Wrap-up Discussion

1. Gary Burtless

Thank you for the invitation to participate in this conference and to hear the very interesting papers and discussion.

The critical question raised by the conference is: 'What should governments do now about population ageing?' There is a real prospect that population ageing will bring undesired or potentially catastrophic financial market consequences sometime in the future. That is a possibility raised in several of the papers and it is one that newspaper readers are reminded of a few times every year – at least in North America and Europe.

Among the unpleasant possibilities we are warned against are the following:

- an unsustainable fiscal burden to support aged populations, which after all derive much of their consumption from state-financed pensions and health programs;
- a labour shortage, as the proportion of working-age people in the national population declines;
- paradoxically, we are also warned about the prospect of a capital shortage, as big retired populations draw down their assets for retirement consumption; and
- finally and most ominously, readers of the business pages are sometimes alerted to the possibility of a future 'asset-price meltdown' when big retired generations try to sell off their assets to shrunken working-age populations.

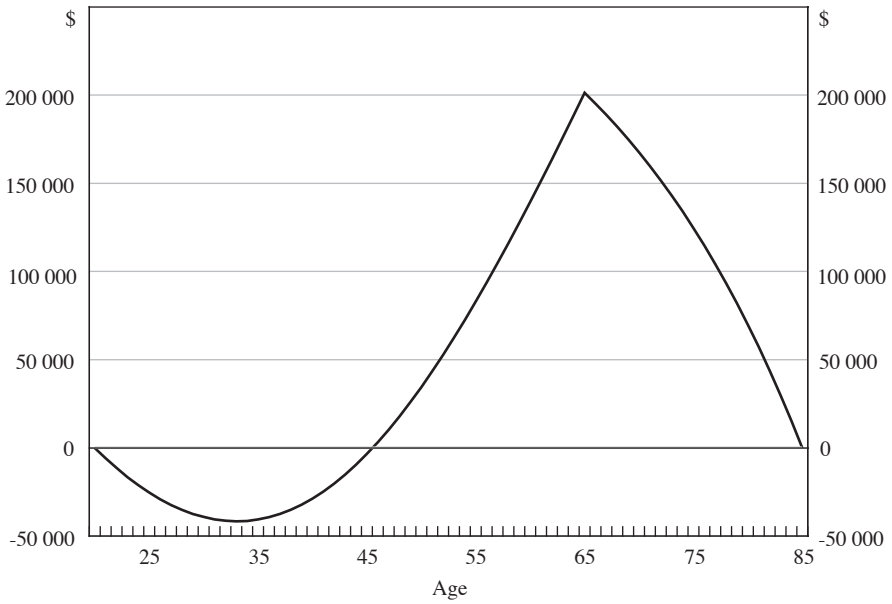
It is not likely that population ageing will produce *all* of these outcomes, at least in the same country and the same decade. (I'm not sure what it would mean to have *both* a labour *and* a capital shortage.) But the crucial question for policy-making is: 'Which of these is likely and what can we do *today* to make them less likely or at least less disruptive?'

The basic problem economists face in answering this question is uncertainty about the correct model linking population age structure to saving, investment and financial markets. For example, will rapid population ageing trigger a catastrophic fall in asset prices in some future decade when huge numbers of retirees try to unload their retirement savings? If so, will retirees face major deprivation because of their inability to convert financial market claims into retirement consumption?

Yesterday I said I was sceptical about this prospect. Still, we should acknowledge that an asset-price meltdown is within the realm of possibility. It is at least conceivable that asset prices could fall sharply under some plausible model of retirement saving, portfolio preferences by age and asset-price determination when there is herd behaviour and panics. There are two crucial questions: (i) are these models true, and (ii) what should we do about this looming disaster *today*? The correct answer to question number one is 'we don't know'. This makes it a bit difficult to answer question number two.

Let's take a simpler question: 'Will the aggregate private saving rate decline at some point as the population gets older?' As shown in Henning Bohn's paper and noted in the general discussion, the prediction of a saving rate decline is usually based on a straightforward application of the life-cycle consumption model. According to this theory, far-sighted workers/consumers borrow or save very little in early adulthood, gradually accumulate increased wealth up to the point at which they retire, and then gradually liquidate their wealth in order to consume when their labour income stops at retirement (Figure 1).

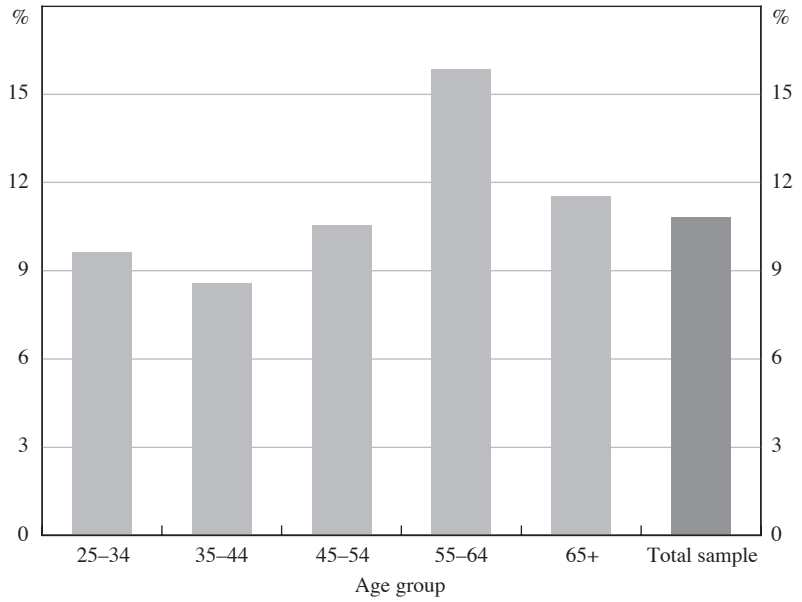
Figure 1: Life-cycle Consumption Theory
Hypothetical age profile of wealth accumulation



As several of us noted earlier, the theory seems to roughly predict the pattern of saving rates out of incomes over the lifetime. Figure 2 shows tabulations of the saving rate, by different age groups, uncovered in the main US consumption survey. You'll notice that saving rates in late middle-age are higher than they are at younger or older ages. And as Larry Kotlikoff pointed out, better definitions of current income and saving would show an even stronger life-cycle pattern, because most of the health consumption of the aged is not counted either in income or consumption, and part of what is counted as 'income' to the elderly – namely, their defined benefit pensions – actually represents liquidation of prior wealth accumulation. So, if we make plausible adjustments, the age pattern of saving is quite a bit stronger than that which is shown here.

