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Global Aging – Capital Market Implications

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Global aging should be positive for the world's capital markets through 2010. The outlook after 2010 may be less sanguine.

Capital market impact

Global aging should have a positive effect on the capital markets between 2001 and 2010 as baby boomers and governments focus on saving for retirement. Financial Assets for the United States, United Kingdom, Japan, Canada, Germany, France, Italy, and Spain should grow from $65 trillion to $144 trillion by 2010, with the strongest growth coming in continental Europe. We project that Germany, France, Italy, and Spain could invest $4.5 trillion or more in domestic and international equities while Japan could invest $2.1 trillion. After 2010 dissavings by governments and retirees could result in high real interest rates and reduced equity returns.

The world's population is aging

Over the next 50 years, the populations of Europe and Japan are projected to decline with the primary decrease in the working age population. In Japan and certain European countries there will be as many individuals over age 65 as workers.

Economic implications

After 2020, GDP growth could slow significantly in Japan and Continental Europe leaving the world more vulnerable to recession. Per capita GDP will continue to grow but will be redistributed from workers to the elderly through increased retirement and health expenditures, leaving countries with rapidly aging populations and PAYG retirement systems at a competitive disadvantage.

There is no single solution

Countries are taking a many-pronged approach: increasing the working population, increasing productivity, decreasing benefits, funding pension plans, and encouraging personal savings.

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Overview and conclusions

Global aging will be positive for the world's capital markets through 2010. After 2010 the outlook for Japan and for many European countries may be less sanguine and dependent upon the steps they take today to tackle the problems associated with the aging of their populations. North America will face fewer challenges because of strong population growth.

Capital market impact

2001-2010. Global aging should have a positive effect on the capital markets between 2001 and 2010 as the baby boomers focus on saving for retirement. Flows into financial assets should continue at least at the rate achieved during the 1995-1999 period. Financial assets for the eight countries analyzed in this report should grow from $65 trillion to $144 trillion with the strongest growth coming from the Continental European retirement market. Barring a significant economic slowdown, large working age populations should enable governments to pay down debt providing ample opportunities for the private sector to raise capital. The exception is Japan, where the number of people in the prime saver category is already declining and government debt is increasing at a rapid rate. We expect the following events:

- Although substantial flows will move into financial assets in the United States, US pension funds will maintain current asset allocations after 10 years of continuously increasing allocations to equities.
- Japanese pension funds and individuals should increase their allocations to equities particularly international equities. We project flows of $2.1 trillion into equities through 2010.
- Pension funds and individuals in continental Europe will increase their commitment to domestic and international equities. We anticipate flows into equities in Germany, France, Italy, and Spain alone could total $4.5 trillion or more.
- UK pension funds will reallocate assets from equities to bonds and from domestic equities to international equities.
- Fixed income markets should benefit from reduced government bond supply and the demand for long dated bonds used to hedge retirement liabilities. However, if, toward the end of the decade, investors anticipate significant increases in government debt they may shy away from the government and corporate bonds of certain countries.
- Investing in non-domestic securities will become increasingly common. Investors will choose companies not countries.

2011-2050: From 2011-2020, the baby boomers will retire in large numbers. Dissavings by governments and individuals could result in high real interest rates and reduced equity returns. Countries (i.e., the United States, Canada and the United Kingdom) with good population growth, low benefit promises, funded pension plans and low government debt will fare better.

Global aging will affect the outlook for individual securities. Corporations dependent on European and Japanese markets will face significant profitability and competitive challenges as the number of consumers declines each year. Higher payroll and corporate taxes will also affect profitability. In our opinion, it is no coincidence that US companies are acquisition targets.

Demographics – the problem

The world's population is aging. Over the next 50 years, the populations of Europe and Japan are expected to decline with the decrease coming from their working age populations. At the same time, the number of elderly will increase dramatically. If labor participation rates do not change, each worker will have to support twice as many elderly people as he or she does today (see Exhibit 1).

Exhibit 1: Elderly support ratio
actual workers/population aged 65 and over

	US	Canada	Japan	UK	Germany	France	Italy	Spain
2000E	4.0	4.1	2.9	3.2	3.0	2.8	2.2	2.6
2015E	3.4	3.2	1.8	2.7	2.3	2.3	1.8	2.2
2050E	2.3	1.8	1.1	1. 7	1.4	1.4	0.9	0.9

Source: US Census Bureau.

The culprits are low fertility rates and increased life expectancies. For example, the US Census Bureau forecasts that by 2050 Japan, Italy, and Spain will have only 60% of the working age population that they have today and that more than 35% of the population will be aged 65 or over.

Economic implications

GDP growth could slow dramatically for countries with shrinking working age populations.[1] Our model of the "pure aging" effect on GDP (holding productivity and labor participation constant), showed that by 2050 US GDP could triple because of high fertility and net migration rates, whereas Japan, Spain, and Italy might see GDP growth of only 30%.

Per capita GDP continues to grow but in rapidly aging countries that rely entirely on PAYG retirement systems, it will be redistributed from workers to the elderly through increased retirement and health expenditures, which some researchers forecast could double as a percentage of GDP in certain countries by 2050.

- Countries with high retirement promises and PAYG systems already pay some of the highest taxes in the world. For example, total government outlays are 51% of GDP in France and 29% in the United States.

[1] This paper addresses the impact of global aging on economic growth. Other factors that could be equally important are beyond the scope of this paper.

- Increased tax rates to pay for the cost of global aging could make countries with unfunded PAYG systems increasingly uncompetitive and further discourage labor force participation.

Savings rates affect productivity growth and gross savings rates may decline after 2010 or 2015 as governments raise debt to pay for retirement and medical expenses and the baby boomers move from their "prime saving years" and liquidate assets to pay for their retirement.

Increased vulnerability to recession. Slower economic growth after 2015, if coupled with high debt levels, would leave the world more vulnerable to recession and with less monetary and fiscal flexibility.

Solutions

There is no single solution ("magic bullet") to supporting the retirement of the "bulge" of baby boomers moving through the population. Those countries that are taking action are using a many-pronged approach:

- **Increase working populations.** Immigration and increased labor force participation help but cannot solve the problem.
- **Increase productivity.** Strong productivity growth is the single most important factor in alleviating the burden of global aging. However, productivity growth is difficult if not impossible to predict and aging countries dare not rely on it.
- **Change the promise.** Although it is politically difficult, countries are changing the minimum retirement age, modifying benefit levels and making it more tax advantageous for the elderly to work. As individuals realize that the benefit reductions already enacted and the future reductions will affect their retirement income, they will increase their savings.
- **Change the funding.** Those countries with healthy funded private pension funds are in a better condition to support their elderly populations than those that rely on unfunded PAYG systems. Some countries are establishing funded pension trusts or using the proceeds of privatizations to establish trust funds for future generations. Others are encouraging personal pension plans or increasing funding ceilings on existing personal pension plans.

Demographics: The problem

The world's population is aging. Over the next 50 years, the populations of Europe and Japan are expected to decline. The working age population will decrease and the number of elderly will increase dramatically. Each worker will have to support twice as many elderly people as he or she does today.

Over the next 50 years, the world's population is projected to increase from 6.1 billion people to more than nine billion (see Exhibit 2).[2] Significant growth is projected in Africa and moderate growth in Asia (albeit from a very high base), North America, and Latin America. **The populations of Europe and Japan will decline** primarily as a result of low fertility rates, which will be partially offset by increased longevity and net migration. While the lesser-developed nations face significant population increases with all the attendant problems, the developed world's share of the total population will shrink.

Exhibit 2: Global populations – the population of the developed world is declining
in millions

	1950	% of World	2000E	% of World	2050E	% of World
World	2,521		6,080		9,104	
Europe	**547**	**22%**	**729**	**12%**	**642**	**7%**
Japan	**84**	**3%**	**127**	**2%**	**101**	**1%**
North America	172	7%	307	5%	446	5%
Subtotals (a)	**803**	**32%**	**1,163**	**19%**	**1,189**	**13%**
Latin America	167	7%	520	9%	757	8%
Asia (ex Japan)	1,318	52%	3,561	59%	5,268	59%
Africa	221	9%	805	13%	1,845	20%
Oceania	13	NM	31	NM	45	NM
Subtotals	**1,719**	**68%**	**4,917**	**81%**	**7,915**	**87%**

(a) United States, Canada, Japan, United Kingdom, France, Germany, Spain, and Italy represent 72% of the world's GDP and 15% of the world's population.

Source: US Census Bureau.

Assumptions: Fertility, life expectancy, and net migration

The three factors that determine a country's population growth rate are fertility rates, life expectancy, and net migration.

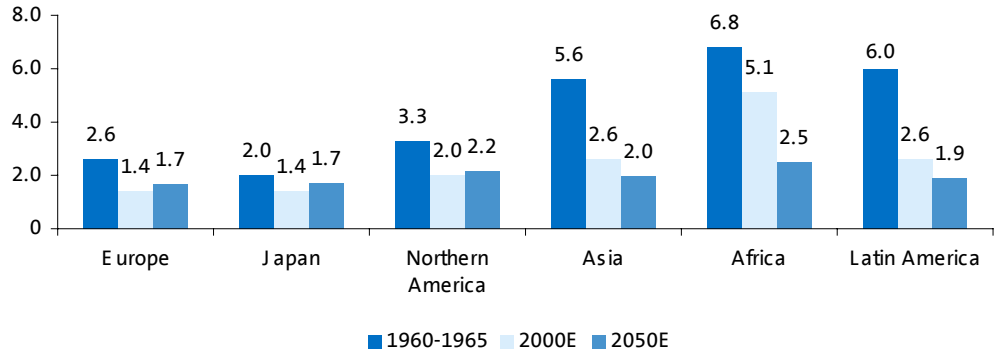
Fertility rates, life expectancies. Typically, a **fertility rate** of 2.1 is necessary to maintain a stable population. [3] Fertility rates have declined throughout the world owing to increased wealth and more readily available forms of birth control (see Exhibit 3). Fertility rates in Europe and Japan are significantly below replacement rates and have

[2] The discussion of demographic trends in this paper is based on projections from the US Census Bureau (May 2000). Appendix I provides a comparison of different databases using Germany and the United States as examples. Appendix II lists the fertility and life expectancy assumptions by country.

[3] The fertility rate is the average number of children born to a woman during her child-bearing years.

been for many years. The US Census Bureau projects that fertility rates in Europe, Japan, and North America will gradually increase from today's levels through 2050.[4]

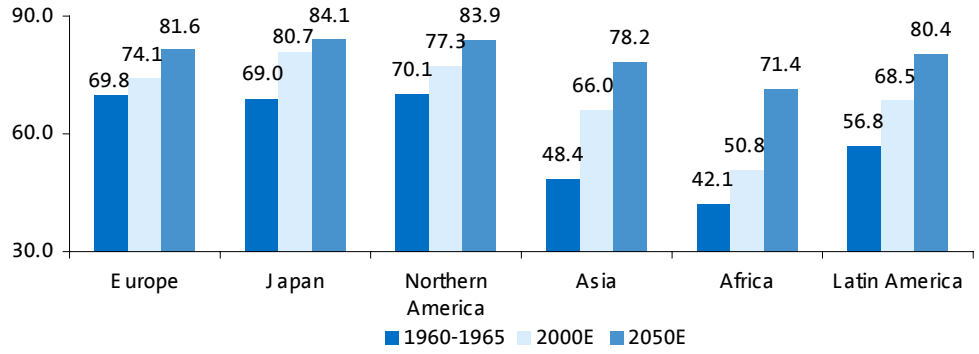
Exhibit 3: Fertility rates by region



Source: United Nations (1960-1965), US Census Bureau (2000E, 2050E).

Many demographers believe that the **life expectancies** forecast by the US Census Bureau, albeit higher than the United Nations' projections, are conservative, i.e., they understate longevity (see Exhibit 4). For example, the US Census Bureau predicts that the average life expectancy of a European born in 2050 will be only one year longer (81.6 years) than a person born in Japan in 2000 (80.7 years). Given modern medical advancements and economic improvement, it would be reasonable to expect European life expectancy to increase more rapidly.

Exhibit 4: Life expectancy at birth by region in years[5]



Source: United Nations (1960-1965) and US Census Bureau (2000, 2050E).

[4] The United Nations agrees on this point.

[5] The low life expectancy for Europe in 2000 (74.1 years) is driven by the demographics in Eastern Europe.

If fertility rates remain stable or decline, or life expectancies rise without a commensurate increase in the number of years worked by the population, the problems that Japan and Europe face from an increased elderly population and a shrinking working age population could be significantly worse than those we are describing (see Appendix II for fertility and life expectancy assumptions).

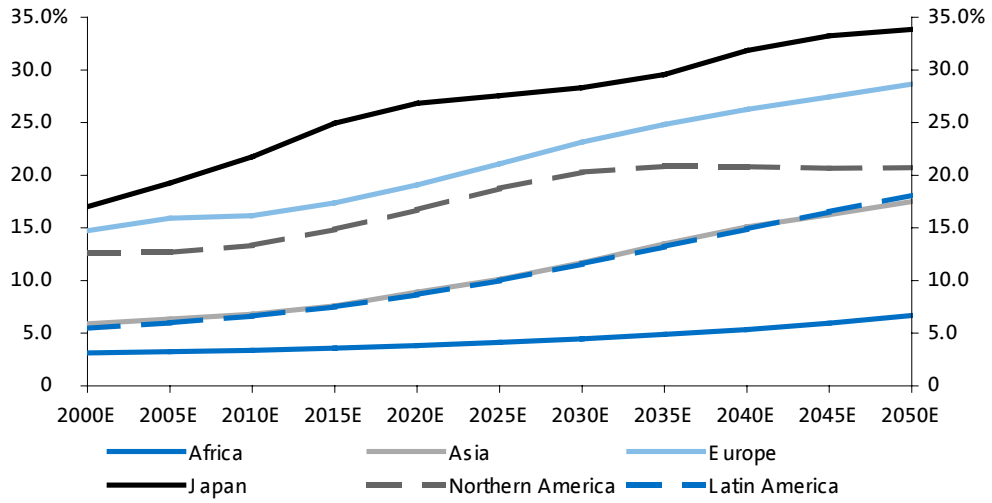
Net migration. Another factor that can affect this equation is net migration. Immigration increases the working age population thereby improving elderly support ratios. Immigration policies are country specific, and both the United Nations and the US Census Bureau extrapolate differently (see Appendix 1 for how these assumptions can vary). The effect net migration can have in solving the problem of global aging is described in the section, Solutions, on page 22.

Global aging acute in Japan and Europe

Given low fertility rates and increases in longevity, the percentage of the population over age 64 will increase throughout the world (see Exhibit 5). The projections by the US Census Bureau assume an increase in fertility rates in North America from 2.0 to 2.2 and in Europe and Japan from 1.4 in 2000 to 1.7 in 2050. All other regions show declining fertility rates (Exhibit 3).

The problem of aging is acute in Japan and Europe. Although Asia and Latin America will see a tripling of the over 60 population it will remain at relatively low levels for the next three decades.

Exhibit 5: Percentage of total population greater than age 64 by region



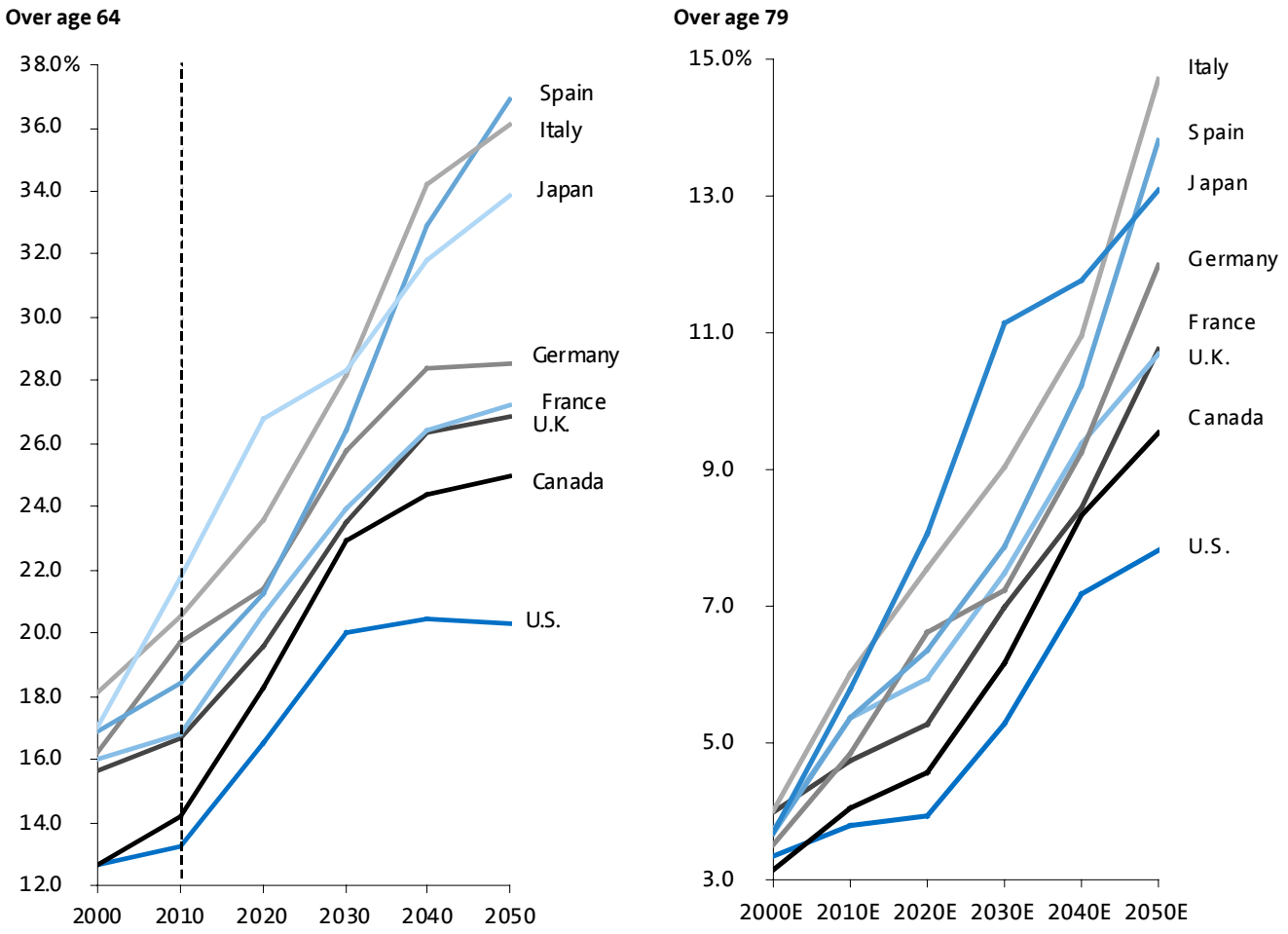
Source: US Census Bureau

Global aging by country

Japan's population is currently aging faster than any other country (see Exhibit 6). The percentage of the Japanese population over age 64 is projected to increase from 17% in 2000, to 22% in 2010, reaching 34% in 2050. **If fertility rates in Japan and Europe remain at the current low level, more than 40% of the population of Japan and certain European countries will be older than 64.** The increases in the over-64 population in North America and most of Europe will be relatively benign until 2010 (dotted line in Exhibit 6), when they will begin to climb steadily. The elderly

population in the US will level off starting in 2030, while elderly populations in such countries as Spain, Italy, and Japan will grow steadily. The percentage of the very old (those older than age 79), in the total population, will increase substantially, which will result in significant increases in healthcare expenditures (see page 15 for further discussion). For example, both Italy and Germany are forecasting that by 2050 the percentage of the population over age 80 will be greater than that under 20. **The United States and, to a lesser extent, Canada, age less rapidly than the other countries because of higher fertility rates.**

Exhibit 6: Global elderly population statistics by country[6]
as a percentage of total population

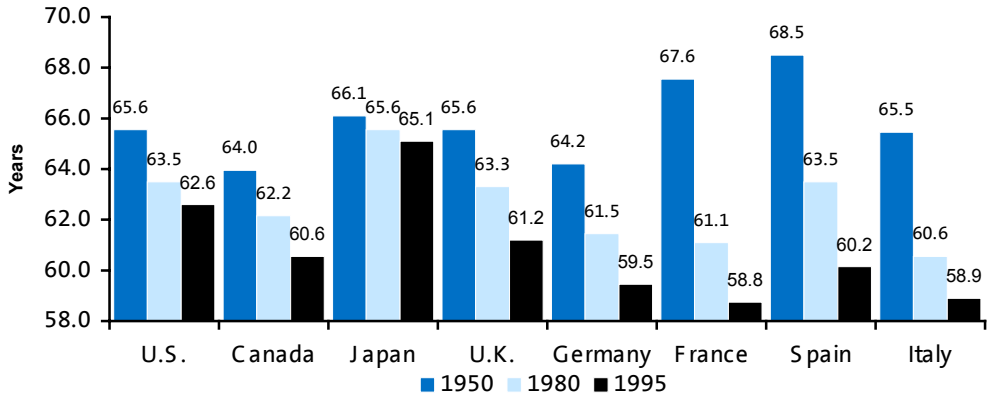


Source: US Census Bureau.

