

Global Aging and Financial Markets

**MA's 16th Annual
Washington Policy Seminar**

Co-hosted by

**Macroeconomic Advisers, LLC
Council on Foreign Relations
Center for Strategic & International Studies**



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COUNCIL ON FOREIGN RELATIONS



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September 7, 2006

8:00 AM **Welcome**

8:15 AM **The Challenge of Global Aging**

Moderator:

Laurence Meyer, Vice Chairman, Macroeconomic Advisers, LLC

Presenter:

Richard Jackson, Director and Senior Fellow, Global Aging Initiative, Center for Strategic & International Studies

9:00 AM **Alternative Fiscal Scenarios: Train Wreck or Return to Sanity?**

Presenters:

Douglas Holtz-Eakin, Paul Volcker Chair and Director, Center for Geoeconomic Studies, Council on Foreign Relations

Laurence Kotlikoff, Professor of Economics, Boston University

10:00 AM **Break**

10:15 AM **Frameworks for Analyzing the Macroeconomic Implications**

Moderator:

Joel Prakken, Chairman, Macroeconomic Advisers, LLC

Presenters:

David Weil, Professor of Economics, Brown University

Barry Bosworth, Senior Fellow and Robert Roosa Chair, The Brookings Institution

11:30 AM **Will There Be an Asset Meltdown?**

Moderator:

Eric Engen, Senior Economist, Division of Research and Statistics, Federal Reserve Board

Presenters:

Robin Brooks, Senior Economist, Asia and Pacific Department, International Monetary Fund

Jeremy Siegel, Professor of Finance, The Wharton School, University of Pennsylvania

12:30 PM **Luncheon**

1:30 PM **The View from the Markets**

Moderator:

William Dudley, Advisory Director, Goldman Sachs & Co.

Presenters:

Ian Banwell, Chief Investment Officer, Bank of America

David Kostin, Chief Sector Strategist, Goldman Sachs & Co.

2:30 PM **Global Aging and Financial Innovation**

Moderator:

Richard Berner, Chief U.S. Economist, Morgan Stanley

Presenters:

Steve Zeldes, Professor of Economics and Finance, Columbia University

Mark Warshawsky, Director of Retirement Research, Watson Wyatt Worldwide

3:30 PM **Closing Remarks**

Laurence Meyer, Vice Chairman, Macroeconomic Advisers, LLC

Douglas Holtz-Eakin, Paul Volcker Chair and Director, Center for Geoeconomic Studies,
Council on Foreign Relations

Richard Jackson, Director & Senior Fellow, Global Aging Initiative, Center for Strategic &
International Studies

4:00 PM **Seminar Adjourns**

The Challenge of Global Aging

Moderator: **Laurence Meyer**, Vice Chairman, Macroeconomic Advisers, LLC

Presenter: **Richard Jackson**, Director and Senior Fellow, Global Aging Initiative, Center for Strategic & International Studies

Joel Prakken: I'm Joel Prakken, Chairman of Macroeconomic Advisers. Before going any further, I want to say that neither I nor any of our illustrious panelists today are the most important person in the room: that would be Tonya Cooksey, whom you probably met while you were registering out front. If you have any administrative issues, see Tonya. But on behalf of MA, let me welcome you to our 16th annual Washington policy seminar, Global Aging and Financial Markets. Now, what you say, does global aging have to do with policy? Well, the policy response to global aging could have a big impact on global financial markets. But you're right, this is unusual for us to have a single unifying theme for the day's proceedings. But, that theme arose out of the close relationships we have with our two other wonderful co-hosts we have today: the Council on Foreign Relations, and the Center for Strategic and International Studies. Richard Jackson at CSIS heads up the Global Aging Initiative there, so their interest in aging is evident. And Doug Holtz-Eakin, who is the director of Geoeconomic Studies at the Council on Foreign Relations, is a former CBO director and has an obvious interest in the fiscal ramifications of aging. What I'd like to do is to have both Doug and Richard come up and say hello to you and say a few words, and then we'll launch directly to the first session of the program.

Richard Jackson: Thank you. I'm literally going to keep this to a few words, because we have a tight schedule today, and I want to move things along. But let me just express my gratitude to the panelists who've agreed to give papers today and to all of you who've come out so early in the morning, especially those of you who've come from far away. We even have a couple of people who've come from Europe for the event. I think we have a great program today. I'm looking forward to it. I expect to learn a lot; I hope you do too.

Doug Holtz-Eakin: I will be equally brief since I am partly responsible for us being behind schedule; so welcome. This is a great step for the Council on Foreign Relations to have the opportunity to partner with these two organizations. The topic is of first-rate importance from the point of economics, policy and, actually, our standing in the globe; so we look forward to learning lots today. I'd like to thank panelists and moderators for their efforts.

Larry Meyer: Okay, we're going to move right into the first session. I'm Larry Meyer and I'm going to moderate. I'll take a few minutes and leave the rest of the time for Richard. We won't take any Q and A on this session. We have a lot of material to cover on the basic demographics. What I wanted to do was to spend a minute or two motivating what we're going to be doing today. And the natural starting point is to take about the demographic drivers associated with global aging; to identify the links from those demographic drivers to the key macroeconomic developments and financial markets. So when we say global aging, it's not just the aging of the

population, it's also the slow down in population growth. Identifying those two key consequences of those demographics and linking them to the macroeconomics and termination of interest rates and net returns.

I think what we decided to do was make the very next session about the fiscal story. If there is a really big impact, this is where the locus is most likely to be. So every other panelist who's giving result has implicitly some assumption about the fiscal policy response; whether it is a "train wreck" (as we say), returned fiscal sanity, or sort of something in between. So that panel is very important in setting the pace. But remember, other panelists have made some implicit assumptions; maybe they'll make those assumptions explicit.

Next we turn to the two panels that really focus on how it all comes together, in terms of the broader macroeconomics, the macroeconomic framework, the attraction of the key forces, and specifically how it impacts itself on the international markets. And then we're going to have the view of what's in the market today. How do markets participants think about these developments, and are they reflected today in long-dated instruments? And if not, why not? And then one of the interesting developments is not just policies that evolve, institutions evolve, financial instruments evolve, strategies evolve, and those developments themselves can have important ramifications about the nature of the adjustment that is underway.

At the end of the day, we'll make an attempt to summarize what's going on. I want a sort of take a minute to say that these are the questions I hope we're going to answer in our panelists, and I call it What, Why, and When? So we're fully focused on real interest rates and equity returns and we want answers. What's going to happen? What's the direction going to be? Is there no effect? Why no effect? When are the effects going to occur, if there are going to be effects? And why do these effects occur? What are the interactions? And I want to keep your attention on the moving parts of the story: what's happening to private investment? Private saving, public saving, and investment, those are the key moving parts of this story. How do demographics affect each. Are these reinforcing, offsetting; how do those play out? I want you to focus also on what's the difference on open and closed economies as they respond to these international shocks. How are international capital flows affecting the situation? Do they dampen the effects, do they exacerbate the effects, can they change the sign of the effects? How will these capital flows themselves be affected by these demographics trends and how do they affect the outcome?

One thing I also want to emphasize when we talk about what happens here. We're thinking here about what I would call a comparative dynamics kind of analysis. What is the impact of global aging, what is the impact of that? That may be different from the directions rates actually go because demographics may not be the key drivers here. That's one of the stories. Are demographics a small enough effect that other developments could be more important in moving rates? And then the question is, if they're not priced into markets, why not? What can we do to make this adjustment process easier? Okay, that's my story. And I was going to say, you can't leave in the middle of your talk. We have very few rules here, but that's one of them. I turn it over to you, Richard.

Richard Jackson: Good morning and welcome once again. I really have two tasks in my presentation. The first is to lay out the basic demographics trends. I'll cover both the developed

and developing worlds, paying particular attention to differential trends in population aging and in population growth. My second task is to identify the main linkages between the demographics and financial markets. I won't be examining the empirical evidence and assessing it, and I won't be offering views on the likely magnitude of the impact. My purpose is simply to orient the audience to the topic and perhaps to provide a broad framework for the panelists who will be talking about these issues in more detail.

Let's begin with the demographics. The whole world is aging, and the developed countries are leading the way. For most of human history, until well into the industrial revolution, the elderly (here conventionally defined as the population aged 65 and older) comprised only a tiny fraction of the population, never more than 3 or 4 percent at any time. Today in the developed world, they comprise 15 percent. According to the latest UN projections, if current demographic trends continue (in particular if current fertility trends continue) that number will change to 25 percent. And that's just an average. In Japan and some of the fast aging countries of continental Europe, the elder share of the population will be shooting past 35 percent.

Now of course there are two forces behind the aging of the population. The first force is falling fertility. People are having fewer babies and this is decreasing the relative number of young in the population. The developed world, in fact, is in the midst of an unprecedented birth dearth. As recently as the mid-1960s, every developed country was at or above the so-called 2.1 replacement rate needed to maintain a stable population from one generation to the next. Today every developed country is at or below the replacement rate and many, in fact, are far below it. In Japan, the fertility rate is 1.3, also in Germany and in Italy. In fact throughout Central, Eastern, and Mediterranean Europe, the fertility rate is between 1.2 and 1.3. Only the United States hovers near the replacement rate, barely.

The second force behind the aging of the population may be the first force you thought of, and that's rising life expectancy. People are living longer, and this increases the relative number of old in the population. Worldwide, life expectancy has increased about 25 years since the early 1950s, which is a bigger gain over the last 50 years than humanity has achieved over the last 5,000. In the developed countries, it has risen from the mid to late 60s to the mid to late 70s. And in two countries, Italy and Japan, it's actually passed age 80. Until recently, demographers assumed the pace of improvements in life expectancy would slow, as rising life expectancy bumped more and more people up against the presumed natural limit to the human life span. But in fact, a growing number of demographers believe the pace of historical development will continue. And in fact, a few argue that it might accelerate as bio-medicine begins to unlock the secrets of the aging process itself.

I should say a word about the baby boom. The baby boom is not the cause of the aging of the population. In fact, some of the fastest aging countries did not have baby booms in the immediate post war period. The baby boom is fundamentally a phenomenon of the English-speaking world. It does not cause the aging, but it does alter the timing. For the past two decades, the passage of our large baby boom pig through the demographers' python has been swelling the ranks of working adults and has been slowing the rise of the elder share of the population. But starting just a few years from now in 2010, the demographics will be thrown

into reverse and the baby boom will accelerate the aging of the population, so it changes the timing but not the ultimate magnitude.

So we arrive at a historic transformation, the inversion of the age pyramid. Throughout history, populations have always had a steep pyramid shaped structure with a lot of young people at the bottom and a relatively small number of old people at the top. Global aging is about to turn the population pyramid on its head. This is the pyramid for the developed world in the 1950s. On the odd chance there is someone in the room not familiar with the population pyramids, these are 5-year age brackets from 0-4 all the way up to 100-plus. By international convention, men in blue on the left, and women in pink on the right.

This is the population pyramid in 1950, now watch the transformation. You can see the youth population beginning to hollow out, the baby boom bulge, in the middle years. Since this is an average for the developed countries, the United States has a big impact on the overall shape of the pyramid. Also, the median age rising on the right hand bar. This is where we are today, and this is where we're heading. So in effect, an inversion of the population pyramid. Again an average for the developed world. The pyramid for Japan or Italy or Spain or Germany, would be even heavier on the top.

Now before moving on, I should say a bit about differences between countries in the developed world. I've been talking about averages, and in fact different countries are aging at different rates and to very different extents. In particular, I want to focus your attention on what we might call the U.S. demographic exceptionalism. The United States today is the youngest of the developed countries. And thanks to our relatively higher fertility rate and to substantial immigration, will be the youngest by an even wider margin by the year 2030 or 2040. So in fact, there is an emerging generation gap between the United States and Europe and the United States and Japan. We sometimes think of Europe as sort of monolithically graying, but in fact there are important differences between Europe too. France and the countries of Northern Europe, including the United Kingdom, the Netherlands, and Scandinavia have relatively higher fertility rates and face a more moderate aging challenge than certainly Eastern Europe, Germany, Central Europe, Italy, and Southern Europe.

On a personal note, I take some credit personally for the higher fertility in France and Europe. My wife is French and we have three children with dual nationality, so I'm doing my part to raise fertility on both sides of the Atlantic. Much greater aging challenge in Germany, Central Europe, Italy, and Southern Europe. The Russian Federation is an interesting case; it has very low fertility rates. It doesn't age as much because Russia is the only developed country where life expectancy has been falling.

Falling fertility and increasing longevity is not only transforming the traditional population pyramid, or rather falling fertility is not only transforming the traditional pyramid (narrowing it at the base and along with rising longevity, widening the top), it is also ushering in an era of unprecedented workforce and population decline. The working-age population in a number of developed countries, including Japan, Germany, and Italy, is already shrinking. And in fact, the working-age population will be shrinking in every developed country within the next 10-15 years, the only major exception being the United States. The projected declines are very

significant indeed. According to the UN constant fertility scenario, there will be 20 percent fewer working-age Germans, 29 percent fewer working-age Japanese, 29 percent fewer working-age Italians. Here too you can see the U.S. demographic exceptionalism; a projected 20 percent increase over the next 35 years. That's in fact a small fraction of the historical rate of workforce growth. But still, the workforce will be growing modestly. In most other countries, it will be declining.

I should note also that these projections assume a continuation of recent rates of net immigration, the declines in the younger part of the workforce, among adults in their 20s and 30s. And I think there's an obvious relevance for the future dynamism of the economy. The declines will be much larger, in fact nearly twice as large in Japan some of the economies in continental Europe.

You may be curious to learn that the Japanese government projects the date that there will be only one Japanese left. If you think about it, with a fertility rate of 1.2 or 1.3, one's demographic decline begins and demographic momentum is thrown into reverse. You're going to be roughly halving the population from one generation to the next. It takes a function with a long tail (it takes a long time, a lot of halvings) before you get to one: that actually occurs in the year 3,000. They don't say whether it's a man or women; my bet is that it will be a woman. Of course that's not a realistic scenario. Nature abhors a vacuum. Either fertility will go up or someone will move in. But still, a projection like that does give you pause.

Let me move on briefly to the developing world. The developing world, of course, overall is still much younger than the developed world, but some regions of it are beginning to age quite rapidly. And a few countries in East Asia, and perhaps even South America, may catch up with the developed world by the middle of the century. This slide shows global fertility rates by major region. As you can see, fertility still remains at pre-modern levels in Africa. And indeed, if I were showing central Asia and the Muslim belt, you'd see fertility is very high there. In short, different regions in the developing world are at different places in the demographic transition from high fertility and high mortality to low fertility and low mortality. Fertility has fallen furthest in the developing world in East Asia. That number is, of course, dominated by China (weighted averages). In China the fertility rate is probably around 1.8. In the East Asian Tigers, fertility has fallen much further. In South Korea the fertility rate is now 1.1, making Korea the lowest fertility country in the world; or at least the lowest fertility major economy.

The consequence of course is that different regions of the developing world are aging at very different rates. Again it's not a big challenge for the foreseeable future. In Africa, the rest of Asia, dominated by India, will continue to grow. But in fact, Latin America is going to be aging substantially and East Asia very substantially. It's important to point out, though, that this, what I call the second wave of global aging, still looms over the horizon. All of the developing countries are younger than the developed world average today and in fact will still be younger 10 years from now. The rapid aging in East Asia takes place in the 2030s; from the mid 2020s through the 2030s. In Latin America, the most rapid aging doesn't occur until the late 2030s or 2040s. But once the developing world age waves have run their course, some of these emerging market countries will be very old indeed. I don't know how many of you are aware that by the middle of the century, China will actually be an older country than the United States. It won't be older than Germany, it won't be older than Japan, but it will older than the United States,

measured by either the median age or the elder share of the population. By 2050, in a constant fertility scenario, so would Mexico.

Let me say a word, before closing out the first part of this overview presentation, about the relative certainty of the projections, or at least the relative certainty of the next 25 years. Beyond 25 years, rising fertility, if fertility rates were to up in the developing world, that could have a significant effect. But over the 25 years, if fertility were to double overnight, it would have no appreciable impact on aged dependency ratios or the rate of growth in the workforce. On rising longevity, I don't think we find any advocate...people can be ambivalent on whether a higher or lower fertility rate. On longevity, I think most of us would agree that it is good. But the risk here is that projections (official UN projections and most official national projections assume a slowdown in longevity growth) haven't caught up with the center of gravity of demographic opinion that now argues that historical rates of improvement will continue. The projections build in a slowdown. So in effect, if anything, they're underestimating the aging trend.

Finally, immigration. I mentioned the projections I'm using assume a continuation of recent net immigration levels, rather rates, in each country. I should also point out that the numbers required to substantially alter this demographic picture are very large, in fact would be destabilizing. A few years ago, the UN did a very interesting study on replacement migration, in which they actually calculated the increase in net immigration in each developed country and major region required to: a) In order to stabilize population, to prevent population decline; b) In order to stabilize the age dependency ratio, in effect to neutralize the aging of the population. The first test, preventing population decline (I should have the numbers, I don't), my recollection is that, that would require an additional 2 million net immigration in Europe each year over the next 50 years. Stabilizing the age dependency ratio, something around 15 million each year over the next 50 years. Immigration is built into the projections, and it can help on the margins, but it is in and of itself unlikely to slow, much less reverse, the aging of the population.

Let's move on to the implications for the macroeconomy and for financial markets. There are obviously many ways...many linkages potentially between the demographic trends I've been describing and economic and financial market outcomes, everything from the sectoral composition of the economy to individual portfolio allocation. What I'm going to do is to focus on four, which I think are most discussed in the literature, and which quantitatively are probably the most important. The first is the fiscal linkage, which operates through the impact of rising old age dependency costs on falling old age support ratios and rising old age dependency costs on public budgets. The second we might call the life-cycle savings linkage which operates through the impact of changing age structure on private savings rates. The third I call the workforce growth linkage which operates through the impact of slower population and workforce growth on potential GDP growth. And finally, global capital flows which could be affected by all of the above.

Let's start with the fiscal linkage. Graying means paying. It means paying more for pensions, more for health care, and more for social services for the elderly. Falling fertility and rising longevity translate directly into a falling support ratio of workers to retirees. A falling support ratio, in turn, translates into a rising cost rate for pay-as-you-go social programs, like Social Security. I'll cover the next two bullet points as we look at the next few charts. What this chart

shows is the demographic support ratio for the G-7 from 1970 to 2005 and 2040, simply the ratio of working-age adults, 15-59, to the elderly aged 60 and over. Age 60 in fact is a much better proxy for the division of the active and retired population in most developed countries than age 65. So the demographic support ratios are scheduled to fall to 2.3 to 1 in the United States and to 1.1 to 1 in Japan and Italy. I stress demographic support ratio deliberately. If we were to look at the actual system support ratio (remember not all working age adults work, not all elderly are retired), more working-age adults don't work than the elderly that are retired in those countries. So system support ratio of contributors to beneficiaries is significantly lower in many countries. In Germany, perhaps in Japan and Italy, it certainly would fall beneath 1 to 1. Meaning what? More people collecting benefits than paying in. This is the second ratio, falling support ratio, rising cost rates.

These projections are taken from the CSIS Aging Vulnerability Index. I should have put the average here, but a simple average for public benefits to the elderly (this includes pensions and health care). A simply average for the developed countries goes from 15-24 percent by 2040. Obviously a lot of variation, but in almost every country, the increase is at least 10 percent. Three basic choices: raise taxes, cut benefits, or pay for this by issuing debt. Probably what we'll see is some combination of that in different countries. But let's consider the implications of the options for just a moment.

Arguably the United States has enough room to pay for the cost of its age wave by raising taxes, in Japan as well. I don't think this is the case in most European countries, already beyond what most economists call the threshold of efficient taxation. If they raise tax rates, they'll learn the Latin American lesson, which is that hiking the rate and collecting the money aren't necessarily the same thing. Rising labor costs will drive more workers into a grey economy. Unemployment will rise. There's a feedback here through the fiscal linkage to possible economic growth. Most countries will need to make significant cuts in benefits. Significant linkage to financial markets, which I'll return to when I talk about the life-cycle savings linkage in just a moment.

I just thought I would throw this chart up and have you consider for a moment the fiscal meltdown scenario. What I've done is simply to assume that all of the developed countries pay for the full cost of the age wave by issuing debt. What we're looking at is the combined, weighted projected increase or shift in the pension balance for the G-7 countries. As you can see, left on auto-pilot, these deficits would eventually consume the net savings of the developed world. Obviously not a sustainable scenario, financial markets would call a halt before it preceded this far, gives you some sense of how large the fiscal, to what extent fiscal policy responses may dominate the overall macroeconomic and financial markets story.

The second linkage is the life-cycle savings linkage. I'm sure you're all familiar with this, but basically the life-cycle savings hypothesis states that there is a humped age savings profile, that people save little, or that savings are negative at youth, as they borrow for educations, households; savings peak in middle age; old save less or dissave to finance retirement. As the share of the population in the harvest years, individuals and their pension funds may sell off their assets on a large scale, perhaps putting downward pressure on equity prices. There's no question that a large shift is unfolding in the age composition of the population. Here what we're looking

at; adults aged 20 and over. As you can see, the share of adults in the high-saving middle years declines significantly in the United States, the EU-15, and Japan, and the share in the presumed low saving or dissaving elder years, harvest years, rises dramatically.

I think in thinking about the life-cycle savings hypothesis, however, we need to keep a couple of questions in mind. The first, of course, is to what extent the typically elder in different countries actually dissaves today. I think we'll be hearing something about that during the first panel (in fact in a number of panels). There's little evidence that the elderly now dissave. The second question that immediately arises is whether the historical or current life-cycle pattern is a good predictor of the pattern in the future. Here we come back to the fiscal linkage for a moment. The issue here is that large benefit cuts are in the pipeline in many countries and that the elderly in most countries are highly dependent on public benefits. In fact, for the third income quintile, the share of elderly income in the form of a government check ranges from 75-85 percent in continental Europe. So it's certainly possible as these benefit programs are reformed that we may see more elderly dissavings in the future than we see today. The third issue is the extent to which savings assets are concentrated among the elderly. Leaving aside what the typical retiree does. If the affluent, who owned most assets, didn't need to save, that could obviously have an important impact on the overall outcome. The final question is whether there will be enough buyers in developing countries to take up the slack. I think most economists who anticipate large declines in asset prices because of the life-cycle savings effect are assuming a closed economy, but when you open that up, the picture changes. But the key question there is not just whether there will be enough warm bodies in the developing world, but whether they will be in a position to take up the slack.

The third linkage is the workplace growth linkage. More slowly growing or declining workforce populations could mean more slowly growing or declining economies. When I make this point (you'll find this incredible), I'm sometimes accused of pessimism. Not pessimism, simply arithmetic. The relevance of population and growth here, and particularly the growth in the working-age population, are twofold; perhaps the panelists can help clarify the connection between these two points. The first is that investment demand is likely to fall as workforces grow more slowly, need less capital. The second is that over the long-run, returns to capital are probably limited by the real growth rate of the economy, returns to capital can indefinitely exceed the growth rate of the economy. Take a look at the numbers. What we're looking at in this chart is the rate of the growth in the working-age population for the G-7 countries. By the 2020s and 2030s, the working-age population will be declining in Japan and a number of European countries by 1-1.5 percent per year. So unless productivity grows at least as fast as workforce grows, we may be looking at secular economic stagnation, or indeed in some cases, a long-term secular decline in aggregate GDP.

What I've done in this chart is simply to illustrate this point. I've created an index in which I've normalized GDP in G-7 countries to 100 in the year 2000. I assume, in this chart, constant labor force participation and same 1 percent per year productivity growth rate in all countries. As you can see, the United States continues to grow, France as well to some extent, and the United Kingdom, but long-term stagnation in Germany, Japan, and Italy. Of course there are some potentially offsetting trends. Labor force participation rates could rise, so could productivity. We should be skeptical on both of these points, absent major policy shifts in these countries.