Aggregate private saving should vary as the age profile of the population changes. But a variety of studies show that trends in OECD private saving rates have not followed this prediction. Based on the age pattern of life-cycle consumption, economists would predict that the aggregate private saving rate should increase

Figure 2: Age Pattern of US Saving Rates – Consumption Survey Results
Per cent of after-tax income



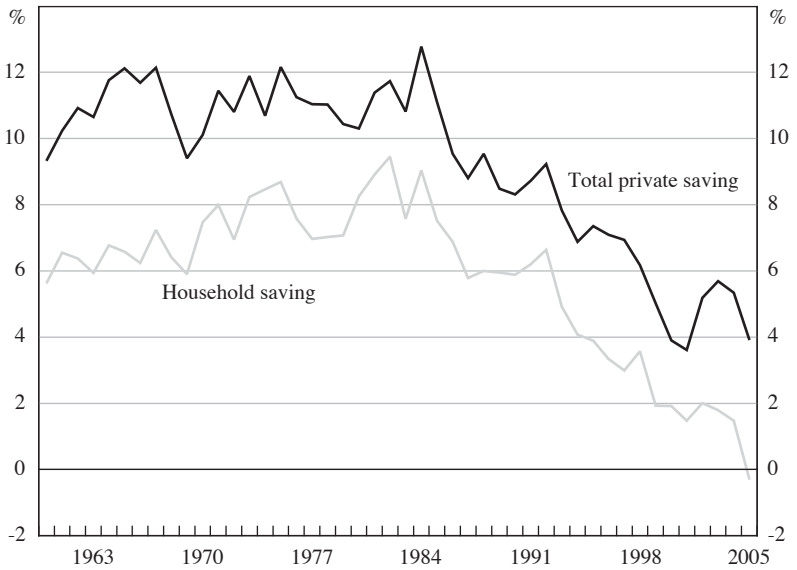
Note: Saving measured as after-tax income less consumption expenditures
Source: Bosworth, Burtless and Sabelhaus (1991)

along with the percentage of aggregate income that is received by the population aged between 40 and 60. Notoriously, the US private saving rate has fallen by two-thirds or three-quarters over the past two decades, even as the share of the population aged between 40 and 60 has reached an all-time peak (Figure 3).

The same is true in other rich countries. My colleague Barry Bosworth (1996) examined the prediction that a middle-aged population should save more than a younger one by comparing the private saving rate between the late 1960s and late 1980s. In 12 out of the 13 OECD countries he looked at, private saving should have increased; the predicted rise in private saving should have averaged almost 4½ per cent of GDP. The private saving rate actually *fell* in 11 of the 13 countries and the average *decline* in private saving was 2 per cent of GDP. Incidentally, Barry measured the saving rate as the percentage of current production that is withheld from consumption, which is the relevant way to measure saving in standard growth models.

I don't claim this pattern of aggregate private saving disproves the life-cycle model. It simply shows that other changes in the environment swamped whatever effects were caused by the demographic cycle. Swings in the saving rate *within* each age group in the population have been much bigger in OECD countries than the impact on aggregate saving of changes in the age distribution of the population.

Figure 3: US Total Private and Household Saving Rates
Per cent of income



Note: Saving rates measured as income withheld from current consumption, divided by private income

Sources: BEA; author's calculations

What does this mean? It means that many modelling exercises based on straightforward application of the life-cycle model over long periods of time may *correctly* predict the supply and demand for savings – within a single country or in a cross-country framework – but the predictions are *mainly* useful for thinking about pure effects of life-cycle saving accumulation and decumulation *when no other factors are at work*. But that is very unlikely to be the case over the next three, four or five decades. Other determinants of private saving and willingness to invest are likely to change too.

I want to strongly associate myself with some comments made in earlier discussions that when we think about the long-term predictions of these models, we should also think about their capacity to explain the past variations in saving, investment, or cross-national capital flows. If the stylised model predicts large capital flows from more-developed to less-developed economies and it should happen that recent capital flows have been in precisely the opposite direction, users should be a bit slow to adopt policies suggested by predictions of the model.

It will not do to say 'Oh, the recent past has been affected by special circumstances – asset-market collapse in east Asia or Latin America or a spike in energy prices. Those factors are going to disappear so the predictions of the model are reliable'. The reason it won't do is that the future is as likely as the past to be pockmarked by 'special circumstances'.

The private saving rates of OECD countries should have increased as larger fractions of their populations approached their peak earning years. And that would have happened, too, except that private saving was also affected by these special circumstances. You can pick from a long menu of special circumstances – some plausible and many less plausible – because researchers in and out of economics have given us a long list of explanations to consider. Our uncertainty about the correct model is what makes it hard to know how to apply the life-cycle model – which I find persuasive but incomplete – to the business of making policy *today*.

