10.5	11.4	21.4
Czech Republic	7.8	14.6	7.5	9.5	15.3	24.1
Denmark	6.1	8.8	6.6	9.3	12.7	18.1
Finland	8.1	12.9	8.1	11.9	16.2	24.8
France	12.1	15.9	na	na	na	na
Germany	11.8	16.8	na	na	na	na
Hungary	6.0	7.2	na	na	na	na
Italy	14.2	13.9	na	na	na	na
Japan	7.9	8.5	5.8	8.2	13.7	16.7
Korea	2.1	10.1	0.7	1.2	2.8	11.3
Netherlands	5.2	10.0	7.2	12.0	12.4	22.0
New Zealand	4.8	10.5	6.7	10.7	11.5	21.2
Norway	4.9	12.9	5.2	8.4	10.1	21.3
Poland	10.8	8.3	na	na	na	na
Spain	9.4	17.4	na	na	na	na
Sweden	9.2	10.8	8.1	11.3	17.3	22.1
United Kingdom	4.3	3.6	5.6	7.3	9.9	10.9
United States	4.4	6.2	2.6	7.0	7.0	13.2

Source: Thai Than Dang, Pablo Antolin, and Howard Oxley, *Fiscal Projections of Aging: Projections of Age Related Spending* (Paris: OECD, September 2001), Economics Department Working Papers No. 305, p. 25

Table 2: Total Fertility Rates and Change in the Rates for Selected Periods

	Total fertility rate					Percentage change	
	1950 to 1960	1975 to 1980	1995 to 2000	2015 to 2020	2035 to 2040	Late 1950s to late 1990s	Late 1990s to late 2030s
Australia	3.41	2.09	1.77	1.61	1.57	-48.03	-11.31
Austria	2.52	1.64	1.36	1.46	1.5	-46.08	10.21
Belgium	2.5	1.70	1.55	1.73	1.8	-38.06	16.2
Canada	3.9	1.74	1.6	1.5	1.5	-58.95	-6.25
Czech Republic	2.35	2.32	1.18	1.41	1.5	-49.94	27.33
Denmark	2.54	1.68	1.74	1.78	1.8	-31.76	3.7
Finland	2.78	1.64	1.71	1.69	1.7	-38.45	-0.76
France	2.71	1.86	1.73	1.79	1.8	-36.06	3.81
Germany	2.3	1.52	1.33	1.5	1.5	-42.44	13.21
Greece	2.27	2.32	1.3	1.52	1.6	-42.73	23.08
Hungary	2.21	2.12	1.37	1.54	1.6	-37.95	16.62
Ireland	3.68	3.48	1.92	1.82	1.8	-47.83	-6.25
Italy	2.35	1.89	1.2	1.41	1.5	-48.77	24.58
Korea	6.33	2.92	1.51	1.78	1.64	-76.15	8.61
Japan	2.08	1.81	1.41	1.58	1.61	-32.07	14.1
Netherlands	3.1	1.60	1.54	1.79	1.8	-50.15	16.66
Norway	2.84	1.81	1.83	1.8	1.8	-35.5	-1.64
Poland	3.29	2.26	1.46	1.72	1.83	-55.64	25.27
Portugal	3.03	2.41	1.46	1.68	1.7	-51.72	16.2
Spain	2.75	2.57	1.16	1.4	1.5	-57.96	29.65
Sweden	2.23	1.66	1.51	1.68	1.8	-32.59	19.52
United Kingdom	2.49	1.72	1.7	1.78	1.8	-31.8	5.82
United States	3.71	1.79	2.04	1.98	1.95	-44.87	-4.55

Source: Derived by the authors from 1955-2000 based United Nations Population Division, *World Population Prospects: The 2000 Revision*; from 2015-2040 based on an unpublished series provided by the OECD.