Workers retire early because governments bribe them to retire early. We may not see a large labor market response unless pension policies are changed. On productivity, I think we need to recall that the average age of the workforce will be rising very rapidly. The typical worker will be much closer to retirement age than college age. Also to come back to fiscal linkage, the whole question of rising fiscal deficits, and crowding out of productive investment in private capital markets.

I'm going to skip over to "Does aggregate growth matter?" I need to draw the presentation rapidly to a conclusion, but let me just say a few words about the capital flow linkage. This gets back to the whole issue of differential aging and differential population growth, both within the developed countries and between the developing and developed worlds. International capital flows can clearly match savings with investment opportunities, possibly mitigating financial market impacts of global aging. The key question here, and we'll come back to this repeatedly, is whether investment demand falls faster than savings or whether savings falls faster than investment demand? So you have two scenarios here: a capital export scenario, historically capital has flowed from older and more slowly growing developed countries where capital is abundant and labor is relatively scarce to younger and faster growing countries in the developing world where the opposite pertains. In this scenario falling investment demand predominates in the developed world and these capital exports continue, savers continue to earn higher returns by investing in places like China and India. But then there's another scenario. What if savings falls faster than investment demand? The life-cycle savings effect, but totally apart from that, there's the potential for large and widening deficits. So if savings falls faster than investment demand, you could see a reversal of historical roles with developed economies depending on savers in developing countries to prop up consumption and maintain minimal levels of investment.

A couple questions about the capital flow linkage which I hope the panelists will help throw some light on. First of all, are these really alternative scenarios or do they represent near-term and long-term futures? The second question relates to the capital export scenario and that is simply: Are investment opportunities in the developing world sufficient to falling investment demand in the developed world? The third relates to the capital imports scenario, and this is: What are the overall economic and even geopolitical implications of an indefinitely rising debt service charge to the rest of the world? And the final question, to bring this around full circle, is whether these population age differentials that are driving these scenarios persist in the future, or rather how large they will be in the future and how long they will persist.

What I've done here is simply to show the rate of growth in the working-age population by decade for China, the EU-15, India, Japan, Mexico, and the United States. You can see that China is decelerating dramatically, and turns negative around 2015 in fact, Mexico decelerating but a bit more delayed. India does continue to grow.

One minute to conclude, or rather to sum up and recapitulate. Populations in the developed world are due to age dramatically, and in many cases enter a gathering decline. At least over the next 25 years, the relevant demographic outcomes are locked in. In theory, there could be important implications for financial markets which would act through several avenues: rising old age dependency burdens; falling private savings rates; slower growth in GDP and investment demand; and shifts in the direction and magnitude of global capital flows. Obviously what

happens, what we think will happen, needs to be based in part on the evaluation of existing empirical evidence on the linkages, of these various linkages of demographics and financial markets. Also, it is important to stress that there is also a substantial degree of judgment involved; this judgment needs to be made explicit. What we think is going to happen depends to a very significant degree on what we think fiscal policy responses are going to be. These may diverge between countries. It may also, given the whole international capital flow dimension, depend crucially on what we think about the future of globalization and whether in fact a younger and faster growing developing world will be able to prop up our aging welfare states. Thank you.

Laurence Meyer: Thank you very much, Richard. That got us off to a really great start. We're going right to the second panel.

Alternative Fiscal Scenarios: Train Wreck or Return to Sanity?

Presenters: **Douglas Holtz-Eakin**, Paul Volcker Chair and Director, Center for Geoeconomic Studies, Council on Foreign Relations
 Laurence Kotlikoff, Professor of Economics, Boston University

Douglas Holtz-Eakin: Welcome to the second session, which is “Alternative Fiscal Scenarios: Train Wreck or Return to Sanity?” I am Douglas Holtz-Eakin and I will serve as both the moderator and the presenter in this session. And in my former role, I want to introduce Larry Kotlikoff from Boston University. And then I will follow up.

Laurence Kotlikoff: I want to thank all three organizations for hosting this event and inviting me to speak. So let me start out by just posing the question of the conference: Is this a train wreck or return to fiscal sanity? I think the answer is clearly that it is a train wreck. Every piece of evidence I’ve seen points in that direction. I want to stress with you right from the get-go that there is lots of evidence that may point in the opposite direction that I don’t believe is real evidence. As an example of that, the debt to GDP ratio in the United States is not particularly high compared to other countries. I want to make clear from the get-go that there are numbers out there that are not even worth considering because they have no economic basis. One of those is the stock of debt in any particular country. The official debt numbers, deficit numbers, tax flows, transfer flows, these numbers are really measures in search of an economic context, have no real economic basis. I’ve been arguing this for years (hasn’t actually made a big dent in the consciousness of lots of economists and economic analysts), but the reality is that how we label our government receipts and payments will generate what we report to be the time path of government debt and the labeling is really a matter of language, not a matter of economics.

The latest diatribe on this point is an article I wrote with Jerry Green (who is a theorist at Harvard) on my website, called “On the General Relativity of Fiscal Language,” because we kind of make the analogy with physics (not to suggest there’s any connection between us and Einstein). But in physics, they have a measurement problem too when it comes to time and distance, not well defined concepts. Measurement of time and distance depends on time and speed. People can have different measurements of time and distance in physics, measurement of time not meaningful, an illusion as Einstein indicated. It’s exactly the same for the standard measures of our fiscal realities that they too are illusions, not fundamental to what’s going on. So we have this emperor’s new clothes problem.

I’m going to try to talk in more fundamental terms of what’s going on. Richard did an excellent job of going through the demographics, I’m going to breeze through thus in slightly different ways. We are going to experience this unprecedented aging, due to longevity changes and birth rate declines, going to be enormous economic and social consequences. We are going to see major depopulations in Japan, Europe, China, Russia, and all of Eastern Europe for that matter. What’s going on could well bankrupt the United States, Europe, Japan, and China, although I think the United States is in worse fiscal shape than any other regions of the world. I think we

could end up with high inflation, if not hyperinflation. The aging process has begun, one-fifth of Japanese are now 65 or over. The oldest baby boomer is George Bush, apparently he's age 60. European and Japanese workforces are already now shrinking. Japan is already depopulating; they're experiencing negative population growth. Europe starts down this path in 4 years.

So these are the population shares. As Richard indicated, the United States is the young kid on the block. We're still going to be relatively old. The whole country will be older than Florida is today by the mid century. We have very low fertility rates; the Italians have a rate of 1.2. I don't think the Italians aren't having any sex, rather to the contrary. I think the Italian women are trying not to have any men. The life expectancy is projected to rise dramatically and has risen and continued to rise, and where we see some striking numbers about the absolute population size. The U.S. population is going to rise by 100 million through the end of the century. The European population is going to be falling by 80 million, huge swing in absolute number of people in Europe and the United States. Japan by the end of the century could have half the population it has today. It's pretty striking; things can happen here.

These are some demographic shockers to use for your cocktail party over the weekend. The life expectancy for Russia for males is now 59, in Japan it's 86. Minorities in the United States account for 90 percent of population growth. By 2060, U.S. minorities will be the majority. Fully developed China will constitute more than two-thirds of the developed world. That may happen by the middle of the century if China continues to grow. So the United States may be Canada to the United States...that could be our relationship to China in the middle of the century. So we could just be a bit player to the developed world at that point. We're going to have enough people age 100 and over to fill Washington, D.C. by 2050. France could be a Muslim country by 2050. Right now, one half of 65 year U.S. couples will have a member live to age 92 and a quarter will have a member live to age 97. That's based on current mortality. U.S. females in top college outnumber males 1.3 to 1. I find that really interesting. It's a good time to be a male in college. Roughly half of U.S. children today will live with only one parent to age 18. I'm not sure if this statistic is correct, but I got it from a credible website, but I believe 80 percent of black men under 35 have a criminal record. That tells you what's going on in that population and how society has failed that population.

Here's another striking fact, I double-checked it. I could be wrong, but the average Social Security/Medicare/Medicaid payment to an older person today is over \$30,000. If you take \$30,000 and multiple it by 77 million baby boomers, you get a number in the trillions of dollars, and of course a \$30,000 benefit payment in real dollars is low compared to what the boomers are going to be receiving. So you get a sense of the magnitude of what is coming in terms of fiscal obligations. \$30,000 is 80 percent of U.S. per capita GDP. It exceeds GDP in most countries in the world. And health care spending represents roughly half of this total. And the health care component has been growing at incredible rates.

Here's a table that shows you, over the last three decades or so, that benefit levels in the United States have been growing in real terms annually at the rate of 4.6 percent, in Japan been growing at 3.57 percent, Germany 3.3 percent. These are all in some sense unsustainable rates. But Herb Stein, the famous economist, used to say what can't go on will stop. But I think what Herb really should have said was what can't go on will stop too late. And if we get these benefit levels too

high up (we can't even slow their growth, I can't see how we'll have the political will to cut their real levels), if we can't cut them, the game will be over. And it doesn't take 50 years for these benefit levels to rise. Real Medicare benefit levels are projected by the CBO to grow 17 percent in real terms, just in this year, thanks to the Part D drug benefits (that's not the only factor, but that's one of it). At least a couple years ago, they had slightly different projects from now, but this was the under Doug's able leadership at the CBO. The share of GDP devoted to Medicare/Medicaid is projected out to the end of the century to be 25percent, just in those two programs which don't even cover the entire population, or even the majority of the population.

So who's watching the shop? It's obviously not this administration, or the previous administration, or the previous administrations. We have a bunch of children running the country, and we've had that problem for some time now. And we adults are supposed to be taking care for the next generation, for our kids, and we're not doing that, because, just look at what's happened since 2000. The share of GDP that's been devote to discretionary spending as a share of GDP has gone up by 25 percent. We've spent almost a half a trillion dollars on Iraq, and the conditions getting worse each day. CBO is predicting a real growth of 17 percent for just this year in Medicaid spending, and we're expecting (just by 10 years from now according to the CBO) an increase in these entitlements as a share of GDP equaling 42 percent. So again, this is happening right now. We don't have to wait 50 years to see excessive spending on the elderly; it's happening right in front of our faces, we're just not paying that much attention.

The fiscal gap, which I'm going to mention right now, is going to rise by 1.5 trillion according to my estimate just this year, in a single year. So what is the fiscal gap? The fiscal gap is the best comprehensive measure of our long-term fiscal position and it looks at this present value of all expenditures into the future over the infinite horizon and compares that with the present value of receipts. You might say: looking at the infinite horizon is nutty, looking into the future where you don't know what's going to happen, discounting, and making a very speculative calculation. That's absolutely the case. There're lots of uncertainties about what's going to happen in the future, but economic theory tells us, neoclassical economics tells us that this is the only well-defined measure of our long-term as well as our short-term and medium-term fiscal situation.

This labeling problem that I mentioned is such that we can't truncate our projections and form the present value. We can't look at 10 years and form the present value of what's happening over the next 10 years, 20 years, 75 years as our Social Security Trustees want to do, because what we see over any given finite period of time in terms of our present value calculation is a function of our fiscal language, labels, which again has no economic bearing on anything. So the only calculations which are well-defined, label free, are these infinite horizon present values. So we have no alternative to looking at the fiscal gap. This is the only thing we should be looking at. We should not pay attention deficits or debt numbers for any country nor should we be paying attention to taxes per se, or transfer payments per se, because they also are totally dependent on our language. And any derivative measure like private saving, personal saving, disposable income: these numbers are also complete nonsense.

So the U.S. fiscal gap right now is 63.3 trillion, which is calculated by Jagadeesh Gokhale at the Cato Institute and Kent Smetters. It's an update of their 2002 Treasury study which was censored by the Bush administration at the same time Paul O'Neill was fired. He was about to

publish a number that was much smaller, 45 trillion in the President's budget. He was fired, and two days later the report was censored. The gap is a whole lot bigger now because it's growing with interest. If you don't pay it it's like a credit card bill, it gets bigger. And we've expanding spending on Medicare dramatically and we've also had a third tax cut, so things have gotten worse. To get a sense of what you need to do to come up with 63 trillion in present value (and this is all getting to the point of why this is a train wreck) just look at what you need to do to close the fiscal gap. One option is an immediate and permanent 70 percent hike in personal and corporate tax. Another option is 109 percent immediate and permanent hike in payroll tax. Third option is shutting down the federal government, including all the military spending. All the spending for...you know, the President won't be able to fuel up Air Force One. Another option would be to basically cut in half Social Security and Medicare spending, immediately and permanently. So if you wait to do one or some combination of these things, wait 5 years, 10 years. The pain gets worse for those who experience it.

Now, what is this administration up to? Like the previous administration, it's engaged in no real Social Security reform, also no Medicare or Medicaid reform. But this administration has also dramatically increased Medicare, no tax reform, and huge rise in discretionary spending. So the situation in terms of the fiscal gap has gotten significantly worse.

Now the Wall Street Journal, I don't know if you saw the editorial about a week or so ago, suggested that this concern that I have been raising is all hogwash, and that we have first of all plenty of assets to deal with our fiscal gap. Well, we also have liabilities to offset these private sector assets that the WSJ references. So the private sector net worth is somewhere around 35 trillion, the fiscal gap is around 66 trillion, and the private sector is not exactly volunteering to hand over their wealth to cover the government's shortfall, so that's complete nonsense. The second point the WSJ suggested was that our debt to GDP ratio is low. And again, that's complete nonsense, because those numbers don't mean anything. If we use different labels, we can show that the debt to GDP ratio is just gigantic. We can make it 50 if you want with the right set of words. The Wall Street Journal also suggests that we could just eliminate Medicare and Medicaid over night, and deal with the problem that way. But that's just ludicrous. It will politically never happen.

They said in the WSJ that we could easily cut these benefits and that those benefits were up for grabs. And the official debt, defaulting on that? That's a legal obligation, so we weren't going to do that, but we were going to default on these implicit obligations. This is all legal mumbo-jumbo, in terms of economics and politics. We're going to inflate and wipe out the real value of those official bonds much sooner than we're going to cut Social Security benefits. And again, I want you to think about something that can't go on stop too late. If we get these benefit levels up, and even if we can cut them somewhat, if we have these benefit levels up so high, young generations are going to have to pay these very high benefit levels to the contemporaneous older generation. So you're going to have a economy that's constantly drowning in fiscal obligations. That sounds a whole lot like Argentina. That's where we're headed. We're not immune from the Argentine kind of policy and implications. So I think the WSJ must stand for We Smoke Joints, or We Speak Jive, or something of that nature. They also think we can immigrate our way out of this. But careful studies by economists Alan Auerbach and Phil Oreopoulos have

done a very careful study of all the costs of immigration and all the costs, and it's basically a wash. So immigration isn't a solution.

And you know, Jeremy Siegel is going to tell us today we can count on China to provide capital to the United States. And I think that's a real possibility that China could bring in lots of capital if they continue to save at the very high rates they are now saving at. But it's a bit of a long shot, whether we would be willing to import, basically have China and India do most of the investing in the United States. Could raise the real wages and increase the tax base and increase our fiscal situation and the fiscal gap, because the fiscal gap calculations are partially equilibrium and are not taking into account general equilibrium feedback effect, and I've done some simulations studies which suggest that China can help a lot, but we're not willing to even allow China to buy a single small oil company, so who knows, China has other places to invest its money.

So other countries around the world face these same problems that we're facing, but they're at least getting on with trying to make fundamental reforms. I think we have, the United Kingdom has done major things going back to Thatcher. Japan, France, Italy, Sweden, and Germany have engaged in at least initial pensions reforms. I don't think they've done enough, at least on going. Italy has done a major pension reform. I don't know if it's sustainable, have cut long term replacement rates by about 40 percent. Our system is a fee-for-services system, so I think we're going to have a hard time controlling the spending in the health care sector, much harder than the other countries. That's why I think we're in worse fiscal shape.

I have proposals in an article that's coauthored with Neil Ferguson, came out in the New Republic, called the New New Deal (it's on my website) I sent to all 100 senators. Senator DeMint got in touch with me, no one else read it. There are proposals that are very simple, they fit on a postcard. They meet the criteria for politicians to pay attention, they can be read very quickly, but no one wants to think of anything radical or new. I think we're going to go critical; we're going to get the point that people in the financial community start paying attention. They're going to start selling bonds; interest rates are going to go up. Ben Bernanke, who I have the deepest respect for, is going to be forced to accommodate this by printing money and trying to lower rates, and we're going to have inflation taking off because of that process. And we could easily end up with hyperinflation and that's going to damage the economy. Real interest rates would be very high as well as nominal rates and if you look at the potential for this, China has three quarter trillion in U.S. treasuries, could easily dump or start selling them. I wouldn't hold these things if I were China.

Our national saving rate which is a well defined measure, which is label free, is going down the tube. This is one thing you expect to see when you simulate life-cycle economies that are in a death cycle. You see you take more and more resources from young people that would otherwise be saved and hand them to older people who will spend them. And the reason our national saving rate has gone down the tubes is not because the government is consuming more of our output, but rather that the private sector is consuming more. It's the elderly that are doing; the increase in spending as a share of GDP is coming from that group. So we are on our way to a negative national saving rate and at some point all these factors are going to be sufficiently evident to the folks on Wall Street that they're going to start selling U.S. securities. So here's my final message: hyperinflation is just around the corner, we're going to see sky high interest

rates, that could happen this afternoon, after you leave this afternoon and start selling your positions, Fed independence is a myth, the bond market is going to tank, where U.S. bonds go the stock market is going to follow, where the U.S. market goes the real economy is going to go as well. All bad news, but that's where we are.

Douglas Holtz-Eakin: So here's the meaningless federal debt as a fraction of the GDP. This is debt in the hands of the public. I'm going to use this as an indicator of the status of things. The numerator's useful because it measures the cumulative mismatch between monies flowing into the federal government and spending going out. The denominator is nice because it shows the scale of real economic activity. As a result, you could actually have policies that the numerator worse but the denominator better, and actually get the right answer as an indicator of the status of things. That's the indicator I'm going to use, and that's the history. You can see there's no monotonicity in that. It does go up, and it also goes down. And I'm going to come back to that in my discussion. This is the problem, you've heard a lot about it, the U.S. version (and I'm going to focus on the United States because Larry pointed out there are a lot of challenges in there). We're going to see this globally, as Richard Jackson made it very clear. The thing I'd like to focus on for the United States in this case is there are really two parts to the problem, given the general aging you'll see this rise, but given the baby boom you'll see a very sharp increase to 2030 and a more modern increase thereafter. So the policy problem comes in two steps. So the problem is how will the United States deal with this?

Here's the problem: this is debt in the hands of the public as a fraction of GDP projected under a variety of scenarios. This includes three scenarios for spending, two scenarios for tax policy; imagine six total scenarios. Larry's scenario, searching for our inner Argentina, is scenario one. And as he's pointed out, what he wants to do is to focus not on this particular time path, but on the integral of everything underneath scenario one at the top from now to forever. And I'm simply shocked it converges, but that's the number he's got. I think it's important to be cognizant of that. There's no question we need to know what the total scale of commitment is, and the total scale of dedicated resources look like. But the ultimate question for this session is one in which political pressures cause things to change or not, and politicians are creatures of timing. Things will be relatively slow in Washington between now and November, a tribute for their deep respect for timing. I think showing the time path is important because it shows you some of the political dimensions.

These are the six scenarios. I want you to focus on scenario three. Scenario three, you will notice, is the one in which there is a steady debt to GDP ratio. This is the one that suggests that there is no train wreck, that it's just business as usual. I want to sketch what scenario three looks like. Scenario three is an attempt to do business as usual in the United States. What does that take? On the revenues side the federal government raises 18 percent of GDP in revenues. It typically spends 20 percent of GDP and borrows the 2 percent difference. That, by the way, is basically how the federal government will close its books this year, fiscal year 2006, deficit 2 percent of GDP. So scenario three, we're going to raise 18 percent of GDP in federal revenues. On the spending side, you will probably have to think about how to do this.

The first thing we'll do is just honor the scheduled benefits and Social Security. There is no particular evidence that despite the manifest importance of reforming Social Security, we're

going to do it soon. So I just left scheduled benefits, Social Security as promised. That means that they're going to rise with the demography we have seen from about 4-4.5 percent of GDP to 6.5 percent of GDP in 2030 and drift north there afterward. The second thing we're going to do is simply ratify the administration's position that you should hold non-security spending flat in nominal terms. The administration wants to hold non-defense discretionary spending, non homeland security spending flat for 5 years. I'm going to go to 2050 just absolutely nominal, flat. That, you should not minimize the political difficulty of doing. The third thing I want to do to get scenario three is to reverse a bit the current policy of increasing defense spending. The basic defense policy in the United States, this is spending outside of Iraq and Afghanistan, will raise real defense spending by about another 10-15 percent over the next 15 years. It will be well above the height of the Cold War in real terms. Scenario three is one in which real defense spending is cut immediate by 25 percent, a reversal, and you hold flat spending thereafter in nominal terms. So it's a very severe reversal of the administration's policy. Given that, a lot of political will, keep taxes at 18 percent, don't make tax cuts permanent, nominal spending flat for defense and non defense, defense taking a 25 percent cut; the only thing you need at that point is a miracle. The miracle is the immediate cessation of the slide that Larry showed about the relationship between spending per capita on health and GDP per capita. Where in the United States, that horse race between spending and resources for spending, spending has won by about 2.5 percent a year for three decades, in scenario three, health care spending per capita drops to the rate of GDP growth per capita and that allows you to have a stable ratio of debt to GDP.

So what does that tell you about the future and what it would take to avoid a train wreck? It tells you that number one, you've got to give up on business as usual, because business as usual is nothing like scenario three. Scenario three is one in which there are very, very stringent fiscal controls on the spending side. And even with those, the only way to accommodate the retirement of the baby boom is to have a miracle in health spending. Number two, you have to deal with health care costs in the United States. And number three, you cannot do any of the list of things that Larry mentioned: you can tax your way out of this, you can't immigrate your way out of this, you can't barter your way out of this, you have to deal with this. So this is one in which we have to get some actual political pressures that determine a new future.

So why do I think it's sensible to say that we're not going to run into the fiscal wall and have a train wreck? First of all, I think I just disagree on the political dynamics with Larry. I find it hard to believe that, faced with these kinds of pressures, the only political response that the world's most successful representative democracy would generate would be the loss of central bank independence. I think there are other margins along which we might adjust. And history says we do adjust. It's easy to characterize these numbers as immutable, but if one looks back just over my career as a professional economist, we've seen all parts of the federal budget adjust, and adjust appropriately. We've seen taxes go up, go down, reformed, so we do anything in principle on the tax side. We've expanded a major entitlement program, Part D, we've cut back the Greenspan Commission on Social Security reform, we've raised and lowered defense spending, and we have raised and lower non-defense spending. So history says it can happen that the U.S. political system is sufficiently flexible; that this is something we can't rule out. What would cause it to happen? Well, looking out there right now, there's already concern about the scale of the U.S. debt held by foreign entities. China gets the most attention, but there are

others. And whether this is rational or not is almost immaterial. Our politicians are cognizant to it and are loath to issue more debt knowing it will place it in the hands of foreign lenders.

Number two, an increasing fraction of the revenues in the 18 percent of scenario three are coming from the Alternative Minimum Tax which politicians have already said is an unacceptable trend and that will place a great deal of additional pressure on both eliminating the AMT and as a result either reforming the tax system to make more efficient, or controlling spending, which is necessary. That means that both taxes and spending will be on the political table. There is no way to avoid that and that's the necessary condition for some sort of fiscal fix to avoid the train wreck.