The life-cycle model is one reason among many that I think rich countries like the United States save too little *today*. This is partly based on a prediction – namely, that the future, older population of the US would benefit if the country had a deeper capital stock and more overseas investments when the number of dependent old is much bigger than it is today. But it is also based on looking at Figure 3, which shows that current private saving is much lower than it was in the not-too-distant past. In my judgment, total national saving (including government saving) should probably be *higher* than it was in the past. Even though I am not completely confident in the model that says optimal US saving should be higher, I am more confident in that than I am that demographic ageing will automatically produce first a rise and then a decline in private saving. And I am certainly more confident of that than I am of claims that demographic ageing is going to generate an asset-price meltdown.

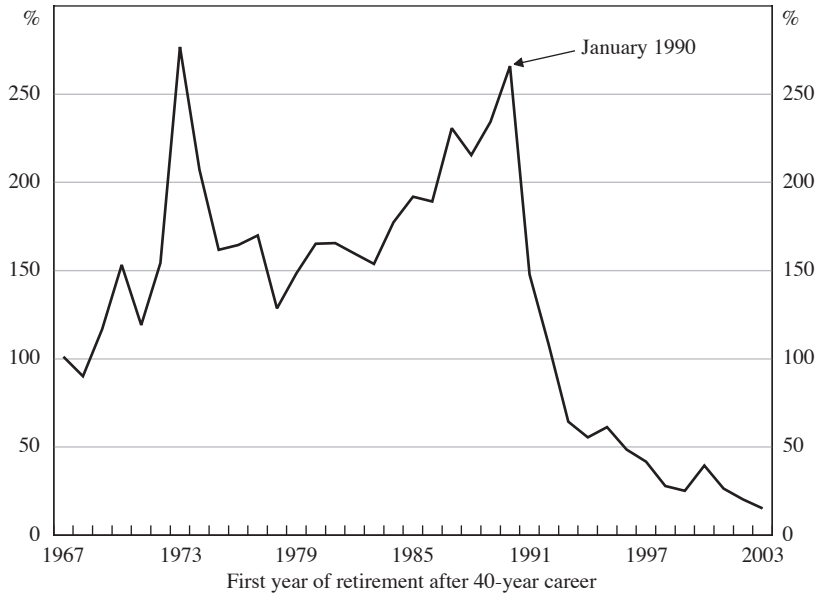
Let me turn last to the 'asset-price meltdown' scenario. Paul Samuelson quipped some time in the 1970s that 'the stock market has predicted nine of the last five recessions' in the US. Since then it has gone on to predict seven of the last three recessions. The 'demography predicts asset-price meltdown' theory has the opposite problem. Many countries in many historical eras have had asset-price meltdowns, but it's very hard to think of a single one that can be convincingly explained by demographic change, which, after all, usually occurs on a rather slow schedule.

I think the lesson for policy-making *today* is not to disregard the possibility of asset-price meltdowns. Instead it is to look soberly at the historical record and design your country's retirement system around the reality that meltdowns are going to occur from time to time – *even if only a handful of them will be caused by demographic change*.

Let me illustrate with evidence from recent years. Figure 4 shows the pension replacement rate that a newly retired Japanese worker could have expected after contributing 7 per cent of his pay to a defined contribution pension plan over a 40-year career and placing all of his retirement savings in a composite fund that invests solely in the Japanese stock market. I calculate the replacement rate by converting the worker's final savings into an annuity, whose price is determined by the Japanese long bond rate.

Workers retiring from 1967 through 1990 would have done pretty well. Their pensions would have replaced all their final salaries – or more. Workers retiring after 1990 would have fared much worse because of the prolonged stock market decline that followed the 1990 peak. By January 2003 the pension replacement rate had fallen to about 20 per cent of final salary. This worker also would have suffered

Figure 4: Japanese Replacement Rates
Under 100 Per Cent Stock Investment Strategy



Note: Per cent of final salary replaced if all of a Japanese worker's contributions were invested in Japanese stocks

Source: Burtless (2003)

because the decline in Japanese long bond rates should have increased the price of annuities or led to the bankruptcy of Japanese insurance companies.

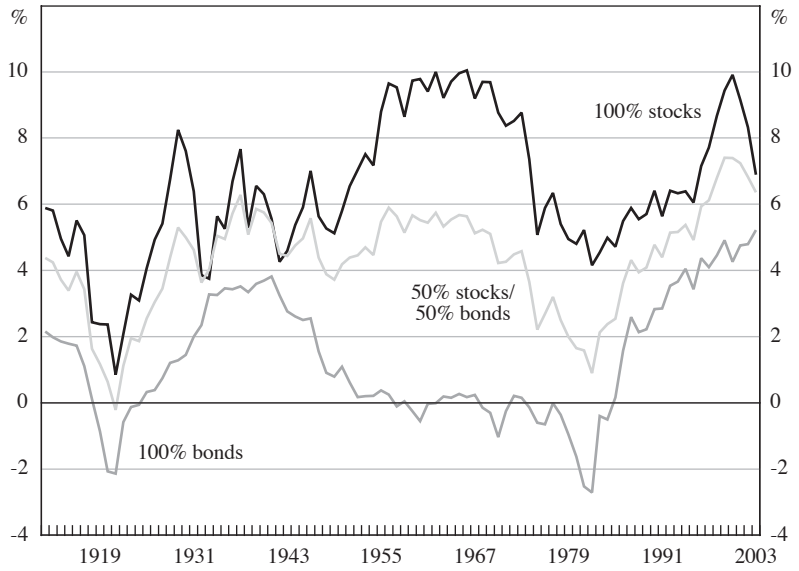
Most of you know the US stock market performed better than the Japanese stock market over the past 15 or 16 years. Even so, stock market gyrations lead to big ups and downs in what US workers can expect to earn on their retirement savings. Figure 5 shows the real returns Americans would have earned after investing their retirement savings in three different portfolios over a 40-year career. I remember someone yesterday saying the long return on US stocks has been stable at around 6½ or 7 per cent per annum for the past 200 years. This chart only uses stock return data back through 1872, but the 135-year average return is almost precisely in the middle of that range.