Table 3: Increase in Immigration Required to Offset the Extent Fertility Falls below Population Replacement Levels

	Average total fertility rate 1995-2000	Average births 1995-2000 (000s)	Additional births at TFR=2.1 (000s)	Average net immigration 1995-2000 (000s)	Multiple of current immigration to offset low fertility
Australia	1.8	1,250	233	95	2.5
Austria	1.4	408	221	5	44.2
Belgium	1.5	553	197	13	15.2
Canada	1.6	1,782	557	144	3.9
Czech Republic	1.2	452	354	10	34.4
Denmark	1.7	328	69	14	4.9
Finland	1.7	290	66	4	15.5
France	1.7	3,649	770	39	19.9
Germany	1.3	3,815	2,231	185	12.0
Greece	1.3	500	310	35	8.9
Hungary	1.4	496	263	(7)	-35.7
Ireland	1.9	263	24	18	1.4
Italy	1.2	2,623	1,952	118	16.6
Japan	1.4	6,160	3,008	56	54.1
Korea	2.1	2,034	47	(9)	-5.3
Netherlands	1.5	935	338	32	10.5
New Zealand	2.0	276	18	8	2.3
Norway	1.8	289	43	9	4.9
Poland	1.5	2,018	889	(20)	-44.2
Portugal	1.5	563	245	13	18.9
Spain	1.2	1,823	1,486	37	40.1
Sweden	1.5	441	174	9	19.6
United Kingdom	1.7	3,530	828	95	8.7
United States	2.0	19,983	558	1,250	0.4

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

Table 4: Labor Force Participation Rates of Men and Women Ages 20 to 64 by Gender in Selected Countries and for Selected Years

	Men			Women		
	1970	1990	2000	1970	1990	2000
Australia	94.5	88.2	84.6	43.1	62.1	66.5
Belgium	-	79.3	78.0	-	56.9	63.8
Canada	92.1	87.9	83.7	41.5	69.7	71.9
Denmark	-	89.5	86.9	-	79.5	78.4
Finland	86.0	83.6	81.8	64.8	76.6	77.3
France	90.6	82.9	83.0	50.3	63.1	68.4
Germany	92.7	84.9	84.8	44.7	58.6	68.1
Italy	-	-	77.5	-	-	47.8
Japan	93.1	91.9	91.7	56.2	62.1	65.9
Korea	-	86.9	85.3	-	55.1	57.1
Netherlands	91.2	81.4	83.6	27.0	49.1	59.0
New Zealand	-	87.0	85.5	-	64.0	71.1
Norway	86.5	87.4	87.4	50.3	73.3	79.2
Portugal	92.2	87.5	86.9	47.0	61.8	65.7
Spain	92.4	85.9	83.4	28.3	44.0	54.3
Sweden	90.3	90.2	85.4	60.1	84.8	79.6
United Kingdom	-	89.6	88.1	-	64.6	69.7
United States	91.7	88.7	86.1	49.9	69.3	73.8

Source: The authors' calculations from *The OECD CDROM on Labour Market Statistics Database* (forthcoming in January 2002).

Table 5: Projected Changes in the Labor Force Participation Rates of Men and Women Ages 20 to 64 as a Percentage of the Participation Rate in 2000

	Males			Females		
	2000-2010	2000-2030	2000-2050	2000-2010	2000-2030	2000-2050
Australia	-0.9 %	1.7 %	1.2 %	2.5 %	4.3 %	4.7 %
Belgium	-3.9	-4.9	-3.4	5.9	10.3	12.0
Canada	-2.6	-3.5	-4.3	0.6	2.3	2.8
Denmark	-2.5	-3.1	-3.2	-0.5	1.8	5.6
Finland	-4.6	-3.2	-4.4	-2.5	0.4	0.7
France	-4.1	-5.3	-5.0	-0.1	2.2	7.3
Germany	0.8	-2.0	-1.4	8.9	8.7	10.0
Italy	4.1	2.6	2.9	9.6	24.4	44.9
Japan	-1.5	-2.0	-1.4	6.5	12.5	21.8
Korea	0.2	-2.2	-1.5	13.1	27.2	28.6
Netherlands	-2.1	-5.1	-4.0	11.7	22.7	25.4
New Zealand	-1.1	-1.5	-1.8	1.0	-0.8	-0.5
Norway	-2.0	-3.2	-3.0	-2.3	-2.6	-1.6
Portugal	-0.9	-2.8	-1.8	3.5	6.5	15.5
Spain	-0.3	-2.7	-0.7	10.0	22.1	33.6
Sweden	1.3	1.0	0.5	3.1	5.0	6.6
United Kingdom	-1.7	-2.1	-2.3	3.7	3.4	6.9
United States	-0.6	-1.6	-1.8	2.9	7.6	5.4

Sources: Derived from Appendix Table 1 which is based on the authors' calculations from *The OECD CDROM on Labour Market Statistics Database* (forthcoming in January 2002) and an unpublished series of projections provided by the OECD (December, 2001).