The pressure will rise beginning in 2010. The Social Security surplus will peak every year thereafter. One will see an increasing pressure on policymakers to find a way to make the federal budget add up without using Social Security surplus to pay for Iraq, Afghanistan, education, highways, you name it. And then the real political dynamics begin. We'll have a presidential election in 2008. Those candidates will seek to be elected in 2008 and reelected in 2012. That's just how these people are. That means they want to govern in 2016, regardless of who wins. Well, there are lots of ways you can shade these trends between now and 2010, now and 2012, but there's no good way to kick this can all the way to 2016, regardless of which candidate's leg is kicking it. That means that candidates for the 2008 election will have to come to grips at least internally with the nature of the fiscal problem and to start outlining a fix because it will happen on their watch. Now the second thing about presidents is that they don't seem to like to deliver all the bad news in their second term. It seems to lead to bad legacies. That means that the fix doesn't happen in 2012 to 2016. The politics are to get out ahead of it and start doing what you can in your first term, that means at least implicitly foreshadow this during the election.

Now the cynics will say no candidates will run and say we have to come to terms to that, but then the third piece comes in. And that is the same bill that gave us the prescription benefit included the groundhog day shaming mechanism in Medicare spending. The Medicare Modernization Act has a provision that says then that when Medicare requires more than 45 percent general revenue for its financing, in a forecast period of 7 years, the actuaries have to highlight this and the Trustees have to report it. They've done this once. They'll do this again next March, March 2007. And at that point, the law requires the president of the United States to submit proposals in the subsequent budget which fixes the excess of spending over revenues. That says that in February 2008, during an election year, the president of the United States will submit proposals to scale back Medicare because of the perceived draw on federal revenues. That's a political election year, that will make it inevitable that the even the cynical candidate who wants to deal with it but not talk about, it, will have to talk about it. As a footnote, it doesn't guarantee action on the part of the Congress. The MMA has all sorts of expedited procedures for them to consider this, but they don't actually have to do anything, so it will put it on the political calendar. So this is a question of whether the United States will regain its fiscal sanity, that is a political question. It is a threshold issue that political candidates talk about that, and I believe it's going to happen.

So why would this also finally take shape? The key is health, and the health care problem is not a problem which is uniquely the structure of Medicare and Medicaid. It's true that Social Security is a design problem. It's a program that picks up money from one area of the economy and drops it in another; it's a problem with the structure. It's not the biggest part of the problem, the healthcare problem is. That's a national health care problem, not a Medicare/Medicaid problem. That means there are simultaneously pressures outside the political system, pressures on the part of the employers to pass more and more costs of employer sponsored insurance to the employees, higher premiums, greater copays, bigger deductibles, pressures on the part of the state and local governments to scale back Medicaid programs. The upshot of those pressures will be the increasing uninsurance in the U.S. population as employers scale back and drop their coverage, as Medicare and Medicaid get scaled back. The convergence will be quite dramatic and it may be difficult to make these changes, and the train wreck will be a political one.

But I believe the United States will in fact make these changes, and as a result, this is the central piece of the big impact of the United States, I think the financial market implications will be relatively modest. We will get the fix in the long-term. We will not see the dramatic spike in interest rates. We won't see a dramatic creating of equity markets. We'll see them, through arbitrage, match up with trades in bond markets, and we won't see hyperinflation in the United States. We'll see an inflationary path that is chosen by the Fed based on its ability to control the traditional metrics of monetary policy and the shocks that hit the economy.

So I disagree with Larry. I agree that scenario one, the top line is current law. I believe it's implausible that the United States will adhere to current law. The remainder of the lines are pretty easy to sketch out. Scenarios two, four, and five are all scenarios in which you either raise more revenue and or have greater spending, you notice that you cannot tax you're way out of this, if you raise taxes to 35 percent of GDP, you still see spiraling upward of debt. Scenario six you can ignore, there are no spending pressure and we raise taxes anyway, and that would mean the Republican Party was gone, and I'm not forecasting that today. Thank you very much.

At this point we will open the floor to questions. If you could just identify yourself when you ask your question and ask your question in the form of a question.

Question: I'm Brian from Macroeconomic Advisers. I definitely agree with Doug's skepticism that Federal Reserve independence is a myth, and we would get this outcome of hyperinflation. But even if we entertain that possibility, you know a lot of these entitlements are indexed to inflation, and I wondered what fraction of that 63.3 trillion dollar problem would be solved by unexpected inflation.

Doug Holtz-Eakin: That's an excellent question. The United States has Social Security formally indexed, but there are other spending programs, including discretionary spending. When you think about it, that is mostly going to the wages of civil servants and the military. Those really have to be indexed to inflation in the political system. Medicare/Medicaid seem to be uber-indexed, given the way things work here. So you see that the ability of the U.S. government to get real resources, or really make money by making money, is rather limited. Let's say it this way. We have a narrow base in terms of generating seniorage. If you raise

prices enough, you'll wipe out 5 trillion worth of debt, a lot of that in the hands of the public, in the hands of the Chinese, so that'll get you somewhere towards the 63.3 trillion. But the point of this is not that the fact that this monetary base, this potential for making money by making money, is small and therefore we will not be printing money. It's rather because it's so small, we'll print lots of money to try and beat the indexation, that we're going to have accelerating inflation in order to try and from this very small base to generate a lot resources and beat the inflation. That's what I think raises the potential for hyperinflation more in this country than in other countries.

Question: I'm James Francis with the State of Florida. I agree with Larry that health care is the real issue, and I'm wondering if there's any data regarding decomposing this increase in longevity into two factors: how much of that is due to healthier lifestyles, which is a good thing, because it means people can work longer, and how much is due to the fact that we stuck our finger in Darwin's eye and we've got all these wonderful surgical and medical advances that we really can't afford as a society.

Laurence Kotlikoff: Well there's some evidence for that. We know that there are a lot of the expenditures at the very end of life, and that if we could just shoot them three months before they die, a lot of this expense would go away, but we can't do that. My view is that whatever is going on, some people think that people are going to be working, healthier for longer, maybe they won't cost as much. We've had decades of experiencing increasing longevity and increased health expenditures, the cost just goes up. So whatever process is going on, we can look at the history and infer the future from it. I don't see any changes that are going to happen to this dynamic that will somehow save us a lot of money. Certainly the people who really know about this, the demographers, the actuaries, don't seem to be projecting that. Maybe Doug has a different take.

Question: Larry Meyer (of Macroeconomic Advisers). It seems to me, Larry and Doug, that you're really doing completely different exercises. What Larry seems to be doing, and correct me if I'm wrong, you're not making a forecast, you're extrapolating what would happen if there's no policy response. It's a great way of dramatizing the problem. Do you have any policy recommendations in your analysis or are you only extrapolating? And if you are only extrapolating (that is not a forecast) would you care to make a forecast?

Larry: The calculations were not done by myself, but again by Jagadeesh Gokhale and Ken Smetters. And based on this very extensive year-long work, they made pretty optimistic assumptions about demographics: how long we would, how soon we would die. That's optimistic in these contexts. They also assume that the excess growth in benefit levels relative to GDP per capita growth were rather modest compared to what we've seen in the past and would stop after 50 years. So they have, implicitly, a policy scenario which I think is on the optimist side, so I think 63 trillion is, if anything, an optimist estimate. You can run different scenarios but I think what Doug was saying, keeping nominal spending fixed for years means real cuts in spending for years. And coming up with some way to restrain health care benefit growth requires some real dramatic institutional change, some radical reform, because we tried for decades now to get control of these benefits levels, and we haven't. We're the worst, apart from Norway, in the growth of real benefit levels. Clearly, I'm not saying this stuff is all bad, my

Mom's enjoying Part D. The fact that elderly people have this insurance is a big plus, and I kind of applaud the Bush administration for going down this path. But the elderly have to be asked to pay for what they're getting. They can't put the whole bill on young and future generations. That's why I advocate a sales tax, which would shift the burden to rich middle class, away from younger people. Hopefully I answered your question.

Doug: I think that they are different exercises. Given what I know about the way Jagadeesh and Ken do the work, they're close to the line that looks like scenario. That's one that implicitly assumes that health care spending does slow in the future without a cause specified. That's the actuaries and Trustees assumption in Medicare, where Medicare/Medicaid don't rise to 20 percent of GDP, under current law rise to 12 percent of GDP, currently at 4. They are extrapolations, fundamentally. Those lines are all extrapolations. Questions are twofold: 1) can the political system come to grips with this and change current law, and I believe the answer is yes, and then 2) what should they do? And I left out of my remarks the right way to fix this, but obviously it's most important that we fix it. We might all disagree about the best policy, but there's a far amount of unanimity over getting things in line, over the long-term. It's the threshold question.

Question: Hi, Isabella McRae from the British Embassy. I was just wondering if Doug could give a bit more information about the presidential candidates next year and more different policies they're likely to take on this.

Doug: I'm good, but I'm not that good. I have no idea who's going to run. I hope a stronger race, which is that it isn't personality driven. In fact the, certainly the fiscal plus the political dynamics are one in which candidates, regardless of party, race, gender, will have to come to terms with this. It will be part of being elected president, and that's the one thing they have in common.

Question: John Praveen from Prudential. [inaudible] What about raising the retirement age and how much is that going to help in mitigating this problem?

Doug: Raising the retirement age for Social Security and the receipt age for Medicare? If you raise that overnight from 67 in Social Security, let's say you made it 75 today. Starting tomorrow, everyone hitting 65 today would not get Social Security and Medicare until 75. You would have complete revolution in the street by older people, and middle age people, so anything you do is going to have to, in terms of raising the age, would have to occur gradually. Present value doesn't generate enough, so it's a non-starter. Surely it will happen as part of other things that will eventually happen, my concern is that it will happen too late. You can see we're captive of these ridiculous numbers we have. If we had different labels, we would be showing at 1.5 trillion dollars, not a 300 billion, or we could be showing a 5 trillion deficit this year. And then the Chinese would be very nervous about holding their bonds, and we'd have this financial meltdown that I'm predicting. We'd have it happen literally today, and then we'd get some adjustment. We're really victimized by bad language and bad economics ultimately.

Question: I find your numbers, Doug, are more alarming than Larry's here. To get to scenario three, if you assume 3 percent rate of inflation, you're talking about 75 percent decline in

government spending over the next 4-5 years. Yet you seem to attach a fairly high probability to some serious political action. That's an awful lot of action.

Doug: To be clear, I'm not saying we're going to get scenario three. We'll always have taxes between 18 percent and 20 percent. That debt to GDP ratio will stabilize somewhere in the 2040s. But I believe the pressures in any of those other scenarios will generate something that will stabilize this perhaps at a higher debt to GDP ratio, certainly with greater health care spending, zero spending per capita growth, or GDP growth. I just think the presumption that the political system will allow everything to spiral out of control is really misplaced. That's the major message.

Question: Brian Horrigan, Loomis Sayles. Quick question for Larry. Those matters are a menu of pain for the United States. How do we get out of this? What does the menu of pain look like for Western Europe and Japan?

Larry: Well, in some ways, more severe. But the Japanese are already engaged in a major pension reform, and I think they have another one coming, which together may reduce these replacement rates by 40 percent. They have a state run health care system. So they have direct control over spending. So they seem to be in the position to, over time, keep real benefit levels growing with per capita GDP rather than twice as fast. We don't have that kind of control. I think that they have in some sense a worse situation, because they're aging more significantly, but they're taking control of their situation, unlike our country. I think things are not going to spiral out of control. I think they have spiraled out of control. We are bankrupt already as we sit here today; we are in dire shape. When you let Medicare spending levels grow at 17 percent in real terms, just this year, you're nuts.

Question: Dick Hoey, Dreyfus Corporation. My question is about whether there are early signs of attitudinal change to reality. When the baby boomers graduated from college, there weren't enough good jobs, so they created an ideology of tune in, drop out, and went off for somewhere for about 10 years before they came back and found a new job. Is there any change of attitude about what is right in terms of the medical care demanded in the last 3-5 months of the life? Any signs of an attitudinal change that would make Herb Stein write sooner or later.

Larry: This is a role reversal for me. I'm usually doing Larry's voice of doom. I've been surprised at the extent to which qualitatively the U.S. public knows there's a problem; they don't get the magnitude right, they don't get the timing right. That's why I think the necessary condition to get this thing going is to have presidential candidates talk about it. That's how you educate them. The experience of this president in trying to "reform Social Security," is quite illustrative in that regard. People didn't really understand the problem. The education was insufficient to get the reform to have a broad base. I think that's part of it. The attitudinal change comes with raising it to that level on the national debate.

Question: Joel Prakken, Macroeconomic Advisers. For Larry. Back to forecast vs. extrapolation. Rewind the clock to the early 60s. The depression of World War II over, Social Security has been invented so that the baby boom phenomenon is in train, Medicare and Medicaid are legislated; would your measure of fiscal liability have shown us bankrupt in 1960

or 65, and as a young phenom (as you must have been at that age), would you have been predicting hyperinflation in 2006, 50 years later?

Larry: That's a good question. Certainly back in 1960, we had 5-6 percent payroll tax rate. Today we have 15.3 percent. We didn't have the aging prospects back in 1960. We were in the middle of the baby boom. We would have looked relatively okay. There are countries when we did these fiscal gap analyses, including the United Kingdom, Australia, New Zealand, old British Empire (I don't know about India), including Canada; that fiscal gap, that's close to zero. I don't think I would have been predicting the kinds of problems I predict today. And also you have to realize that, when you simulate these kinds of fiscal policies in large-scale dynamic life-cycle simulation models, which I spent a fair amount of my career doing, the transition paths are very slow. That's the most important message. These things are like a slowly growing cancer. At some point, they really do kill you. You cannot get out from under them without major surgery. And some countries have not done that. Argentina and Brazil are good examples.

Question: [inaudible], Fortress Investment Group. One short question for each of you. Larry, could you give a relative attribution of how much of the problems you think comes from the baby boomer bulge itself entering retirement and how much from the expansion of benefits? Doug, turning to you, the kinds of things you're talking about—these problems coming to politicians, and that gradually countries adjust themselves. Well in a sense, those things have happened in Europe over the last 10 years, but they've not been confronted without tremendous stagnation and half measures that are quite far from complete. Is that what you would forecast here or is there something in the U.S. process that makes it better?

Larry: In the first four years, the Bush administration's handling of the economy, real Medicare and Medicaid benefit levels grew 16 times faster than real wages for workers, so out of control. If we go that under control, if we had real benefit levels and Medicare/Medicaid grow at the same rate as average wages per worker, we could get rid of about 40 percent of the fiscal gap. That is my rough guesstimate.

Doug: I think there are two different kinds of adjustments. First of all, there is a political pain, regardless. But the nature of the problems are those in Social Security vs. Medicare/Medicaid. Social Security problems could be fixed tomorrow. It's baked in the demographic cake, it needs money, we know how to fix it. Medicare/Medicaid will involve incremental changes because it's about the health care system as a whole, and changing that overnight is both undesirable and unfeasible. So I think we'll have some muddling, there's no question. But my point is simply that, while the transition from here to 2030 might not be pretty, we're not going to end up with hitting a wall when we hit 2031. Thank you.

Frameworks for Analyzing the Macroeconomic Implications

Moderator: **Joel Prakken**, Chairman, Macroeconomic Advisers, LLC

Presenters: **David Weil**, Professor of Economics, Brown University
 Barry Bosworth, Senior Fellow and Robert Roosa Chair, The
 Brookings Institution

Joel Prakken: To advance this discussion today we have two distinguished panelists, David Weil from Brown University and Barry Bosworth from the Brookings Institution. What we've asked them to do is to put into focus for us three macroeconomic factors: the relevance of the fiscal imbalance and how it would work through these models; the fact that the reduce in investment opportunities are a consequence of slower population growth; and something about the potential impact of foreign capital flows on financial markets in all of this. And then there's a macroeconomic consideration, and that's the impact of these life-cycle patterns of savings as the population ages. David is going to go first; his presentation is a little more analytical. Barry's is about parametrizing some of the coefficients in these models. So why don't we begin.

David Weil: As Richard Jackson laid out, population aging means there are going to be two changes in demographic measures. First, there are going to be changes of fractions of the population that are going to be in different age groups. For example, there's going to be a rise in the ratio of old people to working people. And second, there are going to be changes in the rates of growth of different demographic groups, most importantly a slowing in the growth rate of the working age population. So why do we care as macroeconomists? What about demographic changes are going to change the macroeconomy?

In a very abstract level, the reason we care is because people in different age groups interact with each other, that is that they supply and demand different services and goods, and the demands and supplies they bring to interactions are functions of their age. Put another way, population aging has macroeconomic effects because people's behavior typically follows the life-cycle; people do different things at different ages. Here, for example, is the life-time profile of labor income. This is primarily driven by the life-time labor supply. People don't supply much labor when they're young. They supply a lot of labor in middle age.

This is data for the United States for the year 2000. Labor supply tails off very rapidly in the 60s and goes close to zero. There's also a life-cycle to the type of labor that people supply. Young people supply energy and drive; older people supply experience and wisdom. There's a life-cycle pattern to saving, there's a life-cycle pattern to giving and receiving transfers of time to other members of your family, and, of course, there's a life-cycle pattern to paying taxes, receiving transfers from the government, or being a recipient of government spending.

This is data from Ron Lee and his colleagues breaking down private and public consumption in the United States by age group. The three top categories at the top there are public spending. The very highest one, the light blue, is public spending that can't be attributed to any particular

age, assigned an equal number of people of every age. The light green is public spending on education, which is concentrated on children, and the yellow is public spending on health, which is of course concentrated on old people. The biggest part of spending is the red area, which is private consumption which peaks in late middle age (which is the 50s) and then declines and is edged out by public health spending, which rises in old age. My point is that even if we aren't interested in the life-cycle *per se*, it's these individuals who get aggregated up to populations and that's going to have macroeconomic impact. So we have these individual behaviors, we have aggregate numbers of people in each age group, and then we have series of equilibrium conditions that have to hold when people of different age groups interact.

Let me be more explicit about that; there are going to be two kinds of equilibrium conditions, first there are equilibrium conditions regarding contemporaneous interactions, just thinking of different people at different sides of the market at different times. The first example is the relative wages of old people and young people, we know there is a lifetime wage profile that has an origin in two things. First of all, old people and young people supply different goods. Old people, for example, have more human capital. But secondly, the ratio of old people to young people as in economic interaction is going to affect the relative price of the goods they supply. So as the population ages, and as the work force ages, the good that older workers supply, this experience and wisdom, is going to be in greater supply and energy and drive of the young is going to be in shorter supply. So we should expect to see a change in the wages, with the wages for older people going down, which is unfortunate, because a lot of the solutions to the fiscal problems we've been talking about involve getting older people to work more, but their wages are going to fall.

The second example is the ages that people own capital and work are different, so changes in the age distribution of the population are going to change the ratio of capital supply to labor supply. In addition to contemporaneous interactions, you have intertemporal conditions. That is, people inherit from the past some state of the world; how much education they have, how much assets they have, how much debt they have. And similarly when people make their decisions about how to behave today, they look at the future. When I save today, I think about how the world looks tomorrow.

So we can put all together in a kind of schematic view about how aging affects macroeconomic equilibrium. We have three periods; the past, the present, and the future. On the picture I've labeled something age specific behavior. This is things that people do as a function of their age: working, receiving transfers from the government, and so on. On the right hand side you have prices and institutions. So in a purely economic model, the thing that would affect age specific behavior and be affected by it would be prices (things like the interest rate and wage rate). But in a broader model our age specific behavior, also affected by institutions like pension rules and Social Security.

We're going to have to tell a story about both prices and institutions adjusting. These age specific state variables are what you inherit from the past. And finally, the age structure of the population is what Richard Jackson talked about, the number of people in each age group. There is going to be equilibrium in a period based on what people inherited in the past (the age

structure of the population) and (this is the red arrow at the lower right of the screen) what people expect to happen in the future. The future affects the present through these expectations.

What happens when the age structure of the population changes? Something has to give. To maintain macroeconomic equilibrium, some age specific behavior has to change. A lot of what we're thinking about is which age specific behaviors are going to change in response to current and expected future changes in the age structure of the population. So given that background, there are two ways you can approach the issues we are interested in. First, you can do what I call the first round of the analysis: look at age specific behavior in the population, something we can get data on, and then look at the effect of changing age structure of the population by simply multiplying the number of people in each age group forecasted for the future by age specific behavior we observe today. That methodology has the advantage that it is very robust, but of course what it does not account for is how changes in prices and institutions in the future are going to affect age specific behavior.

The other way to go is a general equilibrium analysis in which we solve for actual changes in age specific behavior that will take place in response to changes in prices that will take place in the future. Of course, we have to do this in general equilibrium, because the prices depend on changed behavior and so on. And the problem with that is it only works if you have the correct model of how people are going to change their behavior in the future. That is the correct model of why we observe the age specific behaviors that we observe.

So why do we observe these age specific life-cycle behaviors? We have some answers, but not all of them. In the case of labor supply, we know that children don't supply labor because they're simply unable. On the other hand, if we look at the large decline in the labor supply by old people, that's not a biological necessity. That's something that results from the cultural, institutional, and economic environment in which old people find themselves. And one of the biggest questions we have to answer is what change in institutions, prices, or culture for that matter would be required to change that behavior. And as I say, some age specific behaviors are going to have change, and it's sort of a question of which ones it's going to be.

Let me take you through some first round analysis of aging. I'm going to talk about four different first round effects. They're not the only ones, but I think these are, other than the other fiscal story that's been told, the ones that are most important for thinking about the macroeconomic effects. The first two are going to come through the most basic channel of all: capital accumulation. So here's data from Jim Poterba on the age profile of both net worth and, what I'm going to focus on, net financial assets. Financial assets here include defined contribution pension plans. Because of the data limitations, I do not include defined benefit pension plans. I can take that cross-sectional profile of net financial assets, simply multiple it by the number of people in each age group, and create a forecast of how demographic change is going to change the total quantity of net financial assets in the economy. And this is what you get. You see that the growth rate of new financial assets, the part that is due to demography, is peaking around now and will be declining over the next several decades. So growth rate of net worth is falling. On the other hand, as mentioned by Richard Jackson, the growth rate of the working-age population is also falling. So when we think about capital per worker, both the numerator and the denominator are going to fall. So there are going to be two effects on interest

rates and equity prices: one from capital deepening and one from slower growth in the labor force.

So the capital deepening effect is going to work through this net financial assets for the working-age person. To do a back-of-the-envelope calculation, I'm going to start by assuming we have a closed economy, so all the capital stock in the economy is going to be financed by the net financial assets of Americans. So here's net financial assets per working-age person. You can see that rises by almost exactly 25 percent over the period 2010-2030. If we do the simplest kind of production function analysis, looking at GDP per worker as being a function of simply the capital stock per worker, I can solve for the marginal product of capital. And then look at the change in marginal capital between 2010 and 2030. There you see the algebra. So according to this very rough calibration, the marginal product of capital is going to fall by about 14 percent over this 20 year period. If you thought that the marginal product of capital in 2010 was 10 percent per year, that says the marginal product per capital will fall to 8.6 percent over that period. That's a pretty substantial fall. Of course this is gross of depreciation, so the net of depreciation marginal product of capital, which is what should map into the interest rate, should fall by even more. So that's a fairly large effect.

Of course there are a lot of things you can object to in this calculation. First, some of the net financial wealth of households is not found in the form of capital, it's found in the form of government debt. A lot of what we've been hearing is population aging is going to lead to a large increase in government debt, so if government debt soaks up that excess wealth, then that's not going to have any effect on the marginal product of capital. Far more importantly, it's hardly the case that capital in the United States is primarily funded by the savings of Americans (which is a good thing), so it may be that there will be no particularly tight link between net financial wealth of U.S. households and capital per worker in the U.S. economy.

Second effect is going to come from slower capital growth and there are going to be two reasons: one would be a slowdown in the accumulation in net assets, and the other one is a slowdown in the labor force. So let me now make what I think is an opposite assumption, but I think somewhat more realistic, that the marginal unit of capital is not funded at all by American savings, that there is some world interest rate that pins down the marginal capital in the United States. In that case the capital stock in the United States will grow at the same rate of the labor force, adjusted for productivity and so there's a Tobin's Q effect. If capital starts growing more slowly because the labor force is growing more slowly and the price of an installed unit of capital depends on the level of investment, then you get a decline in Tobin's Q, since you are now needing to invest less.