The problem is, workers won't necessarily earn that average return if they invest steadily in stocks over their careers. That's because their career-average returns are affected by the 40-year period in which they happen to work and especially by returns in the last few years of their careers. The worker retiring in January 2000 would have earned 10 per cent on his career investments and the worker retiring in January 2003 would 'only' have earned 7 per cent. The difference might seem small, but it translates into a startling difference in retirement income.

Figure 6 focuses on just the years from 1991 to 2003. Someone retiring in January 2000 would have received a pension that replaced 156 per cent of final

Figure 5: US Internal Real Rate of Return on Retirement Savings Over a 40-year Career

Career ends on 1 January of indicated year



Note: Internal annual rate of return if an individual invested in a representative sample of US securities in the specified proportions

Source: Burtless (2003)

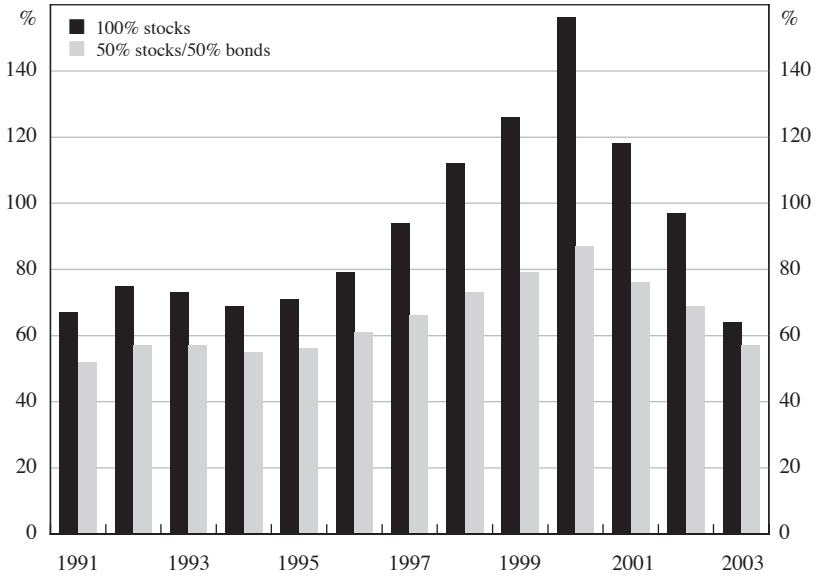
salary; someone retiring in January 2003 would have received just 64 per cent. Putting 50 per cent of your retirement savings into stocks and 50 per cent into bonds reduces that particular fluctuation, but even that moderate portfolio would have produced pension replacement rates ranging between 52 and 87 per cent over a 13-year period.

My point is that you don't need demography-induced asset-price meltdowns to think that there's a realistic possibility that asset-price meltdowns will occur. Policy-makers *today* should take that possibility into account when reforming their retirement systems.

Also, no one should misinterpret this evidence to be an argument *against* defined contribution or individual investment-account pension plans. It isn't. Instead, it is an argument for providing workers with a portfolio of old-age income sources, some dependent on investment performance in a funded system and some dependent on an income source that is outside of financial markets – for example, a basic pay-as-you-go pension system that relies on a modest wage or consumption tax.

In addition, I would argue that the evidence of occasional asset-price meltdowns offers a strong argument for creating new kinds of financial market instruments that can shelter workers against the effects of wild up-and-down swings in asset prices and annuity prices late in their careers. Olivia Mitchell and John Piggott described some interesting kinds of new instruments in their paper. The evidence I just presented

Figure 6: US Pension Replacement Rate After a 40-year Career
Career ends on 1 January of indicated year



Note: Per cent of final salary replaced if a US worker's contributions were invested in the specified proportions

Source: Burtless (2003)

offers an argument, for example, for indexed bonds and new financial products that guarantee workers at least a zero per cent real rate of return on their contributions, with some possibility of obtaining better returns on the part of their savings that is not needed to obtain the minimum zero per cent real return.

So, number one, the life-cycle model offers a good guide to *one* important determinant of saving: the age structure of the population. Unfortunately, it is not a *complete* explanation of saving, so policy-makers have to be very cautious in adopting policies that rely *solely* on that theory to forecast future aggregate saving.

And, number two, future asset-price meltdowns may or may not occur as a result of population ageing. But future asset-price meltdowns are likely to occur for other reasons. Policy-makers should design national pension systems and pension reforms with that thought in mind.

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2. James Glassman

I will recall the areas from the discussion that I feel are most relevant for policy-makers, reflecting my own roots at the Federal Reserve.

Yesterday, we discussed the nature of the demographic challenge – the rise in the world's population from 6 billion at present to an expected peak of 9 billion by the year 2050 and the significant ageing that David Bloom described so well. In the industrial world, this was partly a result of World War II's disruptions, and in the developing world, a result of falling infant mortality in the latter half of the 20th century (the demographic transition). Linking the debate about the demographic challenge to another important policy debate, I would say that the predicted consequences of this demographic transition make concerns about global 'imbalances' seem misplaced.

International trade 'imbalances' are merely symptoms of forces that are profoundly stabilising. These forces have nothing to do with the United States, unless you consider the US economy to be overheated and over-employed, and have everything to do with a global economy that is growing or developing at different speeds.[1] The truth is that we are watching one of the great human endeavours that is lifting a large part of the world's population out of poverty and that provides the answer, the antidote, to many of the problems we have discussed at this workshop. There is nothing like economic development and rising living standards to cure poverty and to enable a society to meet the needs of its ageing population.