[6] We have chosen to analyze eight countries — the United States, Canada, Japan, United Kingdom, Germany, France, Italy, and Spain — based on their GDP, financial assets and population. In doing so, we have excluded certain countries such as Switzerland and the Netherlands, which have significant financial assets but small populations. These eight countries have 15% of the world's population, 72% of its GDP and, according to InterSec Research, 92% of the world's wealth.

At the same time that the **elderly** population is doubling as a percentage of the total population in many countries, the **working age** population (aged 20-60) is declining dramatically (see Exhibit 8). The 20-60 year-old group was selected because, despite increased longevity, people in the developed world are retiring earlier each year (see Exhibit 7).

Exhibit 7: Average of male and female retirement ages



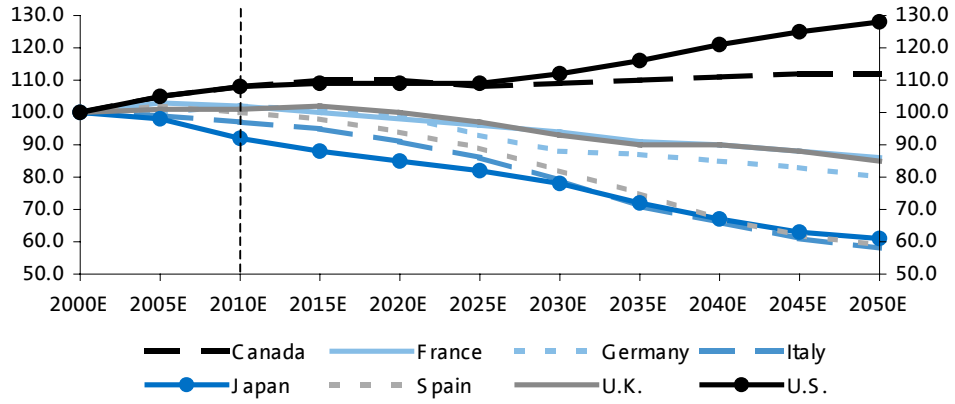
Source: Bl·ndal and Scarpetta 1998.

By 2050 Japan, Italy, and Spain will have only 60% of the working age population they have today. A similar decline will occur in the 20-65 year-old group. The United States and Canada are the exceptions with increasing working age populations.

The next 10 years will provide a window of opportunity for governments to prepare for the increased fiscal burden of the aging population before the working age population (its tax base) shows significant declines (dotted lines in Exhibits 6 and 8).

Japan's window of opportunity is already slipping away.

Exhibit 8: Working age population (aged 20-60)
Indexed 2000=100

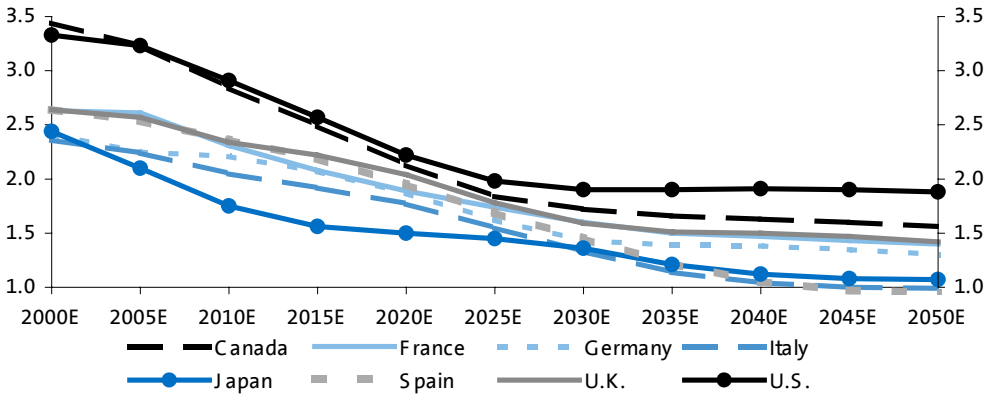


Source: US Census Bureau.

Support Ratios

Because of the demographic changes in the aging and working age populations, the elderly support ratio (the number of working age people divided by those who are 60 or more years old) will decline substantially through 2050 in all the countries in our study (see Exhibit 9). Even if one assumes that everyone works until age 65, the decline is similarly severe as is the decline in the total support ratio (working age divided by those aged 1-19 and those aged 60-plus; see Appendix IV).

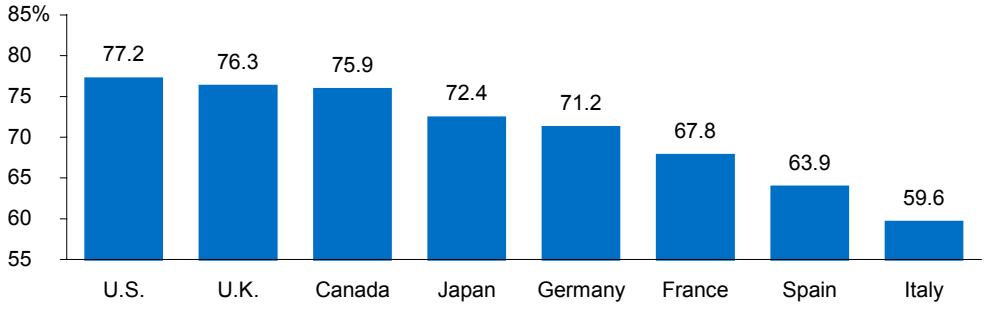
Exhibit 9: The elderly support ratio
working age population: aged 20-59 divided by aged 60-plus



Source: US Census Bureau.

Many working age adults are not employed. The OECD's 1999 data on labor force participation rates for persons aged 15-64 (an expanded definition of working age) show that there was high employment in the United Kingdom, Canada, and the United States (most economists consider 77% in the United States full employment), moderate employment in Japan (because of low female participation) and Germany, and low employment in France, Spain, and Italy (see Exhibit 10).

Exhibit 10: Labor force participation rates (1999)
For ages 15-64

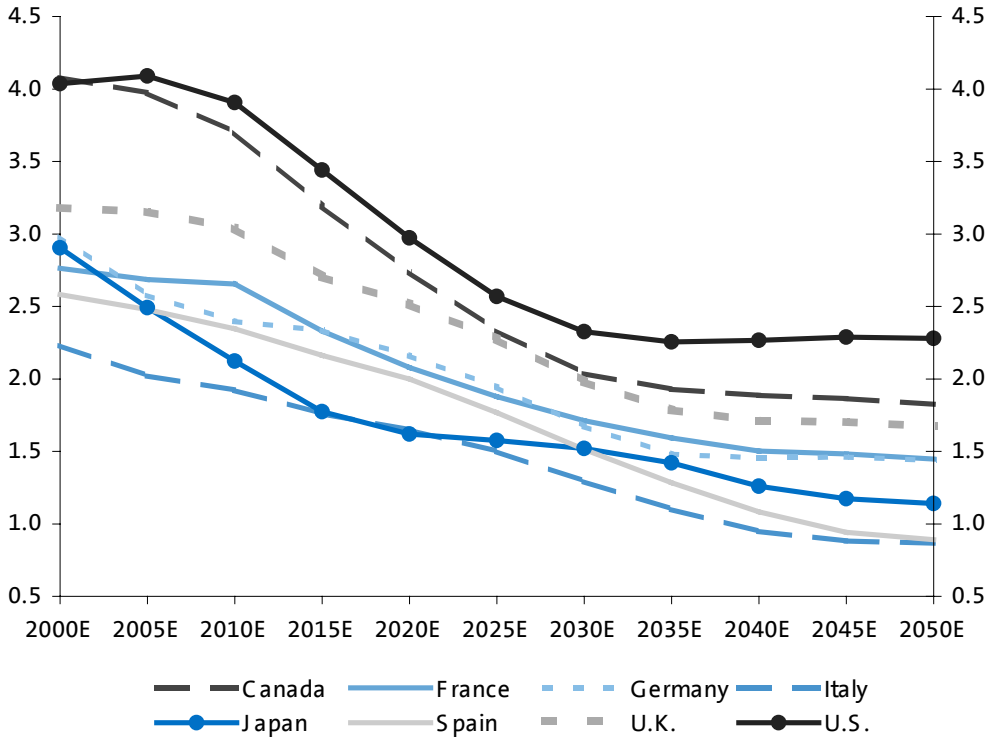


Source: OECD Economic Outlook No. 67, June 2000.

Using current employment rates for the working age population (assuming they remain constant) and multiplying them by the projected 15-64 year-old group, we can create another elderly support ratio that reflects how many workers in each country actually support each person aged 65 and over (see Exhibit 11). For example, in Italy because of low labor participation rates, there are only 2.2 workers for every person aged 65 or over. In 2050, if labor participation rates do not increase, the number of those aged 65 and over will exceed the number of workers.

No matter how support ratios are calculated, they deteriorate significantly.

Exhibit 11: The elderly support ratio
actual workers



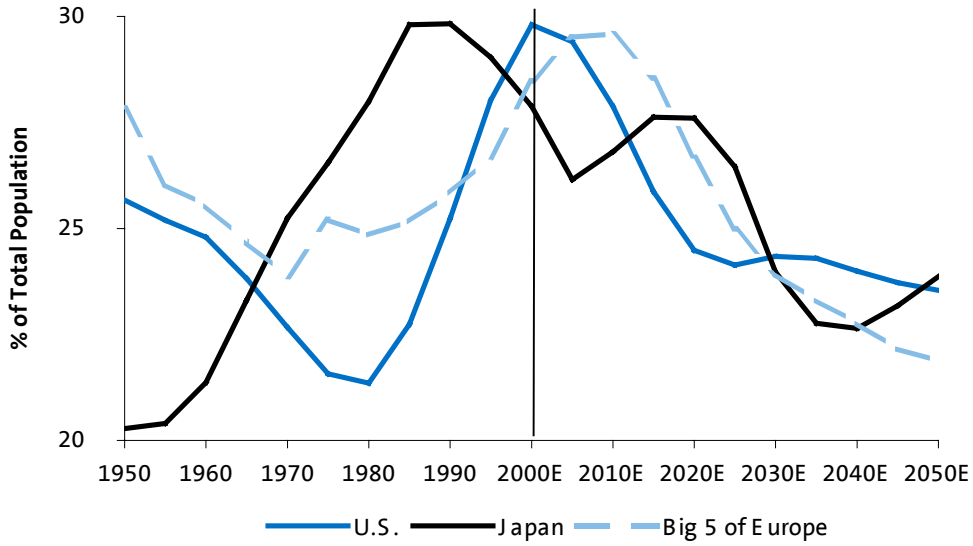
Source: US Census Bureau.

The baby boom

We loosely define the "baby boom" generation as the two generations born after World War II, currently aged 35-55.

The baby boom generation differs by region and is most pronounced in the United States (see Exhibit 12). Exhibit 12 shows the percentage of the population aged 35-55 for every year since 1950. In 2000 the United States had a greater percentage of the population in this age group than it has had in the past 50 years or will have in the next 50 years (line at 2000 in Exhibit 12). This segment of the population peaked in Japan around 1990 and will peak in the Big Five European countries in 2005. The baby boom generation has had a profound effect on the world in many ways and we expect that this will continue as the baby boomers retire.

Exhibit 12: Individuals aged 35-55 as percentage of total population



Note: The "Big 5" includes United Kingdom, France, Germany, Italy, and Spain.

Source: US Census Bureau, United Nations.

Economic implications

The aging of the world's population will have profound worldwide economic consequences. GDP growth will slow as the working age population contracts in many countries. Increases in productivity will be the key to growth.

Although per capita GDP should increase, the gains will be redistributed to non-working members of society through increased retirement and health expenditures. Further economic slowing could occur if high and growing tax burdens discourage labor participation, and reduce competitiveness.

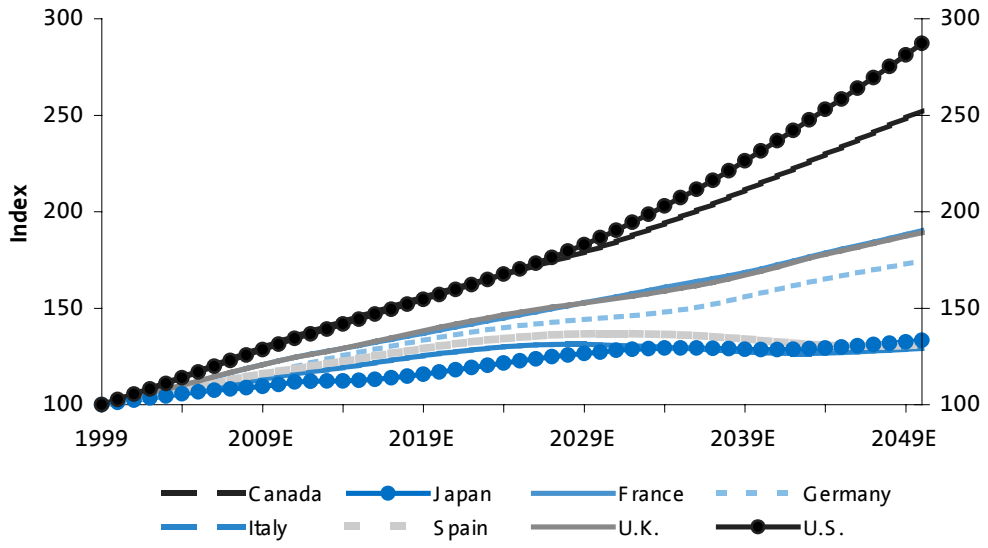
In addition, increased government deficits and the liquidation of financial assets by retiring baby boomers may lower gross savings rates resulting in slower economic growth.

GDP growth slows, the result of declining working age populations

Holding productivity for all countries constant at 1.5%, we calculate that the GDP of Japan, Spain, and Italy will increase only 30% by 2050 as a result of declines in the working age population. On the other hand, the estimated GDP of the United States will almost triple by 2050, because relatively high fertility rates and net migration will increase the working age population (see Exhibit 13).

By 2050, US estimated GDP almost triples; GDP in Japan, Spain and Italy increases 30%.

Exhibit 13: Real GDP, 1.5% per annum productivity growth
1999 = 100



Source: US Census Bureau, GS estimates.

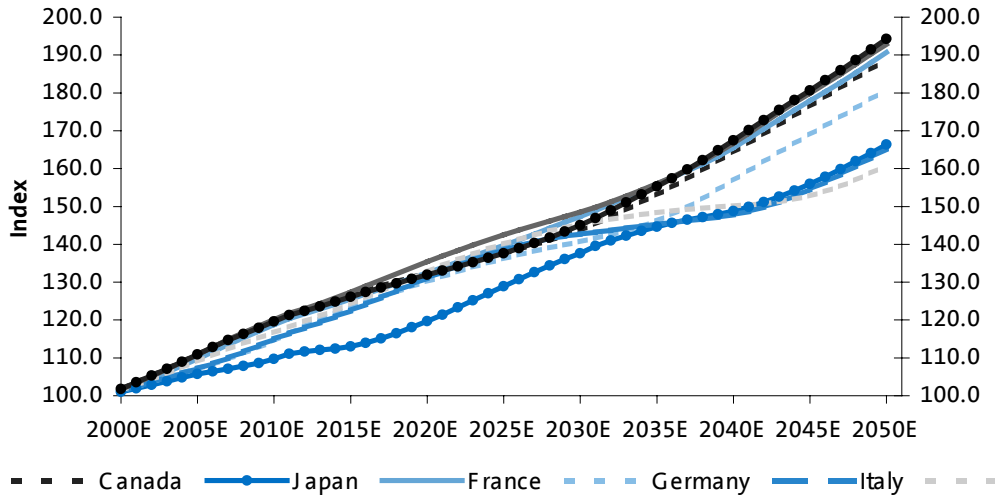
Real GDP in its most simple form is labor hours worked multiplied by productivity. To analyze the "pure aging" effect on GDP growth we assumed constant 1999 labor force participation rates for the group aged 15-64 in each country (Exhibit 10) and 1.5% annual productivity growth — the post 1973 average growth in productivity for the

OECD countries.[7] If all countries have equal productivity growth rates, we will see Europe's and Japan's share of the world's GDP shrink dramatically.[8]

Real per capita GDP will grow, but it will be redistributed to the elderly

Per capita GDP should grow faster if productivity continues to rise, thus increasing average living standards (see Exhibit 14). This is a positive not often mentioned in the global aging debate. The problem, however, is that increases in per capita GDP will need to be reallocated from the wage earners to the elderly.

Exhibit 14: Real per capita GDP
1999 = 100; 1.5% per annum productivity growth



Source: US Census Bureau, GS estimates.

Pay-as-you-go (PAYG) systems can inhibit GDP growth. Many countries rely almost exclusively on government PAYG retirement systems that promise high benefits, while the United States, United Kingdom, and Canada utilize funded pension plans to augment social security. PAYG systems redistribute income from the working age population to the pensioner population through taxes. When the benefits paid replace a high percentage of average earnings, they also create disincentives to save and to work past the normal age of retirement, both of which decrease GDP growth.

The demographic changes previously discussed make many PAYG social security systems financially unsustainable. To meet PAYG system obligations will require significant contributions from the wage-earning population (in the form of tax

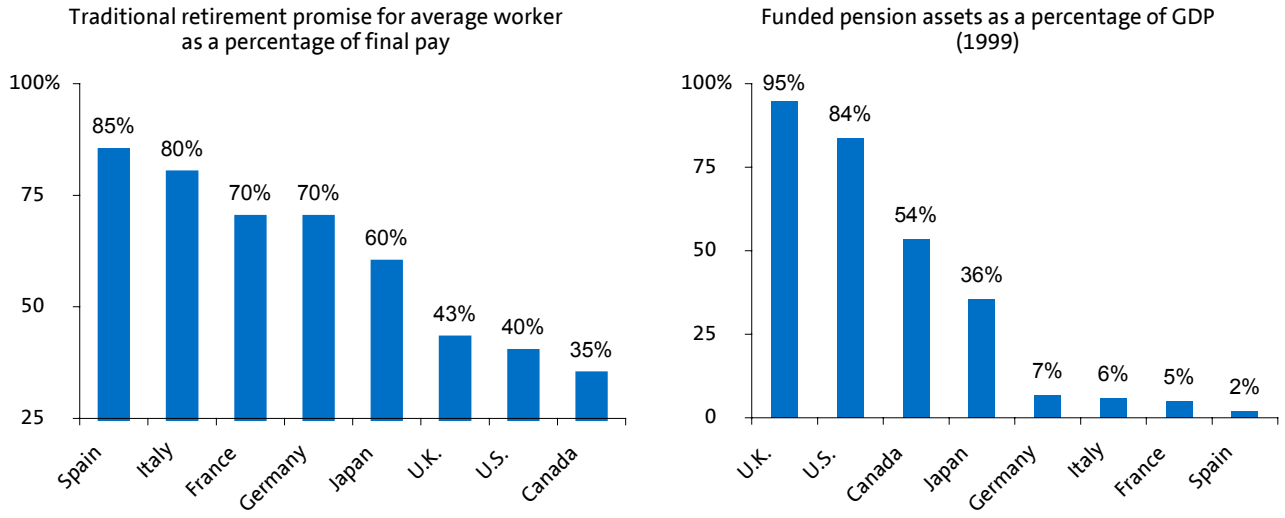
[7] We have assumed the same productivity growth across all the countries we have analyzed. This 1.5% rate is used in most global aging research as a proxy for long-term productivity growth. Recent growth rates have been higher (Exhibit 24).