Table 6: Estimated Labor Force Participation Rates by Gender for Ages 55 to 64 for Selected Countries

	Men				Women			
	2000	2010	2030	2050	2000	2010	2030	2050
	Percentage of age group in the labor force							
Australia	60.6	62.2	65.9	66.7	34.8	39.7	42.7	43.3
Austria	38.0	44.7	56.4	71.3	13.9	20.4	36.4	57.8
Belgium	34.0	36.2	35.6	38.6	17.0	29.9	36.3	37.3
Canada	58.1	56.0	56.0	56.0	38.8	40.6	48.3	51.2
Czech Republic	56.6	61.2	61.2	61.2	27.0	38.9	45.1	51.2
Denmark	65.5	59.1	59.1	59.1	46.3	43.6	48.6	54.1
Finland	45.7	46.0	46.0	46.0	43.6	46.0	46.0	46.0
France	42.4	39.9	39.9	39.9	29.5	28.5	31.5	34.9
Germany	55.7	62.4	60.8	62.4	37.0	46.0	48.9	51.4
Hungary	38.2	44.0	46.4	44.4	16.2	49.6	52.5	50.6
Ireland	67.9	66.9	64.4	64.4	19.0	20.5	27.0	44.4
Italy	44.9	51.9	57.9	53.3	17.4	26.6	33.4	44.5
Japan	83.7	80.0	80.0	80.0	47.1	47.1	57.4	70.0
Korea	74.2	74.1	73.3	73.8	49.9	56.1	60.1	60.3
Netherlands	45.6	52.9	48.2	49.5	17.8	24.0	36.4	38.1
New Zealand	71.0	72.6	71.8	72.6	50.3	54.7	53.5	54.3
Norway	68.8	64.9	63.1	62.7	56.5	55.7	56.9	59.1
Poland	44.5	55.0	55.0	55.0	26.1	36.1	40.3	44.5
Portugal	62.6	61.1	61.1	61.1	33.7	35.1	43.8	54.5
Spain	58.3	58.3	58.3	58.3	21.8	30.6	42.9	48.3
Sweden	72.0	70.1	70.1	70.1	64.8	70.1	70.1	70.1
United Kingdom	66.4	62.9	62.9	62.9	40.0	40.5	43.0	51.9
United States	67.7	69.2	66.1	65.6	52.0	57.4	58.6	58.1

Source: The authors' calculations from an unpublished series of projections provided by the OECD, which uses the baseline population projections by Eurostat (December, 2001).

Table 7: Health Care Expenditures as a Percent of GDP and the Rates of Growth in Health Care as Percent of GDP for Selected Countries and Periods

	Health care as percent of GDP in 1970	Annual compound growth rate in health expenditures as percent of GDP			Health care as percent of GDP in	Last year in data series
		1970-1980	1980-1990	1990-1999	1998 or 1999	
Australia	5.7 %	1.1 %	1.2 %	1.1 %	8.6 %	1998
Austria	5.3	3.7	-0.7	1.6	8.2	1999
Belgium	4.0	4.8	1.5	1.9	8.8	1999
Canada	7.0	0.1	2.4	0.4	9.3	1999
Denmark	8.0	0.7	-0.7	-0.1	8.4	1999
Finland	5.6	1.3	2.1	-1.7	6.8	1999
France	5.7	2.6	1.5	1.0	9.4	1999
Germany	6.3	3.4	-0.1	2.1	10.3	1998
Greece	5.6	1.5	1.4	1.4	8.4	1998
Iceland	4.9	2.2	2.6	1.1	8.7	1999
Ireland	5.1	5.1	-2.2	0.2	6.8	1998
Italy	5.1	3.2	1.5	0.1	8.2	1999
Japan	4.6	3.5	-0.6	2.4	7.4	1998
Korea				1.3	5.4	1999
Luxembourg	3.5	5.4	0.3	0.0	6.1	1999
Mexico				2.4	5.3	1998
Netherlands			0.6	0.3	8.7	1999
New Zealand	5.2	1.4	1.6	1.6	8.1	1999
Norway	4.4	4.8	1.1	2.0	9.3	1999
Poland				1.8	6.2	1999
Portugal	2.7	7.6	1.0	2.7	7.7	1998
Spain	3.6	4.1	2.0	0.7	7.0	1998
Sweden	6.9	2.8	-0.7	-0.9	7.9	1998
Switzerland	5.4	3.1	1.3	2.9	10.4	1998
United Kingdom	4.5	2.2	0.7	1.6	6.9	1999
United States	6.9	2.3	3.2	0.9	12.9	1999

Source: Derived by authors from *OECD Health Data 2001*.