Demographic developments always appear daunting when viewed in isolation – that is, when holding everything else the same. Malthus was sidetracked by a misunderstanding about the economic mechanisms that transform all scarcities into demand-supply balance. But everything else isn't the same. Several forces are unfolding that will prove to be powerful antidotes for the demographic burdens that will emerge in coming decades.

1. Life expectancies are rising, tempering pressures associated with the natural ageing of our populations. Some who think about relative age (for example, Sanderson and Scherbov 2005) – that is, the actual average age of the population relative to its life expectancy – assert that the US is getting younger in relative terms and that the same will be true for Japan and Germany in about a decade. Rising life expectancies imply that those in the workforce are becoming productive for longer spans of time, compared with earlier generations. As Charan Singh

1. For example, had US households saved more in this recovery and, equivalently, had consumer spending been more restrained, the US policy response to numerous economic threats would have been even more aggressive than it was. This is because the Federal Reserve's congressional mandate is to foster maximum sustainable output. Given this, the Federal Reserve's policy response likely would have restored aggregate demand in line with what actually occurred, supporting a recovery in US imports. Those who worry about global imbalances offer no solutions of practical value, because there are no credible solutions, other than the of-course-sensible platitudes about structural reforms to promote growth. Structural reforms will enhance economic performance but would do little to address current growth disparities.

noted in his discussion, rising life expectancies call for a new conversation about retirement.

The challenge for many of our social insurance systems is that they have coded in rigid retirement ages that are unrelated to life expectancy. In these cases, each future generation of retirees can expect to draw more benefits, compared with the previous generation. This represents the fundamental source of the projected financial shortfall in the US Social Security system as well as in social insurance programs in other countries.

If the public debate has failed to address this reality, private individuals have not. Workers over 55 years of age in the US are staying on the job longer, and by enough to offset the growing numbers approaching retirement, whose participation rate typically drops off sharply as they approach retirement.[2] The same is true for Japan, according to Hiroshi Watanabe. Because the principal source of stress on social insurance systems will be the result of a favourable factor – people are living longer – solutions can't be all that unpalatable politically.

2. A second industrial revolution is taking shape, this one centred in east Asia, with India and China choosing to lean toward market-based economies, anchoring their currencies to the dollar (particularly in the case of China) and joining the international trading community. Some have noted, with good reason, that this effort echoes the spirit of the Bretton Woods System of fixed exchange rates that helped Japan and Germany regain vigour after World War II. This time, however, it is east Asia, and particularly China, that voluntarily chooses to anchor currencies to the dollar. This effort will accomplish for one-half of the world's population what the first industrial revolution did for the 15 per cent of the world who lived in the West. Of course, this is contributing to the US international trade deficit. And so what?

   With reference to Larry Kotlikoff's simulations of the future transition path in 'Will China Eat Our Lunch or Take Us to Dinner?', I don't know who is eating who for dinner. The US Congress apparently thinks it is China that is eating the US. I suspect China thinks it is the other way around, with foreign companies profiting from businesses in China. I am certain, however, that this important trade partnership is putting a nice feast on China's table. And I suspect that most people affected are getting a pretty good meal out of it, US consumers and businesses alike.

   As an aside, there is a reason why China is investing the dollars it earns in trade with the US in Treasuries. It is in China's own interest to do so, for if China were unwilling to hold the dollars it earns in trade, and were to diversify its dollar holdings into non-dollar-denominated assets, market pressures on the yuan would build. This would undermine China's current competitive advantage and

2. A Federal Reserve Board staff study for the Brookings Institution, to be published in a forthcoming issue of the *Brookings Papers on Economic Activity*, warns of a coming slowdown in labour force growth. The warning is a point taken, although it may be a little premature.

discourage foreign companies from investing in manufacturing operations in China, which are so essential to China's long-run economic ambitions.

If east Asia's development proceeds as intended, at current growth rates China and India's per-capita incomes will rise to the level enjoyed by those in the West by mid century. Can there be an easier way to support China's ageing population? We ought to embrace what east Asia is undertaking rather than resist it, and rather than complaining so much about countries' currency pegs. And, as one participant noted in discussion, we should encourage China to reform its financial system as rapidly as possible.

3. Productivity growth, which for more than a decade has been far stronger in the US than most expected, is a third key force, as several participants have noted. Productivity growth is an important antidote for growing demographic burdens. This has been vividly revealed in the official long-term fiscal projections for the US. The economic assumptions underpinning official projections of a substantial deterioration in the fiscal budget position in coming decades are based on productivity and potential growth assumptions that, although they might seem reasonable to cautious economists, are strikingly pessimistic, both in comparison with the experiences of the past decade as well as the historical performance of the US economy. For example, these forecasts assume that US real GDP growth will slow to about 1¾ per cent annually, essentially half the pace experienced over the past 150 years. It takes no expertise to realise that if an economy's growth rate slows to half of its pace in the industrial age, a period that shaped current government commitments to its citizens, then it will have trouble financing those obligations. The outlook for productivity growth is absolutely critical to the anticipated burden of ageing populations and the current productivity 'surprise' is quite promising in this regard.

These three forces have important policy implications. First, with respect to the fiscal burden of ageing:

- We need to open up the conversation about retirement age and social insurance systems, recognising that retirement should be related to longevity, since presumably the factors boosting longevity are also extending the amount of time that we can work productively. Better yet, social insurance systems ought to be structured to provide incentives for those who are able to work as long as they choose. Many present systems include disincentives to working beyond retirement age.
- We need to put more energy into promoting structural reforms that enhance growth, because it is growth that provides the means to finance our obligations to the aged.
- We need to turn our attention away from worries about global imbalances, which are organic and reflect favourable developments, and embrace the efforts by China, India and others.
- We need to encourage reform of financial systems, because, as Glenn Stevens implied in his opening remarks, market mechanisms are the best and most efficient

means to help households manage risks related to their saving and retirement needs.