[8] All studies point to declining GDP growth in rapidly aging countries. For example, Turner et al. (1998) estimated that 2025-2050 annual GDP growth would be 0.5% in Japan, 0.6% in the European Union, and 1.5% for the United States.

increases) or the issuance of large amounts of governmental debt. Private funded pension systems, on the other hand, redistribute income through the purchase of assets by workers and the sale of assets by pensioners. They encourage workers to save thereby increasing capital, which in turn increases productivity and GDP growth.

Exhibit 15 highlights the traditional benefit promises for retired workers in the eight countries we are studying. Recent changes have lowered this targeted benefit in some countries. For example, in the future, the target benefit in France will be 60% rather than 70% and in Germany it will fall from 70% to 64%. The average payment will slip further from the targeted benefit given the long working lives required to qualify. **Although benefits are being reduced, many countries have not yet established funded pension schemes to compensate for these declines.**

Exhibit 15: Retirement promises and pension assets



Source: InterSec Research, OECD.

Quantifying the cost of global aging

Although one might question the assumptions in each one of these studies, all of them paint a similar picture: significantly increased old-age benefits.

Since 1995, the OECD has sponsored three major studies that have attempted to quantify the future cost of the PAYG retirement promise.[9] These studies estimate the cost of aging as a percentage of GDP (see Exhibit 16). The OECD is likely to publish another study in 2001, which will incorporate recent changes in benefit levels and increases in retirement ages. A European Commission November 2000 study incorporates recent significant benefit changes.[10] All these studies rely on data provided by governments, much of it politically sensitive. Each uses different assumptions for labor participation rates, retirement ages, inflation, and fertility rates and other variables. All forecasts, therefore, are only indications of future costs.

[9] Leibfritz et al., 1995. Roseveare et al, 1996. Turner et al, 1998.

[10] Commission of the European Communities, November 2000.

The first section of Exhibit 16 highlights OECD estimates of total governmental outlays for 2000 along with 1997 OECD data (the most recent available data) on public old age cash payments. The OECD defines old age cash payments differently of from Roseveare although both exclude healthcare costs. **Total government outlays range from over half of GDP in France to 29% of GDP in the United States. Old age cash benefits range from 4.4% in Canada to 13.2% in Italy. Given the already high total government outlays as a percentage of GDP, certain European countries have limited flexibility to support increased payments**.

Exhibit 16: Retirement spending as a percentage of GDP

Country	Total Government Outlays 2000E	Cash Public Old Age Benefits (1997)	Basic Old Age Pensions (Roseveare) 2000E	2010E	2050E	European Commission, November 2000 2000E	2050E
Canada	37.8%	4.4%	5.0%	5.3%	8.7%	NA	NA
France	51.2	10.7	9.8	9.7	14.4	12.1%	15.8%
Germany	43.0	10.5	11.5	11.8	17.5	10.3	14.6
Italy	46.7	13.2	12.6	13.2	20.3	14.2	13.9
Japan	38.2	5.5	7.5	9.6	16.5	NA	NA
Spain	38.5	8.6	9.8	10.0	19.1	9.4	17.7
UK	38.4	6.4	4.5	5.2	4.1	5.1	3.9
US[11]	29.3	5.6	4.2	4.5	7.0	4.2	6.8

Source: OECD, December 2000; OECD Social Expenditure Database 2000; Roseveare, et al. 1996; Commission of the European Communities, November 2000.

The United States, Canada, and the United Kingdom, with low governmental outlays, are the least affected by global aging because of faster population growth and low social security promises.

Prior to the November 2000 European Commission study, everything pointed to old age pensions as a percentage of GDP almost doubling (as is the elderly population) over the next 50 years. Although the important studies on global aging are not strictly comparable, they arrived at similar conclusions. Using Japan as an example, the Roseveare study estimated that an additional 7.5 % of Japan's GDP would be applied to basic old age pensions by 2040. Turner estimated another 10% of GDP and McMorrow et al. estimated the Japanese increase at 9% of GDP.[12] The recent European Commission study highlights the dramatic benefit reductions that have occurred over the last five years in France, Germany, and Italy. Instead of old age pensions increasing to 20.3% of GDP by 2050, Italy's pension expense is now estimated to be 13.9%, versus 14.2% in 2000. This is the result of dramatic benefit reductions for future retirees. One might question whether these estimates are realistic. The number of Italians aged 65 and older is projected to at least double by 2050, reaching 35%-40% of the population and 50% of the electorate and yet benefits are scheduled to decline.

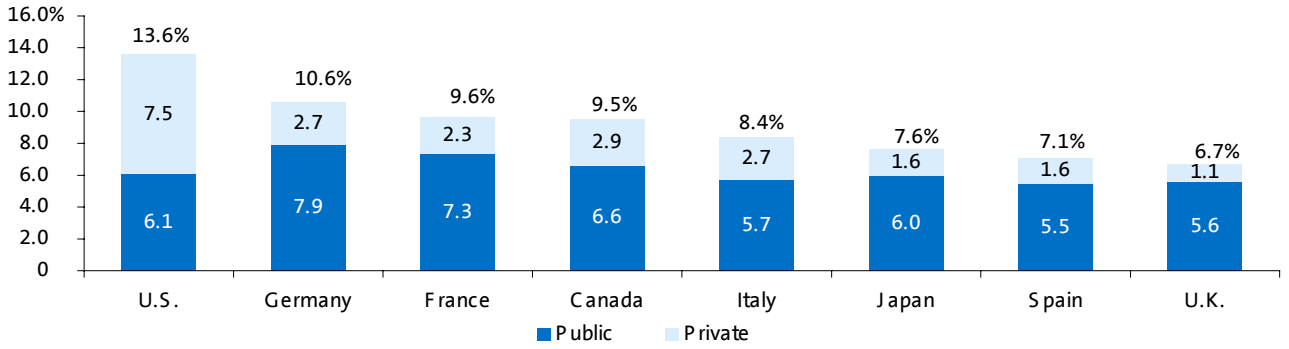
It is important to emphasize that the basic old age pension data above exclude the increased medical and long-term care costs that are associated with elderly populations. **Studies consistently put the cost of healthcare for a person aged 65 and older at three to five times that of a younger person. Increased medical and long-term care costs could add another 3%-5% of GDP or more to the cost of aging.** Although we have noted

[11] Board of Trustees, Federal OASDI Trust Funds, 2000.

[12] McMorrow and Werner, 1999.

that the United States appears relatively well positioned to deal with its aging population, this is not so in the healthcare area (see Exhibit 17). The budget effect of higher healthcare costs in the United States has been contained because a large portion is privately financed. Recent proposals to expand healthcare coverage (for example, funding prescription drugs for the elderly) would increase US government outlays.

Exhibit 17: Healthcare expenditures as a percentage of GDP (1999)



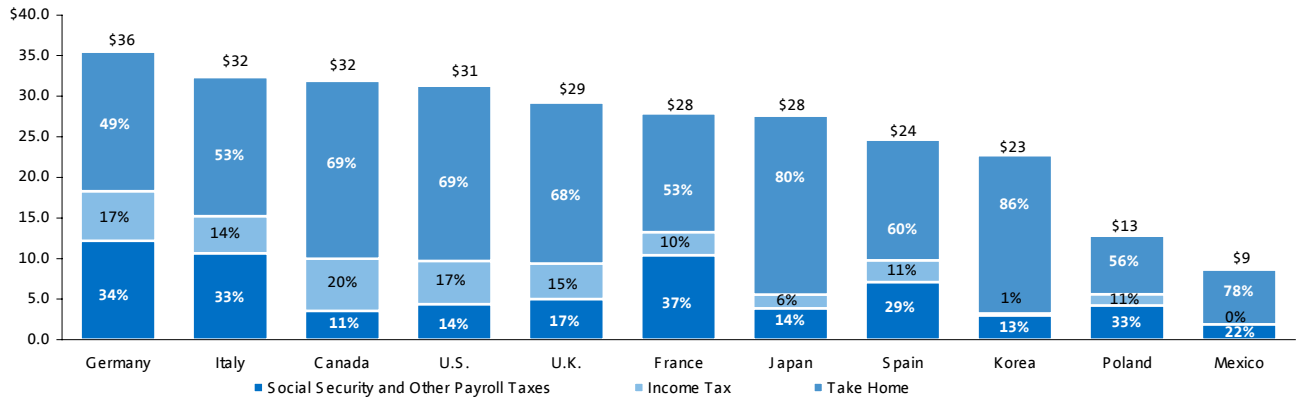
Source: OECD 1999.

Redistribution of GDP to the elderly through higher taxes is problematic

Gross earnings are defined as a worker's pretax wages increased by the amount employers pay for social security and other payroll taxes.

The European countries with PAYG retirement systems already have the highest tax rates in the world. Exhibit 18 looks at the **current** tax burden of an average production worker. In 1998, the average German production worker was four times as expensive ($35,900) as his Mexican counterpart ($8,700) with 51% of his pay going to taxes, excluding VAT. Developed countries are already concerned about the effect of high payroll taxes on the competitiveness of their work force.

Exhibit 18: Gross earnings of average production worker, 1998
thousands of dollars of equal purchasing power



Note: Excludes VAT.

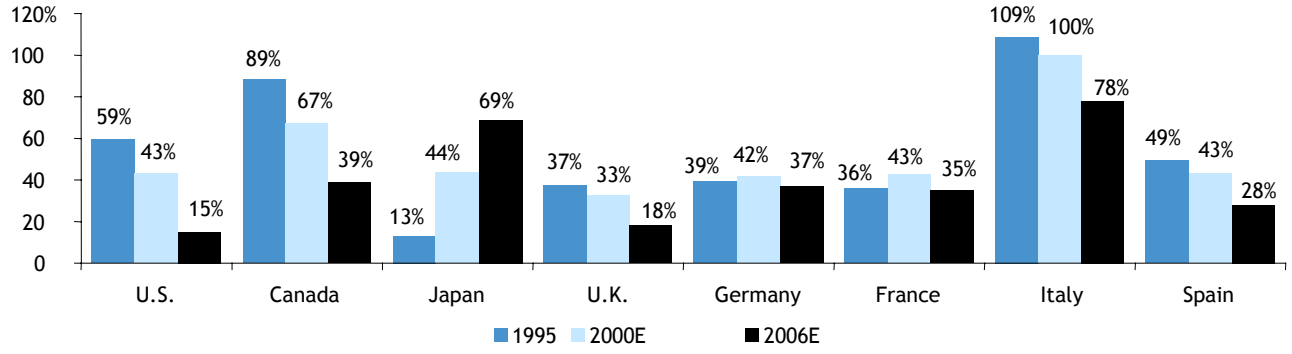
Source: OECD 2000.

The higher taxes required in the future to fund PAYG retirement systems will make workers in countries with rapidly aging populations increasingly uncompetitive. In Germany, for example, social security and other payroll taxes currently absorb 34% of a German worker's gross earnings. **However, the old age pension portion of payroll taxes (19.3%) covers only 76% of current social security expenditures.** If, as German demographers predict, the current support ratio of workers to elderly is halved by 2050, significant increases in payroll taxes would undoubtedly result. This added burden could cause a further diminution in the work force as individuals chose to work less, work in the underground economy, leave the work force completely, or move to countries with lower tax rates. Squeezed by high taxes, individuals may also choose to have fewer children thus worsening the demographics. All of these events would result in lower GDP and per capita GDP growth for the countries with rapidly aging populations. Those countries with fully funded pension plans and lower retirement promises will not need the same level of tax increases. **There are no easy solutions to the cost of supporting an aging population. It means higher taxes, higher government debt, lower benefits or some combination of the three.** An alternative solution, funding retirement schemes today, is discussed starting on page 26.

Without increased taxes government debt could rise to unsustainable levels

If benefits are not reduced further in certain countries, the imposition of increased taxes or issuance of additional debt will be necessary. The first members of the post-World War II generation (the baby boomers) will reach age 60 and start to retire in 2006. Entering the baby boom retirement years, **the United States will have net government financial debt of 15% of GDP** and unless governmental spending levels increase or the economy slows substantially, net government financial debt should decline further (see Exhibit 19).[13]

Exhibit 19: Net government financial debt as a percentage of GDP
1995-2006E



Source: OECD, December 2000.

[13] Net government financial debt measures a country's gross financial liabilities less the amount of government debt that is held by government agencies as investments. For

Japan enters this period with net government financial debt of 69% of GDP, a number that is growing rapidly, and **Italy stands out with 78% net government financial debt to GDP** (Exhibit 19).[14] It is important to remember that given strong economies and demographics, this is the best of times.

Roseveare estimated the effect that future basic pensions payments and increased elderly health costs would have on net government financial liabilities by 2030. **All of the countries analyzed, except Canada, show net government financial liabilities in excess of 100% of GDP, with Germany, Italy, France, and Spain approaching or exceeding 200%.**

According to Roseveare et al., Japan was projected to have net government financial liabilities of 339% of GDP in 2030. Obviously, these levels could never be reached. Taxes or benefits would need to be reduced. In March 2000 Japan did just that, passing a pension reform bill that increased retirement ages, indexed pensions to inflation rather than wages, and increased payroll taxes starting in 2004, doubling by 2020. These reforms will be gradually phased in over the next 20 years. Prior to these reforms the Ministry of Health and Welfare had estimated unfunded Japanese retirement obligations at approximately double GDP.

Saving affects productivity growth

We broadly define the "prime savers" group as individuals aged 40-60 and dissavers as individuals aged 60 and up.

Decreases in personal and governmental savings could limit capital investment and productivity growth, which in turn could further slow GDP.[15] Increased government debt could crowd out private capital needs and the gross amount saved could decline. As baby boomers retire they move from the "prime saver" category to the "dissaver" category, receiving private retirement benefits, and liquidating assets to supplement public retirement programs (see Exhibit 20).[16]

Some studies have noted that dissaving by the elderly is not as large as might be expected. Over the past 10-20 years two factors have been at work. (1) In many European countries and in Japan retirement payments have been so generous that individuals did not need to liquidate savings. This is changing rapidly given the reforms of the past five years, which should reduce future benefits. (2) Stock market gains in countries, such as the United States, have almost kept pace with the liquidation of assets by the elderly.

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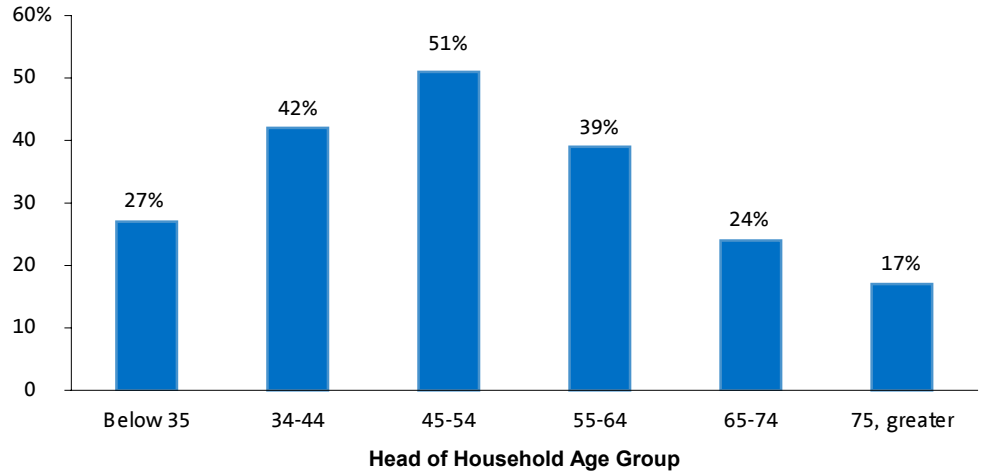
example, the US Treasury securities held in the Social Security Trust Fund are netted against US gross debt. Net government financial debt excludes unfunded retirement obligations.

[14] There are concerns that net government financial debt does not accurately capture debt levels in countries with government-owned assets of questionable value and in these cases gross debt is more appropriate. Japan is a prime example.

[15] How aging affects savings rates is a controversial subject. Although the majority of the research we analyzed points to decreased savings as the elderly population becomes larger, certain studies question this premise citing examples of countries with high retirement benefits where the elderly actually increase savings.

[16] The 1998 Federal Reserve Survey of Consumer Finances describes the effect of aging in the United States. In 1989, 20.4% of the survey respondents gave retirement as the most important reason to save. In 1998 this percentage had increased to 34.7% coinciding with the aging of the baby boom generation.

Exhibit 20: Percentage of families that save by age group



Source: Federal Reserve 2000

There is a 10-year window before the baby boomers retire to put in place reforms that can better position countries to deal with the economic implications of their rapidly aging populations (see Exhibit 21). **By 2015 it will likely be too late to affect the outcome without painful adjustments.**

Exhibit 21: Prime savers (aged 40-59) and dissavers (aged 60+)
as percentage of total population

	1990	2000E	2010E	2020E	2030E	2040E	2050E
U.S.							
Prime savers	21	27	**28**	25	23	23	23
Dissavers	17	17	**19**	23	25	25	26
Japan							
Prime savers	**29**	28	**26**	**28**	27	23	**24**
Dissavers	**17**	23	**29**	**33**	35	39	**40**
The Big 5							
Prime savers	24	26	**29**	**28**	25	24	23
Dissavers	20	22	**24**	**27**	32	34	34

Note: Big 5 consists of the United Kingdom, France, Germany, Italy, and Spain.

Source: US Census Bureau, United Nations.

Economic data – country summary

If fertility rates in Europe and Japan do not increase from 1.4 to 1.7 or if life expectancy is greater than forecast, global aging vital statistics could deteriorate even further than shown here. The United States and Canada are best prepared followed by the United Kingdom (see Exhibit 22; factors that pose challenges are highlighted in blue).

Exhibit 22: Global aging — vital statistics

		% of population 65+	Projected net debt 2006	Public old age payments/ GDP (1997)	Total government outlays/GDP (2000E)	Traditional retirement promise (% of pay)	Average retirement age	Funded retirement assets % of GDP
US	2000E	12.64%	15%	5.6%	29.3%	40%	62.6	84%
	2010E	13.23						
	2030E	20.02						
	2050E	20.30						
Canada	2000E	12.67	39	4.4	37.8	35	60.9	55
	2010E	14.18						
	2030E	22.93						
	2050E	24.95						
Japan	2000E	17.01	69	5.5	38.2	50-60	65.1	35
	2010E	21.76						
	2030E	28.31						
	2050E	33.86						
UK	2000E	15.67	18	6.4	38.4	40	61.2	93
	2010E	16.69						
	2030E	23.50						
	2050E	26.83						
Germany	2000E	16.25	37	10.5	43.0	64-70	59.5	7
	2010E	19.70						
	2030E	25.75						
	2050E	28.55						
France	2000E	16.00	35	10.7	51.2	60-70	58.8	5
	2010E	16.79						
	2030E	23.98						
	2050E	27.25						
Italy	2000E	18.09	78	13.2	46.7	60–80	58.9	6
	2010E	20.55						
	2030E	28.15						
	2050E	36.10						
Spain	2000E	16.91	28	8.6	38.5	80-90	60.2	2
	2010E	18.45						
	2030E	26.40						
	2050E	36.89						

Source: US Census Bureau, OECD, InterSec Research, miscellaneous.

To summarize, over the next 10 years, the aging of the baby boomers, i.e., high working populations and large numbers of prime savers, should be a positive for the world economies, with the possible exception of Japan, which is aging more rapidly. After 2015-2020, the aging of the population could result in slower economic growth, high government debt and expenditures, leaving the world more vulnerable to recession with less monetary and fiscal flexibility. Those countries with rapidly aging populations and unfunded pension systems could be at a competitive disadvantage.