Here's the algebra behind that. Basically there's a key parameter, this letter A, which is the adjustment cost related to the investment capital ratio. This is something that macroeconomists are notoriously bad at estimating, so I've given you a bracketed range of values from 1 to 10, and looked at the actual reduction labor force growth over the period of 2000-2020 when it's largest. Even if I used the largest value of A that I can find the literature; that says that Tobin's Q over this 20 year period should decline by 3.1 percent. If I want to know what that does to the value of equity, I have to accommodate leverage. My colleague Eva Welch tells me that I should use a debt equity ratio of 1 for the U.S. corporate sector, so I doubled that number. So I get a decline

in the value of equity of 6.2 percent over 20 years, which isn't a lot. The most I can get out of it, if I goose it, is two-thirds a percent per year.

The third of these first rebound effects is going to be a change in the appetite for risk. So we know that the financial sector can take risk from corporate investments and slice it and dice it in all sorts of fun ways. But in the end someone has to bear that risk, and there's good reason to think that the willingness to bear risk is a function of age. Both in what we see in the data and the advice we give to investors, old people do not want to bear risk. If we have a change in the relative numbers of old and young people, that's going to change the appetite for risk.

I have some data on this. It comes from Steve Zeldes and his coauthor. This is cross sectional data on the equity share and asset holdings in the United States from a series of surveys on consumer finances from 1989 through 1998. The first thing you see in this picture is there is just a huge change in the equity share in people's portfolios. It's jumped by about 10 percent in these last 10 years. That has nothing to do with demographics. But the second thing you see is there is a hump shape to it. Old people like to hold less risky portfolios, so holding everything else constant, this should lead to an increase in the price of risk, an increase in the equity premium as we put more and more people in these age groups that are less happy to hold the risk. Someone has to hold the risk.

The last first round effect is something that Larry Meyer asked me to talk about (which is very hard to say anything good about), which is productivity growth. We know that productivity growth has played a huge role in both equity markets and the U.S. economy over the last several decades. The great thing about productivity growth is that, beyond that, we almost know nothing about it. We know very little about where it comes from, and less about how it's related to demographics. The pessimistic view would start by quoted the French demographer Alfred Sauvy, who famously said that an aged society would be one of old people living in old houses mulling over old ideas, which would suggest that population aging would not be very good for productivity growth. The one empirical paper that I know on this subject is work by James Fire at Dartmouth. It actually looks at cross country data on productivity growth and relates it to demographics, and takes account of time effects, not getting simply that the United States has gotten rapid productivity growth. The good news from that study, at least for me, is that the key to productivity growth is the population shares in the 40-49 and the 50-59 age groups. These are the high productivity inducing age groups. It's an empirical paper, so we don't know why, but here's the data, and you can see those are peaking around now. So that's potentially bad news for productivity growth over time.

So those are the first round effects. Let me talk some about what happens when you move beyond these first round effects, general equilibrium effects. I'm going to sketch some of the possibilities here, but, of course, once you start opening up this box of general equilibrium, anything is possible. First effect is that under most of the scenarios we can imagine there is going to be an increase in payroll taxes; it's an open question whether that's going to reduce labor supply. Recent work by Ed Prescott, comparing Europe and the United States, had pointed out that payroll taxes in Europe are very high, and by U.S. standards they work much less. We don't know that that's causal, but if it is, that's bad news, because if payroll taxes go up,

Americans are going to move to European levels of labor supply. That's going to mean tax revenue and GDP both fall, and that could be very bad news.

Secondly, if there's less generous Social Security and Medicare and people understand that that's going to happen in the future, that could lead to a delay in retirement. And here again, we have this imponderable of the elasticity of retirement behavior with respect to institutions and prices. What would we have to do to the Social Security rules to get people to actually retire at age 70? Biologically it's not a problem, people retiring at age 70 now would enjoy a much nicer retirement than people retiring at age 65 a generation and a half ago, but it's not clear whether politically and socially that can happen.

And finally, if there is less generous Social Security and Medicare, that might lead to higher savings by workers, and that's going to flow through financial markets and the capital labor ratio. So that could have an enormous effect, but we're not very good at knowing if that's going to happen. So why is it that our speculations about general equilibrium effects end up being so wishy-washy? I think there is a fundamental problem which is in our treatment of forward-looking behavior. So this is an audience of practical people, and I don't want to talk about economic theory much, but this is economy theory that is front and center in thinking of population aging, which is how much do the economic actors in the our story look forward? We can think about three different sets of factors: governments, financial markets, and households.

People in financial markets are supposed to be looking ahead. That is why we are here today. At the same time, most casual observers are struck by the fact that financial markets are focused on the next couple quarters' financial earnings and are not thinking about these long-term issues. The government has a very elaborate apparatus for thinking about the far distant future. We've got Social Security's 75 year forecast, CBO's 10 year forecast, and so on. It's not clear whether or not any of that feeds back to how the government acts today, but the apparatus is there. And then there are households. So we macroeconomists have this beautiful model, the life-cycle model of intertemporal optimization, which says that when people make their consumption and savings choices today, they look toward the far distant future. The life-cycle model. The blue line is net of tax and transfer income. Given the blue line that you face, you choose some consumption path in red, which, say you want to be flat, implies a build up of wealth and decline of wealth. According to this model, if I read in the paper or read Larry Kotlikoff's book saying that Social Security is not going to be there for me, that should effect my consumption today. I've read Larry Kotlikoff's book, and it does effect my consumption today. But it's a pretty open question if it affects the consumption of most households today and when its' going to start. And I think that's central to all of our analysis of aging.

So let me conclude by touching on a point that Larry Meyer pressed me to address, which are asset markets affects of all of this. Having gone through fairly conventional macroeconomic analysis of this, I want to undercut what I've done and say that I think that the most important asset market affects are really going to come through the fiscal side. The reason for that is that the really important parts of the aging all have to do with the government, in particular the federal government. So taking a step back, aging has both pluses and minuses. It's true that we have more dependent old people that we as a society have to care for. On the other hand, lower fertility has given us a big benefit of having fewer kids around; they're very expensive in terms

of money and time. So we as a society reaped this large benefit, starting many decades ago, of lower youth dependency. And now we're getting compensating increase in old age dependency. It is very roughly for society as a whole making up for that. The place where these things don't balance out is the federal government, because the government isn't in the business of taking care of youths, but is in the business of taking care of old people.

Here's some data on federal outlays from Jogadeesh Gokhale and Ken Smetters. Total federal outlays are 18.9 percent of GDP. Of that, they can take 10.8 percent of GDP and attribute it to particular age groups, and there you see the breakdowns. So the federal government spends .5 percent on kids, spends 6.4 percent of GDP on old folks and somewhat less on middle aged focused. In the second column I show you the shares of the population in each of those age groups. You can divide one by the other to get the percent of GDP per percentage point of population that the federal government spends, and you can see that what it spent on the old people is way out of proportion with what it spends on everyone else. So looking at this chart for example, if I took 2 percent of the population out of the 0-20 age group and put it in the 65 plus age group, that would raise federal outlays by 1 percent of GDP. So aging is not a big problem for the economy as a whole, but it is a big problem for the federal government.

So now let me answer Larry's question, how is that going to affect things like asset returns. My own view is that the most important thing is not going to be tax rates, it's not going to be Ed Prescott story. So if we raise payroll taxes enough to cover all these expenditures, it might be a little bad macroeconomically, but it's not going to be a disaster. I don't think it's going to come through the channel of government savings. I think the total effect on asset markets is going to come from the potential budget chaos, tax rate chaos, government chaos, and fear of hyperinflation. All of these things are going to result from the very harsh fiscal environment over the next 20-30 years. We've been in a relatively benign demographic market and the government has still managed to get itself in trouble. Over the next 20-30 years we're going to be in a harsh fiscal environment. There are a number of things from raising the retirement age, to raising payroll taxes, to cutting benefits, to limiting health care spending that the government could do to fix that situation, but I'm much less optimistic than Doug Holtz-Eakin that any of things are going to be done soon.

So if I had to make a forecast, it's that the Larry Kotlikoff risk premium is going to start appearing in financial markets sometime in the next decade, that is, people are going to start worrying about all the bad things that could happen. I think the potential for those bad things could start being priced in. So if I have to give an answer, I think the risk premium on all financial assets will rise. That will lead to lower equity prices, low rates of returns for a while, and once we enter this new riskier regime, higher rates of returns, at least until something bad happens. Thank you.

Barry Bosworth: My name is Barry Bosworth from the Brookings Institution. I hope that people were not expecting that David and I would disagree like the prior session perhaps. So what I want to do in this presentation about the macroeconomic effects of population aging is to emphasize four themes. First, (I think of the macroeconomic effects as really falling on two sides), what is demographic aging going to do to saving. Second, what are demographic effects

going to do to investment demand, which I think is an often overlooked aspect of population aging. And third, (well maybe there's some disagreement with David) I would favor a much more global perspective. That all this today has to be done within the context that the United States is just a little player, and will become an increasingly small player in an increasingly open economy. We should look at it in this context. And finally I'd like to end with how this will fit in with some of the current discussions of the global economy and the U.S. imbalances.

First of all, the effects on saving. About a year ago, colleagues of mine and myself at Brookings tried to do a survey on what all the literatures show about savings and demographics in the United States. And I think, as David gave you a flavor of this, there's a lot of heterogeneity in the results, particularly at the microeconomic level. In general, I agree with much of the paper that was put up by Jim Poterba. While the life-cycle effects look weaker in the data that you would expect them to be on the basis pure theory, there's a lot of variation.

One problem is that many people have no significant retirement savings at all. That means that we have a real problem of how to aggregate this data. At some sense on the macro level, we don't care about people. We care about dollars. If you want to talk about the aggregate savings rate of the United States, you'd want to talk about aggregate income. And unfortunately most of that income is accumulated by a very small number of people, and they're the only ones you care about. And it does appear that this is the group of people that are even less inclined to have any life-cycle behavior. Very wealthy people don't seem to display a life-cycle consumption pattern. So that complicates it. There's also a tremendous shortage of data in the sense of panel surveys where we can follow the same people. We've learned that cross-sectional analysis can be very misleading about what's going to happen in the future. And a third thing is an awful lot of this wealth doesn't show up in these surveys because it's held in the form of pension. People don't know how much wealth is in their pensions and we don't adequately take an account of annuity type income. So a lot of wealth disappears in the form of annuities.

So I think the microeconomic evidence is highly divergent, highly uncertain. There is some life-cycle effects, it's simply that they're not quite as strong as we might expect them to be. I think that has some relevancy to some of the simulation models which tend to assume a very strong life-cycle phenomenon and therefore tend to exaggerate some of the effects. When you look at the macroeconomic evidence, I think the life-cycle pattern of saving is somewhat stronger. In macroeconomics, what you're usually doing is comparing the pattern of countries over time, so you can get national data.

Two prominent studies in this regard both found very significant macroeconomic effects was one by Higgins in 1998 and one by Masson, Bayoumi, and Samiei in 1998. What you conclude out of this data is that the effects are dominated by Asia. For some reason, in this data Asia shows tremendous life-cycle effects; the rest of the world does not. It's particularly weak for industrial countries. You have to worry, when you look at cross national differences, that these can be correlated with lots of other country specific effects. So the focus has been on trying to develop long data sets that have got a time series, panel type data.

One example of this, I'm going to summarize some results from this one that is based on 85 countries with data from 1960 to 2000. We can separate public and private savings to get to the

issue that was addressed in the first session about the public sector train wreck with 40 countries, that's still 90 percent of GDP, and use UN data to try to look at the demographics. This particular result comes out of a fixed effects model where you can control for time or for countries and try to use polynomial to see if you can get this hump shape distribution. This is basically the process used by Higgins and we're updating what he did. This shows the typical result that we get. The solid black line is the results for the entire sample. You do see a hump distribution of the age parameters, definitely turning negative at older ages. The dashed line is Asia. You can see how big it is for the Asian economies. The polynomial is both third and fourth degrees, so it's not just the young that resolving for the test to make sure you're not forcing the elderly to go down. And then for the OECD, it's significant but it's trivial.

It's very important to keep in mind that, for the industrial countries, you don't find evidence. Global studies that say there is are dominated by what's going on in Asia. Second, one is to distinguish between public and private saving, and this is the private saving result for 40 countries (don't have it for 85). The interesting thing here is that most of the effect shows up in the private sector; it's not the government. In the historical data; here's the result of government saving in the historical data. Again there is a significant effect on government saving. That is, populations that are very young or very old tend to have low rate of savings, but the public sector component is small compared to the private sector component. Most of the life-cycle phenomenon is showing up in the private sector.

This is an attempt just to say that, if you use these parameters that you got out of this and apply it to demographics for the United States, what would happen? What I want to stress is how uncertain we continue to be about what the magnitude of this might be. The solid line there, that's what happens if you use the results from the OECD so the United States is matched to similar countries. As you can see, it's a pretty small effect on saving, reduces it by 3-4 percentage points of income out to 2050. So if you think it's the experience of the OECD countries to the United States, there's not a lot to get excited about here. On the other hand, if you thought it was the total, which is based far more on the effect for Asia, you get a very big, almost unbelievable magnitude of effects that would occur in the future on saving. The red line there is just to tell you, it doesn't make a difference whether you use polynomial or not; you can use categorical and get the same answer.

The second one, though, that is demographics effects on investment. There is, as was already said, the effects come because slower labor force growth should give rise to the need for a slower rate of growth of the capital stock. There's very limited research on the link between labor force growth and technological growth. I don't think you see any particular links, so you would assume that the growth of the economy slows in line with the growth of the labor force and the TFP growth stays about the same. There's only a very few studies on the impact of aging on investment demand. Higgins was probably the most prominent. Simply for comparisons, (although the mechanism is different, because the mechanism is slowing of growth in the labor force) think of the age distribution as the labor force distribution participation rate of different ages. Use the same polynomials so you can see the parallelism with saving. And when Higgins did that, he concluded that savings would decline less than that of investment out to 2025. I find a bigger effect for savings than for investment than he did. Extended out we find out that countries like the United States by 2050 will be highly deficit as a result of this.

Here's a typical result. The red line is simply a reproduction of the savings result for all countries I showed you earlier. This is from investment. Again the investment is highly significant. The interesting thing here is, as you would expect, the peak of investment occurs far sooner than the peak of saving. It's young people coming in the labor force that gives the rise to the peak of that, and not so much on savings.

So I think you do find in the macroeconomic data and in cross country data some evidence of effects of demographics on both savings and investment. And maybe to go back, note that at the older ages, the savings declines. And that's relevant in the case that I'm interested in because that implies that countries in that sort of circumstance would have substantial current account deficits; they would be borrowing from the rest of the world.

What about a global perspective? I think one paper that just dominated for years was that of Cutler, Poterba, Sheiner, and Summers in 1990. That's what has so much affected U.S. analysis. We are kind of arrogant, so we do a closed economy analysis of everything. And we concluded that, if you have a closed economy analysis, and you think your country is going to age, you should reduce your savings. And I think they were absolutely right in concluding that population aging is not going to lead to an increase in savings prior to retirement. Because the lack of investment opportunities are so often ignored, when you stress the investment side, that's the dominant effect. There are just no investment opportunities; you don't need many savings in a closed economy. Second, you have to remember that they assumed away a lot of the things that others would take account of. There's no substitution between work and leisure allowed for in that particular analysis, so this tends to make the model very rigid. But still I think that's where we ended for many years, where the response to aging is that countries are going to reduce their savings.

On the other hand, you can take an open economy analysis. They are becoming far more common in recent years, in part this is because there is a larger global capital market, and the demographic trends among countries are really quite disparate. But also I think it's because there's one big part of the capital market that's often ignored, and that's FDI. An awful lot of international capital flows are going to go through the internal mechanism of multinational corporations. Therefore the potential to move capital throughout the world is increasing steadily over time. This implies that shifts in the SI-balance can spill over into the current account. When you take that perspective, then notions of shortages of labor begin to get a little absurd. We don't really think we have any shortage of labor in the global economy; we have a lot of underutilized workers in countries like China and India who are rapidly becoming more productive and need more capital. It seems implausible to believe that the marginal utility of capital is going to decline.

This is the same data estimating the current account for these countries, and you can see this all does translate into the current account effects which do seem to get a hump shaped distribution and age effect. In trying to use this data, I would emphasize, for industrial countries, the demographics in this analysis are already turning negative. There is no further buildup in anticipation of retirement. It's most pronounced for Japan in recent years and for Europe, but it's starting for the United States within a few years. We're on a plateau. Estimate large current

account deficits for the industrial countries after 2025; if you use the OECD, you're talking about a change for a country like Japan of 6 percent of GDP, for the United States about 2 percent,

As a final point I'd like to put all this back in perspective. Of current, a lot of focus that I think got the demographics back on the policy agenda right away was when Ben Bernanke talked about a global savings glut, and pointed to a lot of excess of savings he thought was developing because of demographic effects in other industrial countries. So he linked to that and he pointed out we've lived in a world, now because of this, of falling real interest rates. And I think an interesting phenomenon he brought up: you can be puzzled about why savings collapsed so much in the United States, but you can be equally puzzled about why the rest of the world finds it so easy to finance it. And I think that was part of Bernanke's focus.

Here's the current account by region. What I want to point out that the United States has this big run up, particularly since the early 1990s, in its current account deficit. That's risen by almost 1.5 percent of world GDP. But the changes in the offset to that (nothing is happen in Japan, very little is happened in Europe), the change is in two regions of the world that are the offset to the U.S. dissaving: emerging Asia and the Middle East (which is just a code word for OPEC). Nobody else is really doing anything. Everyone else is positive and we're negative, but they haven't changed much. So the change is in those two regions.

The second point I think is very important. The change that is occurring in the puzzle of current behavior is not on the savings side; there's no evidence of an increase in global savings. The two points I'd like to make are that the United States is unusual compared to other industrial countries, not because its savings have declined; savings have declined in all industrial countries. What is unusual is that investment has not declined in parallel. Second, there has been a very sudden and abrupt drop in investment in East Asia after the East Asia Financial crisis.

Here's the data set of the United States. Here you see a steady decline in national savings since 1980, but there is no decline in U.S. investment rate. It has held up very well, and the result is this huge current account deficient. And second, industrial countries, other than the United States, which is Japan and Europe and Australia, there you see both savings and investment are drifting down, but investment has drifted down more than savings. So in general they've run a small current account surplus. The big change is an emerging Asia. You can see the impact of the Asia financial crisis, how that shock led in these countries to a sharp decline in savings as well as investment. Only recently has the savings started to come back, and that's mainly due to China. This is dollar aggregated, so these countries are all converted on commercial exchange rate. So this is the aggregated of Asia. But investment which went down has not come back in Asia, so the rate of investment has stayed low after 1997 and so this whole region has converted over to a significant surplus.

The interesting thing is that it has nothing to do with demographics. It's an interesting phenomenon, an interesting problem about how long the current account deficit can go on, but what's going on has nothing to do with demographics. There is evidence that demographics matter for aggregate savings and investment. But for industrial countries, the effects appear to be small (and they will be easily overcome by other economic shocks in the world economy) so you can't project what's going to happen in the future on the basis of demographic change. Far

more important will be what will happen in the next half century in China and India. Will they be able to catch up with us in some standard of living? That will completely dominate this data. Second, there is a significant offset to the savings decline on the investment side. And the final point is that I think you have to evaluate all this in the global context. We now live in a global world; capital can move pretty freely across national borders. Let me stop there.

Joel Prakken: I was just sort of thinking about all these potential influences. I'm going to paraphrase what I thought I heard you both say, and you can tell me whether I heard it right. Think about maybe five different ways in which these demographic changes that are coursing through the economy could potentially affect interest rates and equity returns. One is through a big increase in public saving, a growing fiscal imbalance which would raise interest rates, and it seemed like you, David, thought that was potentially large factor. Presuming everything's equal, that would push interest bond returns and stock returns in the same direction. But you threw in an additional sort of argument that I thought was fascinating, which was: there are two reasons that the equity risk premium might rise, one is older people don't like to hold stocks, the other is chaos would make them skittish. So there's an argument for equity and bond yields to move in opposite directions, or maybe one rise more than another. This capital deepening effect from the growth opportunity; this is a stunningly large impact. Holding other things constant, that static calculation was a decline in real interest rates of 1.5 percent, which for a while could go a long way towards offsetting whatever upper pressure rates might be coming from the decline of public saving. And then third, it seems that particularly you, Barry, are skeptical of the notion that changes in average savings rates come about because of life-cycle profiles in labor income and asset allocation are probably relatively minor players compared to the fiscal imbalance and international capital flows. So that's a three-minute version of our presentation. Let's see what we have in the way of questions for our panelists.

Question: Paul Hewitt. My question deals on a couple issues Barry raised. One is this very strong life-cycle effect on savings in Asia. Could that have something do with the lack of social insurance programs there compared to in the OECD countries? And the other is unrelated, but it has to do with the very low savings rate for most Americans and the impact potentially on markets. As you go to deal with the large fiscal deficits a lot of these people are not going to be able to bear budget cuts. Could it be that, as we move towards dealing with these deficit pressures that we will focus on progressive benefit changes and tax changes, which do affect holders of wealth disproportionately?

Barry: On Asia, what you actually see in the data that, you think, relates to demographics is the decline in the number of young people. So that was when Asia went to a reduction in the number of children. And I think you raise a good point, is that effect exacerbated if there is no retirement program? It used to be that you used your children and a high birth rate to finance yourself in retirement. And then with improvements in living status, people have shifted towards saying I'll provide my own retirement savings, and relied less on the number of children. Will the move towards national safety programs reduce it? You might argue it would. So far there's been a very strong move in Asia towards social safety net programs. You can't find evidence in countries where it has been a big move that that's what's happening so far. The Asian savings rates are staying very high. Korea is a good example, which in the aftermath of the crisis has

introduced a large net. They had a consumption boom for a while, but that's one of the countries where saving is coming back. So I don't know why Asia is an accident. And despite the fact that I added and subtracted countries, I can't get rid of the effect. It's no one or two, or three countries in Asia that gives rise to this.

On America's thing, I agree that there are income effects, but I guess I'm not quite as alarmed. My points that I would make, I wasn't asked to present on that topic, but I would say Social Security is not a problem. It's because we gave our parents benefits for which they never paid taxes. If you look at the actuarial projections, that's old money. What we're fighting about is that implicit debt, which I agree with Larry, has not been recognized, and should be recognized. That implicit debt is old debt, and that's some cost and we're going to argue who's going to pay for it. The problem is Medicare, and that's the point I was making. It's very general, not just limited to the elderly, and you can't have a good that stays free. So I think the logical thing in the future is that there will be some form of rationing. It will be done with the prices or [inaudible]. The real argument is what the mechanism is. So I don't think there's going to be an explosion. I think that Larry's right that if you don't do something, there will be an explosion. I'm with Herb Stein, what can't go on forever won't go on. The issue to argue about should be what should be the mechanism for bringing it under control.

David: I want to answer that in part by following up on what Barry said. I think Barry's exactly right when he says you can't underestimate the effects of the open economy. So although I did the studies on the capital deepening in the United States and the willingness of Americans to bear risk as a function of age, I think that's pretty unimportant because over the next few decades, the marginal investor in American will be someone in Asia. So what we should care about are the attitudes towards risk of that investor. The problem is that the world is relying on these super high Asian savings rates that we really don't understand. We can look at household structure in Asia, point out that there's less public support, different patterns of co-residence. But all of these things are going to be changing quite a lot as countries like China and India develop rapidly over the next several decades. So it's a little worrisome that we're relying on them having continued high savings. And finally, to introduce a point that's not really demographic, in some of my other work I've argued that the big driver of these high Asian savings rate is in fact economic growth. Even though economic theory says that a fast growing economy should not save more, it seems to be the case that what allows these countries to save so much is that income is growing so rapidly that people feel rich. That's great as long as it lasts, but it implies that if the cycle reverses and the growth slows down, that's going to be unfortunate to begin with, but that's also going to contract the savings rate. And that could have dire effects in the United States.