Table 8: Compound Annual Growth in Labor Productivity for Selected Periods

	1970-1980	1980-1990	1990-2000	2000-2010	2010-2030	2030-2050
	Annual percentage increase in GDP per hour of work in the economy					
Austria	3.01	2.08	1.59	2.14	1.41	1.77
Belgium	3.20	1.93	1.66	1.92	1.83	1.75
Canada	0.85	1.11	1.37	1.48	1.45	1.75
Denmark	1.81	1.04	2.02	1.70	1.71	1.60
Finland	2.53	2.36	2.88	3.01	1.88	1.77
France	2.72	2.07	1.28	1.61	1.74	1.75
Germany	2.56	1.70	-0.40	1.75	1.75	1.75
Ireland	3.76	3.57	3.13	2.90	1.90	1.80
Italy	2.55	1.60	1.57	2.07	1.75	1.75
Japan	3.56	2.84	1.04	1.40	1.71	1.75
Netherlands	2.69	1.60	1.16	1.45	1.71	1.73
New Zealand	-	1.42	0.85	1.60	1.75	1.75
Norway	3.16	1.77	2.20	0.84	1.21	1.10
Portugal	2.97	1.74	1.61	3.13	3.18	3.26
Spain	3.78	2.28	1.64	1.65	2.30	1.75
Sweden	0.98	1.59	2.50	1.76	1.75	1.75
United Kingdom	1.75	1.97	1.88	1.99	1.79	1.75
United States	1.57	1.42	1.59	1.95	1.80	1.80

Source: Authors' calculations from Source OECD Economic Outlook for 1970-2000; for the period 2000-2050, data based on an unpublished series provided by the OECD.

Table 9: Voting Rates by Age in Selected European Countries

	18-29	30-39	40-49	50-59	60-69	70+
Belgium	96.7 %	97.9 %	97.6 %	97.9 %	95.6 %	93.5 %
Denmark	86.0	93.8	92.0	93.7	91.7	89.2
Finland	68.6	84.4	92.9	93.6	96.1	90.1
France	63.2	79.8	83.9	86.4	91.9	93.6
Germany	84.8	90.5	92.1	93.6	93.0	93.4
Great Britain	81.0	88.4	89.4	88.7	90.0	89.4
Greece	88.5	98.9	98.0	100.0	98.1	97.4
Ireland	64.1	89.2	92.2	96.1	96.9	90.5
Italy	95.4	97.0	97.8	98.7	96.7	89.3
The Netherlands	86.2	93.5	96.0	96.1	94.8	92.5
Norway	75.9	85.4	89.4	89.1	93.5	93.0
Portugal	63.7	84.6	93.2	89.3	93.5	90.0
Spain	80.6	85.1	89.9	88.8	90.5	84.3
Sweden	89.3	93.3	95.6	96.8	94.6	94.5
Switzerland	50.2	62.6	66.8	72.6	75.0	62.3

Source: International Institute for Democratic and Electoral Assistance, *Youth Voter Participation* (Stockholm, Sweden: International IDEA, 1999), p. 26.