Solutions: Change the numbers, the pie, the promise, the funding

Immigration, increases in labor force participation and, in particular, productivity, reductions in benefit levels, and a move to full funding of retirement plans all offer some relief. However, early implementation of changes is critical. There is a 10-year window of opportunity before the baby boomers retire and the number of workers begins to decline.

Change the numbers: Increase working populations

Immigration can help but not cure the aging problem. Some see immigration as the solution. A report from the United Nations **dispels this proposition.**[17] It demonstrates that attempting to cure the aging problem through net migration would cause enormous societal changes that could create severe political pressures. In its base case for Germany, the 1995 elderly support ratio of 4.41 declines to 2.05 in 2050.[18] **If the German elderly support ratio were to be maintained at 4.41 through immigration, the total number of immigrants in residence by 2050 would have to be 188.5 million.** The report notes that "in 2050 the total population [of Germany] would be 299 million (versus 82 million in 1995), of which 80% would be post 1995 migrants and their descendants." Besides the sheer numbers of people necessary to solve the aging problem, net migration also carries costs: immigrants both pay taxes and receive services.

Increased labor participation will help countries with very low employment but it will not cure the problem. Others have proposed that the key to aging is increased labor participation. To test this hypothesis we modeled real GDP growth given current employment rates (see Exhibit 23, refer to the solid lines). 1999 labor participation rates for the United States (77.2%), Japan (72.4%), Germany (71.2%), and Italy (59.6%) were used.

To model full employment (the dashed line in Exhibit 23), we increased the current rate 1% per year until we reached the 1999 US participation rate (which we believe reflects full employment) and kept it there for the entire period. This is a very aggressive assumption. It also assumes that new entrants are just as productive as current workers and that the official employment rate is accurate. **This very positive case shows significant benefits only for Italy** (shown in Exhibit 23), Spain and to a lesser extent France (not shown in Exhibit 23).

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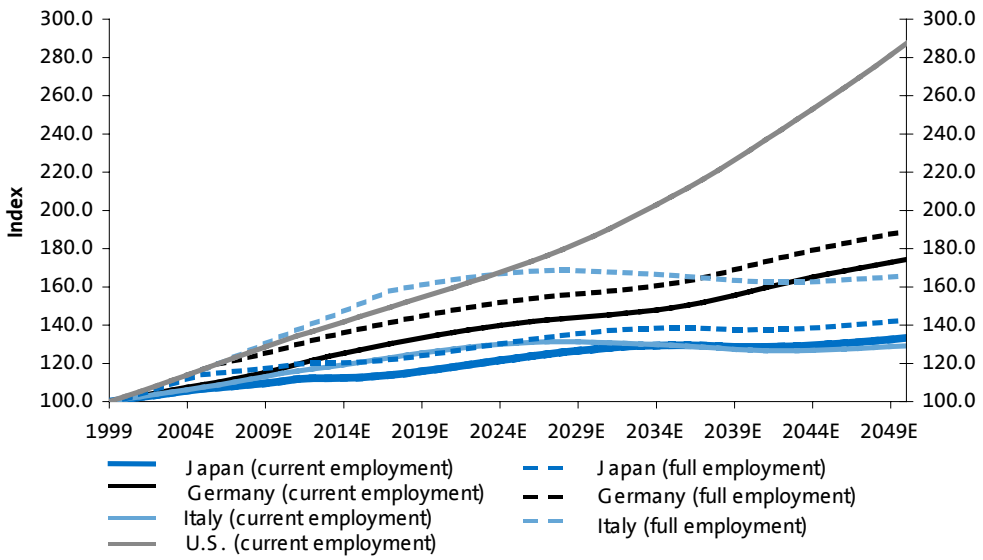
[17] United Nations 2000, *Replacement Migration.*

[18] The median UN forecast for Germany assumes that Germany's population will decline from 81.7 million in 1995 to 73.3 million in 2050 (see Appendix I). This assumes approximately 200,000 immigrants per year from 1995 to 2050. In 2050, 11.4 million of the 73.3 million inhabitants of Germany would be immigrants.

Increased labor participation can make meaningful differences only in countries with very low labor participation rates.

Exhibit 23: Effect of full employment on real GDP growth
1999 = 100



Source: US Census Bureau, GS estimates.

Change the pie: Increased productivity is key to increasing living standards

Strong productivity growth will increase GDP and allow living standards to increase. Over the past two decades increased labor force participation has fueled US GDP growth (see Exhibit 24). Japan and Europe, however, have relied heavily on productivity growth, in part, choosing to invest in machinery rather than labor because of the high cost of providing social benefits to employees. This metric may be changing. In the past four years, US GDP growth has been driven by increased productivity, while productivity is declining in other markets as employment has increased.

There is a tradeoff between productivity growth and employing new inexperienced workers. For example, Spain's unemployment rates have dropped from 22% to 15% over the past five years. Although real GDP grew at a strong 3.69% over the 1996-1999 period almost all came from increased employment, only 0.34% was from productivity growth. This is in contrast to the 1990-1995 period when labor hours declined by 0.86% and productivity grew by 2.58%. When increased employment is proposed as a solution for low employment countries such as Spain, it is important to factor in the trade-off between employment growth and productivity.

Exhibit 24: Real GDP annual compound growth rate – labor hours and productivity

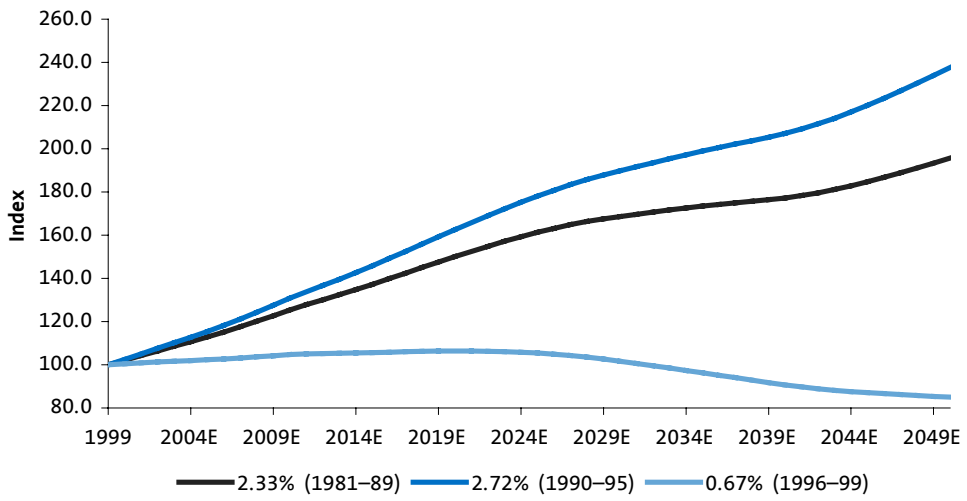
	1981-1989	1990-1995	1996-1999
US			
GDP	3.44	2.41	4.43
Labor hours	2.10	1.41	2.08
Labor productivity	1.31	1.02	2.30
Italy			
GDP	2.36	1.59	1.38
Labor hours	0.04	(1.09)	0.71
Labor productivity	2.33	2.72	0.67
Canada			
GDP	3.25	1.51	3.53
Labor hours	1.81	0.17	2.59
Labor productivity	1.42	1.34	0.92
France			
GDP	2.40	1.30	2.53
Labor hours	(0.95)	(0.94)	0.91
Labor productivity	3.41	2.26	1.61
Germany			
GDP	n.a.	1.62	1.72
Labor hours	n.a.	(0.62)	(0.41)
Labor productivity	n.a.	2.26	2.14
Japan			
GDP	4.09	2.15	1.31
Labor hours	0.95	(0.73)	(0.76)
Labor productivity	3.12	2.89	2.07
Spain			
GDP	**2.70**	**1.67**	**3.69**
Labor hours	**(1.10)**	**(0.86)**	**3.34**
Labor productivity	**3.89**	**2.58**	**0.34**
U.K.			
GDP	3.54	2.37	2.78
Labor hours	0.22	0.60	1.29
Labor productivity	3.37	1.78	1.47

Source: Gust and Marquez, October 2000, "Productivity Developments Abroad."

Productivity growth is the single most important factor in alleviating the burden of global aging. To illustrate the power of productivity growth rates we calculated Italy's real GDP growth by (1) applying current labor participation rates to the changing demographics and then (2) applying the average productivity rate it achieved in the 1980s (2.33%), the first half of the 1990s (2.72%), and from 1996-1999 (0.67%). The outcome shows the power of productivity. Using the strong productivity growth rate of the early 1990s, we calculated that Italy's real GDP would more than double by 2050. However, if the more recent productivity growth of 0.67% were used, 2050 real GDP would be only 84% of the 1999 level. (See Exhibit 25.)

If Italy's recent productivity growth of 0.67% continues through 2050 and its labor force participation rate is not increased, its 2050 GDP would only be 84% of 1999 real GDP.

Exhibit 25: GDP growth in Italy – various productivity growth rates
1999 = 100



Source: Gust and Marquez, October 2000, "Productivity Developments Abroad", GS Estimates.

Change the promise: Reduce benefits; change the retirement age

Another potential solution is to change the benefit levels for the elderly or encourage the elderly to work longer. This has been the most common solution and one that is so complicated that the electorate has not focused on it. The United States and United Kingdom linked retirement benefits to prices rather than wages in the early 1980s. As these changes have rippled through the system, poverty among the elderly has become an issue. Recent changes in Italy, and to a lesser extent in France and Japan, that link full retirement benefits to an increased number of years of worked or to prices rather than wages will materially reduce benefits for those retiring 10-20 years from now. As individuals come to understand these changes they should increase their savings rates. None of these countries has developed sufficient second pillar schemes to compensate for the reduction in benefits from the first pillar. For those countries that have not yet made adequate adjustments it becomes more difficult as the elderly make up a larger and larger share of the electorate.

Most countries have changed or are changing the retirement age. Many of these reforms are being phased in and will not be fully in place until large numbers of baby boomers have already retired. For example, the current retirement age for full social security benefits in the United States is 65. This will be increased to 67 gradually from 2004 to 2027. Italy has increased the male retirement age to 65 and the female retirement age is increasing to 60. Japan is also phasing in increased retirement ages for men and women. Many countries are increasing the female retirement age to match that of men (United Kingdom, Germany, and Japan). Several countries are increasing the number of years of work required to qualify for a full pension (France, Italy, Sweden, Canada, and others) and more closely tying pension benefits to contributions. **Despite these reforms, individuals continue to retire at earlier ages.**

Some countries are modifying benefit levels. Germany is reducing retirement income from 70% of pay today to 64% of pay by 2030. The Japanese Pension Reform law passed in March 2000 indexes benefits to the CPI not earnings. The United Kingdom appears to be in relatively good shape because it dramatically reduced its pension promise by freezing its flat rate benefit in real terms in 1986.

A few countries are making it more tax advantageous to work. For example, the United States has reduced the tax on income earned by those receiving social security benefits. Employees in continental Europe have a strong incentive to retire early (see Exhibit 26). For example, in France, 60% of the labor force aged 55-65 is not employed. Fifty-three percentage of the men have left the work force by age 59, motivated by early retirement social security benefits that replace 91% of after-tax income. The implicit tax on the next year of earnings (take-home pay minus one year of benefits) is 80%. In the United States, by comparison, only 26% of the men have left the work force at age 59. Although one can retire as early as age 62 in the United States, one receives only 41% of after-tax pay and this payment is used to actuarially reduce future earnings. There is no disincentive to work. Nevertheless, even with this balanced policy the average retirement age in the United States is only 62.

Exhibit 26: European countries encourage early retirement

Country	Unused labor capacity aged 55-65 (%)	Men out of the labor force, aged 59	Early retirement age	Replacement rate at early retirement age (%)	Implicit tax on earnings in next year (%)
France	**60**	**53**	**"60"**	**91**	**80**
Italy	59	53	"55"	75	81
Netherlands	58	47	"60"	91	141
United Kingdom	55	38	60	48	75
Germany	48	34	60	62	35
Spain	47	36	60	63	-23
Canada	45	37	60	20	8
United States	**37**	**26**	**62**	**41**	**-1**
Sweden	35	26	60	54	28
Japan	22	13	60	54	47

Source: Gruber and Wise, Eds. 1999.

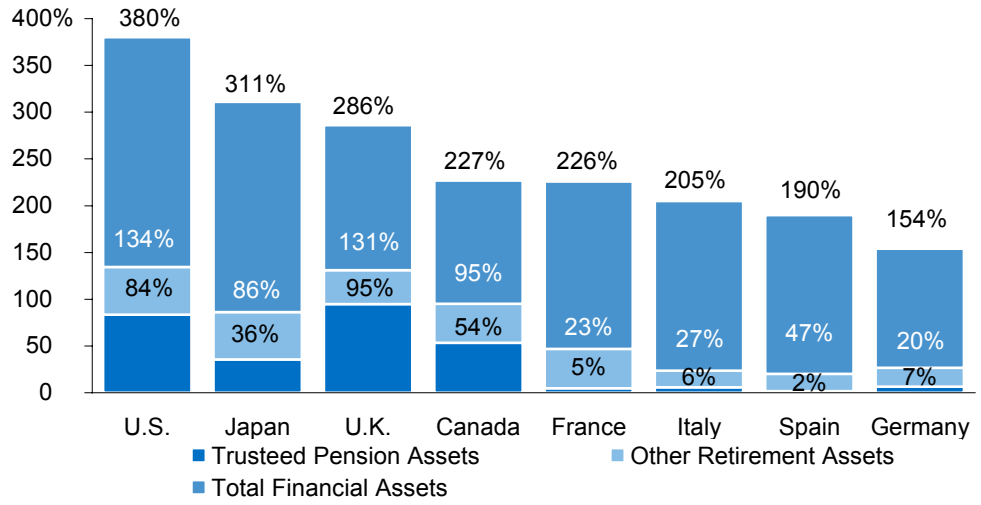
Change funding and fund early: Private and public pension plans and trust funds

Fund private and public pension plans. The countries that face the greatest challenges are those with retirement systems that are entirely pay-as-you-go (PAYG). Countries with funded pension plans are better prepared for global aging. Funded pension systems motivate individuals to work and save to accumulate the capital needed to finance retirement. PAYG systems discourage savings (see Exhibit 27). The United States, United Kingdom, Netherlands, and Canada have laws requiring the funding of private pension plans. All are, on average, fully funded. Japan's private pension systems are not fully funded even with significant tax incentives. German tax policy currently discourages the funding of private pension plans.

Accumulating savings prior to the baby boom retirements, whether in the form of minimized government debt or increased household savings is key to a smooth

transition. The United States, Japan, and the United Kingdom enter the baby boom retirement years with strong household savings. Germany is particularly ill prepared.

Exhibit 27: Household, retirement, and pension assets as a percentage of GDP
1999 estimate



Note: Trusteed pension assets are defined as assets held in pension trusts exclusive of annuities and personal pensions that are included (where possible) in retirement assets. Insurance assets are included in Other Retirement Assets for the United Kingdom, Germany, France, Italy and Spain. Excludes partially funded government sponsored social security trust funds (e.g., the U.S. Social Security Trust Fund) which are invested entirely in government debt[19] Household assets include private equity (except for the United Kingdom) and, in certain countries, assets of not-for-profits.

Source: GS Research estimates, InterSec Research, Federal Reserve, Bank of England, Bank of Japan, Statistics Canada, Banca d'Italia, Deutsche Bundesbank, Banque de France, Banco de España.

Research has shown that where public pension benefits are low, people manage to maintain their standard of living either by saving more prior to retirement or by working longer.[20] If individuals are aware of changes in their future benefits and if countries provide tax incentives for retirement savings, individuals should theoretically increase savings, although the magnitude of that increase is difficult to predict.[21] Many countries are looking at ways to increase private retirement savings; for example, Stakeholder pensions in the United Kingdom and proposed new limits for individual retirement accounts (IRA) and 401(k) plans in the United States. As mentioned before, it is difficult to quantify how much net new savings will result.

Establish trust funds for future generations. The next 10 years could be used to reduce government debt by controlling government expenditures and using the proceeds of

[19] Government debt held by governmental entities as investments have been netted against gross debt to arrive at net government financial debt that we quote throughout this report.

[20] The OECD report, *Maintaining Prosperity in an Aging Society*, (1998), points out the consistency of replacement income in old age regardless of the level of state sponsored old age benefits.

[21] Leibfritz et al., 1995.

privatizations to pay down debt or to establish trust funds for future generations. For example, **Ireland is using the proceeds of privatizations to fund social security. It seems equitable that the workers (future retirees) who built the businesses being privatized should benefit from their sale.**

Funding early is extremely important. The funding required for retirement plans is determined by the age of the employee when funding begins, the normal retirement age, the rate of return on assets versus salary increases, and mortality. A simple rule of thumb is that if funding begins when an employee is age 30, the percentage of pay that would have to be contributed would be less than one-third of that required if funding begins at age 50. A retirement age of 65 in a traditional pension plan would require one-third less funding than a retirement age of 60.[22] Given these rules of thumb, certain industries in Germany and Japan with rich pension benefits, unfunded plans, and early retirement options will be at a significant disadvantage to their worldwide competitors as the baby boom employees begin to retire.

Five bold initiatives: Canada, Sweden, Norway, Ireland, and Germany

In the last three years Canada, Sweden, Norway, Ireland, and Germany have taken bold steps to fund social security or to set up "funds for future generations."

Canada

In 1998, Canada passed legislation that would move the national pension arrangement from a partially funded PAYG system to one that is more fully funded. Even though Canada has a relatively modest social security promise, funded private and public pension plans, and a population that is aging less rapidly than most, it decided that a remedy taken today would be much less painful than one in the future. Canada is increasing its combined employee and employer social security contribution rate from 6.4% in 1998 to 9.9% in 2003 with a goal of funding 20% of its social security obligations. **Assets are expected to grow from $37 billion (C$53 billion) in 1999 to $138 billion (C$200 billion) in 2010**.[23]

Sweden

Sweden started funding its social security system in 1995. Sweden has a flat rate social security system with a supplementary earnings component that targets a replacement rate of 60%-70% of final salary. The PAYG system will continue to be funded with employer and employee contributions of 16% of pay. Employees put an additional 2.5% of pay into a defined contribution plan (the Swedish Private Pension System or PPM). Contributions have been accumulated since 1995 and will be invested by early 2001. Individuals will be able to choose among 450 investment options. **As of year-end 1998 the PPM had $7 billion (€7 billion) of assets. This could grow to $140 billion**

[22] Some point to this suggesting that if everyone were to work until age 70 the global aging crisis would be contained. Given recent history of ever earlier retirement ages, countries should not count on this "bail out."

[23] Exchange rates are as of December 31, 1999.

(€140 billion) by 2010. It is anticipated that younger participants' retirement will eventually be financed entirely through this defined contribution plan.

Norway

Norway is setting aside proceeds from oil revenues for a fund for future generations. **It is estimated that this fund will be $32 billion (285 NOK) at year-end and could grow to $122 billion (1,070 million NOK) by 2004. Although its growth is highly dependent upon oil prices, it could easily double or triple by 2010.**

Ireland

Ireland will use part of the benefits derived from the "Irish miracle" for the benefit of future generations.[24] This new fund will receive 1% of GDP annually plus the proceeds from privatizations and benefits will not be paid out for 15 years. **This $5 billion (€5 billion) fund could grow to $30 billion (€30 billion) by 2010**. This bold step has been taken even though Ireland has high fertility rates, funded private pension plans, and a modest social security promise.

Germany

The German legislature is considering a bill establishing tax-incentive individual pension plans. Although this measure will not cure the ills of the current PAYG system, which is already running significant deficits, it is a courageous start. Under the proposed legislation, employees are to set aside 1% of gross wages in a defined contribution scheme. The amount is to increase in steps of 1% every two years until it reaches 4% of gross wages in 2008. **Savings under this plan are expected to reach $240 billion (€260 billion) of assets in 10 years time.**

[24] Ireland lowered taxes and subsequently experienced the fastest GDP growth of any European country: 7.3% from 1990-1998 and 9.9% from 1996-1999.