Second, with respect to asset values and demographics, as an economist, the discussion we had during the session on the evidence regarding links between demographic change, savings and asset prices was intriguing. But my peers on Wall Street who analyse equities for a living would be horrified to hear that our discussion about demographics and equity valuation made no reference to earnings and the fundamentals that drive earnings and market valuations.

As a market economist, I have been asked by numerous business groups to discuss demographic trends – demographics are a key driver for some businesses, including the beer and cosmetic industries, for example. But equity analysts, those dealing with reality, rarely consider demographic developments. I too am a bit sceptical of stories, like demographics, that focus on only one dimension, such as the role of investors in the stock market valuation equation.

Many of us who are sceptical about the role of demographics are influenced by the events of the past decade. We just witnessed one of the most significant moments in the history of the stock market, with price-earnings ratios doubling in the late 1990s, from around 15 to 30, all over speculation about the dimensions of the new economy. Earnings turned out to be far better than anyone expected – they doubled over the span of five years, despite the turbulence of the times – and valuations are back to where they were, justifying the 'bubble' prices of the late 1990s. Demographic factors changed little in that time and no one talked about demographics as a driver of the stock market. I suspect that the demographic variables in the equity equations discussed by Robin Brooks in his paper are standing in for more complex linkages between demographic developments and corporate profits.

This issue is relevant to two further important policy discussions:

a. Reservations about the measurement of economic concepts notwithstanding, it is widely believed within the Federal Reserve System and the community of macroeconomic economists that the US household saving rate, narrowly measured – that is, excluding capital gains – fell from around 10 per cent in the early 1980s into negative territory most recently. This is verified in the two official measures of saving: the national income accounts measure, which is the difference between income and consumer spending; and the Federal Reserve's flow-of-funds measure, which reflects the net new additions to household savings-type accounts, including retirement vehicles. Alternatively, the ratio of consumption to GDP has increased.

   It is also firmly believed that this decline in US household saving was mostly a rational response by households to the rise in net worth to historically high levels in relation to income. Real estate net worth (net of mortgage debt) is an important component of household balance sheets, but real estate net worth represents only about one-quarter of total household net worth. Equities represent the most significant contributor to the rise in household net worth.

Consistent with a number of participants' comments, it appears to be true that ownership of financial wealth is skewed to wealthier households. Nonetheless, it is this part of the population that contributes to most of the saving in the US. Moreover, those earning more modest incomes who struggle and are unable to save much probably always contributed little to overall national saving. Of course, that doesn't diminish the need for policy-makers to provide more incentives to boost saving.

There is little reason to doubt that ownership of wealth is skewed to wealthier individuals, but I suspect that surveys attempting to assess the ownership of wealth don't fully capture the information respondents have about inheritances, perhaps because respondents don't think about this, aren't willing to share information about expected inheritances or are unaware of assets that may be passed down to them. What is certain is that the vast accumulation of wealth that has built up through the generations during the industrial age will not travel to paradise.

b. It is rather ironic that many encourage central banks to explicitly target asset prices, when there is such little consensus among economists about the factors that determine equity values and what constitutes 'fair value'. There is even less consensus among equity analysts and investors of course, which is why we leave these things – equity valuations – to financial markets to determine. 'Render unto Caesar what belongs to Caesar' comes to mind.

Third, with respect to the conduct of monetary policy, there are a number of relevant issues. On the one hand, demographic shifts pose little challenge to the conduct of monetary policy. For one thing, supply creates demand, and if demographic forces slowed the supply of labour and potential output growth, the slowdown in supply would result in slower growth of income and ultimately curb aggregate demand growth.

Also, central banks are well-equipped to manage uncertainties regarding the growth of the labour force and potential output because they are accustomed to monitoring pressures on resources. For example, if demographic factors slowed labour force growth, the evidence would be clear in the evolution of the unemployment rate.

The more challenging issue for central banks is to determine the equilibrium level of interest rates. The discussion in the session on what theory can tell us about optimal responses to demographic trends was a reminder that demographic developments can have important effects on equilibrium real interest rates. There is little agreement among economists about what the magnitude of that impact is, or even what the direction of the impact is. Nevertheless, central banks need to anticipate expected economic outcomes when they set policy rates, given the lags between policy actions and their impact on the economy. As a result, they need to be able to assess the stance of their interest rate actions. Economies that have well-developed capital markets provide important market guides about equilibrium. This is why we in the financial markets, if not those at the central banks, devote so much attention to the yield curve – the level of policy rates versus long-term market rates. Without a well-developed capital market, central banks would be flying blind.

In conclusion, the demographic trends in store will be challenging. Yet, the forces that are unfolding, including rising longevity, rapid development for newly industrialising economies, and rapid labour productivity growth – even if they are contributing to large and growing international trade 'imbalances' – represent antidotes for the social burdens associated with growing and ageing global populations.

Reference

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3. Adair Turner

I would like first of all to thank the Reserve Bank for organising this workshop. I spent about three years working on pensions, demography and capital markets, and I thought that I had got to the end of being interested in this subject. But I think that this workshop has provided a very effective exploration of some very important issues.

I would like to begin with some comments about some of the macroeconomic issues that we discussed yesterday and then turn to some of the issues relating to financial risk that we discussed today. Yesterday, David Bloom gave us a broad outline of likely future demographic trends, while some of the other speakers provided additional detail. In particular, Axel Börsch-Supan highlighted the differences in demographic structures among developed countries. I would like to draw about three or four points out of that overall demographic picture.

First, I do think that it is very important, amid all the talk of the problems of ageing, slowdowns in the rate of population growth and even population decline, to note that the biggest demographic problems in the world today are still those created by population expansion. They are associated with environmental pressures, which will increase further as the world's population expands from 6 to 9 billion, and exist most crucially in those African countries where fertility rates are still five births per woman or even higher. I do think that the problems that those societies have in dealing with rapid population growth are really much more severe than the problems facing developed rich countries in dealing with slow or negative population growth. Not least because rich countries, simply because they are rich, have the resources and the capabilities to deal with such problems.