Question: Could I ask a clarifying question on the capital? So currently the Asian economies are financing our current account deficit (but of course) and part of our federal budget deficit. That might go on for a while under current steady state scenario, but our public deficit is about to get very much larger. So I think the issue is, relative to some baseline in which there wasn't aging, whether we can expect those Asian economies to ramp up their savings rate even more than they already have, because our requirements, if we're going to try to pay these promised entitlements, are going to be much larger. Saving will have to go up even more if it's going to rescue us from the increase in the federal deficit from demographics.

Barry: I didn't say that Asia would rescue us from an inappropriate fiscal policy. I would argue that the last part of my comments would say that the United States has good reason to change its fiscal policy. I won't do it overnight. We're like the family of J.D. Rockefeller, we're incredibly rich, and they wanted to live for 100 years off his wealth, and that's apparently what Americans want to do. We just sell off our national assets to support our consumption. We could do it for a long time.

Question: Chris Varvares at Macroeconomic Advisers. Both analyses require reliance on some degree on extrapolation on historical estimated propensities to consume and save, and those estimates rely on data that include populations that were either had one foot or two feet in the Great Depression. I think that that episode created a degree of caution and saving behavior that is nothing like the baby boom generation, who are the consummate consumers. And I do worry that when the baby boom generation retires their behavior will be unlike previous generations, and instead of lowering consumption and maintaining savings rates, they will instead dissave dramatically. So I just worry that the influence of the Great Depression has set up some false hope in that regard.

Barry: If you have some evidence that cohort effects are very substantial. My reading of the research, something I tried myself, is that cohort effects do not explain what's going on with the U.S. savings rate. In fact, the decline in saving seems to be among the very oldest cohorts. So I think cohort is an interesting issue. We lack good data, panel data, to track the same people over a period of time, but attempts to use the SCF and the PSID do not produce big cohort type effects.

Question: Sam Wardwell, Pioneer Investments. To some extent I want to follow up on both of those questions. I guess, Barry, your graph is showing Asian exceptionalism. I wonder whether, to some extent, this is a cohort question, whether this pattern was built back when Asia was an agrarian economy without social safety net and therefore is not relevant if they build safety nets. Second, look at the South American experience, countries like Columbia, which have built funded retirement systems as opposed to pay-as-you-go systems. Do you see different patterns there? To some extent, can these patterns be explained by rational household behaviors to the incentive the government has created?

Barry: Take one step. On the international savings, you have this example of, say, Japan. The Japanese savings rate is declining quite substantially since the early 1970s. However, it remains remarkably higher than the United States. Yet Japan has a social safety net about equivalent to that of the United States, in some ways better. So I don't think it's just the safety net, but I do agree with you that, you would think that, income growth slows down in Asia, as they get a more mature economy, they develop one thing: more financial markets. I think that's big. They're not able to dissave to the extent that young people can dissave in the United States and there's a social reluctance to do it. All of these things would lead you to think there would be a convergence of savings rates around the world. But formal attempts to test convergence don't work very well.

David: I would just add to that. It's nice to think about households, that's what we're best at, but if you want to think about the Chinese savings rate, it's not clear that that's the right way to think

about it. It may be the government policy variable, and we should think about who in Beijing is setting it, and why, rather than about households.

Larry Kotlikoff: I just want to stick up for the life-cycle model. If you look at the propensity of... The key test of the life-cycle model is whether the average propensity to consume out of life time resources rises with age. As you get closer to death, you have a shorter lifespan so that you should be spending a bigger chunk of your resources. And if you test that proposition, you get very strong evidence that that's exactly what happens. The propensity of the young to consume their remaining lifetime resources is 6 percent on an annual basis, for the elderly that's 13 percent. There's been a big increase in that over the last few decades as the elderly become more annualized and have to worry less about running out of resources thanks to the government's provision of health care and Social Security as annuities.

Another implication of the life-cycle model is that, if you shift resources from the young to the old (since the old in the life-cycle model are not altruistic), they'll consume those resources. So as the age resource distribution has shifted, we've seen a major increase in the consumption of the elderly relative to the young. The average consumption of an elderly person compared to the average consumption of a middle-aged person has roughly doubled since the 1960s. These facts about U.S. saving are discussed in a paper I coauthored; it's in the Brookings Papers back in 1996 called "Understanding the Post War Decline in U.S. Savings." Now if you contrast that evidence with the kind of evidence we've been looking at right now, which is looking at personal saving out of disposable income, that brings up my concern about this labeling issue because, if you're, for example, to classify payroll tax contributions as a form of private saving. After all, when we contribute to Social Security, we're going to get something back in the future. Re-labeling those as contributions rather than taxes, as loans to the government, calling the future benefits the repayment of principles plus interest, less an old age tax; that would swing our private saving rate in the United States by about 750 billion dollars. Our individual age profile of savings rates would be dramatically different. Simulating the interrelation of that different profile with the demographics would be dramatically different.

In other words, what I'm saying is that, unless you really focus on label free analysis, you can get any answer you want regarding the interaction between demographic and national saving. When you do a label free analysis, you see very clearly that the reason our national saving rate is 2.1 percent of national income, used to be 12 percent back in the 1950s and 1960s. That decline is not because the government is consuming a bigger share of national income, it's because the private sector is consuming a greater share. That connects directly with the consumption of the elderly and the increase in their resources related to the young. So I see overwhelming support for the life-cycle model in the data.

David: As Larry's coauthor on the occasion and someone who teaches his excellent book on the life-cycle model to my students, I have to disagree. I think that the life-cycle model has two different incarnations. If you say there is life-cycle behavior so people have a higher marginal propensity to consume out of income when they're old than when they're young, and you call that the life-cycle model, that's a very robust descriptive model for the world. But the really theoretically beautiful part of the life-cycle model is that people make their consumption and savings today looking ahead to the far distant future. When I look at the microeconomic

evidence of various experiments where people have forecasted changes in their income even over fairly short horizons we just don't see evidence of that. The very large majority of households in the United States do some kind of matching of their consumption to current income, maybe with some rule-of-thumb saving in there. So when it comes to predicting the effect of demographic change to do what you and some of your coauthors have done, which is to assume households are optimizing and taking on board now the very different macroeconomic environment they are going to be in 20 or 30 years from now, I think is crazy. I think that if the president and you and leadership of Congress got up and said, look folks, Social Security is not going to be there for you, we made a constitutional amendment; that still would not effect consumption today very much. There's just not much evidence that people are operative life-cycle savers. That has very important implications for how population aging is going to play out.

Question: Richard Jackson with CSIS. Let's grant your point for the moment about young and middle aged adults not being forward-looking. What about old people? Presumably they base their savings on their current consumption needs. My question relates back to a point I made during my presentation and also perhaps to the issue Paul Hewitt raised. Perhaps old people in most developed countries today don't dissave much because they don't need to; they have generous Social Security income and other public benefits. What if this is cut dramatically in the future? Would that alter life-cycle savings? If you're right about young people, I guess there would be two effects. You might expect young people to save more if they're forward-looking and old people to save less. That's one question. I guess, to put it another way, is the current age savings profile necessarily the right one looking ahead 20 or 30 years, given possible changes in the generosity of benefit systems? The second question just really briefly relates to the whole question of aggregate growth and whether it matters. I understand that in a standard neoclassical perspective that if you have slower growth in the labor force you need less savings to maintain the same capital to labor ratio. But I'm wondering if there isn't more going on there that isn't captured fully in the neoclassical perspective. What about the role of expectations about market expansion? What about the possible relationship between innovation and the overall level of investment as society undertakes a learning-by-doing hypothesis? In other words, don't we need to think a little bit about what happens in a long-term future of stagnating GDP? Does that change the way the economy operates and perhaps affects economic performance in ways that aren't captured by the neoclassical perspective?

David: Taking those one at a time, in terms of whether the age saving profile now will last into the future, eventually I think the answer is no. Because if we really think Social Security is not going to be more generous, there may be a cohort or two that learns a very harsh lesson, but eventually they may learn to save more. But the old people are the ones least likely to change. They are incredibly risk averse, and if there is any group that it is forward-looking, it is the old people. They are doing the calculation about how much they can consume so that if they live toward 210, their consumption will be relatively constant. Regarding the productivity, I don't think they're going to change that. Regarding the productivity, I think you're right. There is an important effect there that, as the growth rate of the economy slows and investment falls, the vintage of capital is going to get older, so there's going to be more old capital relative to old capital and you can see how that's going to work its way into slower productivity growth. There's actually a similar effect that I've worked on some, which is that you are also going to have older human capital relative to younger human capital. So think about the group of college

teachers. Instead of having college teachers who recently go their PhDs, we're going to have professors who got their PhDs 20 years ago. So you can tell a story that's somehow going to produce slightly slower productivity growth, but it's all abstract since we know so little about productivity growth. You made a lot about how countries have GDP actually falling because they're labor force is falling so rapidly that productivity growth doesn't make up for it. I think that's a possibility, I just don't know that that's a traumatic thing. Because what's happening is that these countries are getting smaller. We don't look at Belgium and say what a tragedy that Belgium is a smaller country than the United States. We just think that Belgium is a scaled down version of the United States. So a lot of the European countries and Japan are just going to be scaled down to a smaller version of themselves. It is not clear that that has first order economic effects.

Joel Prakken: I think we're going to have to cut it off because we're two minutes from the beginning of the next session. Let's thank our panelists very much.

Will there be an asset meltdown?

Moderator: **Eric Engen**, Senior Economist, Division of Research and Statistics, Federal Reserve Board

Presenters: **Robin Brooks**, Senior Economist, Asia and Pacific Department, International Monetary Fund

Jeremy Siegel, Professor of Finance, The Wharton School, University of Pennsylvania

Eric Engen: If we could get this next session started. The title of it, “Will there be an asset meltdown,” I think, is both an important question for us professionally and I think we have personal interest in this as well. We will have two people that have studied this topic quite extensively and will talk about the issues that in many ways have been raised in the prior sessions. But this one will focus more on the effects of asset prices, interest rates, and equity returns. The first speaker will be Robin Brooks, who is a senior economist at the International Monetary Fund, and following him will be Jeremy Siegel, professor of finance at the Wharton School at the University of Pennsylvania.

Robin Brooks: Thank you very much. Thanks a lot to the organizers for including me in this very interesting program. I work in the Asian Department at the Fund. A lot of the discussion that came up just now was about savings gluts and in particular, excess saving perhaps in Asia. I just wanted to take two seconds to respond to some of that. And I should, of course, add the caveat that what I’m going to say today reflects my own personal views and are not an institutional position. There was a question on social safety nets in Asia and whether they are responsible for excess saving and I think the short answer to that is no. There are many, many other emerging markets that basically have no social safety nets, but don’t have anything like the high savings rates that Asia exhibits. So I think that’s probably not the reason. In the forthcoming issue of the *Regional Outlook*, the Asia Department at the State Department puts out, we looked at if there is excess saving in Asia. We modeled saving as a function of fundamentals that happened to include demographics. And there is one particular hypothesis that we tested. In the wake of the Asian crisis and with the absence of these social safety nets, the hypothesis has been floated that maybe precautionary savings has gone up, that the Asian crisis somehow awoke people to higher risks out there and for a given level of fundamentals they are now saving more. We find strong evidence that that is not the case; the relation between saving and fundamentals in Asia has remained the same before and after the Asian crisis.

Now there is one really interesting thing that came out of this study, which is that demographics, by far and away (and I think this mirrors what Barry said earlier), is one of the strongest determinants of saving in Asia. And I think, to add to Larry Kotlikoff’s fiscal shock or the fiscal train wreck, the main shock that is going to hit the United States is from the global economy, and it’s going to be a dissaving shock when Asia ages. So that, in one fell swoop, is going to eliminate the low global interest rate environment. So we’ve talked about how Asia is saving,

but I think we're looking at the wrong thing. We should be looking forward and looking at the dissaving. I'll stop talking about the previous session, and I'll start talking about this session.

I'm going to talk about whether there will be an asset market meltdown. I thought that the way I would best start would be to just sort of, rehash one more time what are the possible channels through which aging can affect financial markets. And here I want to stress two things: there are many different channels; we are hazy about how those channels actually work. The way I classified different channels were as two groups: first round effects and second round effects. Although I'm using the same language as David, I mean something else (just to be completely confusing). By first round effects, I mean the direct impact from demographic change through individual behavior or corporate behavior on financial markets. By second round effects, I mean the policy response either by the monetary authorities of countries or by the fiscal authorities.

So first round effects include individual savings behavior, so that is how much to save in a given point in time on your life-cycle and how to allocate those decisions, the portfolio decisions. Then, of course, there are DB pension plans which are declining in importance, but are still important. And as they have changing demographics, they may change their portfolio, shift those around. There's an investment demand, which might also change. You have changes in demographics so you have changes in work force. Companies are going to change investments in anticipation to changes in the workplace and that may lead to changes in the issuance of equities or bonds. You have productivity growth; we don't have much of an understanding of how it may be it affected, if it is affected.

Second round effects are government finances. If we have large entitled programs directed at the elderly, then deficits might increase, interest rates might go up, that would be bad. We also have monetary policy. There was talk about inflation; inflation might be used to deflate debt stocks, inflate away debt stocks, so the reaction function of the reaction policy authorities is also important. Now you can basically follow two approaches when you're trying to look at what is demographics going to do; you can either model or you can estimate. Looking at this, there's a lot of stuff to do here. There are many different channels. This is probably very incomplete list. Modeling is very complicated. So I'm going to do the much simpler thing, which is to look at history, try to estimate what is the historical association between demographics and financial markets, and then extrapolate from that to the future. And of course there are many pitfalls, and I will come to those as we go along.

Now I just want to highlight one piece of model uncertainty which I talked about before. I said there were many channels and then there was uncertainty about how those models work. One particular source of uncertainty deals with how people actually save, and we talked about the life-cycle hypothesis. Well, the standard sort of meltdown hypothesis in the stock market holds that, if you look at this picture, you have this red line, which is the number of people 40-64 relative to the rest of the population. That increased sharply from the mid 90s and coincided with the increase in real stock prices. At the time there was speculation that all these people in middle ages, according to the life-cycle, and as we now go farther, these people are going to be dissaving, and that is going to lead to a reduction in the real price of stocks.

Underlying this is the life-cycle hypothesis, and I just want to add two pieces of evidence to that. First, when we think of this life-cycle hypothesis, it's really misleading to think of one person saving and then dissaving. The way wealth in the United States is held is highly unequal. There are people who are very rich and people who have almost nothing, and it so happens that the people who are very wealthy play a disproportionate role in the financial markets. So if you look at data, and this is from a study from the GAO, you'll see that two-thirds of the financial assets that are held by the baby boomer generation are actually held by the top 10 percent of that generation, in terms of wealth. So the distribution of holdings of financial assets are very concentrated. And disproportionately you have incredibly rich people holding financial assets, and those people won't have to dissave in retirement. They can live off the income those assets provide. That is one point.

The other point is even when you step away from incredibly wealthy people and you look at your average Joe household, even then there is little evidence of dissaving in retirement. And this is a little bit of a puzzle. One reason why it might be is that people don't have a whole lot of assets to dissave and the main source of wealth is housing, so there might be factors like longevity risk. People are worried about outliving this little financial wealth that they have (high cost of end of life care, etc) that explains why people don't dissave in retirement. Then there is one additional group of people in the United States that doesn't have any financial assets at all. The GAO kindly points out that for that group of people, the important asset that they hold in terms of value is their car or their truck. So when you think about how financial markets are affected, it's important to think of the very rich who don't dissave and poor who don't hold financial assets. Just keep that in mind as we now go to the empirical results.

Looking at financial markets and demographics, the main challenge is that demographics is a really slow moving phenomenon. It takes forever for these series to change. That's a problem when you're trying to estimate a relationship because it means your effective number of observations is very low. So the key task here is to collect as much data going back as possible. So what I did was to collect a bunch of country's financial data going back, in the case of the United States (that's the third point from the bottom) from 1900 to now. And then for many other countries, you've got data from the 1920s or somewhere in the 1910s.

Now what I'm going to do with these data is to run panel regressions and the framework is somewhat similar to what Barry Bosworth did. I'm going to have a regression where the dependent variable is either real asset prices or real asset returns. And then on the right hand side, among these variables, I'm going to have country dummies. Country dummies are capturing factors that are time variant but country specific. So this is a standard macroeconomic tool for controlling for stuff that doesn't change over time like institutions, people's preferences, or financial development. I'm going to have time dummies (I'm going to come back to those) and then I'm going to have the age share for each cohort and the population from 0-75 plus. And the framework that I'm going to use here is very similar to Barry's. You're going to see a very smooth shape which comes from a polynomial that both he and I impose on these age coefficients. Now what are the advantages of this approach? The advantage, to some degree, is that we have a control and then we have demographics, so the demographic coefficient is going to be a summary statistics about how demographics affect global markets through direct effects

and indirect effects. So based on history, we're getting an overall affect in these demographic coefficients.

The other advantage (and this is a feature of the data), when we think of demographics it's easy to think of demographics as exogenous. This is the thing that's driving everything else: it's driving productivity, it's driving financial markets, it's driving fiscal. But really in the very long run demographics are endogenous. In particular, the baby boom in the United States is the result of two large events, the Great Depression and World War II, which kept people from having kids. There was a big catch up in fertility following these two big shocks. So we need to control for these big global events that affect fertility decisions because those happen to have affected financial markets. So that's what the time dummies in this regression will do. They will be controlling for a long-run global cycle which is predominantly reflecting these large global events.

Now the disadvantages, this is a reduced form analysis, so sad to say I won't be able to split apart if the demographic coefficient shows how people hold assets over the life-cycle or if whether it reflects fiscal factors, monetary factors, etc. It is a summary measure so it's difficult to explain to you why exactly we're getting the kinds of coefficients. Although I'm going to propose a reason; I'm going to give you a reason. I can't guarantee that's the right one. And then of course we're using very long run data here and of course financial markets evolve over time, especially financial development is very difficult to measure. Especially in advanced countries, declining personal or private savings rights are a lot related to financial development. People can borrow more, so this financial innovation has contributed to household saving less. So this is very difficult to capture well, but it contributes to changing relationships over time.

Now here are the results when I like real stock prices to demographics and what you see here are the age coefficients. The interpretation of this U-shaped curve is that in middle age, real stock prices tend to be on average lower when you have lots of middle age people. And when you have lots of old people, real stock prices tend to be on average higher. This is a puzzling picture because it doesn't conform well to the life-cycle hypothesis. Life-cycle would say real stock prices should be high when you have a lot of middle age guys, and they fall as these middle-aged guys turn old and dissave in retirement. But, of course, this picture looks eerily similar to the survey of consumer finances data on asset holdings over the life-cycle and the lack of dissaving in retirement. People start saving late and then they don't dissave. So there is a parallel on the survey data.

Now if we take this at face value, what do we get? This is a projection of real stock prices going forward based on these age coefficients and this is of course a partial equilibrium exercise based on the average relationship over time for the United States. With all those caveats, you can see that the implication based on this historical association is, in fact, that as this capital deepening that David was talking about takes hold, real stock prices will actually increase. And this result carries over to bonds and also T-bills. Real total return indices will be going up for all of these. It's also the same for the price earnings ratio for stocks. Across countries this result is robust for Australia, Canada, and the United Kingdom, so it's robust for the main Anglo-Saxon countries that we perceived as having an equity culture.

Now what about returns? There are stationarity issues when you look at prices as opposed to returns; let's talk about that. Well, if you regress real stock returns and real bond yields or real T-bill yields on demographics generally you find nothing; you find no relationship at all, and that mirrors the academic literature. Basically the consensus is that there is very little association empirically between returns and demographics. And I give you an illustration of that: this is the ten year government bond yield for the United States, projected forward, and you can see the error bands are huge. In other words, there is essentially no relationship that the data are picking up. And if you look at the point estimates, there's really nothing going on either. So does this mean there is no link between financial markets and demographics? I think this is a very unfair exercise to run. If you're running a regression of the returns linked to demographics, then you're sort of implying the change in say the old age dependency ratio in 2004 to 2005 is going to impact returns in that year. And that's crazy to think because the change in the age structure of the population from one year to the next is not news. It's highly predetermined, so that shouldn't be driving returns. So in a way, this result should not be a surprise. And what I take from this result is that prices, because they are smoother, are a better measure, or a better candidate, for looking at the link to demographics that returns. But of course you have to control for stationarity issues and possible spurious correlations which I've ruled out in this case to the best of my ability.

Now, conclusions. So the upshot of this presentation is that either you believe the return sides of things, in which case there is no association between demographics and financial markets, or you believe the real price level side of the story in which case the impact of aging on prices is positive, so it's a positive impact for financial markets. Now there's one big caveat to this conclusion, which is again, we're using data from history. These data will only be able to tell us about the future to the extent that it's happened in the past. If there's a fiscal train wreck, that's basically unprecedented. If we're on a path that's fundamentally unsustainable, the data will not reflect that. They won't capture in the projections the implications of a dramatically higher risk premium, which would be bad for stock prices and such. If you look at the demographics and voting (which is this chart here) what this chart shows you is the year in which 50 and over voters are going to exceed 50 percent of the voting population.

In this whole debate over the fiscal impact, and Social Security, and health care programs, the thing that is striking is that the solutions are so totally obvious. The thing that's complicated is the political economy of all this. And essentially you have generations battling out who's going to pay, and that's going to be determined at the voting booth. Here you can see that the United States is very quickly approaching the point where the voting power of older people is going to exceed that of younger people measured by this cut off. I would add one caveat to that. Older people happen to be disproportionately wealthy, and it's not clear to me that they would vote to deflate their asset values. So I think when you're looking at this voting model you have to weigh the financial wealth people have.

So basically the bottom line is that demographics is not a big deal for financial markets, could even be positive. But if you don't believe me, what we do in finance when we think we have a risk factor, we try to diversify it away. Demographics could be a risk factor over these long horizons, so what can you do to protect your portfolio from this risk? There's one obvious candidate for a trade, which is you could invest in emerging markets that have incredibly young

populations. India is one country that comes to mind, South Africa, and some African countries with HIV/AIDS come to mind (in fact there the risk is not of longevity, it's of mortality, so it's very different risk). But of course if you invest in emerging markets, you're taking on volatility that has nothing to do with demographics. You want to short emerging markets overall, so that way you'd be identifying this demographic risk component. So you're hedging your demographic risk exposure.

Jeremy Siegel: Okay, demographics and capital flows. It's interesting because a lot of media sort of cast me as being a pessimist about stock returns or financial asset returns. That is only right, if we are forced to rely on ourselves. We've talked about foreign capital (and I know Larry did also and Barry also), how important it is. I've got some measures about how important that is, I think that I'd like to share with you. Let's take a look at the last 50 years. We've had a trend of rising life expectancy and decline retiring age (that's life expectancy at birth). It actually surprised me that in 1950 the difference between life expectancy at birth and the average retirement age was only 1.6 years, now it's 15.9 years. That's a huge change that retirement has become an extremely significant part of individuals' lives. But as we've all been saying, this trend cannot continue. We all have our sort of age waves, let's see if mine comes out over here. In terms of looking at the United States, yeah we have every five years, and that cycles back too. You can see the five years going: the blue are children, the green are workers, and the red at the end are the segment of the people over 65. The blue line at the bottom is the number of workers per retiree. We had another graph, one of our presenters looked at that. And you can see the wave moving through. Here it is 1950. The age wave. Here we are today, moving into retirement. Snapshot; that's 1950, that's today. Again, still five workers per every retiree, which is still very, very high, but that in the United States is going to go down to 2.5.