Capital market impact

Global aging should have a positive effect on the capital markets between 2000 and 2010 as the baby boomers focus on saving for retirement. Flows into household financial assets should increase at least at the rate achieved during the 1995-1999 period. Financial assets in the eight countries analyzed should grow from $65 trillion to $144 trillion with the strongest growth coming from the Continental European retirement market.

Given good economic conditions and a large working age population, many governments should maintain or reduce debt levels, limiting the "crowding out" of private issuers. The exception is Japan where the number of people in the prime saver category is already declining and government debt is increasing at a rapid rate. Within this benign environment we project the following:

- Although substantial flows will move into financial assets in the United States, US pension funds will maintain current asset allocations after 10 years of continuously increasing allocations to equities.
- Japanese pension funds and individuals should increase their allocations to equities particularly international equities. We project flows of $2.1 trillion into equities through 2010.
- Pension funds and individuals in continental Europe will increase their commitment to domestic and international equities. We anticipate flows into equities in Germany, France, Italy, and Spain alone could total $4.5 trillion or more.
- UK pension funds will continue to reallocate assets from equities to bonds and from domestic to international equities.
- Investing in non-domestic securities will become increasingly common.
- Corporate bond and mortgage markets should benefit from reduced government bond supply and the demand for long dated bonds used to hedge retirement liabilities. However, the longer-dated Japanese and continental European government bonds could be negatively affected if investors anticipate future increases in debt levels.

The outlook for Japanese and continental European capital markets after 2010 is less sanguine. It will depend upon the following:

- How these countries prepare for global aging over the next 10 years;
- Productivity growth and, in certain countries, employment growth; and,
- To a lesser extent, the world's appetite for European and Japanese securities.

Within this context, certain countries and industries will be better able to attract capital than others:

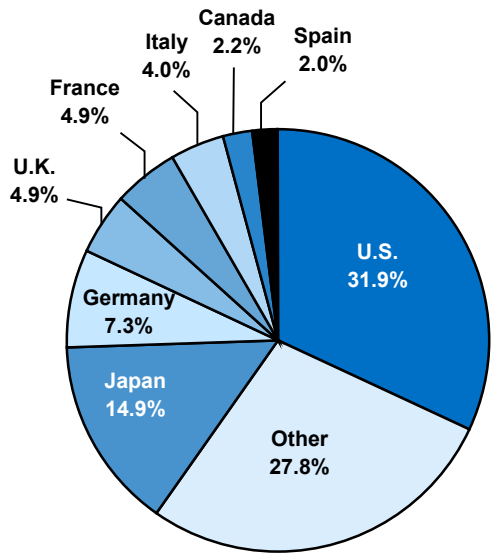
- Countries with high tax rates and low GDP growth will likely find it more difficult to attract investments.

- Countries with good demographics, low pension promises, and funded retirement plans or high household savings should provide good growth environments and attract capital.
- Companies dependent on population growth (consumer non-durables and household formation) in fast aging countries will likely suffer. Companies with unfunded pension plans (primarily those in Japan and Germany) will also likely face significant cash flow challenges.
- Companies involved in healthcare and other products and services for the elderly will grow. However, heightened government scrutiny of costs might inhibit profitability in the healthcare sector.

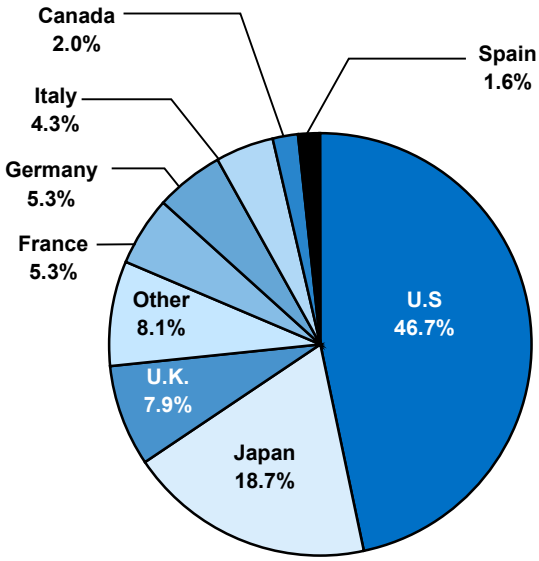
Identifying the assets

Ninety-two percent of the developed world's financial assets and 72% of the world's GDP are held by eight countries (see Exhibit 28).[25] These are the countries that will most influence the financial markets over the next 10 years. We have therefore limited our analysis to them. Those countries that have been previously identified as having funded pension systems hold a disproportionate share of the world's financial assets (see Exhibit 29). This relationship will be examined later in this section.

Exhibit 28: World's 1999 GDP ($29 trillion)



1998 financial assets ($63 trillion)

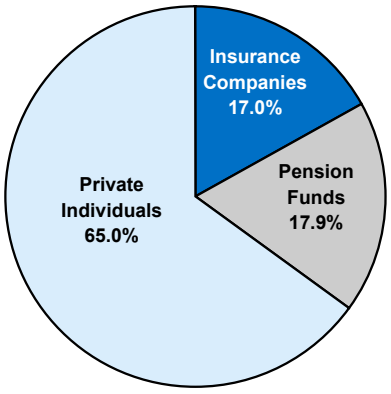


Source: InterSec Research, GS Research estimates.

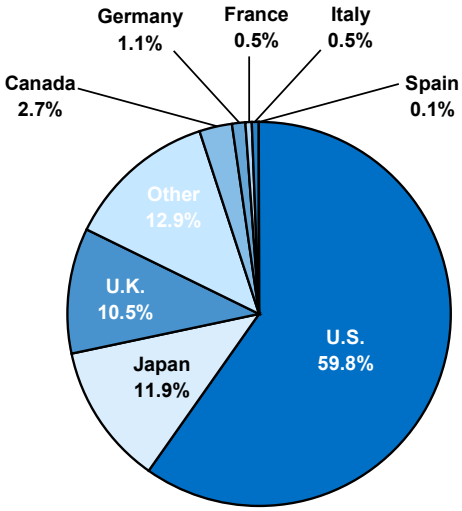
[25] These figures are based on InterSec Research's country-by-country analysis of 29 countries: United States, Canada, Argentina, Brazil, Chile, Mexico, Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, South Africa, Australia, Hong Kong, Japan, Malaysia, New Zealand, Singapore, and Thailand.

InterSec Research estimates the world's financial wealth at year-end 1998 at $63 trillion. Of this, 17.9% is held by pension funds (Exhibit 29). According to InterSec Research, the eight countries in our study held 87% of the world's pension assets in 1999 (Exhibit 29).[26] This helps us to identify those countries that have adequate financial assets set aside for retirement as well those assets that will most likely be liquidated.

Exhibit 29: Owners of financial assets (1998 estimate) $63 trillion



Pension assets (1999 estimate) $13 trillion



Source: InterSec Research.

For those countries without funded pension plans, the government payments to the elderly will result in increased government debt or higher taxes. Higher government bond yields could divert assets from private equities and bonds into government instruments. Upon retirement, individuals receive payments from national social security systems, funded public and private pension plans, and the proceeds from personal pension plans and insurance-related retirement savings vehicles. Although a portion of **individual** assets will certainly be liquidated to pay living expenses in retirement, the amount that may be liquidated is difficult to estimate. On the other hand, it is clear that most **retirement** assets will be liquidated. As governments lower the retirement promise, individuals will more aggressively liquidate savings. **The creation and liquidation of retirement assets and the resulting effect on the capital markets will be closely tied to the course of global aging.**

[26] It is important to note that InterSec Research excludes many retirement asset categories from this definition. For example, pension annuities are included in the insurance category, personal pension plans – such as IRAs in the United States or registered retirement savings plans (RRSPs) in Canada – are included in the individual asset category. In many countries insurance products are used as retirement savings vehicles.

Identifying the flows: 2001-2010E

Global aging should be a positive for the capital markets in most countries (Japan is the exception) over the next 10 or more years as prime savers prepare for retirement. After 2010 the percentage of prime savers in the United States[27] and the "Big Five" of Western Europe flattens out, while the percentage of dissavers continues to grow (see Exhibit 30). Over the next 10 years prime savers will outnumber dissavers (with the exception of Japan). Their increased savings rate should be enhanced by the steps being taken by certain European countries to promote saving for retirement, further increasing flows into the capital markets. Serious pension reform in continental Europe could cause those markets to perform exceedingly well. A growing awareness in Europe that the "social security promise" will change should also promote personal savings.[28]

Since the mid-1980s, the United States has been blessed by the demographics, enjoying a steady increase in the number of prime savers as a percentage of the population, while the number of dissavers (those over 60) has remained essentially flat. This spread of individuals most likely to save versus those most likely to receive cash payments will peak in 2005 and remain quite wide until 2015. This spread has been, and will be, a positive for the capital markets for the next 10-15 years. Even when dissavers outnumber savers after 2020, high fertility rates will result in prime savers continuing to be a large portion of the population. One might question the "prime savers effect" given the recent low level of the US savings rate. Most researchers attribute this low rate to the "wealth effect" (i.e., US household assets doubled from 1990-1999) and full employment, which has increased consumer confidence and consumption. Offsetting low personal savings has been strong government "saving."

The picture for Japan is troubling. It is not surprising given the demographics that the Japanese savings rate has been very high historically. Prime savers have outnumbered dissavers by two to one for a long time. It is also not surprising that the Japanese savings rate has declined in recent years as this spread has decreased. The dominance of savers over dissavers has been reversing over the past five years and by 2050 the percentage of dissavers in the population could easily be twice that of the savers, especially if fertility rates remain flat. This reversal will likely be slowed for a few years because Japanese men stay in the work force longer than men in other countries (Exhibit 7) and upon retirement they often receive large lump sum payments in addition to generous retirement benefits, which are put into savings. Future reductions in government retirement benefits (and possibly reduced lump sum benefits) will result in the need to liquidate assets more quickly. At some point, however, savings rates should decline substantially. This could affect productivity, GDP growth and the capital markets.

Europe has not enjoyed the historically wide spread between prime savers and dissavers seen in the United States and Japan. However, Europeans continue to save at

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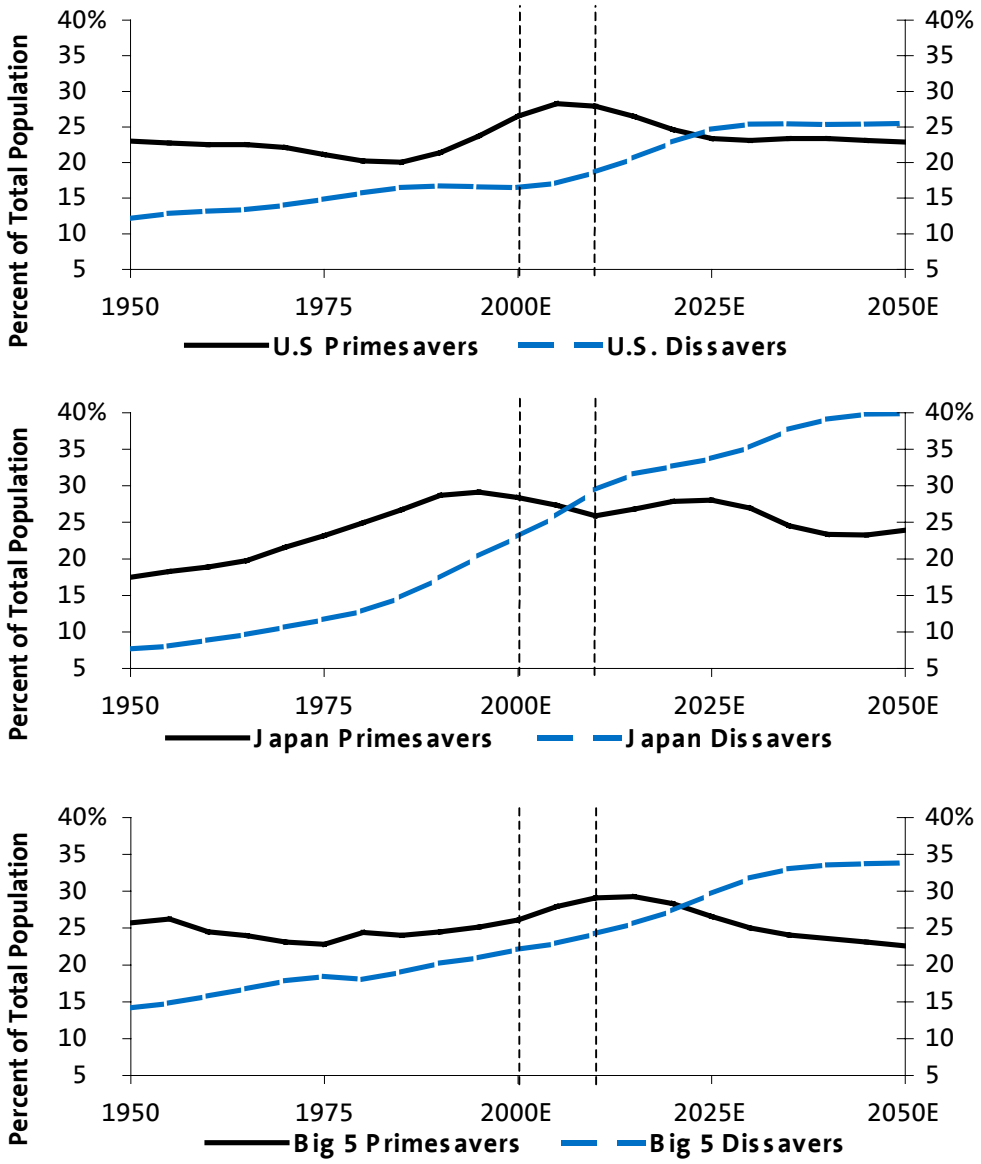
[27] The 1998 Federal Reserve Survey of Consumer Finances found that the percentage of families that saved peaked in the 45-54 age group. The saving rates by age group were as follows: aged 35 or less, 27%; aged 35-44, 42%; aged 45-54, 51%; aged 55-64, 38.5%; aged 65-74, 24%; aged 75 or more, 17%.

[28] Kohl and O'Brien, 1998.

high rates. The elderly population is increasing rapidly and dissavers will overtake savers in about 2020. If European countries continue to establish and fund pension plans and/or to pay down debt over the next 15 years, they will be better prepared to handle the dissaving that will occur after 2015.

If good economic growth continues, Europe and North America should use the 10 years prior to baby boom retirements to reduce government debt. If this occurs, the supply of government bonds should decrease providing a stimulus to the private debt and equity markets. Of most concern is Japan, which is adding debt at a furious pace.

Exhibit 30: Prime savers (40-59) and dissavers (60+)



Note: The "Big 5" includes United Kingdom, France, Germany, Italy, and Spain.

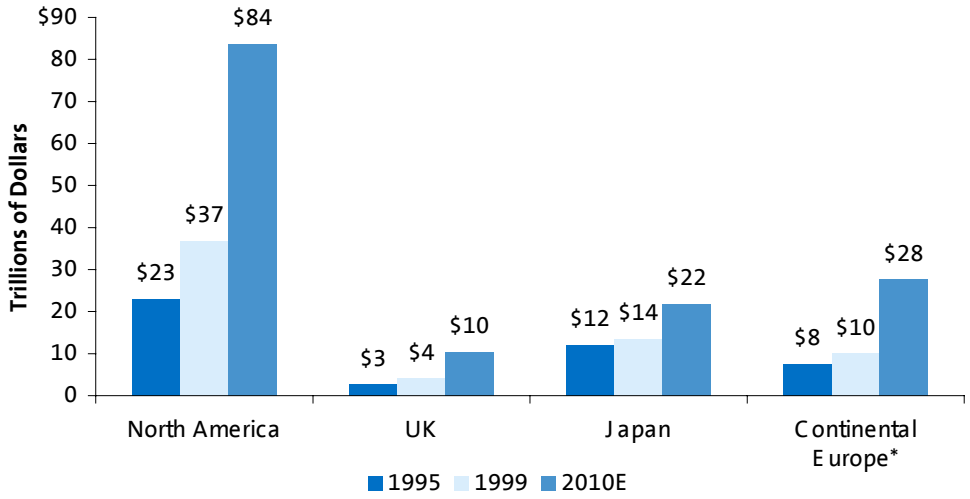
Source: US Census Bureau, United Nations.

Capital market flows and asset projections – 2010E

Growth in household financial assets should be strong for the next 10 years as the baby boomers save for retirement. Financial assets in the eight countries we analyzed are projected to increase from $65 trillion to $144 trillion.[29]

The strongest growth will be in continental Europe where financial assets are projected to almost triple driven by high savings rates and increased equity ownership (see Exhibit 31). The United Kingdom and North America show the next strongest growth followed by Japan. The United States continues to dominate with household financial assets equal to 128% of the other seven countries in 2010.

Exhibit 31: Projected household financial asset growth (1995-2010E)



*Continental Europe includes France, Germany, Italy, and Spain.

Source: Federal Reserve, Bank of England, Statistics Canada, Banco de España, Banca d'Italia, Deutsche Bundesbank, Banque de France, Bank of Japan, and GS Estimates

Over the next 10 years we expect flows into financial assets to at least keep pace with the past five years (see Exhibit 32 and assumptions that follow). There should be greater upside than downside to these forecasts especially in Europe, where future retirement benefits have been, or are anticipated to be, reduced. The two downsides are the "wealth effect" in the United States (Exhibit 27) and the rapid decline in the number of Japanese prime savers in the later part of the decade. Both could reduce savings in those markets.

[29] See page 37 for underlying assumptions.

Exhibit 32: Capital market flows and asset projections
US$ billions

	US	Canada	UK	Japan	Germany	France	Italy	Spain
Flows								
1995-1999 Flows								
Total Household Financials	2,242	149	524	1,709	498	568	516	270
Retirement	1,116	58	317	415	71	354	149	69
Other Household	1,126	91	207	1,294	426	214	366	201
2000-2010E Flows								
Total Household Financials	5,566	361	1,295	4,103	1,109	1,254	1,139	594
Retirement	2,944	149	826	1,200	599	825	352	268
Other Household	2,621	211	469	2,903	509	429	786	326
1995-1999								
Average Flows as % of Average Assets	**1.6%**	**2.2%**	**3.0%**	**3.0%**	**3.2%**	**4.1%**	**4.6%**	**5.7%**
Average Retirement Flows as % of Retirement Assets	**2.3%**	**1.7%**	**4.1%**	**6.2%**	**7.5%**	**11.7%**	**11.9%**	**13.6%**
1999 Flows as % of GDP	6.0%	3.2%	7.5%	7.5%	6.3%	8.2%	9.3%	9.1%
Assets								
1995								
Total Financial	21,778	1,264	2,642	11,995	2,784	2,222	1,950	730
Retirement	7,101	596	1,137	1,218	182	468	200	74
Other Household	14,677	668	1,505	10,777	2,601	1,754	1,750	657
1999								
Total Financial	35,343	1,464	4,130	13,527	3,258	3,253	2,408	1,133
Retirement	12,472	797	1,840	1,542	183	677	288	121
Other Household	22,871	667	2,290	11,985	3,075	2,576	2,120	1,012
2010E								
Total Financial	80,476	3,318	10,360	21,750	8,516	9,128	6,804	3,207
Retirement	29,936	1,663	5,019	3,522	950	2,482	1,052	569
Other Household	50,540	1,655	5,341	18,229	7,567	6,646	5,751	2,637
CAGR 95-99								
Total Financial	**12.9%**	**3.8%**	**11.8%**	**3.1%**	**4.0%**	**10.0%**	**5.4%**	**11.6%**
Retirement	**15.1%**	**7.6%**	**12.8%**	**6.1%**	**0.1%**	**9.7%**	**9.5%**	**13.1%**
Other Household	11.7%	0.0%	11.1%	2.7%	4.3%	10.1%	4.9%	11.4%
CAGR 1999-2010E								
Total Financial	**7.8%**	**7.7%**	**8.7%**	**4.4%**	**9.1%**	**9.8%**	**9.9%**	**9.9%**
Retirement	**8.3%**	**6.9%**	**9.6%**	**7.8%**	**16.1%**	**12.5%**	**12.5%**	**15.1%**
Other Household	7.5%	8.6%	8.0%	3.9%	8.5%	9.0%	9.5%	9.1%
Equity Impact								
Household flows into public equities 2000-2010E (in billions)								
	239	**(16)**	**221**	**2,126**	**1,628**	**1,386**	**949**	**576**
Percentage in equities "looking through mutual fund, pension and insurance assets" (excludes private equity)								
1999	**56%**	**36%**	**53%**	**18%**	**22%**	**19%**	**21%**	**22%**
2010E	**56%**	**40%**	**51%**	**28%**	**47%**	**39%**	**38%**	**42%**

Sources: GS Estimates and GS Research estimates, Federal Reserve, Statistics Canada, Bank of England, Bank of Japan, Deutsche Bundesbank, Banque de France, Banca d'Italia, Banco de España.