Table 10: Estimated Share of Voters over Ages 50 and 60 for Selected Years

	Share of Voters 50 and Over				Share of Voters 60 and Over			
	2000	2010	2030	2050	2000	2010	2030	2050
Belgium	42.41	47.00	54.95	57.96	27.33	29.33	38.98	42.06
Canada	39.66	46.51	54.27	56.33	23.27	26.82	37.98	39.97
Denmark	43.64	47.57	54.88	56.28	25.22	30.05	38.18	38.74
Finland	46.60	52.51	58.15	61.25	27.30	33.05	42.41	44.15
France	46.17	50.95	57.80	59.66	30.24	32.92	41.79	44.84
Germany	44.76	49.02	58.34	61.37	29.34	31.38	43.22	45.68
Greece	44.42	47.98	59.63	63.45	29.31	31.39	40.30	48.62
Ireland	39.53	42.38	50.37	52.96	23.03	24.81	30.92	38.00
Italy	44.00	47.98	60.76	63.22	28.23	31.33	41.96	47.68
Netherlands	40.46	45.86	54.90	56.93	23.50	27.62	38.73	40.07
Norway	43.95	48.06	55.91	58.83	27.38	30.56	40.15	42.39
Portugal	44.32	47.08	58.37	61.30	28.82	30.33	38.02	45.69
Spain	41.46	45.35	61.08	65.47	27.13	29.18	40.44	51.10
Sweden	47.00	49.50	57.36	62.49	28.74	32.88	41.29	45.52
Switzerland	47.48	53.84	62.30	65.33	28.14	33.60	46.47	47.17
United Kingdom	43.52	46.36	54.84	58.41	27.34	29.92	39.59	42.28
United States	45.13	50.35	56.20	58.03	27.43	29.74	39.06	40.32

Source: Estimated by Watson Wyatt Worldwide.

Table 11: The Value of Future Pension Benefits Relative to the Value of Future Contributions for Various Ages in 2000

	Age in 2020						Breakeven
	30	35	40	45	50	55	age
Austria	0.346	0.419	0.545	0.840	1.388	2.800	46.46
Belgium	0.374	0.448	0.606	0.837	1.300	2.514	46.76
Canada	0.594	0.700	0.868	1.173	1.918	3.577	42.17
France	0.436	0.554	0.696	0.947	1.526	2.895	45.46
Germany	0.381	0.484	0.607	0.850	1.436	2.679	46.28
Greece	0.336	0.424	0.604	0.865	1.352	2.580	46.38
Hungary	0.195	0.261	0.404	0.627	1.027	1.979	49.67
Ireland	0.520	0.707	0.920	1.249	1.870	3.572	41.22
Italy	0.279	0.364	0.482	0.701	1.126	2.191	48.52
Japan	0.463	0.597	0.771	1.058	1.581	2.895	43.99
Luxembourg	0.525	0.654	0.789	1.033	1.631	3.044	44.33
Netherlands	0.501	0.583	0.728	1.011	1.598	2.979	44.80
Norway	0.551	0.646	0.870	1.202	1.858	3.556	41.95
Poland	0.303	0.436	0.642	0.943	1.334	2.695	45.73
Portugal	0.414	0.521	0.751	1.067	1.749	3.104	43.94
Spain	0.296	0.407	0.568	0.851	1.459	2.727	46.23
Sweden	0.499	0.597	0.754	1.100	1.679	3.153	43.56
Switzerland	0.488	0.567	0.702	1.025	1.606	3.143	44.62
Turkey	0.459	0.606	0.836	1.323	2.118	4.244	41.68
United Kingdom	0.459	0.541	0.731	1.018	1.599	3.098	44.69
United States	0.627	0.735	0.969	1.295	2.101	3.860	40.47

Sources: Authors' calculations from United Nations Population Division, *World Population Prospects: The 2000 Revision*; The OECD Economic Outlook – *Source OECD*; *OECD CDROM on Labour Market Statistics Database* (forthcoming in early 2002).

Table 12: The Value of Future Pension Benefits Relative to the Value of Future Contributions for Various Ages in 2020