Of course as we mentioned, there are other countries where the age wave is even more extreme. Take a look at Japan, and it's really dramatic. Here's Japan in 1950, which is a downward sloping age profile, which for 99.9 percent of human history has been *the* age profile. This is Japan in 2050. Larry showed us some demographic shockers. Another demographic shocker you might add is that the most populated five-year age group in Japan by the middle of this century will be those aged 75-80 years of age. The most populated!

Throughout history there has usually been very few people that age, even live, that long, and now it becomes the most populated group. The number of workers per retiree is going to shrink to one to one, and that raises some very big questions. Who are going to produce the goods? One worker for every retiree has to produce for himself or herself and the retiree, compared to five to one today. So who's going to produce the goods? And then a very similar question, and in fact the flip side is, who is going to buy the assets? Because if there's not enough workers producing enough goods, then there's not enough income that will generate enough saving to buy the assets at the prices they are now bought and sold at. One way of getting at this question was developing a computer based model that actually looked at consumption patterns over life-cycles. It looked at the demographic commissions of the UN demographic commission, and then talked about what age will Americans have to retire in order to maintain the consumption profile after retirement that they now maintain, relative to their current position. Well, this has been the pattern over the last 50 years. As I've showed you, life expectancy we know will continue to

rise. There's no question about that, but this is actually going to be the path of the retirement age. So this retirement age allows individuals to maintain their consumption at retirement at levels that are 10-20 percent below the last years of their life as consumption evidence shows.

Now some people say, well, we're going to have to work longer because we live longer, but the situation is actually more acute than that. Because we will go from 15.9 years, even though life expectancy increases to 11.6, that's a 30 percent reduction in retirement age. Never before in human history have we ever had a reduction in retirement age, number of years spent in retirement. But that is predicated by this model. Let me just also mention to you that there has been a rather large change in the demographics, the UN demographic data in 2004, which has improved the situation. Let me show you the difference. The 2000 model required us to work to 73-74 and now it's around 70-71. So there is a better demographic profile here as compared to before. It was much more acute in other words, it's still going to go down to 15 to 11 years, but it was more acute early on. But as we've been mentioning, once we get outside the developed world, we get a very different age profile. Look at India, back 50 years and projected by the UN commission, let's go to the snapshots. That's 1950, that's 2005, and that really looks like Japan did actually in 1950. The demographic profile of the developing world is really give or take about a half century behind that of the developed world. And this is when it is 2050, still quite a few workers per retiree, during the critical time in the United States, which is between 2010 and 2030, it will stay above 6-7 to 1 in India.

You could ask the question, well what does the age profile of the developing world have to do with age profile, and the situation that we find ourselves in? Well there is where we have to expand our minds. I'm very pleased from what I've seen in this conference the recognition of the importance of international capital flows because so many times people are analyzing each country unto itself, and looking at that population profile rather than talking about the fact that we are all one world which is engaging in trade. Throughout history the old have sought assets to young, this is the pattern of life-cycle. Florida is the oldest state, it may be the net seller of assets, but to the extent it is, it is absorbed by younger workers in the other 49 states. As it was mentioned, in not so many years the average age of the United States will be more advanced than Florida is today.

We're all going to be aging; we're all going to be aging in the developed world. Who can we sell our assets to? And that is the developing world. Now the success of this, selling assets to developing world, importing good, the exchange depends critically on the growth that takes place. This is the current situation. Population in the developed world is 15.2 percent of the world, developing world 84.8 percent. But world GDP, as we know, is very skewed toward the developed world. Right now 53.3 percent (as I break it down) and 46.7 percent for the developing world. Population for 2050 is taken from the UN demographic commission and that shows a further reduction in the percent that is coming from the developed world from 15 percent to 12.3 percent and an increase in developing world. However I've done some of my own projections on productivity growth. I won't go into details at the present time, and it will result in a rather dramatic reduction in the share of world GDP. That is produced by what we call the developed countries, down from over 50 percent on the 22.9 percent. The United States at 10, Western Europe at 7, that's 17, Japan at 2, that's 19, Canada at 1, that's 20, Australia, New Zealand at 1 and a few high income non-OECD countries. China at 19. That, by the way, is due

to an assumption of per capita income in China about half that of the United States by the middle of this century. That only requires productivity growth of three percentage points per year higher than the United States, much lower than the last 20 years its done. India at 18. So there is going to be very dramatic growth in the rest of the world.

How does that growth change? When I put together the whole world model and allow trade of goods for assets (in other words instead of just looking at the developed countries, took a look at the world itself) their growth, consumption, and production and how that might effect; the impact was enormous. This is a world model. If we assume no GDP growth in the developing world, (and this is obviously very extreme, it means we aren't going to get any goods from them) the work age goes all the way to 76. Here's 2 percent of growth (by the way 2.2 was the default) which has been the long run growth rate in the United States. Here's what happens at 4, 6, and 8 percent of the developing world. So you know if all the developing world can be like the Chinese today and can sustain that for the next 20, 30 years, we'll be in great shape. There is going to be enough savings generated and therefore enough goods that are been produced to buy the assets in our system. My assumption is closer to the 4 percent that you see over there. I've done individual projections for different parts of the world, and this is the line that I actually get from there.

But the important bottom line is that the growth of the developing world is going to be critical for the so-called solution to our aging system. And of course the integration of the capital markets, as you can see, that once we have the developing world we go from an 11.6 percent 6 years of retirement to 15.4, it is a slight reduction in the retirement age, but it enables it to hold it at a relatively constant rate. I call this the global solution in a paper that I wrote on this subject. The answer to the question who's going to produce the goods and who's going to buy the assets is one and the same: it's the developing countries of the world. And by the way, I agreed with Barry. Large current deficits and that not only in the United States but Europe and Japan, could definitely move into that. In fact, I predict they will move into that. And when I run out the model to the end, by the middle of this century, the developing countries of the world will own most of the world's capital. Most of the big multinational corporations in the world today will be owned by investors in the developing world; Indian investors, and Chinese investors, and other areas.

Let me give you a little bit on where stock market capitalization stands today in my projection into the future. In 2006, 97.6 percent of the equity capital is located in the developed world, only 7.3 percent is in the developing world. By doing this study of the relation, once I projected GDP, I did a study, and these are informal studies of the relation between GDP and stock market capitalization, projecting it towards the middle of the century. Only 33 percent of the world's capital will be headquartered in the developed world by mid century; two-thirds will be headquartered in the developing world. The word headquarter is a bit arbitrary. Really we should identify the investors who are going to own it. Don't forget the developed world's share of GDP will fall below 30 percent down into the mid 20s by the end of this century, and that's based on conservative growth estimates in the rest of the world. So it is not unreasonable to believe the capital will migrate there.

Conclusions. Developed economies by themselves will suffer lack of asset demand. In other words, when we talk about the stock market falling, we're saying that, if everyone wants to retire at age 59, they'll go to the market and they'll find out the stock values are not there to retire. The market will give you the signal that you must work more. That's how the market mechanism tells you how long you're going to have to work. One more issue (and I like Robin's paper a lot), I want to caution people. When we're talking about age profile and asset demands (the last 20 years, let's say particularly up to 2000, but for bonds almost up to 2004 and beyond, in real estate also to the current age) have been extraordinary in terms of real asset returns.

Why does this matter? I had talked to a lot of people in their retirement and you know what they told me, they said: "I retired with so much money, so much in stocks and savings and bonds and I figured out I would use most of it up, I never believed stocks would go up so much, so as a result, I have more money than I really started out with." For 20 years, from 1980 to 2000, real stock returns were 13.6 percent a year. That is double the long-run average. We've never had a bull market in history as what happened the last 20 years. We've never had a bull market in bonds of what happened in 20 years, and we've never had a bull market in real estate. Now if you think all those are going to repeat themselves, maybe you'll believe that the older you get, you have more assets and are saving more. But I don't think that's going to happen. And once you put down returns that are more normal (forget about being subnormal), you, I believe, will turn over those conclusions that the older you get, you seem to own more assets. It's really because of a very dramatic 20-year period that we have experienced in terms of asset returns.

So I think there is going to be more selling of assets by elderly as they don't see them appreciate as they had in the 2010s and through the 2030s. I do believe that growth in the developing world will offset the slowing in the aging economies and support future equity prices, but this depends critically on the integration of world equity markets. And I remember Larry saying that, when we saw how Congress got so upset with CNOOC trying to buy UNICOL (and we're seeing it up and down the line), there is a fragmentation of the world capital markets. If there are restrictions that are placed on capital flows, if there's protectionism, cannibalization (you can call it what you want), it's going to be disastrous for us. We need the capital infusion from these developing countries in order to supply the goods. Because the population profile that exists in the developed countries in and of themselves will not allow for the longer periods of retirement or even the maintenance of the periods of retirement that are so critical to what people's expectations of that period are.

Again as I mentioned before, asset prices will be the signal to the boomers how much longer they will have to work. You think you have enough money, but once you come to sell and there's not the buyers, you'll see you have to work longer. How much longer you'll have to work, you'll have to compute out by productivity trends, consumption levels, and such (as I've done on the model). So I'm an optimist if world capital markets stay open, I'm a pessimist if capital markets stay closed. And the developing world becomes a very key player in understanding the impact of global aging. Thank you.

Eric Engen: Thank you very much to both our presenters. They were both very interesting presentations and I would guess somewhat provocative. We'll open up questions in the format we have done in prior sessions, please just come to the center to the microphone.

Question: My name is Luc Vallee from CDD Capital/Caisee de Depot. I have a question: could you put back the slides with the pie charts? This one. You could put the first one: the world GDP in 2005. I'll start with assuming that today we have the share of the United States being 21 percent. Call that one unit, the U.S. unit. In 2005 that's what the United States consumes. Assuming, and you see, in the China represents another 20 percent. That gives you two U.S. units in 2005. Let's assume that the United States grows 3 percent for 45 years. GDP would about quadruple in that country. So that gives you 4 U.S. units for the United States in 2050. And if you go to the other chart now, you realize that India and China together are twice the size of the United States each. So that gives you another 8 U.S. units for China and 7 units for India. You sum these up and you get 19, let's say 20. So you go from two units for U.S. consumption in 2005. So that's what the world consumes in 2005, those three countries alone and in 45 years they consume 10 times the world. It doesn't look dramatic on this chart because we have percentages, but, when you see sheer size of the resources, they are going to need to consume to get to these numbers that you present to us, it's seems impossible: 10 times more oil, 10 times more electricity, and 10 times more copper. So I wonder what you have to say about this.

Jeremy: You're saying it has strained resources. So there's a resources constraint here, which I haven't dealt with. I'm making the assumption that throughout history we have overcome resources constraints by technological progress and whatever. We can look at agriculture as the major one. The question of producing enough food which was questioned 50 years ago and now we produce a surplus of food, so it's a question of what you want to make. The issues of global warming and peak energy are obviously things to address that were outside the scope of my presentation.

Question: Frank Nothaft with Freddie Mac. Robin commented on how housing is an important asset for a large group of households, and, in fact, housing and home equity are much more broadly held across households than financial assets. Financial assets are concentrated more with high wealth individuals. Since most of the comments are about financial assets and how their values will change over time, do the same conclusions hold for housing? Will the returns to housing be similar? Will mortgage utilization vary over time, increase, or decrease? Or any views at all on that?

Jeremy: If we just rely on ourselves, I think all assets are affected. There are a rise in real rates, that depress all assets. People need consumption, and the only way they are going to draw that from the winnowing number of workers give them an extremely high rate to grab it. And that effects the prices of all of those assets, and real estate might be particularly difficult. I mean, we talk about foreigners buying capital; will they buy real estate? They might buy condos in major cities and that could support real estate prices there. What about suburbs? Do they have any desire to live there? That could take the hardest hit. You're going to have to talk about foreign demand for real estate and how big that might be, but I think all asset prices are effected.

Robin: There was a paper in the 80s by Mankiw and Weil, one of whom is in the room. That paper linked demographics to housing and in many ways you would infer that the link between housing and demographics is a lot stronger than the link between financial markets and demographics. Certainly if people look at wealth effects and feedbacks to consumption, we tend to get bigger wealth effects for housing than financial wealth. But the interesting thing about that paper is that it made a prediction, and that prediction doesn't hold up well against reality (or the realization of what happened). I guess you predicted that real house prices would fall as the baby boomers aged, but I guess we've seen real house prices rise dramatically. I think that's just an object lesson in a bigger truth, which is that demographics is definitely a factor but in the scheme of things, it's a small factor. And there are other factors; like financial innovation and changes in fundamentals, global interest rates; that happen to dwarf demographics. The IMF did a study two to three years ago, on the world economic outlook which tried to quantify the contribution the recent housing prices increase. I think the biggest contributor was short term interest rates or policy rates of central banks. So that's a variable, that's a policy variable, and that's not necessarily linked to demographics.

Question: I'm David Weil from Brown University and I have regressed asset prices on demographics. But I'm not regressing asset prices on demographics again. As a reformed sinner, I wanted to comment some on Robin's paper. Two things, you start with this motivation picture that shows the value of the SNP and demographic component, and it fits incredibly well, as did ours. Of course, the problem is that, if you take this fit seriously, it implies that demographics were behind the huge asset run-up in the last 20 years. So we can take good Fed policy and productivity and throw it out the window, and that seems like a dangerous path to go down. The second issue is that, I like looking at long historic time series for lots of things, but when you think of the different channels by which demographics might effect asset prices, it's hard to believe that these factors have been stable for the last 90 years. You're going back to 1910, before Social Security, before corporate pensions, before people retired very much before they died. People used to work until they died. Even if the post war data, you're going back, say you're going to the 1970s, to a period before financial globalization. So it's not clear that the even the inferences you draw from that period would be relevant to the world today. So as reformed sinner, you should be careful.

Jeremy: I would like to follow up on that. The demographics we're going to face is a very much bigger than the little waves that we've had so far. It's almost like the quinine theory of money. Money just fluctuates a little bit, you don't get much effect, but when it fluctuates a lot, you begin to see it. I just question that when we're doing these historic studies, whether we're taking the little waves and projecting them into big waves. And yet, I think different factors, such as a huge asset return of the last 20 years are distorting our figures compared to the demographics. This is a huge hump we're going over because, if you go back in history, rarely do we find such factors. I hear what you are saying and I think there is some truth to that.

Robin: Couple quick words. I'm glad I got my dig in to David. I just wanted to say two things. One, in terms of this empirical work, I agree with you 100 percent. The literature is rife with papers that find one demographic measure or another that happens to fit great with some financial variable. What I tried to do here was to sidestep that using polynomial approximation. You're not picking one measure or another, you're just using the entire age distribution (of

course you have polynomials, etc). Now, I think we have a real dilemma here because, as I said in my presentation, you can either simulate or you can estimate. The dilemma is that we really don't have enough data to estimate. So we don't have enough data to calibrate the models we want to simulate. So everything is somewhat speculative. Going to Jeremy's point, the recent stock market surge and increases in bond prices and whether that has distorted asset holdings over the life-cycle, it's certainly true that wealth effects played a role. But the kind of pattern that I showed pre-dates the surge in stock prices that happened from the mid-90s, so the dissaving... so the lack of dissaving for households in retirement was a more fundamental problem.

Jeremy: Actually 1980 is when the big surge began. The bubble began 1995, 6, 7, but really from 1980 through 2000 is when you had double real returns for 20 years, never before experienced. So I mean. I don't... You went back further than that, but we are talking about a rather major period of incredible returns.

Question: Lynn Reaser, Bank of America. Most of the morning, we've indicated that, at least for the industrial countries, the life-cycle has not had a lot of relevance. But in terms of risk preference, in the evidence that you have that there is a change in risk preference varying with age, what impact would age have on the distribution of assets?

Jeremy: There is a lot of discussion that there would be some increase in risk aversion as you age because you don't have the flexibility of labor income to offset changes. And if there is some increase in risk aversion, that obviously would increase the gap between stocks and bonds. It might depress real bond yields, and keep stocks constant, or might be some combination of the two. Of course once you get into foreign capital and you have a young, growing income stream in population, they're very much risk takers. That effect could well offset the aging of the developed world.

Robin: As Jeremy said, there are theoretical reasons for thinking risk aversion would increase with age. I think Steve Zeldes has a paper looking at equity shares and bond shares and financial wealth over the life-cycle. I don't remember exactly, but I don't believe there was a huge pattern there of shifting away from risky assets as people age. Steve you can correct me if I'm wrong.

Steve Zeldes: There's not much evidence of shifting away at old ages except perhaps around... there is evidence that around the time of retirement of people shifting out of risk. But the bulk of the evidence is that people don't make many shifts in their portfolio and don't gradually decrease risk. They change. There's the growth in life-cycle and target date funds that may change the patterns going forward, but historically we don't find much evidence.

Question: I'm George Hoguet from State Street Global Advisors. This is a question for Jeremy Siegel. One of the puzzles in finance is the home country bias, and it's very pronounced in developed markets, but it's also found in emerging markets. Koreans, for example, and other capital exporting countries don't seem to be that well diversified. So I'm just wondering if you think the home country bias is going to be substantially reduced in the next 10 to 15 years?

Jeremy: The answer is: I hope so. It was actually interesting that, when China began its stock markets and only allowed its own citizens to buy within the market, a lot of that stuff was overpriced and returns have been poor up until this year, despite huge growth and the Chinese in Hong Kong. However, we're very cool to many of those offerings and they preferred an international portfolio and are very well diversified in comparison. We're hoping that, as globalization takes place, some of that home country bias will decline, and that would be necessary to fill out the essential transfer that needs to be done.

Question: Ezra Greenberg from McKinsey Global Institute. I just want to bring back to the discussion that you guys were just having, particularly Professor Siegel's point about asset returns in the 80s and 90s, and how that might be distorting the data. I'm assuming you're speaking specifically about consumer finance being the primary resource for this household distribution data. So could you just talk about little more about what the impact might be on the life-cycle?

Jeremy: What I'm saying is people started out with half a million dollars in stocks. Maybe they retired in 1980 or 1985 and they were maybe planning to work down \$20,000 a year. But their capital gains or returns were equal to that, so they found out they weren't. When you measured their wealth levels, they kept on going up, and they ended up with a lot more money than they had anticipated in the beginning in their retirement. That's all I'm saying. When you measure these wealth levels, this could distort the data in terms of how powerful the life-cycle effect actually is.

Ezra Greenberg: So if we go with the hypothesis that that is distorting our ability to observe the life-cycle over those periods, has anybody given any thought about how one might go about controlling these things to see if we can see a life-cycle?

Jeremy: Not to my knowledge. I haven't tried this; someone else might have. I do believe in life-cycle. I do know the caveats. But I think one of the reasons we're getting weaker than we should in the data is this tremendous asset return period over which...it's really a 20 year period.

Robin: can I just come back to that point and add to that? So when you look at survey consumer finances data, there are two things that people have controlled for: one is this return effect Jeremy brought up, and the other effect is cohort effects. So when you look at the kind of cross-section chart I showed, there are two things that might be distorting it. One, if you've had a past appreciation that has made people who happen to hold assets wealthier, that might have been old people, so that would distort this picture to make it look like there's no dissaving. The second effect that could be happening is cohort effect, which is, since you are looking at different people in this cross section, it may be that the currently old happen to save more and have more financial assets because they were born in the Great Depression and are risk averse. So the people have controlled for both of those things. But you can't control them both simultaneously, because of an econometric problem. But the bottom line is that empirically both of those factors are huge.

Eric Engen: Again I'd like to thank Robin and Jeremy for a very interesting presentation.

The View from the Markets

Moderator: **William Dudley**, Advisory Director, Goldman Sachs & Co.

Presenters: **Ian Banwell**, Chief Investment Officer, Bank of America
 David Kostin, Chief Sector Strategist, Goldman Sachs & Co.

William Dudley: This panel is about to begin. Let's get settled in here guys and gals. We're about ready to start. Could we get everyone to take their seats so we can try to stay reasonably on time? The summation of our panel could be summarized very briefly after talking to Ian and David, with the conclusion that the markets don't really care about any of this stuff. So we're done. Larry Meyer asked me to talk about the survey results, and I'm going to do that first and talk about why I think the bond market doesn't seem to care about any of these issues at this point and ask the question about whether that's reasonable on the part of the market. And then I'm going to turn it over to Ian Banwell, who is the Chief Investment Officer for Bank of America, which is important in two respects: one, Bank of America is a huge institution with probably just about as much investable funds as any single entity in the world, and two, Ian is very forward-looking guy in terms of all these kinds of issues. I've been dialogue with him for at least a decade and he likes to think about economics and look at things that are coming down a pike. So I think it's going to be very interesting to hear what he has to say. Then we're going to hear from David Kostin, who's responsible for our U.S. equity views at Goldman Sachs. Certainly on a day to day basis that means Joseph Cohen is still around, but David is doing all the heavy lifting in terms of how we see the U.S. equity market at Goldman Sachs.

So the survey results; well the survey results. It would be nice if the survey results had really strong definitive conclusions that were contradicted by the presenters, then we'd have nice controversy. But in fact what we're going to find is that the survey results are pretty consistent with what we heard earlier, generally pretty reasonable. I can't find anything in the surveys that I strongly disagree with. In terms of the question of how global aging affects the economy and financial markets, as you can see in this slide, a very clear view among the participants of the survey that the budget channel was the important channel by a significant margin. And I agree with that. I think that at the end of the day, the biggest effect will be through how we finance Medicare and Medicaid spending going forward, and what that does to the fiscal deficit. The other channels, as we heard from other presenters, it's not clear whether savings effects are bigger than the investment effect or not. So I think the other channels are much less important.

In terms of the issue of private savings, the starting point probably matters. The fact that we're starting at a household savings rate that is minus 1 percent of disposable income probably makes it unlikely that the demographics are going to have...(even if they did work in the direction of lowering savings), that they would lower them appreciably from where we started. I just wanted to add that the starting point does matter. As far as a shift of portfolio preferences towards safer assets, I just say that you need big shifts by each cohort to have small effects on financial asset prices. Because it's not as if the baby boomers are 100 percent of the population as you move from age cohort to age cohort, it's fairly level even with the baby boom generation. So you have

to have really large shifts to have much of an impact there. So I think it's pretty reasonable the survey results there.

As far as the productivity piece, as you can see here, people didn't really have strong opinions. At the margin, more people thought the global aging process would raise productivity rather than lower it, and I would certainly agree with that. Older workforce, plenty of capital, there's not going to be any shortage of capital, so workers are going to have plenty of capital to work with. It seems to me, at the margin, that should result in higher productivity rather than lower productivity. Look at the U.S. experience in the 60s and 70s when you are absorbing a large number into the workforce. In the 70s productivity growth inexplicably declined. Then we get to the 90s, and labor force growth is growing much more slowly. The baby boomers are much more experienced workers now. Productivity growth inexplicably rises. So very much consistent with the idea that an experienced work force is a positive development in terms of productivity growth.

On fiscal policy. I thought it was interesting that not too many people agree with Larry. It would be interesting to take this survey again after he spoke, but only 3 percent (that's probably Larry) think there is going to be a fiscal train wreck. Very much in the muddling through. I think that what is interesting though about this result is what's not stated here, which is: how does the muddling through actually take place? Douglas Holtz-Eakins gave a story where the politicians wake up one day and realize that this a heck of a problem they have to address and go out and deal with it. My own idea is that the muddling through is going to be more episodic and difficult. The markets are going to have a problem, and only when the politicians see the market is having a problem will there be political support that forces a political solution. It probably won't be all at once. It will do a little, fix the problem for a year or two, there'll be another episode and then the politicians will do a little more. So you will muddle your way through it. But muddling through it is a little too benign in terms of what it connotes, because it implies that the financial markets are all very happy through this entire period. I don't think that's going to be the case. I think you are going to have financial market turbulence from time to time.