Assumptions

- In the United Kingdom, France, Italy, and Spain, insurance assets have been included in retirement assets.
- Total Flows in 2000 are assumed to be the average of the five years ending in 1999 and increased by 2% each year (Retirement Flows 3%), except in Japan where flows have been held constant due to deflation and Retirement Flows increase by 3%.
- Total Household and Retirement assets in 2000 have been adjusted to reflect estimated local market returns and asset mix. In markets where data on private equity are available, private equity flows are assumed to grow at 2% per annum from 2000-2010, and the per annum return on private equity assets is assumed to be 5%.
- Long-term investment returns on assets are assumed to be 9%, 6% and 5% for equities, bonds and cash, respectively. Lower returns (5.5%. 2.5% and 1.5%) have been assumed in Japan.
- Projections for asset growth of the CPP and QPP from 2000-2010 were supplied by the Canadian government.
- United States, Canada, Spain, and Italy include not-for-profits; United Kingdom, France, Germany and Japan exclude not-for-profits.
- Local currencies from 1999-2010 have been converted to US dollars at 1999 exchange rates.

The United States still dominates but Europe should grow at a faster rate. Flows into financial assets have been and should continue to be very strong in Europe. Flows ranged from 6.3% of GDP in 1999 in Germany to 9.3% in Italy. These flows combined with increases in equity allocations (bottom of Exhibit 32) over the next 10 years will result in very strong asset growth in Germany (9.1%), France (9.8%), Italy (9.9%), and Spain (9.9%). This compares with 7.8% in the United States, 7.7% in Canada and 8.7% in the United Kingdom.[30] The projected equity increases are phased in ratably over the next 10 years and reflect projected increases in direct equity ownership as well as indirect ownership through mutual funds, pension funds, and insurance products. Despite higher equity allocations throughout the period, the United States, United Kingdom, and Canada show slower growth because of lower forecasted flows. The Japanese returns are lower reflecting lower rates (we have not adjusted for exchange rate differentials).

Over the past five years the retirement market has outpaced other savings in every country with the exception of Germany and France, which are two countries with minimal pension reform to date. Going forward, we anticipate that retirement asset growth will easily outpace the growth in other household assets**. We are forecasting retirement asset growth of 16% per annum in Germany, 15% growth in Spain and 12.5% in France and Italy.[31]** In addition to the countries analyzed in Exhibit 32, other countries in Europe, such as Sweden, Norway, and Ireland, have passed legislation that should result in the addition of significant new pension assets. In addition, if France, Italy, or Spain pass major pension reform, these forecasts could increase substantially.

[30] For the assumptions underlying the increases in equity ownership see Ramsden et al., November 24, 2000.

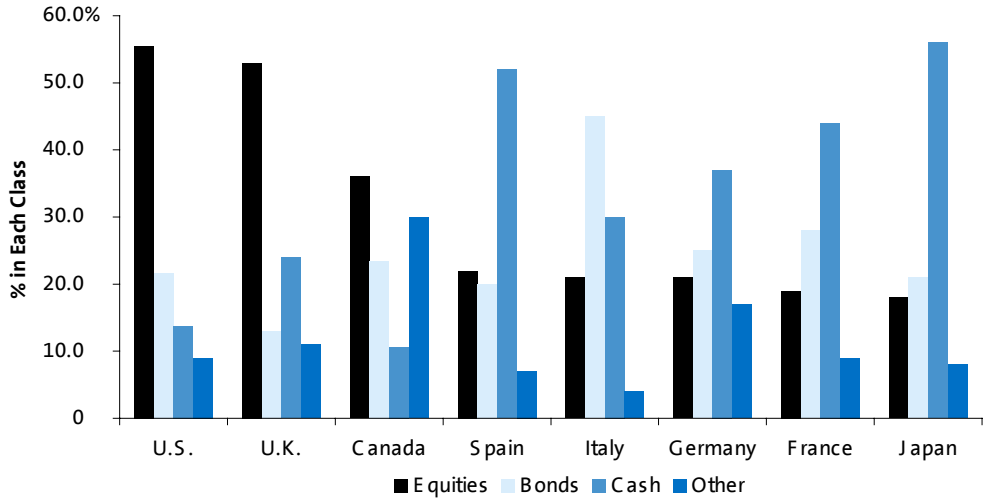
[31] Retirement assets in Spain, France, and Italy include insurance products.

Asset allocation: 2000-2010E

Equity ownership varies significantly among countries. High equity ownership in retirement funds seems to coincide with high **individual** equity ownership. With a more than 50% share of household savings in equities, the United States[32] and the United Kingdom have developed an "equity" culture, while continental Europe and Japan are more risk averse.

Exhibit 33 graphs the percentage of household financial savings (defined as household financial assets excluding private equity where possible) invested in public equities and other asset classes. This asset allocation analysis looks through pension funds and insurance companies to their underlying assets.

Exhibit 33: Asset allocation – a look through pension, insurance, and mutual fund assets
1999



Source: Federal Reserve, Bank of England, Statistics Canada, Banco de España, Banca d'Italia, Deutsche Bundesbank, Banque de France, Bank of Japan, and GS Estimates.

Investment restrictions have also played an important role in limiting equity allocations in funded pension plans. However, these restrictions are being liberalized (see Exhibit 34, for investment restrictions in 1995 and 2000). For example, Japan removed its last restriction on pension fund asset allocation in 2000. The European Community is proposing the lifting of all investment restrictions and the imposition of the prudent man rule. This change has been delayed for at least another two years because of opposition from certain countries. Nevertheless, the trend to fewer restrictions is irreversible.

[32] The 1998 Federal Reserve Survey of Consumer Finances estimates that stock holdings in all forms comprised 53.9% of US family financial assets, up from 27.8% in 1989.

Exhibit 34: Retirement plans asset allocation restrictions

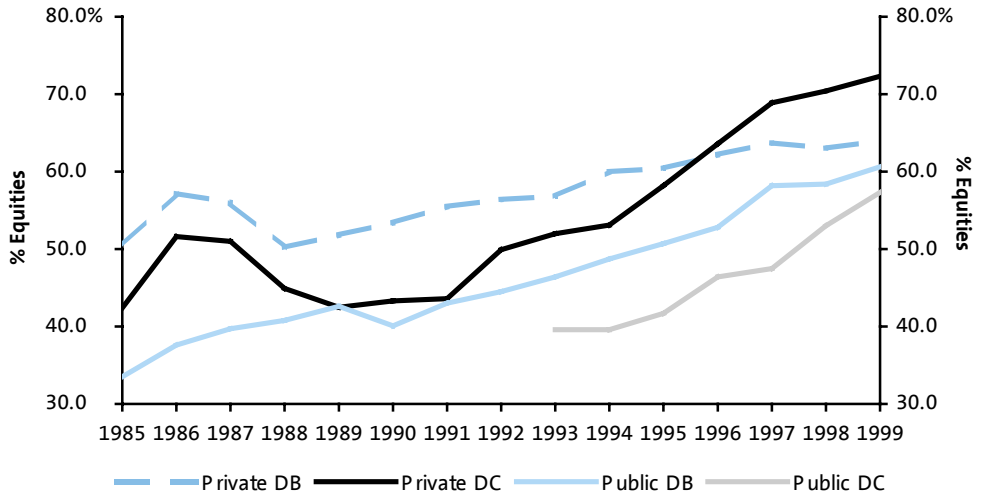
	1995	2000
United States	**None**	**None**
Canada	**<20%** Foreign Securities	**<30%** Foreign Securities
United Kingdom	**None**	**None**
Japan	<30% Equities <30% Foreign Securities >50% Principal Guarantee	**None**
France	≤20% or 25% Domestic Equities ≤20% or 25% Foreign Equities ≤20% or 25% Foreign Bonds	≤20% or 25% Domestic Equities ≤20% or 25% Foreign Equities ≤20% or 25% Foreign Bonds
Germany (Pensionkassen)	<5% Foreign Securities <30% Equities	<5% Foreign Securities <30% Equities
Italy	**None**	<90% Italian Government Bonds
Spain	>90% in Equities, Bonds and deposits <15% deposits	>90% in Equities, Bonds and deposits <15% deposits

Source: Greenwich Associates, InterSec Research, European Federation for Retirement Provision, Davis 1997, GS estimates.

We believe that public equity allocations in pension funds have peaked (as a percentage of the total not in absolute terms) in the United Kingdom and are near peak in the United States (see Exhibit 35). Although some marginal increases may occur, primarily in international equities, the majority of the reallocation to public equity is complete.

Note the dramatic increase in equity allocations that has occurred over the past 15 years in the United States.

Exhibit 35: US pension plan allocation to equities



Note: Excludes Private Equity and Real Estate.

Source: Greenwich Associates.

This does not mean that US pension funds will liquidate equities over the 2000-2010 time period. Defined contribution plans and IRAs will continue to provide strong cash flows to all asset classes. Higher 401(k) and IRA contribution ceilings will only add to these flows. Although private defined benefit plans have been net liquidators of assets, particularly equities, for a number of years, they will likely continue to rebalance, purchasing equities after stock market declines. Given the recent decline in equity prices private defined benefit plans in the United States should put new cash into the equities in 2001.

In the United Kingdom, where equity allocations have historically been greater than 70%, assets are already moving into fixed income and we expect this trend to continue. This is a direct result of regulatory (MFR) and accounting changes (FRS 17) adopted in the past few years. The Minimum Funding Requirement (MFR) requires corporations to keep their defined benefit plans 100% funded. This requirement makes equities risky and long bonds that move in tandem with liabilities "safe." FRS 17 requires that assets and liabilities be marked to market each year. This can result in balance sheet and earnings volatility. Although similar to SFAS 87 in the United States, this accounting rule does not include the SFAS 87 smoothing methods. Therefore, long dated bonds, both fixed and index linked, whose market values move in tandem with liabilities, have become increasingly popular investments.

Barring a prolonged stock market downturn, we anticipate increased public and private equity investments in continental Europe and Japan by both individuals and funded pension plans (see Exhibit 36). Liberalized investment restrictions that have been adopted to date, and those that will be put in place over the next 10 years, will play a role. In addition, as defined contribution schemes, personal pension plans, and mutual funds proliferate, the education provided about the value of security ownership should increase equity allocations. Privatizations, the increase in the number of mutual funds, and the related advertising should also stimulate equity ownership.

High quality long bonds should benefit, as individuals increase their investments in retirement products, for example annuities, and as private and public defined benefit pension schemes proliferate and/or increase funding. New accounting and regulatory rules require that the present value of liabilities of defined benefit plans be adjusted for changes in interest rates. These pension liabilities can be hedged by bonds of a similar duration. Likewise, retirement plans with benefits linked to inflation will seek to hedge liabilities with long dated inflation-linked bonds. This will create increased interest in long dated bonds and this interest will coincide with reductions in government debt during the 2000-2010 time frame. This should continue to provide a good environment for long dated government bonds and high quality long dated corporate bonds.

Exhibit 36: Outlook for equity and bond flows
Percentage allocated in 1999, direction in the future

	Pension plans asset allocation (%)				Individuals'
	Domestic equities	International equities	Domestic bonds	International bonds	total equities[33]
United States	53 (—)	11 (↑)	27 (—)	2 (↑)	56 (—)
Canada	31 (↓)	23 (↑)	33 (↓)	3 (—)	36 (↑)
United Kingdom	49 (↓)	24 (↑)	16 (↑)	3 (↑)	51 (—)
Japan	25 (—)	15 (↑)	45 (↓)	6 (↑)	18 (↑)
France	10 (↑)	2 (↑)	48 (↓)	6 (↑)	19 (↑)
Germany	19 (↑)	6 (↑)	59 (↓)	3 (↑)	22 (↑)
Italy	4 (↑)	0 (↑)	38 (↓)	2 (↑)	21 (↑)
Spain	17 (↑)	9 (↑)	45 (↓)	11 (↑)	22 (↑)

Source: Greenwich Associates, InterSec Research, GS estimates.

International investing

We anticipate that pension funds in all countries will increase their allocation to international securities for the following reasons:

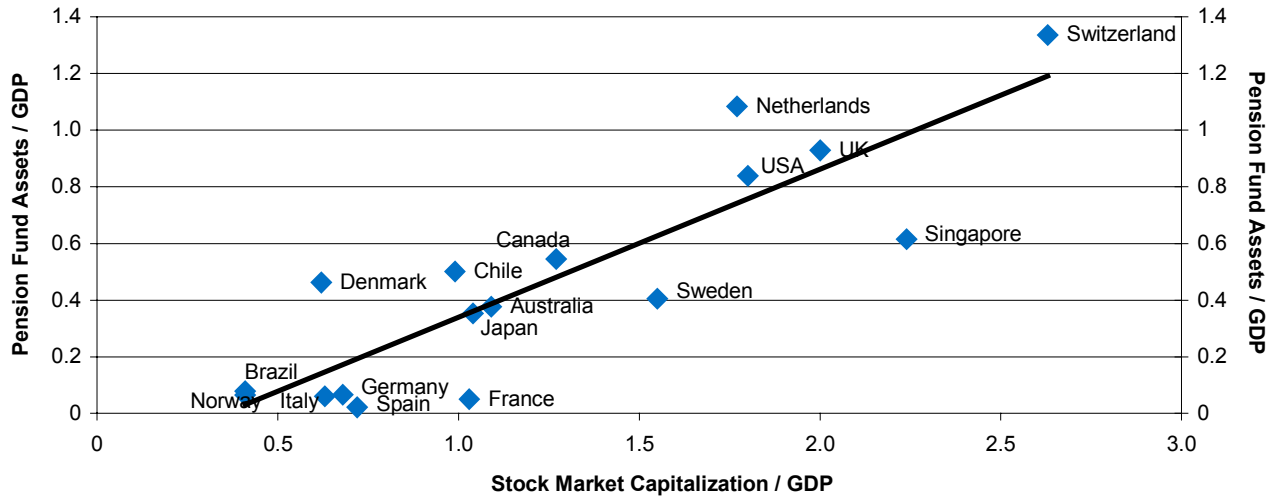
- The benefits of diversification are becoming more widely accepted throughout the world.
- Certain major markets have liberalized or eliminated investment restrictions.
- With the pension liabilities in 12 European countries now denominated in euros, the currency risk of holding non-domestic European assets in those plans has been eliminated.
- Through the use of swaps, futures, and currency overlay techniques pension funds can capture the price performance of non-domestic securities with minimal currency risk.
- Institutional investors and sell-side security analysts are following industries on a worldwide basis.

Reforms establishing funded pension plans should increase equity ownership and stock values. Establishing funded pension plans seems to improve market capitalization. A recent World Bank study reiterates the positive correlation between market capitalization as a percentage of GDP and the size of pension fund and insurance assets as a percentage of GDP (see Exhibit 37).[34] It identified a virtuous circle between contractual savings (in pension funds and life insurance companies) and the development of capital markets, i.e., pension funds and insurance companies with their long-investing time horizons are able to maximize investment returns by investing in equities without undue concerns about volatility. Removing investment restrictions on contractual savings also fuels growth. As funding of pension schemes is encouraged and equity ownership constraints are loosened or legislated, the stock market capitalization of rapidly aging countries should reap the benefit.

[33] These numbers "look through" pension and insurance holdings.

[34] Impavido and Musalem, November 2000.

Exhibit 37: Relationship of funded pension assets and stock market capitalization (1999)



Source: InterSec Research, OECD, Morgan Stanley.

Identifying the flows: 2011E-2050E

A recent World Bank study, which quantified the effect of global aging on the returns of rapidly aging economies, estimated that the real return on investment in rapidly aging economies would drop by roughly 200 basis points between 1995 and 2050.

Dissaving by governments and individuals could result in high real interest rates and reduced equity returns in many rapidly aging countries. Starting in 2011, the baby boomers will begin to retire in large numbers. As individuals receive benefit payments from defined benefit plans, these plans will have negative cash flows. These outflows should peak in the 2030-2040 time frame. Withdrawals from defined contribution plans and personal pension plans will also occur but at a slower rate and in certain countries, such as the United States, flows could be positive throughout the period.

Dramatically higher governmental debt levels could result if further action is not taken. The single best global solution is for strong productivity gains and the commensurate increases in GDP growth and wealth to offset moderate dissaving by governments and individuals. Otherwise, real interest rates will rise and the returns on equities will decline.[35] As populations age and government retirement benefits are reduced, the elderly may seek the safety of the fixed income markets putting further pressure on equity prices.

Emerging markets can help but are not a solution. It is often proposed that the salvation for aging economies is in the emerging market countries. The rationale is two fold.

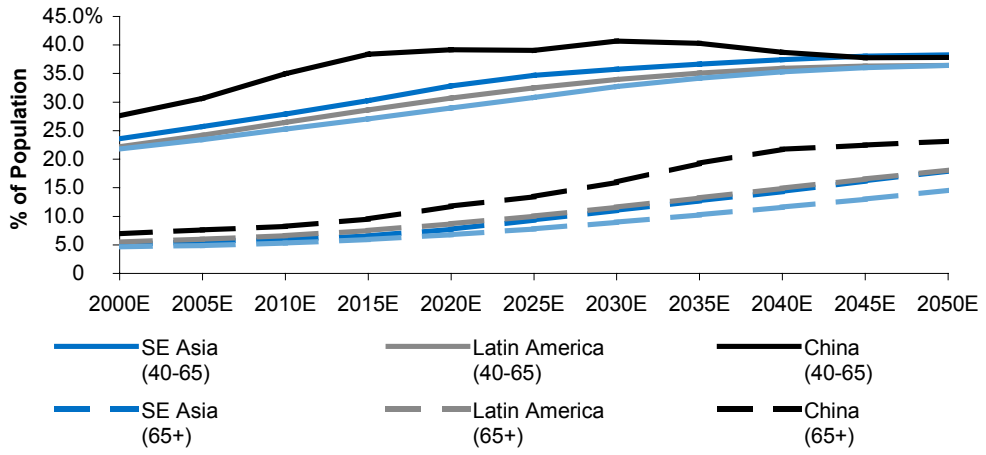
(1) Rapidly aging countries could invest in rapidly growing economies and receive investment returns as the population ages. This model worked in the 19th century as Great Britain funded the railroads and industries of the emerging United States. The World Bank study looked at the effect of rapidly aging countries investing aggressively in emerging markets. They found that **given the relative size of emerging markets,**

[35] Turner et al., 1998. MacKellar and Reisen, August 1998.

even with very aggressive investment assumptions, the improvement in real returns from 1995 to 2050 would be minimal.

(2) Emerging market countries could be purchasers of the stocks and bonds of rapidly aging countries during the second quarter of the century, as the aging countries increase debt and liquidate assets to pay for retirement. The demographics would certainly favor this solution – there are strong increases in the prime saver category in South East Asia, China, India, and Latin America from 2000-2050 (see Exhibit 38). However, **these countries would need to become significantly wealthier before they could materially affect worldwide investment flows.**

Exhibit 38: Prime savers and dissavers, other economies



Source: US Census Bureau.

Capital market scorecard

United States

Flows into all asset classes should remain positive over the next 10 years. However, the major reallocation of retirement assets into public equities is complete.