Second, I think it is very important when we focus on rich developed countries, and indeed some developing countries, to realise that we are talking about two completely different demographic factors, increasing longevity and falling fertility. Both of them together produce an increase in the elderly dependency ratio, measured for any fixed retirement age, but it is important to distinguish between them. And once you have done this, I would like to reiterate my argument that longevity

in itself is not really a problem or is a problem at least to which there are very straightforward solutions.

If the only effect at work was increasing longevity and there had been no fertility fall then it is easy to show that, as long as the retirement age rises proportionately with life expectancy, you would get no increase in the ratio of the retired population to the active population. And therefore as long as the pay-as-you-go pension system has within it a rule that the retirement age should rise proportionately with life expectancy, no other adjustment is needed. You can, provided you have that one policy, maintain a stable replacement rate of earnings with a stable contribution rate during working life. Now you might want to change either of these for other reasons but you would not be doing it because you are under demographic pressure.

I believe that the core of all PAYG pension system reform should be this proportional principle. I think it is also useful to note, however, that the analogous finding exists for capital-market-based systems. These are, of course, also exposed to demographic risks through the rate of return and asset-price effects, which we discussed extensively. But it is straightforward to illustrate again that if the only effect was longevity, and if people on average took their longer life and split it in the same proportions as before, into a period of working and saving and a period of retiring and decumulation, then ageing would produce no significant change in the capital-labour ratio since extra capital (arising from a longer period of accumulation) is largely offset by extra labour.

So the problems are not fundamentally created by ageing. The key problems for both PAYG and funded systems arise from the fertility decline. The fertility decline means that, even if we adopt the principle of proportional rises in retirement ages, we will still have an increase in the dependency ratio. In a PAYG system, even if you have the principle of a proportional rise in the retirement age, you will still have to make some other adjustment, whether it be an increase in the contribution rate or a reduction in the replacement rate.

There are two important features of this fertility decline effect which I'd like to highlight. First, I think it is important in the long term, looking out over the whole century, to realise that the effect of declining fertility on the dependency ratio is a one-off effect. Now, it is a one-off effect spread over 50 years or so, which is a funny sort of one-off effect, but it is still a one-off effect. But once you are through it you don't have a permanently increasing dependency ratio whereas the longevity effect, as best we know, continues forever and therefore the adjustments to it through increasing retirement age will probably also have to be permanently sustained.

Second, and more importantly, there are major differences across countries in the extent to which fertility rates have declined and these differences have a big influence on how challenging PAYG system reform is. France, at 1.9 births per woman is, I think, in a completely different position to Germany or Italy at 1.4 or 1.3. Those differences in fertility rates, as Axel's charts yesterday showed, produce really dramatic differences in what is happening to the ratio of active workers to retirees. And these differences have major implications for the severity of problems in PAYG systems.

Our analysis for the UK Pensions Commission leads me to believe that, provided that your fertility rate or your fertility plus immigration rate – the effective fertility rate – is up at about the 1.8 or 1.9 level (in the high 1s rather than the low 1s), which is where Australia, France, the UK and the US are, then the challenges to PAYG systems, while significant, are manageable. The required changes are not transformational and certainly do not require wholesale rejection of existing PAYG systems.

To illustrate, in the UK we have a dependency ratio, expressed as if the retirement age stays at 65, which will rise from 28 per cent to 48 per cent. That means that, if we accepted that we had to maintain a stable replacement rate as a proportion of average earnings, we would have to increase the share of GDP devoted to pension expenditures from about 6 per cent to 9 per cent. Or, alternatively, we would have to cut the generosity of the replacement rate promised by about 33 per cent. But of that increase from 6 per cent to 9 per cent of GDP, about half would be due to the longevity effect and about half due to the fertility effect. So as long as we put in place the measures the Pensions Commission has proposed and the UK Government has accepted, namely, a proportional rise in the retirement age, then the UK can maintain a stable earnings replacement rate within its PAYG system while having an increase in the share of GDP devoted to pensions from 6 per cent to 7.5 per cent. And no further increases will be needed when you get to 2050 because, as I mentioned earlier, the fertility effect is a one-off effect.

Now, some people would argue against an increase from 6 per cent to 7.5 per cent of GDP – they would say that they would rather have a reduction in benefits. If you switch the choice around the other way and say we are going to keep expenditure as a percentage of GDP at 6 per cent, then we are going to have to cut benefits by about 20 per cent. While this is significant, it is not transformational. So I do not believe that PAYG systems are all that radically challenged provided that your fertility rates are in the high 1's. I think there are adjustments that you have to make but I think they are adjustments that society can debate and then get on with.

I think the problem is significantly different for countries with fertility rates in the low 1's – 1.2, 1.3, 1.4. In these countries, even if you have the proportional principle on retirement age, you still have to make very significant additional adjustments either in the form of a higher contribution rate or a lower replacement rate. And these adjustments really do strike me as quite daunting politically. So, my basic message, and I think it is a good message for world environmental sustainability, is that there is nothing wrong with stable populations based on fertility rates of around 2 or even slightly below. We can live with those. But once fertility rates are down as low as 1.4, there are really major problems for pension systems.

So given that these really low-fertility-rate countries have a severe problem, what are the solutions? Well, one possibility that we discussed yesterday was immigration and the consensus I think was that the levels of immigration required to make a big difference to those systems were so large as to be essentially impractical. While I agree with that point, I think it is important not to overstate it. And the way that you can overstate it is to use models which assume that the retirement age will stay fixed

and then work out how much immigration you need to stabilise the dependency ratio. Of course, the assumption of the fixed retirement age is absurd. But even when you replace it with a more sensible assumption, the figures are so big as to be effectively impractical. We are not going to solve these problems entirely by immigration.