As far as interest rates, very small effects and quite a bit of uncertainty about the effects. In terms of short rates, the net effect would be there would be a small increase in real short term interest rates. Not clear what people see as driving that. Probably the budget deficit side is what's driving that. But believe me, at 25 basis points, an increase in real short term rates caused by demographic pressures is no big deal. What the Fed does over the next year in terms of interest rates and what that means for real rates is probably equally uncertain. 25 basis points is not a lot to get worked up about. What was interesting was when these effects should begin to take place. As we saw this morning, it looked like the big effects start around 2010 and continue in the United States pretty dramatically through 2030. So this is a pretty reasonable response that sometime as we get out to 2010, 2015, the markets are going to start to wake up and price that in.

In terms of long-term rates, I was a little surprised by the results here. Not really sure why global aging is pushing 30 year Treasury yields down now. I didn't really understand why that would be the case. I would say that if global aging probably not having any effect on 30 year Treasury bonds now. So if someone has a view on why the prospect of global aging in the future should be pushing down 30 year yields today, I'd like to hear it. So the question is what will be

the effect on the L-curve? Well, people's views on the L-curve is that they have no idea what the effect will be. I actually found that a surprising result, because if you look at the bond market today, there's basically no risk premium in the bond market at all. In other words, if you think about the expected path of short term rates and you compare that to where 10 and 20 year bond yields are today, they're about the same. So that means the risk premium is about zero. So I would guess that if there is going to be an affect from global aging, it's probably going to push the risk premium up, not down. I guess I thought this would steepen the L-curve. I'm a little surprised people think the risk premium in the bond market will stay close to zero as we go forward this process, because that's essentially what the responses are saying in my opinion. Here's a qualitative estimate. As I already noted, very small, 25 basis points. Obviously our survey response including myself were not heroic in their answers (I think I put zero for both of them).

On equity market, the question of what would be the impact on annual returns, very modest. I think this question, though, is not posed that well because when you're asking yourself what's the impact on annual equity returns, you have to ask why are annual equity returns lower? Are they lower because real rates are higher? Are they lower because the equity risk premium has gone up? If the equity risk premium's gone up, equity returns are lower as the equity risk premium is rising. But once the equity risk premium has risen, expect that equity returns will be higher than they were before. So the impact on equity returns is a tricky one. Are we measuring point to point including its big declining equity prices? I'm not sure people knew what they were answering here. My own view would be the equity risk premium at the margin goes up a little bit, and that pushes down equity prices? When that happens, but once it happens, expect equity returns from that point forward. If no elderly people want to hold equities, you're going to get pretty good return from equities because you're going to get that higher risk premium.

Here you can see again estimates of the effect of global aging on equity returns in 20 years. Pretty tiny, zero, 25, or 50 basis points, so it's a pretty trivial effect. Will equity prices decline? Most people said no; a couple people said yes. The yes is just the idea that seniors are going to be moving towards more riskless assets and so that will effect the equity return. The dividend payouts seemed reasonable. If you need less capital, presumably companies will payout more of their earnings in dividends or by share of buybacks, that also seemed like a pretty reasonable result to me.

In terms of the effect on international capital flows, there's also quite a bit of uncertainty about what was going to happen. Again, I think the starting point matters here, and it wasn't really talked about. Currently, the United States has a current account deficit of 7 percent of GDP. So to say that you think that capital flows to the United States are going to increase, you're basically saying that the current account deficit is going to go up, and you're making pretty strong predictions about what level of foreign indebtedness the United States is going to have related to GDP over the long-term. 6-7 percent of GDP, I haven't done the math, but I imagine the foreign debt to GDP ratio goes well over 100 percent. No country has ever done that before. Maybe we can do that. The starting point really matters in terms of how you think about the answer to this question, especially when you're talking about the United States. So that's it about the survey.

Before I turn it over to Ian, I want to talk briefly about the bond market and why I think the bond market has not worried about it all. And my proof that the bond market hasn't worried about it is based on two things. One, the work of Brian Sachs and Larry Meyer in terms of developing this bottom risk premium is showing that the bottom risk premium is essentially zero or close to zero. The second piece of evidence is looking at the spread right now between the 30-year Treasury yield and the 10-year Treasury yield. That's important because the 10-year Treasury yield is mostly before the demographic problems happen up through 2016. Two-thirds of the 30-year yield are after the problems really persist. So you'd think that if the markets were worried, there would be a pretty big spread between the 10-year yield and the 30-year yield. But in fact the spread is only 15 basis points, which is below the long-term historical average. That's telling you that bond investors are not worried at all about this problem.

So the question is: why? And the second question is: should they be worried? Well, I think there are really four broad set of reasons why bond investors are not worried. One, they believe the Fed is credible and will not monetize the debt. I want to go back to something that Brian Sachs raised this morning, and that is that, one reason the Fed doesn't monetize the debt is that it doesn't really solve the problem. You can expropriate the debt holders, but you still have these real obligations like Social Security and Medicare that you cannot inflate away. They have to be solved some other way. So even if the Fed thought that they could solve it by monetization they'd do it. But the fact is they can't solve it by monetization so they're not going to try.

The second reason why I think the bond market doesn't price this in is that the budget forecast has been horrible over the last 15 years. Early 1990s when we were going to run deficits as far as the eye could see. In 2000 we were going to run surpluses as far as the eye could see, so much so that Alan Greenspan testified that we had to cut taxes, because if we didn't cut taxes, we'd run out of Treasury debt, and running out of Treasury debt was going to be a horrible problem. I always thought it was a problem I'd like to have, especially given this entitlement spending coming down the pipe. Budget outcomes over the last couple years haven't been very good in the forecast. The deficit has been coming in considerably better than expected for the last couple of years. When people like me or Larry talk about how this is going to be horrible, people say, those budget forecasters do a terrible job, so I'll wait to see the bad budget numbers before I actually react to it.

Third, the United States has quite a bit of debt capacity, and I think that's important. U.S. debt to GDP ratio, if you look at the Treasury debt, is less than 40 percent. Remember the Maastricht criteria; 60 percent was the standard. So, it's like, call me when it's 60 percent and I'll start to pay attention to this problem. As long as you have quite a bit of debt capacity, you realize that from the market perception, you're really not going to focus on it until they have a sense that we're in an explosive type of situation.

And the final reason, and this is probably the most important, bond investors have extraordinarily short-time horizons. I've worked with bond investors, bond traders especially, at Goldman for 15-20 years, and they care what's going to happen next week, next month. Bond investors in a day are asking themselves not what's the value of the bond market given these demographic pressures. They're asking the question given the news that's likely to come over the next week: is that news over the next week going to be favorable for bonds, or unfavorable for bonds? If it's

favorable for bonds, I want to own more bonds today. If it's unfavorable for bonds, I want to own less bonds today. That's what drives the bond market, not these very long-term issues.

So that's led to questions of: is the bond market correct? Should bond investors be nervous? Well, my view is yes. As Larry said, demographics is destiny. The likelihood of substantial budget pressure in my mind is extremely high, despite the fact that we've had really poor budget forecast. If you look at the Trustees assumptions for Medicare, they go from 2.5 percent of GDP to 12 percent of GDP, but that assumes that excess inflation in Medicare goes from 2.5 percent to zero. And what's so amazing about these Trustees assumptions is that they assume this out of thin air. There's no mechanism that force it from 2.5 to zero because they don't want to show worse numbers. So there's plenty of margin of error in the budget forecast to give a pretty bad outcome. That means, in my mind, that the debt capacity will used up. We will see very high budget deficits sometime down the road, and I think we'll ultimately muddle through because that will create the market turbulence that will force the politicians to respond. But I think you will have market turbulence, and that will be the mechanism that finally gets the right results. Remember, we're starting at a point right now that the bond risk premium is close to zero. If you make a bet on the outlook, you don't have to put 100 percent probability on us having a budget deficit problem, but the market is putting a zero percent probability on that outcome. With that, I'll turn it over to you, Ian.

Ian Banwell: I'm Ian Banwell from Bank of America. Bill has left me with a relatively easy one. Approaching this one in layman's terms and not in academic terms will leave me plenty of that out. So I'm going to talk hopefully today in the context of, what I think is, the standard investor view of this problem before us. In my estimation, I think the market treats this problem as if it's a first inning problem at best. Grabs this as a pre-game warm-up, so this conference and its estimation on the effects of aging here and aging globally is, in most markets' minds, premature. I want to do three things today. The first is to look at this first bullet in a little bit of detail. Most market participants remember very clearly that big bond markets, not just small sovereign markets, are prone to big problems, and we'll talk about the third and second sovereign bond markets, Italy and Japan, which have had absolute train wrecks in the past 12 or 13 years. I'll spend a bit of time on risk premium and why I think it's unlikely to persist and then throw out a couple mile markers, what market participants focus on along the way when this becomes a more relevant issue. Bill's point about relevance is market participants; we're economic agents keen to keep our jobs over the next year, maybe two years if we're lucky. So the profit maximizing entities that we are, force us to focus on the very near term, and that's in part why you don't see these issues reflected in asset prices today. Okay, so let's look at the problems.

Italy, early 90s. I don't know if maybe you recall this, but in today's markets, this is an absolute catastrophe and one of the greatest money making experiences that most participants from the early 90s on experienced. You see this massive increase in debt to GDP ratios, a spike in rates towards the end of the Fed tightening cycle in 95. The bottom left slides shows you a rolling five month average of swap spreads, so you can see the banking institutions in Italy were declared far more worthy credit than their own government. And then you can see the change in government spending as a percentage of GDP. I think what's really interesting to me is that this is probably

the case that I would focus on as a more likely worst-case scenario for the United States to be mindful of, rather than the next one, which is Japan.

So here's a familiar story to most. The thing to remember in Japan is that they are not a debtor nation. So consequently when the crisis hit, they were much better equipped to deal with the consequences, with the assistance of the Monetary Funds. So the other thing is that, if you notice in the bottom left-hand slide the volatility of productivity growth, which is something I want to come back to in the latter part of my discussion.

So two absolute disasters. Debt to GDP ratios in excess of 150, 160 percent of GDP, as prominent markers. As Bill mentioned, we're quite some distance from that. The risk premium (here's another measure of risk premium), but historically low and you could argue it has a bit further to go. And then are real yields. I think in the view of most market participants, this is a notable slide because of another point that Bill touched on, and that is forecasting, and forecasting's inability to predict general outcomes. So I think most people would have thought that real yields would have risen over the most recent period as our current account deteriorates. In fact, that hasn't been the case. That manifested here, as Professor Siegel touched on, the home bias issue. We've seen the home bias addressed for a variety of reasons by the Asian countries. Although their motivations for increasing dollar reserves could have been articulated differently...and differently here in the United States. But the key question to ask here is: what is the expected return of these nations on their holdings? What has it been and is it likely to persist, particularly as their populations age? And when you have off the record discussions with reserve managers in Asia now, I think that we already feel their preferences shifting. Notably (and you may have seen this recently) the Korean reserve managers are already coming under pressure for returns on their dollar portfolios, as domestic interest rates have risen above yields on theirs. I think that some of the reserve managers with lower risk tolerances, for example, the Chinese, are very nervous about these very large holdings. The intimation there is that they'll stop growing at some point.

So maybe we can touch on what the market will focus on as we move along here as to sustainability or change. If we assume we're in the pregame warm-up (which I think it's obviously clear we are), when and why will people in markets care? I think this slide here is probably the most important to me, personally. Capital deepening is critical to sustained productivity growth over time and to sustain a standard of living this country is used to, given a perceived fixed amount of labor inputs. So those dependency ratios rise and immigration is thought to. Immigration as we've seen it, in a very stable relationship over a long period of time declines, then the residual, i.e. solving for the same standard of living is going to require an increase in productivity. So I would put this as number one in market's mindset. Will capital expenditure, will productivity, will total factor productivity growth stay about where it's been at a minimum?

Second, (and I think this has been touched on in prior presentations) I think in the market's mindset there are big choices to make. The assumption is that an aging population facing increased Medicare and Medicaid expenditures, even with the eradication of the inflation premium, that it's got big choices to make about it wants to live its life. The positive assumption, and I hold this one, and I think it's part of the market's confidence, is that, when you

look at the percentage of GDP consumed by health care, ours is relatively high vs. our other comparatives in the industrialized world. What this means to me is that there is a potential choice, for how you live, how you consume and, specifically, how you die. So the portion of medical expenditure in the last year in the years of death. When I speak with my colleagues in the market, they watch that one as a barometer. Will more people, for example, choose hospice over more expensive forms of medical care? But very broadly as an indicator, health care spending is important to both bond and equity investors.

Household formations, I think it's an interesting in Japan right now that the focus on the aging demographics of that country is pretty keen topic. And people there are pretty aware of it; their asset allocation has shifted to reflect it, perhaps too far. But this household formations issue is a big one, and it's a very powerful mitigant of population dynamics. For example, in Japan right now although the overall population is expected to decline into 2015, we're going to have pretty strong household formations there.

To market participants that focus on this and then the rate of immigration, in this case, this is the immigration rate as a percent of the population. The general view post 9/11 is that immigration rates, particularly for skilled workers, are going to stay low or decline. This seems to me to be a pretty dangerous forecast and forecast assumption, and the market may sense that. This country has been the 200 plus year recipient of positive immigration, and to assume on the forecast that they stay or to assume a pessimistic forecast they're probably arguing against a lot of really well founded history.

So, and then lastly (and I think this again explains why markets are really disinterested in this topic of crisis), expenditures that appeared elevated a few years are historically not. But this is a very important metric to the market and one that the markets will be concerned with when it shifts higher. So that's it and I'm happy to take questions.

David Kostin: I do not have a power point presentation, because I would like to offer a practitioner perspective of what's happening as distinguished from some of the presentations this morning on the theory. I basically want to contrast what the market is thinking vs. some of the demographic or economic projections offered. And I think the theme you heard from both Ian and Bill and myself is the investment horizon. So the title of conference today is on "Global Aging and Financial Markets." And it seems that many of the presentations touched on the two items separately, talked a little about globalization and on aging. Sometimes they were connected, sometimes they were disconnected, so I think I wanted to address one aspect there.

But first let's talk about the issue of investment horizons. I spent 20 years on Wall Street. About half my time right now I spend with hedge funds, and the other half my time I spend with traditional money investment institutions. The investment horizon for most hedge fund institutions is anywhere between a week and a quarter, and the investment horizon for most long mutual funds is somewhere between a quarter and a year. There are very few organizations that I have met with over the years that have a multi-year performance benchmark that a portfolio manager is compensated on. So therefore, if you treasure what you measure, and you are as indicated a profit-seeking individual, you are looking to maximize your revenue and maximize

your earnings. So you are focused on investment horizon that has the most relevance to your company and your career, and therefore the investment horizon as it relates to demographics is less relevant to investment decisions. I want to give some examples of that in just a minute.

So there has been a steady increase in the holdings of major equity institutions internationally. So one of the questions that Professor Siegel raised was who is going to buy the asset and where is the money flow coming. And I guess I would take a somewhat contrarian view there, which is the U.S. investment organizations are investing overseas now to benefit and capitalize on the faster economic growth you see there, and in a sense the younger demographics. A whole lot of reasons why they're growing faster, developing economies are still indicating a lower base, so you have that benefit, and the privatizations. I do work at Goldman Sachs and we're involved in a huge number of privatizations. These are foreign governments that are privatizing their industries and developed country financial markets are buying an ownership interest in that business. So that is, if you will, the cash flow or the capital flow that's going the other direction. Of course, we're continuing to run a deficit, so they're certainly buying our government securities. I'm not suggesting it's a one-way street, but part of the globalization process is you had all this Congressional uproar in Washington, D.C. about the Dubai authority buying control of the UK entity that ran all the port systems. You didn't hear one peep out of Washington when the Dubai authority paid 1.2 billion dollars to buy 280 Park Avenue on 48th Street, an entire square block of downtown Manhattan. Not one person from Congress said anything about that. So it's just a little bit of the cynicism, if you will, from a person outside the Beltway. Since I'm in the Beltway, I can express some of the cynicism from around the country.

So the question is: who is buying these assets? We, and not just in the United States but other developed countries, are buying and participating in the faster economic growth that is taking place overseas. So just as the politicians here seem not to be focused too much on the fiscal ramifications of what's taking place on aging, I would say the markets aren't as well. So that was my first observation sort of as a practitioner.

So I want to go into the subject of how do you profit from the aging process. We have a problem. I think some of the earlier presentations addressed the fiscal issues. I'm not going to minimize those. Those are enormous problems, but that's less of an area of my expertise. I tend to focus more on the investment side. So how is that one profits from it. So here it's basically if a company or business is in the right products or has the right customers. So the question you say, I would say most people here, what is an area that is growing? Health care. Health care is a growing business, people getting older; you saw the demographic statistics, older people use much more health care, people use much more health care the last six months of people's lives, huge increase in the amount of health care spending.

So most people would think about pharmaceuticals. They'd say, well, pharmaceuticals; people are getting older. These are large gap companies; they pay big dividends. People are going to be taking more drugs; you want to own branded pharmaceuticals. Well, the fact is that the economic model broke down in the last five years. The *quid pro quo* was they would spend several billion dollars developing a drug, and in return for that, you got an 18-year patent. You got monopolistic profits for the better part of two decades, and at that point it went generic and you would have gotten a very large IRR. Well, now you're getting patent challenges five, seven

years into that monopolistic period of time. So that whole economic business model in the pharmaceutical industry has completely collapsed. In fact a lot of this is taking place now in the reverse engineering of the drugs in other countries, where those profits are inuring to foreign entities which as a capital markets, international flows, we can still participate in right now. That's one example.

The second example would be again in the health care business. People think... Every time I talk to somebody about demographic issues, how do you play this if you take a long-term view? Recognizing that most people take a short-term view, take a long-term view. Well, you add Boston Scientific as a case in point. There you had the drug eluting stent, the miracle stent, the stent that was going to reduce the frequency of open heart surgery and was going to reduce the need to have repeat angioplasty. This stock was up 76 percent in 2001, 76 percent again in 2002, up 73 percent in 2003. I mean this was a rocket ship, one of the great growth stocks. In the last three years it's down 3 percent, 31 percent, down 30 percent this year, and down 5 percent today. I got on the shuttle this morning and saw the issue that questions the efficacy of drug-eluting stents to begin with.

So the questions is this, I was asked to speak on the equity market's perspective on demographics and aging, so when I talk about well this is an issue, people are getting older, they're going to be using more of these products, you're going to want to be buying into companies that are going to be producing these products, you realize that the length of time in the investment horizon that people need to focus on, frankly, in the equity market is much shorter.

Two other issues to address because as I said, I thought I heard comments about globalization and aging, sometimes they were together, sometimes they were apart. Talking about the BRICs thesis, which nobody at Goldman Sachs would talk about emerging markets without mentioning, the Brazil rush, India, China, and the faster growing there. Well, China's going buy 2,600 airplanes in the next 20 years, 2,600 airplanes worth over 200 billion dollars in orders. Boeing has a 60 percent market share and has it for 35 years. So a lot of those parts are produced in China, but you have an ability from a capital flow point of view to benefit from a faster growing part of the market.

So last thing I'll end on is sort of: if it's generating the right products, and people want to buy in older demographics, what are the right customers? What customer base ought one to focus on? Tom Brokaw talked about the greatest generation; you can also call it the wealthiest generation. You didn't hear about NetJets until a couple years ago, now it's in every magazine insert. There's a lot more spending on leisure. As Ben Stein, a columnist, said, "it's bad to be old, it's bad to be poor, and it's horrible to be old and poor." And so the issue here is (and I think that Robin Brooks gave some statistics)... but basically, financial holdings are concentrated in a very narrow component of the demographic. So as those individuals are getting older, how are they likely to be spending their money, and that, as an investor, is how one looks to profit.

So as an observation, and based on Richard Jackson's comments, 12 percent of the U.S. population is over 65. Well those people account for almost 25 percent of all the passengers that go on cruise ships. So to the extent that you have an increase in the number of individuals over

65 years old, that's a business that's basically a duopoly, run by two companies. They're in a position to benefit from a growing market. And the last would be casinos, if you want to think about that as well. These are industries; a disproportionate amount of their customer base is individuals who are basically over 50 years of age. I would basically end with the comment that from an equity market perspective. The demographics, it's very hard to price that in, very hard to capitalize and make a profit on that. I would certainly come back to the fiscal point of view. It's an enormous issue and with that we will take questions and be mindful to stay on schedule.

Question: Bill Dudley, I used to work at Goldman Sachs, and now I work at a hedge fund in London. I've learned through my years at university and reading research by yourself and many of your colleagues that the short rate in the economy over time should be equal to the real trend growth rate. The real trend growth rate should also be equal to the growth rate of the labor force and productivity growth in that economy over time. I don't see how the short rate in aging society will rise. Firstly because labor force growth is unlikely to accelerate, secondly because I don't share your bullish view on productivity in an aging society, because we've heard before that we don't know much about what drives productivity growth. But we think old people sitting in old homes, thinking about old ideas, is certainly not going to be good for productivity. So if you could elaborate on that point. I do think in financial markets in the real world its oversimplifying just looking at the short rate. One should probably be looking at the average real rate across the year curve on average over the cycle.

The other thing that strikes me is the two countries that are most advanced in tackling these issues in the industrialized world are the United Kingdom and the Netherlands. If you look at inflation-protected securities in the United Kingdom, they had a low yield of 50 basis points last year, and they're now trading a little bit higher. But I just doubt that an economy that would growing a lot slower in 10-15 years will be able to stomach real rates that are higher from where they are today. People are talking about the neutral real rate and the United States being around 3 percent. I think that's actually not the case. Should be lower, but it will certainly be lower in 15 years. You know markets are sometimes inadvertently forward-looking when they're forced to face up to reality. For example, in the United Kingdom through the reform, and I know that's actually more private sector problem there.

But the last point I want to make is that the train wreck scenario, whereby you'd have higher real rates to have higher risk premiums in bonds, is an unlikely one. In fact, Chairman Greenspan, who I rate as a savvy market observer, said in his last Humphrey-Hawkins testimony that it is morally wrong by the politicians in the United States to promise retirees we're going to deliver on the promises that we made them, because they're totally unrealistic. I think the realistic scenario is that the United States, like many other governments, like in Germany, where I was born, will give their citizens next to nothing when they retire in 15-20 years.

David Kostin: There were several questions in there. Real short-term rates. You are correct. There is a rule of thumb that real short-term rates should roughly equal nominal GDP growth over the medium to longer run, but I think it's more a rule of thumb that any result of a formal model or economic model. So I wouldn't want to push it too hard. I think the idea that real rates will be a little higher in this world of aging is really driven by the idea that national savings will

fall because of the fiscal imbalance. As the fiscal imbalance rise, national savings fall. The United States becomes even more dependent on foreign capital; foreign investors demand a higher compensation because they are taking on more risk as U.S. external debt increases. So presumably, real rates in the United States have to go up a little bit. Now remember, it was only 25 basis points. I would say if you're within a quarter percent of long run average, you'd be pretty low. I think we've generally heard today that the savings effect vs. the investment effect, which dominates is pretty ambiguous. So I think the conclusion from that is that we shouldn't expect any significant real short-term rate effects unless market participants balk at what they same happening. And I think that's how you get some real short term rate effect.

As far as the United Kingdom having very low tip shields, UK law has been changed in a way that has created tremendous appetite for pension funds and others for long duration assets. So I think there are a lot of people, including myself, that would say that long duration UK rates are somewhat divorced from reality because of this change in regulatory regime. Probably the solution to that is to create more long duration assets. I think the United Kingdom is in the process of doing that, but it's going to take time to eliminate the...pardon me! The United States may have the small problem to a certain degree. There's a lot of debate in the U.S. bond market, whether 30 year Treasury yields are low because of pension fund extending the duration of their assets. My own view, and I'd like to hear what Ian has to say on this, this is more being discussed by pension funds than actually being acted on by pension funds.

Ian: I'd say that most of the large pension funds that I speak with describe the demand for long duration as incremental, steady, ongoing, rather than what they've experienced as having been a rush to long duration assets. My own view on the term structure here is, probably similar to Chairman Bernanke's, that currently we're the beneficiary of excess savings abroad and national objective for home bias issues in portfolios that are being addressed.