Although the United States has an aging problem (social security expenditures are forecast to grow from 4.2% of GDP to 6.8% in 2075), it is in the best position of the countries analyzed – with a growing working age population, low retirement promise, low debt levels, and large, well-funded pension schemes. Social security contributions will exceed expenditures through 2014. If payroll taxes were increased 1.89% today the system would be solvent through 2075. The United States has household financial assets equal to 380% of GDP. With 31% of the world's GDP and 47% of the world's financial assets, the United States already propels global economic growth and drives the world's capital markets. This influence will only increase given current demographic trends and the simple power of compounding. The US capital markets should be a strong beneficiary of this positioning.

There are two areas were the United States is less well positioned: (1) household savings rates have been extremely low in recent years, and (2) the United States has an extremely expensive healthcare system.

In a best case scenario, the United States will continue to pay down debt, increasing borrowing capacity that can be used to fund social security and future increases in retiree medical expenses. Unless continental Europe and Japan continue to change their policies, the United States may be the only country with the financial flexibility to step in during financial crises in 2020 and beyond. Financial crises are associated with high debt levels. Aging economies with slow growth and high leverage could make the developed world more vulnerable to recession with less flexibility to use traditional monetary and fiscal stimuli.

Canada

Recent changes allowing pension plans to increase their international exposure should fuel increased investments in international equities and decreases in domestic equities.

Canada has benign demographic trends as a result of relatively high birth rates, immigration, a modest retirement promise, and funded private and public pension schemes. Even though it is in an enviable position to deal with its aging problem, Canada has nevertheless begun an aggressive funding program for the social security system. These assets will be invested in all asset classes. In addition, Canadian pension plans should continue to receive contributions, albeit at a slower rate than in the 1990s.

Despite a decline in the Canadian household savings rate, good demographics should result in positive flows for the next 10 years and beyond.

Japan

Given current low levels of equity ownership and the elimination of investment restrictions the allocation to equities, especially international equities, by households and pension funds should increase.

The Japanese population is aging faster than that of any other country covered by our study. Government debt levels are rising at an alarming rate although current government total outlays are average for a developed country providing flexibility to increase payroll taxes in the future. Fortunately, Japan is second only to the United States with household savings of 311% of GDP and the highest savings rate of the countries analyzed.

Prior to the enactment of the 1999 Pension Reform bill, the Employee Pension System, which includes the National Pension Plan, the Employee Pension Insurance, and the Mutual Aid Association, had liabilities estimated at $7.9 trillion, or almost double GDP, according to the Ministry of Finance.[36] The Ministry of Health & Welfare estimated that liabilities post reform would be in the area of $5.3 trillion. Reforms include increases in retirement ages through 2015, indexing of pensions to prices rather than to earnings, and increases in payroll taxes every five years, starting in 2004. Payroll taxes should double by 2020. Despite tax advantages for funded plans, Japanese corporate pension plans are underfunded. The extent of this underfunding will be revealed with the implementation of International Accounting Standards in March 2001. Those companies with underfunded pension plans, i.e., higher "debt" levels than previously thought, should increase funding over the next 10 years, and this should be a positive for the markets. In addition, legislation establishing defined contribution plans may be enacted this year.

[36] Nenkin Joho, November 2000 (based on year-end 1998).

Increasing government deficits, in addition to the reduced number of prime savers and increased dissavers, pose a serious threat to the Japanese capital markets. Recent pension and fiscal reforms should help but may not be enough.

United Kingdom

Recent regulatory (MFR) and accounting changes (FRS 17) have already resulted in a reallocation of assets from equities to fixed income securities and we expect this to continue.

Although the United Kingdom faces significant challenges, it is the best positioned of the European countries covered in this report to cope with its aging population. Starting in the mid 1980s, the UK government gradually reduced the burden of the state pension provision by decreasing benefits, increasing retirement ages, and shifting the pension responsibility to corporate and private (individual) pension plans. In fact the United Kingdom has so successfully reduced the state commitment that poverty among the elderly may be the next global aging issue. UK pension plans are currently fully funded, which may result in reduced flows in the coming years. Full funding requirements will, however, result in increased contributions after a year such as 2000. Stakeholder pensions should increase flows although they will not represent significant assets for quite a few years.

Germany, France, Italy, and Spain just beginning to address the problem

Increases in personal savings should be stimulated throughout Europe as individuals realize that the national retirement income promise has been reduced or may not be met. We anticipate increased equity allocations from low levels.

These four countries have rapidly aging populations, declining working age populations, very large PAYG retirement promises, and minimally funded pension plans. Germany, France, Italy, and Spain had a combined total of 240 million people and $440 billion in pension assets in 1999; Switzerland had seven million people and $447 billion in pension assets[37]; and the United States had 275 million people and $12.5 trillion in retirement assets. Although not covered in this report, the other European countries face similar demographic issues. Other European countries including the Netherlands, Switzerland, Sweden, Ireland, and Norway, however, have built or are building significant funded retirement schemes and therefore do not face challenges as great as the four continental European countries discussed in this report.

Unlike Japan, the European countries with strictly PAYG schemes have a 10-15 year window in which to effect change. To have the maximum desired effect, funded pension systems need to be established soon. If the major European countries follow Sweden's lead, our 10-year forecasts for asset growth (which assume no major pension reform) will likely be very conservative.

Germany

Germany is the first large continental European country to take a serious step toward funding. The retirement promise is gradually being reduced and the funding of private and public pension plans has begun.

The existing German PAYG system will not be able to support its aging population. The German social security system is already running significant deficits even with the highest payroll taxes of any country in this study.

New accounting standards should fuel the funding of German corporate pension plans. Additionally, German states and municipalities have started to fund their plans for the first time, and if legislation mandating private pension plans is adopted, we expect flows into retirement vehicles of $1,554 billion (€1,550 billion) over the next 10 years.

[37] InterSec Research.

France

France's second pillar pension schemes continue to have the tightest investment restrictions in Europe.

France has made less progress in pension reform than any other major country, despite numerous attempts by various administrations. Although legislation establishing personal pensions was passed and then revoked, France was able to increase the retirement age and the number of years of work required to receive retirement benefits. This will gradually reduce the retirement promise from 70% to 60%. France continues to fight the pension reforms proposed by the European Community. Certain of its PAYG systems are already running at a deficit. With government outlays as a percentage of GDP already the highest of any major country, its flexibility is limited.

Italy

The Italian populace is cognizant of the problems and is saving at a very high rate. The introduction of the euro and falling Italian interest rates have propelled household savings into mutual funds and other equity investments.

The populations of Italy and Spain are aging faster than any other European country. The US Census Bureau forecasts that 35% of the population of Italy will be over age 64 by 2050. Assuming current fertility rates, this number could easily exceed 40% of the population.

Italy's debt level is the second highest in Europe as are government outlays at 47% of GDP. Its current social security payments are equal to 14% of GDP, which are the highest of any European country. The government has dramatically changed the retirement promise although this will be phased in over many years and is encouraging the funding of private pension plans.

Spain

Spain is encouraging the funding of private and personal pension plans and with greater success than Italy.

Spain's demographic challenges are similar to Italy's. It still has one of the highest benefit promises in the world and unlike Italy it has not made meaningful benefit changes. However, it enters this period with significantly lower debt levels (28% of GDP) than those of Italy. Government outlays are currently 39% of GDP versus 51% in France or 47% in Italy, providing greater flexibility.

Industry scorecard: Best prospects for growth and where to expand

The investor's point of view

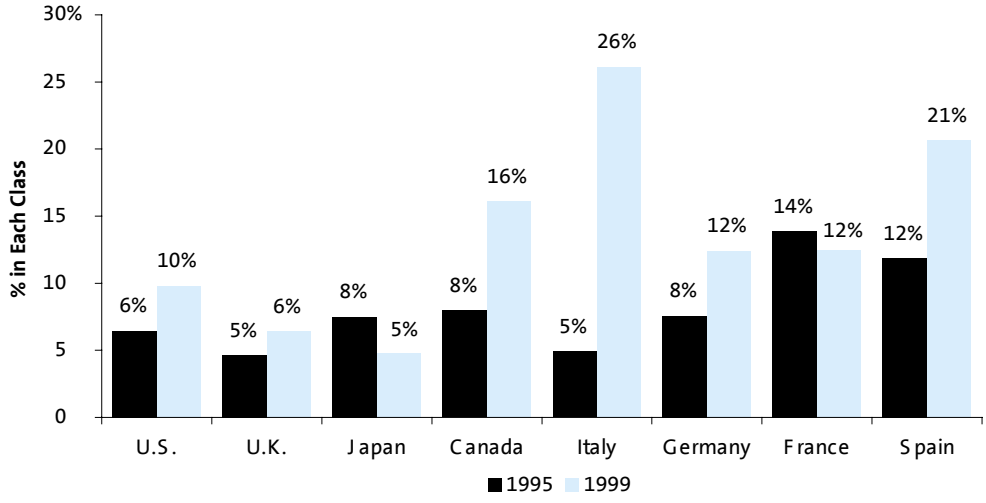
Institutional investors will likely seek out the best investment opportunities regardless of geography, because of an increasingly international view and the lifting of many pension fund investment restrictions. The strength of each capital market will be determined by the strength of its individual securities. Although the effect of aging on individual companies or industries is not the topic of this paper, aging may significantly influence a company's prospects. For example, we list the following:

- A projected 40% decline in the working age population in Japan and certain European countries over the next 50 years will materially affect the demand for housing, office space and consumer durables.
- Real growth in basic food, clothing, personal care items, and consumer durables is closely tied to population growth. Investors might avoid food companies that rely only on Japanese and continental European markets – i.e., where there are fewer consumers every year – preferring perhaps a food

company based in the United States, where the demand for food will grow each year.

- Similarly, investors might be deterred from purchasing shares in a German steel company with a large unfunded pension plan and the obligation to pay high taxes to support an aging population. Companies with fully funded pension plans in stable and growing economies such as the United States, Canada, and, to a lesser extent, the United Kingdom will, in our opinion, have better prospects.
- Future taxes are an important component of profitability. Countries that do not address the problems of an aging population will increase taxes. Corporations will pay them in the form of payroll taxes or direct taxes.
- In all countries the healthcare industry should prosper, unless governmental pressure to contain costs results in lower profits.
- Over the next 10 years, investment firms with a large share of the defined contribution pension plan market and the mutual fund market, in which defined contribution plan participants invest, should be beneficiaries as baby boomers save for retirement and more countries adopt DC schemes. These markets have been growing at high rates for a number of years (see Exhibit 39). This has occurred even without large-scale pension reform in Europe or Japan. In addition, emerging market countries are fast adopting the Chilean defined contribution social security model, which should propel further growth in the defined contribution market.

Exhibit 39: Mutual funds as a percentage of household savings



Source: Bank of England, Deutsche Bundesbank, Banque de France, Banca d'Italia,, Banco de España, Federal Reserve, Bank of Japan, Statistics Canada.

Fixed income instruments will also be influenced. If investors anticipate significantly increased government debt levels they may have concerns about "inflating" debt away or depressed currencies and shy away from government and corporate bonds. Higher

taxes, the alternative to increased debt levels, can affect the viability and profitability of corporations and their fixed income securities. This may be offset by the desire for less risky fixed income securities by retired individuals.

The corporate point of view

Considerations about where corporations decide to locate manufacturing facilities and corporate and research personnel include the growth of the local economy, the tax environment, and a good labor market. As the labor market becomes more global and cross-border employment restrictions are lessened (as is occurring in the European community), the best and brightest members of the labor pool may chose to work in lower tax environments.

Appendices and references

Appendix I: Comparison of demographic sources – United States and Germany

Comparison of demographic sources – United States and Germany

	Germany				United States	
	United Nations Bureau of Statistics (1998)	US Census Bureau (May 2000)	German Federal Bureau of Statistics (spring 2000)		United Nations Bureau of Statistics (1998)	US Census Bureau (May 2000)
			Low Scenario	High Scenario		
Population (million)						
1990	79.4	79.4	79.4		254.1	249.9
2000	82.2	82.8	82.0		278.4	275.6
2020E	81.0	85.5	78.8	80.3	317.1	325.2
2050E	73.3	79.7	65.0	70.4	349.3	403.9
Fertility Rate						
1990	1.30	1.45	1.4		2.05	NA
2000	1.33	1.38	1.4		1.93	2.06
2020E	1.58	1.51	1.4		1.90	2.18
2050E	1.64	1.70	1.4		1.90	2.22
Life Expectancy						
1990	67.0	75.2	NA		75.7	75.5
2000	77.8	77.4	77.4[38]		77.4	77.1
2020E	79.8	80.4	79.4		79.7	79.1
2050E	81.7	83.0	81.6		81.6	86.9
Immigration (000)						
1990	NA	1,025	NA		760	550
2000	208	332	100	200	760	964
2020E	208	273	100	200	760	748
2050E	204	99	100	200	760	1,010

Source: United Nations, U S Census Bureau, German Federal Bureau of Statistics.

[38] Average of male and female.

Appendix II: Fertility and life expectancy assumptions

Fertility and life expectancy assumptions

	Fertility Rate				Life Expectancy at Birth			
	1960	2000E	2020E	2050E	1960	2000E	2020E	2050E
United States	3.31	2.06	2.18	2.22	70.0	77.1	79.9	83.9
Canada	3.61	1.60	1.64	1.70	71.4	79.4	81.7	83.7
Japan	2.02	1.41	1.52	1.70	69.0	80.7	80.7	84.1
United Kingdom	2.81	1.73	1.72	1.70	70.8	77.7	77.7	83.1
Germany	2.49	1.38	1.51	1.70	70.3	77.4	80.4	83.0
France	2.85	1.75	1.73	1.70	71.0	78.8	81.3	83.5
Italy	2.55	1.18	1.25	1.70	69.9	79.0	81.4	83.5
Spain	2.89	1.15	1.31	1.70	70.2	79.6	81.3	83.5
Netherlands	3.13	1.64	1.67	1.70	73.4	78.3	81.0	83.3
Switzerland	2.51	1.47	1.56	1.70	71.7	79.6	80.6	83.7
Denmark	2.59	1.73	1.72	1.70	72.3	76.5	79.8	82.8
Finland	2.58	1.70	1.70	1.70	68.9	77.4	80.4	83.0
Norway	2.90	1.81	1.77	1.70	73.4	78.7	81.2	83.4
Sweden	2.34	1.53	1.60	1.70	73.5	79.6	81.8	83.7
China	5.72	1.82	1.81	1.80	49.5	71.4	76.7	80.9
India	5.81	3.11	2.26	2.02	45.5	62.5	69.4	77.0

Source: US Census Bureau.

Appendix III: Demographic information

Demographic information

	Total population	% of total population			Support ratios	
		65+	60-64	20-59	(20-59/60+)	(20-59/0-19+60+)
US						
2000E	275,562,673	12.64%	3.87%	55.01%	3.33	1.22
2005E	287,972,263	12.63	4.46	55.14	3.23	1.23
2010E	300,118,269	13.23	5.42	54.32	2.91	1.19
2020E	325,182,993	16.52	6.36	50.75	2.22	1.03
2030E	351,326,380	20.02	5.37	48.25	1.90	0.93
2040E	377,606,001	20.44	4.92	48.41	1.91	0.94
2050E	403,943,147	20.30	5.25	48.08	1.88	0.93
Canada						
2000E	31,278,097	12.67%	4.03%	57.42%	3.44	1.35
2005E	32,805,041	13.16	4.70	57.63	3.23	1.36
2010E	34,252,514	14.18	5.81	56.80	2.84	1.31
2020E	36,983,180	18.24	6.89	53.41	2.13	1.15
2030E	39,127,749	22.93	6.17	49.93	1.72	1.00
2040E	40,479,272	24.39	5.87	49.33	1.63	0.97
2050E	41,429,579	24.95	6.19	48.54	1.56	0.94
Japan						
2000E	126,549,976	17.01%	6.03%	56.27%	2.44	1.29
2005E	127,404,212	19.27	6.64	54.50	2.10	1.20
2010E	127,252,377	21.76	7.67	51.42	1.75	1.06
2020E	123,379,660	26.83	5.86	49.06	1.50	0.96
2030E	116,740,449	28.31	6.97	47.88	1.36	0.92
2040E	109,129,979	31.85	7.29	43.82	1.12	0.78
2050E	101,228,471	33.86	5.99	42.73	1.07	0.75
UK						
2000E	59,508,382	15.67%	4.85%	54.23%	2.64	1.19
2005E	60,129,050	15.98	5.19	54.34	2.57	1.19
2010E	60,602,213	16.69	6.29	53.79	2.34	1.16
2020E	61,427,523	19.59	6.29	52.74	2.04	1.12
2030E	61,481,403	23.50	7.09	48.61	1.59	0.95
2040E	60,251,132	26.35	5.66	48.01	1.50	0.92
2050E	58,210,627	26.83	6.54	47.22	1.42	0.89
Germany						
2000E	82,797,408	16.25%	6.80%	55.58%	2.41	1.25
2005E	83,854,106	18.48	5.94	54.99	2.25	1.22
2010E	84,616,035	19.70	5.39	55.51	2.21	1.25
2020E	85,507,300	21.41	6.97	53.08	1.87	1.13
2030E	84,938,675	25.75	7.80	47.83	1.43	0.92
2040E	83,009,706	28.43	5.86	47.32	1.38	0.90
2050E	79,702,511	28.55	6.79	46.09	1.30	0.86
France						
2000E	59,329,691	16.00%	4.53%	54.07%	2.63	1.18
2005E	60,354,863	16.51	4.43	54.62	2.61	1.20
2010E	61,068,720	16.79	6.31	53.38	2.31	1.15
2020E	61,849,122	20.61	6.33	51.06	1.89	1.04
2030E	61,926,376	23.98	6.40	48.72	1.60	0.95
2040E	60,846,143	26.45	5.82	47.47	1.47	0.90
2050E	58,967,418	27.25	6.15	46.83	1.40	0.88

Source: US Census Bureau.

Demographic information (cont'd)

	Total population	% of total population			Support ratios	
		65+	60-64	20-59	(20-59/60+)	(20-59/0-19+60+)
Italy						
2000E	57,634,327	18.09%	5.91%	56.57%	2.36	1.30
2005E	57,746,706	19.61	5.51	56.17	2.24	1.28
2010E	57,409,431	20.55	6.34	55.07	2.05	1.23
2020E	55,539,815	23.55	6.79	53.62	1.77	1.16
2030E	52,867,810	28.15	8.50	48.63	1.33	0.95
2040E	49,431,393	34.24	7.40	43.27	1.04	0.76
2050E	45,016,465	36.10	6.41	41.94	0.99	0.72
Spain						
2000E	39,996,671	16.91%	4.75%	57.15%	2.64	1.33
2005E	40,171,141	17.58	5.15	57.81	2.54	1.37
2010E	40,157,208	18.45	5.72	56.99	2.36	1.32
2020E	39,233,231	21.22	6.82	54.66	1.95	1.21
2030E	37,647,858	26.40	8.18	50.04	1.45	1.00
2040E	35,504,310	32.88	8.54	43.31	1.05	0.76
2050E	32,562,163	36.89	6.14	41.10	0.95	0.70
Netherlands						
2000E	15,892,237	13.64%	4.63%	57.52%	3.15	1.35
2005E	16,304,207	14.23	5.12	56.72	2.93	1.31
2010E	16,616,864	15.34	6.60	55.07	2.51	1.23
2020E	17,085,302	19.69	6.68	52.75	2.00	1.12
2030E	17,326,674	23.94	7.18	48.56	1.56	0.94
2040E	17,153,153	26.70	5.60	47.53	1.47	0.91
2050E	16,721,036	26.40	6.10	47.78	1.47	0.92
Switzerland						
2000E	7,262,372	15.13%	4.84%	57.22%	2.87	1.16
2005E	7,346,071	16.06	5.79	56.27	2.57	1.12
2010E	7,385,493	17.87	6.40	55.14	2.27	1.09
2020E	7,395,020	22.15	7.36	52.18	1.77	1.06
2030E	7,276,355	27.98	7.76	46.17	1.29	0.94
2040E	6,964,800	30.96	5.77	45.35	1.23	0.92
2050E	6,549,633	30.52	6.44	45.23	1.22	0.89
Denmark						
2000E	5,336,394	14.85%	4.94%	56.51%	2.86	1.30
2005E	5,413,717	15.16	6.10	54.46	2.56	1.20
2010E	5,473,871	16.73	6.72	52.58	2.24	1.11
2020E	5,570,313	20.28	6.19	51.91	1.96	1.08
2030E	5,648,719	22.97	6.77	48.99	1.65	0.96
2040E	5,634,830	25.18	5.77	47.69	1.54	0.91
2050E	5,577,713	24.70	5.67	49.03	1.61	0.96
Norway						
2000E	4,481,162	15.25%	4.14%	54.74%	2.82	1.21
2005E	4,586,164	14.84	5.06	54.18	2.72	1.18
2010E	4,677,218	15.53	6.23	53.11	2.44	1.13
2020E	4,861,711	19.00	6.14	51.98	2.07	1.08
2030E	5,018,054	22.00	6.56	49.13	1.72	0.97
2040E	5,067,708	24.43	5.41	48.34	1.62	0.94
2050E	5,061,200	24.29	5.86	48.88	1.62	0.96

Source: US Census Bureau.