	Age in 2020						
	30	35	40	45	50	55	Breakeven age
Austria	0.354	0.427	0.536	0.712	1.039	1.879	49.40
Belgium	0.414	0.490	0.603	0.788	1.195	2.020	47.61
Canada	0.599	0.747	0.912	1.182	1.681	2.966	41.63
France	0.490	0.578	0.709	0.975	1.393	2.342	45.30
Germany	0.421	0.500	0.619	0.861	1.236	2.072	46.86
Greece	0.317	0.385	0.484	0.682	1.009	1.785	49.87
Hungary	0.225	0.278	0.388	0.528	0.862	1.691	50.83
Ireland	0.505	0.621	0.790	1.066	1.695	3.010	43.80
Italy	0.297	0.350	0.428	0.588	0.843	1.450	51.29
Japan	0.515	0.613	0.757	0.991	1.433	2.577	45.10
Luxembourg	0.626	0.731	0.888	1.215	1.713	2.980	41.72
Netherlands	0.538	0.622	0.749	0.957	1.339	2.345	45.56
Norway	0.621	0.766	0.927	1.189	1.672	2.941	41.39
Poland	0.276	0.356	0.473	0.712	1.116	2.186	48.57
Portugal	0.434	0.552	0.679	0.884	1.284	2.395	46.45
Spain	0.268	0.328	0.440	0.590	0.884	1.686	50.72
Sweden	0.488	0.585	0.732	1.024	1.483	2.520	44.58
Switzerland	0.513	0.633	0.767	0.984	1.382	2.413	45.20
Turkey	0.416	0.515	0.758	0.960	1.457	2.866	45.41
United Kingdom	0.515	0.610	0.797	1.042	1.489	2.637	44.15
United States	0.721	0.849	1.040	1.433	2.040	3.587	38.96

Sources: Authors' calculations from United Nations Population Division, *World Population Prospects: The 2000 Revision*; The OECD Economic Outlook – *Source OECD*; *OECD CDROM on Labour Market Statistics Database* (forthcoming in early 2002).

Table 13: The Breakeven Age: the Value of Future Pension Benefits Equals the Value of Future Contributions

	2000	2010	2020	2030
Austria	46.46	48.62	49.40	47.87
Belgium	46.76	47.47	47.61	47.06
Canada	42.17	42.20	41.63	41.70
France	45.46	45.92	45.30	45.47
Germany	46.28	47.31	46.86	46.32
Greece	46.38	48.24	49.87	47.69
Hungary	49.67	50.23	50.83	48.65
Ireland	41.22	42.50	43.80	44.72
Italy	48.52	50.49	51.29	49.86
Japan	43.99	44.67	45.10	44.40
Luxembourg	44.33	42.54	41.72	41.33
Netherlands	44.80	46.03	45.56	44.58
Norway	41.95	42.36	41.39	40.45
Poland	45.73	47.03	48.57	47.20
Portugal	43.94	45.65	46.45	45.68
Spain	46.23	48.66	50.72	48.57
Sweden	43.56	44.28	44.58	45.33
Switzerland	44.62	45.70	45.20	44.28
Turkey	41.68	43.83	45.41	45.40
United Kingdom	44.69	45.39	44.15	44.10
United States	40.47	39.80	38.96	38.26

Sources: Authors' calculations from United Nations Population Division, *World Population Prospects: The 2000 Revision*; The OECD Economic Outlook – *Source OECD*; *OECD CDROM on Labour Market Statistics Database* (forthcoming in early 2002).

Table 14: The Share of Voters over Breakeven Ages under Alternative Assumptions about Voting Rates by Age and for Selected Years

	Assuming historical voting patterns by age				Assuming equal voting rates at all ages			
	2000	2010	2020	2030	2000	2010	2020	2030
Belgium	46.01	50.37	52.51	58.04	46.41	50.76	52.95	58.51
Canada	54.39	60.92	63.61	65.93	51.28	57.70	60.52	62.96
France	53.76	56.44	62.08	63.96	48.97	51.74	57.35	59.18
Germany	49.96	53.29	59.59	62.93	48.80	52.13	58.42	61.84
Greece	49.36	49.74	51.49	61.32	48.30	48.88	50.76	60.51
Ireland	54.99	53.25	54.86	58.44	49.55	48.49	50.74	53.95
Italy	44.00	46.24	50.99	59.05	44.47	46.88	51.67	59.69
Netherlands	48.09	52.14	57.67	60.92	47.15	51.27	56.74	60.11
Norway	57.00	61.38	66.15	69.33	54.30	58.72	63.37	66.71
Portugal	53.43	52.85	58.11	63.67	48.96	49.44	54.78	60.21
Spain	46.30	45.35	48.58	61.08	45.23	44.72	48.11	60.45
Sweden	55.64	58.30	60.41	63.29	54.76	57.44	59.60	62.64
Switzerland	54.99	60.21	66.75	69.44	51.04	56.25	62.81	66.13
United Kingdom	50.24	54.49	60.66	62.55	49.22	53.43	59.56	61.56
United States	64.38	68.79	71.13	74.67	55.37	59.55	61.92	66.00

Source: Estimated by the authors.