If not immigration, how about moving from PAYG systems to funded pension systems? The issue that we spent a long time struggling with over the last day and a half was the fact that shifting from PAYG to funded systems does not free us entirely from demographic risks. The change in the ratios of the retired population to the active population or other changes in age structure may produce changes in the capital-labour ratio, and thus in underlying rates of return. Or it may cause changes in the balance of purchases and sales of existing capital assets, and thus in the price of those capital assets.

Clearly, moving from PAYG to funded systems doesn't magically make the demographic risks disappear. We have had several papers trying to work out how big the price and quantity effects of ageing on financial markets are and how certain we are about them. I think that what is obvious is that we face major methodological problems in deriving firm conclusions. There are major debates over whether savings behaviour actually does follow the life-cycle model. We've struggled with how to fit bequests into these models, but I'm not sure if any of the models yet capture them effectively. And I think there remains one very major conceptual issue that we haven't discussed, although James actually just mentioned it, and I think we really need to incorporate it to have a better understanding of savings behaviour. Namely, how to deal with those categories of wealth accumulation which don't arrive from annual saving, that is, the fact that your wealth might increase even though you didn't save in a particular year because the equity market goes up or because house prices go up. We know that the US has had a very low private saving rate for the past 20 years, but US personal sector wealth has soared in that period and the behaviour of individuals is determined by the wealth that they have. I think that the conundrums about how we correctly measure saving are ones that we haven't really fully got to grips with in the models with which we try to determine the effects of demography on financial markets.

But with all that methodological uncertainty, I think we probably know two things. First, we probably know that ageing will tend eventually to produce a somewhat higher capital-labour ratio and a slightly lower rate of return, the effect of which, while not trivial, is also not huge. Second, I think, on balance, the argument about asset prices suggests that, although there will be asset-price effects, the more extreme asset-price meltdown scenarios will not result (at least in response to demographic change).

Today, we have had a very useful discussion of risk. I think that there are two aspects of risk that we ought to focus on. One is longevity risk, where I reiterate the point I made earlier that I think the key issue is that longevity risk for young individuals is very large and it's unlikely that anybody other than individuals should absorb most of it. The second is investment return risk, where I think Gary's conclusion was absolutely right. Whether or not there are demographic effects on

asset prices, we do know that asset prices are highly volatile and therefore funded systems create significant risks for individuals. In what follows, I can do no better than repeat what has already been suggested. I think we need mixed systems of pension provision that have a base load of defined benefits, which may well best be provided by PAYG systems and which, through appropriate adjustments, have been made robust in the face of future changes in longevity. On top of that we need to build a funded element into systems, but we need to think carefully about the balance of assets in which those funds are invested in order to mitigate, while not fully removing, the investment return risk.

4. General Discussion

A common theme of the discussion in the wrap-up session was the potential for financial markets to help governments and households to manage the risks associated with demographic change. Following Gary Burtless' remarks, there was some debate about whether high-frequency volatility in asset prices creates excessive uncertainty over the value of retirement income in private, prefunded pension systems. A number of participants argued that individuals could minimise this market risk by annuitising their accumulated retirement savings gradually in the years leading up to retirement, although those who retire during times of particularly low asset prices may still be disadvantaged. Another participant pointed to the potential for households to minimise risks by investing in countries with different demographic trends and suggested that the G-20 might be a useful forum for encouraging such cross-border diversification. However, it was also noted that population ageing will ultimately affect the entire world, meaning that some risks cannot be diversified away by foreign investment.

With regards to pension system design, the discussion focused on how policy-makers could minimise the marketing and administrative expenses of pension funds in order to reduce fees for members. A number of participants felt that governments could play a useful role in the collection and distribution of pension fund contributions. In doing so, governments could take advantage of economies of scale to minimise administrative charges and force pension funds to focus on funds management, where the scope for effective, price-based competition is far greater. There was also general agreement on the need to simplify retirement income systems. Some went so far as to suggest that this could be done by restricting individuals' choices over fund managers for investment portfolios and providing individuals with prudent default contribution rates while working, and drawdown strategies at retirement.

The likelihood that demographic change will generate substantial increases in the cost of health care was also debated. Several participants cited the rapid growth of health expenditure relative to output in many countries and noted that, if present trends continue, health expenditure will far exceed rising pension expenditure as a source of pressure on fiscal balance sheets. Other participants argued that future increases in health expenditure may not be so dramatic if increasing longevity is associated with an increase in the number of years of life spent in good health. In

a similar vein, it was also noted that cross-country studies show little relationship between health expenditure and health outcomes. Another participant argued that the growth of the health care sector is a positive development, noting that it is an innovative and productive industry. To the extent that increasing health expenditure is a cause for concern, the problem lies in the reliance on public funding, rather than the growth of the industry itself.

Finally, several participants stressed that urgency is required in developing policy responses to demographic change. One participant noted that, even under optimistic assumptions about future increases in public health expenditures and pension benefits, the fiscal balance sheets of many G-20 countries will come under increasing pressure in the coming years. Given the extent of the problem, no single reform will allow a country to resolve the challenges associated with demographic change, highlighting the need for policy-makers to develop a mix of policy responses. Even so, many of the solutions proposed to correct these fiscal imbalances involve large, immediate policy shifts, rather than gradual reforms. More broadly, a number of participants argued that the painful adjustments that responses to demographic change are likely to require increase the importance of immediate action. There was a consensus that population ageing is manageable, but that the greatest risk is that countries will wait too long to respond and be forced to choose between painful adjustments to the circumstances of the elderly or large increases in the obligations of younger generations.