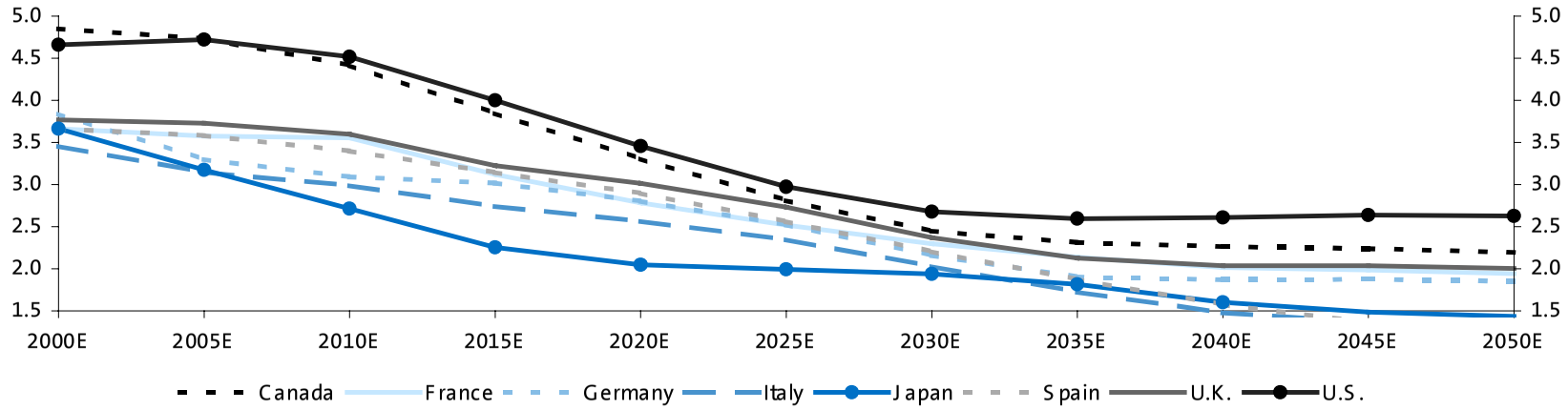
Demographic information (cont'd)

	Total population	% of total population			Support ratios	
		65+	60-64	20-59	(20-59/60+)	(20-59/0-19+60+)
Sweden						
2000E	8,873,052	17.29%	4.92%	53.69%	2.42	1.16
2005E	8,879,786	17.58	6.25	52.78	2.22	1.12
2010E	8,882,131	19.18	6.92	52.15	2.00	1.09
2020E	8,928,333	22.69	6.13	51.44	1.79	1.06
2030E	8,868,445	25.08	6.69	48.33	1.52	0.94
2040E	8,630,780	27.11	5.79	47.89	1.46	0.92
2050E	8,384,747	27.23	6.81	47.05	1.38	0.89
Finland						
2000E	5,167,486	14.89%	4.98%	55.55%	2.80	1.25
2005E	5,203,936	15.79	5.48	55.32	2.60	1.24
2010E	5,227,875	17.07	7.62	52.81	2.14	1.12
2020E	5,235,419	22.58	6.72	49.77	1.70	0.99
2030E	5,148,335	25.80	6.25	47.36	1.48	0.90
2040E	4,947,300	26.33	6.12	47.57	1.47	0.91
2050E	4,723,316	27.17	6.26	46.97	1.40	0.89
China						
2000E	1,261,832,482	6.96%	3.24%	56.54%	5.54	1.30
2005E	1,315,507,068	7.62	3.28	57.43	5.27	1.35
2010E	1,359,140,968	8.24	4.09	59.24	4.80	1.45
2020E	1,434,457,651	11.77	5.07	57.79	3.43	1.37
2030E	1,483,121,202	15.98	7.45	53.05	2.26	1.13
2040E	1,491,736,906	21.74	5.64	50.56	1.85	1.02
2050E	1,470,468,924	23.17	7.23	48.48	1.60	0.94
India						
2000E	1,014,003,817	4.64%	2.38%	49.26%	7.01	0.97
2005E	1,092,502,123	4.86	2.64	51.17	6.82	1.05
2010E	1,168,204,502	5.30	2.91	53.08	6.46	1.13
2020E	1,311,747,009	6.79	3.61	55.23	5.31	1.23
2030E	1,437,103,148	8.97	4.30	55.63	4.19	1.25
2040E	1,539,911,008	11.58	4.98	54.92	3.32	1.22
2050E	1,619,582,271	14.57	5.71	53.04	2.62	1.13

Source: US Census Bureau.

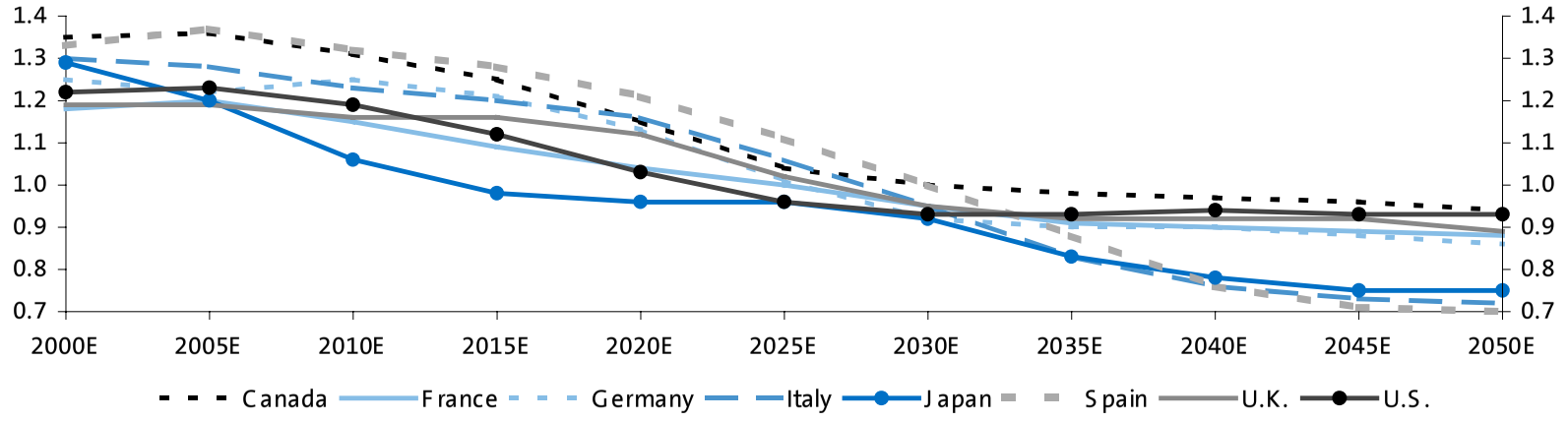
Appendix IV: Alternative support ratios

The elderly support ratio
20-64/65+



Source: US Census Bureau

Total support ratio
The working age population (20-59/0-19, 60+)



Source: US Census Bureau.

Appendix V: Categories of pension schemes

Categories of pension schemes

Social Security Systems

Pay-as-you-go (PAYG)

The majority of developed countries have PAYG social security systems funded through payroll taxes. Certain systems have a basic benefit and an earnings-related benefit. Examples: France, Germany, and Italy.

Partially funded

Certain social security systems whose receipts are currently higher than benefits have established "funds" whose assets consist of book entry government debt. This "surplus" is eliminated when one looks at net government financial debt. Example: United States.

Other social security systems have established segregated "funds." These can be either defined contribution plans or funded defined benefit schemes. Defined contribution example: Starting in 1999, Sweden set aside 2.5% of its 18.5% payroll tax to provide a funded defined contribution scheme for employees. Funded defined benefit example: Starting in 1999, Canada increased payroll taxes in order to set up a partially funded (separate asset pool) defined benefit social security scheme.

"Contracting out" arrangement

A "contracting out" arrangement allows private firms and/or individuals to assume the liability of portions of government-sponsored social security systems. In return for assuming this liability, social security payroll deductions may be reduced or eliminated. Examples: United Kingdom and Japan; in both countries this arrangement is voluntary.

Defined contribution or "privatized" social security systems

Chile pioneered this type of scheme when the traditional defined benefit social security system was terminated in 1981. The Chilean system established mandatory individual retirement accounts for all employees. There is a mandatory 10% payroll tax and individuals can make additional voluntary contributions. Prior to retirement, an individual makes his/her own choice of investments. Upon retirement, account balances are converted to annuities. Chile also provides a minimal benefit for workers financed from general revenues.

Central European, Eastern European and Latin American countries have adopted variations of the Chilean model. Examples: Mexico, Argentina, and Poland. This system is difficult to implement if an unfunded PAYG defined benefit system is already in place since existing workers would be paying for both their own and retired workers' benefits.

Private and public pension schemes

Defined benefit plans

Defined benefit plans are pension schemes that offer a defined benefit to employees upon retirement. The employees may be employed in private industry or by governmental entities. Employees are paid a percentage of final or career average pay based upon years of service. This benefit may be increased with inflation (for example, the U.K. and certain states in the United States) or remain unchanged after retirement (for example, US private pension plans). In most countries, taxes and regulations encourage or require full funding. The major exceptions to full funding of private plans are Japan and Germany. Assets in these schemes are managed by the sponsoring entity, which takes the investment risk of the assets selected.

Defined contribution plans

Defined contribution plans are pension schemes under which a certain percentage of pay is deposited into individual employee accounts. Individuals select their own investment options and bear the investment risk. These plans can be employer sponsored (for example 401(k) or 403(b) plans in the United States) or opened by self-employed individuals (IRA and Keogh accounts in the United States).

References

References

Alpert, W.T. and S.A. Woodbury, eds. (2000) *Employee Benefits and Labor Markets in Canada and the United States*. W.E. Upjohn Institute for Employment Research, Kalamazoo.

Amerini, G. (June 2000) "Social protection in Europe: expenditure on pensions", *Statistics in Focus.* Eurostat.

Auerbach, A.J., L. J. Kotlikoff, and W. Leibfritz, eds. (1999), *Generational Accounting Around the World*. National Bureau of Economic Research, The University Of Chicago Press, Chicago.

Blondal, S. and S. Scarpetta (1998), "The Retirement Decision in OECD Countries", *OECD Economics Department Working Papers No. 202.*

Board of Governors of the Federal Reserve System (September 15, 2000), *Flow of Funds Accounts of the United States 1991-1999*, Washington, D.C.

The Board of Trustees, Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds (2000), *The 2000 Annual Report of the Board of Trustees, Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds,* Washington, D.C.

Clark, S., and F. de Kam (October/November 1998) "OECD Taxes Revisited", The OECD Observer, No. 214.

Commission of the European Communities (November 2000), "The Future Evolution of Social Protection from a Long-Term Point of View: Safe and Sustainable Pensions." *A Communication from the Commission to the Council, to the European Parliament and to the Economic and Social Committee,* Brussels.

Curuby & Company (1998), *A Capital Report on Japan's Pension Market to 2005,* ISI Publications Ltd., Hong Kong.

Davis, E. (July 1997), *Regulation of Pension Fund Assets.* EMI.

Davis, E. P. (1997), *Can Pension Systems Cope? Population Ageing and Retirement Income Provision in the European Union*. The Royal Institute of International Affairs, London.

Employee Benefit Research Institute (2000), *Income of the Elderly, 1998,* based on EBRI tabulations of data from the March 1999 Current Population Survey, Washington, D.C.

European Commission Directorate-General for Economic and Financial Affairs (1999) "Generational Accounting in Europe", *European Economy: Reports and Studies, No. 6.*

German Federal Bureau of Statistics (2000), *Official Population Projection until 2050.*

The GFOA Research Center (April 2000), *2000 Survey of State and Local Government Employee Retirement Systems*. Public Pension Coordinating Council, Chicago.

Gillion, C., J. Turner, C. Bailey and D. Latulippe, eds. (2000), *Social Security Pensions: Development and reform.* International Labour Office, Geneva.

Greenwich Associates, Various Reports.

Gruber, J and D. Wise, eds. (1999), *Social Security and Retirement around the World*, National Bureau of Economic Research, The University Of Chicago Press, Chicago.

Gust, C. and J. Marquez (October 2000), "Productivity Developments Abroad", *Federal Reserve Bulletin, vol. 83.*

Impavido, G. and A.R. Musalem, A.R. (November 2000), "Contractual Savings, Stock and Asset Markets". *The World Bank Policy Research Working Papers.*

InterSec Research, *Various Reports.*

Investment Company Institute (October 2000), "IRA Ownership in 2000" *Fundamentals, 9, no. 5.*

Huber, M. "Health Expenditure Trends in OECD Countries, 1970-1997", *Health Care Financing Review,* 21, No. 2. (Winter 1999).

Kennickell, A.B., M. Starr-McCluer, B.J. Surette (January 2000), "Recent Changes in U.S. Family Finances: Results from the 1998 Survey of Consumer Finances", *Federal Reserve Bulletin, vol. 86.*

Kohl, R. and P. O'Brien, (1998), "The Macroeconomics of Ageing, Pensions and Savings: A Survey", *OECD Ageing Working Papers AWP 1.1.*

Leibfritz, W., D. Roseveare, D. Fore and E. Wurzel (1995), "Ageing Populations, Pension Systems and Government Budgets: How Do they Affect Saving?" *OECD Economics Department Working Papers, No.156.*

MacKellar, L and H. Reisen (August ,1998), "A Simulation Model of Global Pension Investment , *OECD Technical Papers No.137.*

McMorrow, K. and R. Werner (1999), "The Economic Consequences of Ageing Populations (A Comparison of the EU, US and Japan)", No.138, European Commission.

OECD (1998), *Maintaining Prosperity in an Ageing Society*, Paris.

OECD (1999), *Health Data 1999, A Comparative Analysis of 29 Countries*, Paris.

OECD (2000), *Social Expenditure Database*, Paris.

OECD (2000), *Taxing Wages In OECD Countries 1998/1999*, Paris.

OECD (June, 2000), *OECD Economic Outlook, No. 67*, Paris.

OECD (December, 2000), *OECD Economic Outlook, No. 68*, Paris.

Poterba, J.M. (December 1998), *Population Age Structure and Asset Returns: An Empirical Investigation,* Massachusetts Institute of Technology and National Bureau of Economic Research.

Ramsden, R., S. Andrews, C. Malmer, S.R. Leadem, A. Brege, S. Maughan, C. Enrico (November 24, 2000), *Financial Services – Europe: Mapping out the savings mix.* Goldman, Sachs & Co., New York.

Roseveare, D., W. Leibfritz, D. Fore and E. Wurzel (1996), "Ageing Populations, Pension Systems and Government Budgets: Simulations for 20 OECD Countries." *OECD Economics Department Working Papers No. 168*.

Turner, D., C. Giorno, A. De Serres, A. Vourc'h and P. Richardson (1998), "The Macroeconomic Implications of Ageing in a Global Context", *OECD Economics Department Working Papers No. 193*.

Turner, J., and N. Watanbe (1995), *Private Pension Policies in Industrialized Countries a Comparative Analysis*, W.E. Upjohn Institute for Employment Research, Kalamazoo.

United Nations (1998) *World Population Prospects: The 1998 Revision, Volume I,* Population Division, Department of Economics and Social Affairs, New York.

United Nations (2000) *Replacement Migration: Is it a to Solution to Declining and Ageing Populations,* Population Division, Department of Economics and Social Affairs, New York.

United States Census Bureau (May 15, 2000), *Population Estimates*, Washington, D.C.

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Capital market flows and asset projections

US$ billions

	US	Canada	UK	Japan	Germany	France	Italy	Spain
Flows								
1995-1999 Flows								
Total Household Financials	2,242	149	524	1,709	498	568	516	270
Retirement	1,116	58	317	415	71	354	149	69
Other Household	1,126	91	207	1,294	426	214	366	201
2000-2010E Flows								
Total Household Financials	5,566	361	1,295	4,103	1,109	1,254	1,139	594
Retirement	2,944	149	826	1,200	599	825	352	268
Other Household	2,621	211	469	2,903	509	429	786	326
1995-1999								
Average Flows as % of Average Assets	**1.6%**	**2.2%**	**3.0%**	**3.0%**	**3.2%**	**4.1%**	**4.6%**	**5.7%**
Average Retirement Flows as % of Retirement Assets	**2.3%**	**1.7%**	**4.1%**	**6.2%**	**7.5%**	**11.7%**	**11.9%**	**13.6%**
1999 Flows as % of GDP	6.0%	3.2%	7.5%	7.5%	6.3%	8.2%	9.3%	9.1%
Assets								
1995								
Total Financial	21,778	1,264	2,642	11,995	2,784	2,222	1,950	730
Retirement	7,101	596	1,137	1,218	182	468	200	74
Other Household	14,677	668	1,505	10,777	2,601	1,754	1,750	657
1999								
Total Financial	35,343	1,464	4,130	13,527	3,258	3,253	2,408	1,133
Retirement	12,472	797	1,840	1,542	183	677	288	121
Other Household	22,871	667	2,290	11,985	3,075	2,576	2,120	1,012
2010E								
Total Financial	80,476	3,318	10,360	21,750	8,516	9,128	6,804	3,207
Retirement	29,936	1,663	5,019	3,522	950	2,482	1,052	569
Other Household	50,540	1,655	5,341	18,229	7,567	6,646	5,751	2,637
CAGR 95-99								
Total Financial	**12.9%**	**3.8%**	**11.8%**	**3.1%**	**4.0%**	**10.0%**	**5.4%**	**11.6%**
Retirement	**15.1%**	**7.6%**	**12.8%**	**6.1%**	**0.1%**	**9.7%**	**9.5%**	**13.1%**
Other Household	11.7%	0.0%	11.1%	2.7%	4.3%	10.1%	4.9%	11.4%
CAGR 1999-2010E								
Total Financial	**7.8%**	**7.7%**	**8.7%**	**4.4%**	**9.1%**	**9.8%**	**9.9%**	**9.9%**
Retirement	**8.3%**	**6.9%**	**9.6%**	**7.8%**	**16.1%**	**12.5%**	**12.5%**	**15.1%**
Other Household	7.5%	8.6%	8.0%	3.9%	8.5%	9.0%	9.5%	9.1%
Equity Impact								
Household flows into public equities 2000-2010E (in billions)								
	239	**(16)**	**221**	**2,126**	**1,628**	**1,386**	**949**	**576**
Percentage in equities "looking through mutual fund, pension and insurance assets" (excludes private equity)								
1999	**56%**	**36%**	**53%**	**18%**	**22%**	**19%**	**21%**	**22%**
2010E	**56%**	**40%**	**51%**	**28%**	**47%**	**39%**	**38%**	**42%**

Sources: GS Estimates and GS Research estimates, Federal Reserve, Statistics Canada, Bank of England, Bank of Japan, Deutsche Bundesbank, Banque de France, Banca d'Italia, Banco de España.