Question: Stephan Schneider from Deutsch Bank, another German born. I have a question for Ian. I'm not really sure whether I should feel reconciliated by the example you presented. Basically you looked at the absorption capacity of bond markets in terms of chaos or whatever, and you took Italy. I mean, Italy afterwards had a free ride due to EMU conversions. Italy has currently such low rates and such decline in the deficit because it enjoys EMU rates. Actually within Europe, there's quite a big debate, not at least driven by some Anglo-Saxon banks, whether Italy might actually drop out of the EMU. So I think I would describe Italy as a good example for the catastrophe absorption capacity of bond market, and the same applies to Japan. I mean, you show what the central bank in Japan actually did in order to engineer this. Japan is probably not a good example for an open bond market if you look at the domestic share of investors in the bond market. And the last thing were I was also puzzled where was you talked about capital deepening. You showed the capacity to GDP ratio, again you look at Japan. Japan has the highest capacity to GDP ratio, but it also has one of the lowest productivity rates. So I am not sure whether we should be reassured by your examples.

Ian: Well, first points, I agree with you that the Italy are the beneficiaries of German discipline. The points I was trying to make in both examples are complacency resulted, for a variety of different reasons, in bond market outcomes that were dire, and nothing more, nothing less. Other than the fact that both of those bond markets are very large, there the largest address, full stop.

My point is that if things, for many reasons, go wrong, they go wrong frequently in bond markets and big bond markets aren't excluded. As for your comment around capital deepening, the point I'm trying to make in that slide and obviously I didn't do it well, is to say that a standard of living in the U.S. experience is very much a choice. As the population ages, here in my mind, the choice will be manifested in our choice of productivity growth rates. Given that labor inputs are likely to be fixed or declining, capital deepening will be the single metric that the markets focus on the most to determine what the potential growth rate is.

Question: I'm Larry Siegel from the Ford Foundation. The question of liability hedging on the part of pension funds in the United Kingdom or elsewhere. Certainly, UK pension funds are encouraged by regulation to match asset durations to liability durations so that they are at the front edge of people buying long bonds, but the United States is right behind them. More importantly, because they have more money, individual savers are going to recognize and have started to recognize through the purchase of annuities, which are going to become very popular in the next 15-20 years, that for a long-term investor a long-term bond is essentially the riskless asset. I would propose that this is going to keep real long-term interest rates very low for a very long time, 20 or 30 years, in the range of 1-2 percent above the inflation rate and I was wondering how any of you might respond to that suggestion.

Ian: My assumption would be that the asset allocation mix preferences do shift clearly in favor of fixed income and cash from their current allocations over the next 20, 30 years. The implications for real yields to me are much less clear as we're a debtor nation, and the dynamics of savings and portfolio allocations abroad occur to me to play a very important role in the future. So I'm less comfortable with the real yield argument. I guess, there's a much greater chance of shift.

David: How can real yield shift upward, if nominal yields don't go down? What you're suggesting is fiscal condition in which inflation rates go up which if nominal rates are held down by this demand for long term assets would support my suggestion that real yields which are simply the difference between the nominal yield and the inflation rate would go down.

Ian: How would real yields rise? I think real yields will need to rise at some point because our indebtedness will increase and our starting place is that we're a debtor country.

Question: There's a demand side, which is basically people are going to buy more fixed income assets. And there's a supply side, which is how much money is the federal government going to borrow and two, what's the debt capacity of the United States vis-à-vis foreign debt collectors who have been so important over the last couple years. And one of the things that hasn't been talked about today is current account deficit sustainability. Three years ago, everyone was talking about this. Nothing's happened over the last three years. So now everybody's decided it's infinitely sustainable. Now probably the truth is somewhere in between and I think that's an important issue. The final issue that, I think, is very important, that hasn't been talked about at all today, is what happens to the dollar? One way that this adjustment process can take place is through the currency and if the U.S. demographic pressures are very severe. One thing that might happen is a big fiscal deficits, much weaker dollar. That does two things. It reduces the standard of living of all Americans and expropriates some of the debt that foreign investors hold

in the United States because the debt is worth less. So that's another adjustment system that could turn out to be important that we haven't talked about today.

Question: Larry Meyer from Macroeconomic Advisers. When we were thinking about this survey that Bill described, we did think about putting in a question that goes to the heart of the mission of this panel and it would have been... Since some of the people answering it were marketing participants, we would have asked, "If there's no impact today from global aging in the financial markets, why not?" I had four possibilities. One, market participants are clueless; I didn't think that would be response. Two, economists are clueless and have nothing to offer on this subject. Three, market participants don't care what economists think because they have no credibility. Or four, the market participants understand that there are offsetting effects and the net impact are going to be small. I thought that might be the answer. You gave a consistent, across the board answer that surprised me a little bit, and that is that it's not in the market because market participants have such short horizons.

I have a couple of questions. So Bill, are you telling me that I have to revise how I think about long-term rates as reflecting current expected future short rates? Or, I do so without taking into account anything that could possibly effect short-term rates, like these powerful demographics? It's going to be tough, but I can live in the new world. And then for the panelists. I guess the question is: you are practioners, and we value your input, but I'm inclined to ask you, even if there's no impact today, tell us how you think the markets will respond as these things develop. Of course, you could say, "Don't ask me, I'm only thinking about the next week." But I'm hoping I'll get an answer.

Ian: Taking your question about market responses as one question in a way, I think the way I'm thinking about it is in two ways. One, the Japanese are in the midst of this issue, and I'm pretty interested in seeing how far along the discounting process really is at the beginning of the issue, which I would mark as roughly now, and how the assets markets perform. And the second thing I think we've laid out (and Bill laid out) pretty well, there's some pretty simply metrics for lay people like me to follow which suggests that the issue's pressing. It'll be an issue for the markets long before it's pressing and markets will discount things in different time frames. But the answer, to give Bill a hint, it really is short-term.

David: A couple thoughts. Part was a response to the questions asked earlier. I think asset liability is a very interesting observation and if you look at it from a single individual perspective and not a macro... I know it's Macroeconomic Advisers' conference, but let's take the micro view as an individual. If you have a super-aging process, and people are going to be living to, I think there was a statistic there, that of people alive today, one of the spouses, there's a good chance that they'll be living to 92. So if you take the long term perspective, the whole idea of your asset mix between fixed income and equities, I might take the opposite view from expressed earlier that maybe you need to have a higher allocation to equities to ensure that there will be enough assets at the end of your life to support it. So one observation about how markets will respond, in fact, you could have an increase in allocation to equities. The second is, and I think it is related to the second observation, is this whole idea of the investment horizon. And you say, what are some of the big trends that have been taking place, because demographics is clearly the destiny. You had this big suburbanization, post World War II, you had people moving to the

suburbs. Well that led to a lot of businesses, whether it's home building, a lot of ways to invest in that. Clearly health care is the dominant incremental growth industry that will benefit from an aging population. The question is, as I give a couple of examples, that it may be the big driver, but it's not. The markets, if you will, can't price completely off a long-term perspective. It does have a short-term impact on what's going to happen. So those are some observations I would make.

William Dudley: My answer is the same as Larry's: uncertainty. Beyond six months the world gets very uncertain. So the market has a very high discount rate because it can't see out past a six-month time horizon. If the world was certain and the market could see clearly out five years, 10 years, then I think the market would take that in place. But the track record on the budget on the last 15 years shows you how it is to look out at any reasonable time horizon beyond six months. So I think that's why the market is short term. So I don't think the market is being irrational. I think the market has a somewhat higher degree of discount rate than maybe what economists have, but it's mostly the uncertainty that effects that unwillingness to look further out.

David: An observation too, to lead on to the next panel, which is the subject is global aging and financial aging. One of the things that you hear about is these life-cycle funds, which you basically identify your date of anticipated retirement and you know; automatically rebalance it between equities and bonds. So there's clarity. So like every thing else in the private market, it will find a way to develop a product to address the need of the population.

Global Aging and Financial Innovation

Moderator: **Richard Berner**, Chief U.S. Economist, Morgan Stanley

Presenters: **Steve Zeldes**, Professor of Economics and Finance, Columbia University

Mark Warshawsky, Director of Retirement Research, Watson Wyatt Worldwide

Richard Berner: I'm Dick Berner from Morgan Stanley, and we're going to shift gears here in this panel. The last couple of questions on the previous session were a pretty good setup for this one. The issue here, on this panel, is how can financial innovation address the challenges arising from global aging. Here we're going to explore the frontier between macro and micro financial analysis that might offer solutions to these age-old problems and may shed light on the macro questions that we've been discussing here. To frame the discussion, first, I'm going to try to identify five challenges and suggest where innovation may help. The first challenge is one we've discussed a lot today and that deals with longevity. But unlike the population pyramids you saw presented on slides this morning with a great degree of certainty, unfortunately for most people who think about financial planning, longevity is highly uncertain. When you think about it in a macro sense, it is highly uncertain. Just think about the forecast that actuaries make about longevity. Twenty years ago, their forecasts were just as bad as the budget forecasts that Bill Dudley was talking about. They've been skewed in one direction. They've assumed that people would live shorter lives than they've ended up living.

So how do we deal with that risk? We'd all like to ensure against outliving our resources, but it turns out it's pretty expensive. We either have to save a lot or we have to pay dearly for individual annuities. So the question at hand is, can new products emerge to lower the cost of annuitization? And if you don't know what annuitization means, it simply means the ability to provide for insurance against living for a certain period of time and deciding how much resources you're going to need over that time frame. I'll just make a comment about the cost today. If you think about real returns that are, say, 2 percent, and you think about the problem that many of you will face when you get ready to cash in your 401(k)s. You would think that you're going to earn 2 percent on annuitizing the lump sum that you're going to take out of the 401(k)s of the withdrawals you make. But don't forget about the fact that the proceeds from your 401(k)s will be taxable when you make the withdrawals. So when you think about what annuity benefit you're going to get in the future by making those withdrawals. Think about the fact that you're going to be taxed on the nominal amount. You're going to be earning a real return. When you think about the cost of annuitizing, say over 10 years after you start making withdrawals, say a dollar each year. It turns out that, at 2 percent rate of real return, you actually have to put in more than 10 dollars to get 10 dollars back, one dollar in each of those ten years. That's unfortunately how the math works in a world of low real returns.

Challenge two: uncertain and or declining returns. If we now live in a world of single digit returns, and Jeremy Siegel spoke to that earlier, and I agree with that, how can provide for retirement without incurring unacceptable risks? How can we encourage appropriate risk taking among participants? And that alludes to the fact that most people who invest (and all of you who work in financial institutions know this), that most people, don't take the kind of risk that would be appropriate over their planning horizon or their lifetime to ensure they get reasonable returns.

Challenge three: moral hazard. It's intrinsic to any safety net in our society. And, of course, Social Security, Medicaid, and Medicare illustrate the point. While Social Security is a pretty thin safety net, it may nonetheless, in my view, foster the belief that society will help me if I save too little. Now that view was challenged this morning by Robin Brooks, but I actually think that it makes some sense. There's a related issue here, and that's adverse selection. Inside information about your own health may cause you to shun or to buy annuities. If I have terminal cancer, for example, then I may be less inclined to buy an annuity than if I think I'm going to live as long as my parents (and by the way, my mom is 91 and still going strong). So there's a big issue. Can we devise plans that encourage or force people to take more responsible for their own saving and health care, and still minimize moral hazard and adverse selection in safety nets?

Challenge four: who pays? We currently provide benefits through the workplace, but employers can't keep promises they made decades ago, much less continue to make those promises and keep them. In a footloose workforce, workers require more portable benefits. Can we affordably decouple from employment? How should we deal with legacy costs? Can we devise incentives or change policies increasingly to pre-fund the promises that we're making today?

Challenge five is the one for all market participants: price discovery and risk management. The prices for most of our current savings vehicles are set in incomplete markets and thus may not be the right prices. Can we devise securities and markets for them that will enable us to buy and sell such contracts or options in ways that will help discover prices and better manage the risk associated with being long or short those options (and we all are)?

Now that's a big agenda. To begin to answer those questions, we have two panelists today: Mark Warshawsky at Watson Wyatt Worldwide and Steve Zeldes from Columbia University. Each of them will take small bites out of these questions. Mark will talk about innovations in plan design and what else he might want to talk about. And Steve will propose some new securities, and maybe the markets to deal with them that will address some of these challenges.

Mark Warshawsky: Thank you. As mentioned, I'm going to be focused actually on a fairly narrow area, which is recent developments in individual life annuity markets and products. But even though it's a narrow market, and product, and industry, I think it has some potential to grow as the population ages and as many retirement assets are held in individual account form. I'm also going to presume (I won't go through all the details) that there's a general appreciation, (which I think Dick has explained) for the risk reduction properties of an annuity. Basically, sort of making the case that this something that is a good, a social good, that we should concerned about and interested in.

So I actually have a lot of slides so I'm going to be going fast. I'll briefly discuss background trends in retirement plans, which I think many of you are familiar with. But I'll give a few statistics. Then I'm going to go over the traditional annuity products and discuss the pricing of those products, which is a simple reflection of interest rates and market prices. So I don't think there will be any surprises there, but I think it's interesting to see them right up front. And then I will discuss some new annuity and life long distribution products, which some large companies have done. I haven't done a complete survey, but these are easily products because for the very large companies the information is very available. And then I'll just have one slide on current issuance and the individual annuity market. I conclude with my own pet idea, which I've been carrying around for more than 10 years, to combine life annuity with long term care insurance as one way of dealing with the adverse selection problem, which Dick had talked about.

So with regards to Social Security, we've already discussed this extensively. I think one measure, which comes from the Trustees report, is the long run financial imbalance of the program, which is 3.6 percent of covered payroll, which is very substantial. Last year we all participated in reform discussions. Across the political spectrum, reform proposals include personal accounts which were either carve-outs or add-ons, either as compulsory or incentivized. Therefore, there is going to be a need in any of these mechanisms for individual distribution formats from the account. And employment retirement plans are increasingly individual accounts. Here I'm citing some BLS information that about 50 percent of workers have access to retirement plans. Actually, that number increases if you consider overall lifetime. This is a point in time number; this is in the private sector. In the local and federal governments, it is almost universal coverage retirement plans. According to the BLS (and this is a surprising number), the period of workers in a retirement plan over the period of 1999 to 2005 actually was stable at 21 percent. But other data may indicate that this is confounded by people who are in frozen plans. They may report accurately that they're still part of a DB plan, even though that's not going to be part of their benefit plan going forward. But that being said, I think the other aspect, which is very familiar to us, is that more and more workers are in defined benefit plans, either as their main benefit or a supplementary retirement benefit. Furthermore, even if you look at these defined benefit plans, many are cash balance plans, which are type of individual account.

So overall, I think there is a trend toward individual account, and this probably reflects (and here I'm just speculating) an increased demand for investment performance participation. I think this goes back to the experience of the 90s. I don't know if that will hold going forward: flexibility, portability, liquidity, and choice. Therefore, also my claim is here that going forward, there will be a demand for individual distribution mechanisms from these types of plans as well.

Let me pause here on this slide to review what we like about funded defined benefit plans. And this will be important when we look at new product innovations because some of them are very consciously trying to create, on an individual basis, a personal defined benefit plan. I think the advantages are many: participation is mandatory; there is an investment diversification across time and planned participants because of the group mechanism. And I think many of us would feel this lowers risk. There is the life annuity distribution, which is automatic. The design of the plan has the ability to have employer and retirement incentives built in. There is some investment participation performance and inflation protection, that's through the plan design. For the plan sponsor, there is flexible funding. I think there is greater ease because of the nature

of the benefit of financial planning. And also because of scale, the investment expenses are lower. So again, the development in the individual annuity markets are to recreate some of these, but some of it comes at a cost, and some of it is not possible on an individual basis. So I put that forward to keep it in mind.

Let me turn to the standard products, single premium annuity. I actually won't go through all of this verbiage; I think it's pretty well known to you. But I will focus on the last point (which Dick alluded to as well), which is that, in a voluntary market, you do have to be concerned about adverse selection because of health and wealth selection effects. Past research that I've been associated with does result in an increased annuity price of about 10 percent. Here's what I show, simulated annuity prices using the treasury rate and a spot curve, and an annuitant mortality. So this is already taking the adverse selection into account and the annuitant mortality is projected using the Social Security Trustees report. And the basic result is a trend downward for an 100,000 dollar payment, and the monthly payment you can get from the annuity, and this is almost entirely... There's obviously some mortality, almost entirely a function of interest rates.

In terms of risk, and I think this is a risk, which is very difficult for an individual account set up to handle. Because of the interest rate volatility, there is a lot of risk in point-in-time purchase of annuities. Here I simply do this as a difference year-over-year of a fixed monthly payments purchased one year apart over this historical period. For example, if you focus on the summer of 1986 and look at two workers, one retired in 86 and one retired in 85, and if they had individual accounts and they bought one out on the market and bought an annuity, their annuities are about 25 percent difference, in other words, their annual income. That's substantial volatility. I think it's a consideration going forward. Those are simulations. Here I have one company, a very highly rated company, and I get the data from their internet. They quote the price every day, and since 2002 I was collecting this data. Pretty much you see the volatility there as well. So companies price are no surprise on current rates. And here I do the ratio of the coded payment to the simulated payment, and it's pretty much... there's obviously noise here, but you average through it, it's pretty much at one. So my model is pretty good, and I think that's the way this particular company, and I would guess other companies price their annuities as well.

Now let me talk about another traditional product, which is a variable immediate annuity, which may not be as familiar to some of you. It is an annuity so it pays out for the lifetime, but its payments are reflective of the underlying individual selected asset portfolio. The way it works is that it is determined by a assumed rate of return which the insured selects. Just for an example, for one company, comparing their fixed and variable rates in terms of their current payments. But obviously it's much more volatile. You don't have the initial volatility for a fixed annuity, but, going forward, you have the volatility of the underlying asset return. You can trade within the annuity like mutual fund, like a 401(k) plan, but all this comes at a cost. And the point there is the mortality expense charge on average in the industry for variable life annuities is 1.22 percent. Whether you think that's a lot of a little, it's hard for me to evaluate, but it's worth nothing that this choice. There's considerable choice in this mechanism going forwards, even as you distribute assets, there is a cost to that.

Now some new products. One new product is instead of having a fixed annuity, you have an inflation index life annuity. I'm going to focus on one large company, and here you have some description of the product. It's in essence an inflation index, and there are some constraints. I recently found out there are several companies in the United States that issue that, and in the United Kingdom there are companies that have been issuing that for many years. This particular company recently, over the summer, quoted a price for a \$100,000 policy, basically \$502 a month for a 65-year-old man, and that compares to about \$700 for the nominal annuity for the same individual. And here again, these are some simulations and I think one thing to note. There are actually a couple things to note. One is that the volatility seemed to increase quite a bit post 2002. As I understand it, this is a bond market phenomenon that once Treasury announced that it was going to be committed to the TIPS market, liquidity in that market increased quite a bit, and the gentlemen in the previous panel liked trading it, and it introduced volatility. I think you see that in the numbers. Unfortunately, you also get the same result in terms for year-to-year, what one might call an envy range. In other words: I worked hard this year. I bought an inflation annuity. My colleague who used to be in the office, retired last year. What did he or she get? The numbers can be very dramatically different.

Here too, I did a market test. This is the one company I was talking about in this market since 2005. I did a monies worth ratio of quoting the payment to the simulated payment. Here there seems to be a little less value; it's not a one to one relationship. This is only company, but Jeff Brown and his colleagues have done this in the United Kingdom, and amazingly they have found a very similar result. So it may be that for whatever reason, inflation index annuities are a little less value in terms of this measure.

Now let's talk about some other product innovations. One disadvantage of annuity is that you are locked in. And once you pay the money, the payments continue, but you can't get out of the train. One company allows a withdrawal of 30 percent, but they try to control adverse selection by making the withdrawal only at certain anniversaries. That's not going to remove adverse selection entirely, but their intent is to try to manage it somewhat. Another company that does it in a more complicated way, and it's doing it for its variable immediate annuities. It does it through a mechanism called the variable withdrawal period. It's actually quite complicated, but the point is that there is some cash value even for an immediate annuity. I think that's trying to respond to a consumer demand to have your cake and eat it too; to have the annuity protection, but also have liquidity and flexibility.

Now let's talk about what I was talking about before. Some countries through an individual annuity are trying to create what they call (and the marketing is very explicit on this) "individual defined benefit pensions." These are deferred annuities, but they have cash value. So again, they're trying to combine a lot of features all in one product. This particular company is a fixed annuity product, and it is very much an individual pension. So make the payments, and you can get withdrawals starting at age 55. Because it is a fixed annuity, there are guarantees of rates in the product, and they are determined based on the age and prevailing interest rates at the time, a guarantee of 3 percent. There is a cash value, but the interest rate will change. So there is interest rate risk in this product going forward. There is a minimum guarantee of the rate, but there is no guarantee of the rate going forward in terms of the premium payments you make into the product will earn you as a life annuity going forward.

Another company has even a more ambitious product which is trying, not on a fixed basis, but is trying to replicate a typical pension portfolio. This is intended to be offered in a 401(k) plan as a group annuity, variable annuity. Each contribution to the product purchases a specific amount of guaranteed retirement income, if the person remains in the plan to retirement and then takes the annuity. Now withdrawals are allowed at any point. But if you withdraw the money, you lose the annuity promise that is being made, and you're paying for it. And we'll see what you're paying for it in a minute. So you get something for what you pay in an annuity and that's the promise. There the promise is of a certain rate, as a minimum, plus a participation in market appreciation. But you're paying for it. And the actual contributions are actually, literally put into a large corporate pension trust which is a very sophisticated investment product. But the investment charge is 49 basis points and the guaranteed charge is equivalent to the mortality expense charge; for this particular product, it's 80 basis points. So that's what you're paying for these guarantees and creating this mechanism. Again, it's a somewhat complex product and I think that may limit its marketability perhaps. Really only time will tell.

Finally I'll conclude with another new product which is actually not a life annuity. It's sold on an individual deferred variable annuity base, but it guarantees a 5 percent stream of withdrawals for life. And here again you have the details. And here too, I would have to say it's rather complex set up. But again, the idea is to create the most flexibility. And the most here, in this case, is trying to give a sense to the customer: participation in market appreciation with guarantees as floors. And again, there is a charge of this: it is 60 basis points for an individual, 75 for a married couple.

So we've talked a lot about the individual annuity markets, the traditional, and the great innovation that is occurring. What has been market take up? I don't have complete statistics, but this is looking at individual annuity market. If you look at the two columns, variable immediate and fixed immediate, there's growth, but I would still have to characterize it as quite modest. Now what you don't know is, in terms of the deferred annuities, how much will be taken out eventually as a life annuity. But heretofore it's been very modest. According to the statistics by the industry, about a third to half of the variable annuities that are sold have some form of these product innovations.

Let me conclude with my product innovation. I've been pursuing this research for some time, and the idea is to combine an immediate life annuity with a disability form of long term care insurance. This would be at a single premium, and the way the product would work is that you get a stream of lifetime payments. But the payments would increase when you were disabled with an impairment in activities, or you were cognitively impaired, which is the basic trigger in long term care insurance. Because you combine risk pools of different people who ordinarily don't mingle like someone who is in poor health who would not get long term health because they would be underwritten out of the product but would want to have long term care insurance and might even appreciate the life annuity feature as well. You combine those with people like Dick's mother as well. You combine the poles together and you can reduce the adverse selection. And it's all done on a voluntary basis, there's no compulsion. So that's something that I think going forward this may have some legs because Congress just gave the product a tax break.

Steve Zeldes: Thanks. I'm going to talk about a little more broadly than Mark about the topics of reforming Social Security and private pensions. Let me start by just describing what's been going on recently in Social Security reform. We all, of course, know about the massive effort in 2005, including the President's 60 city tour, that did not lead to any significant developments in the form of proposed legislation or legislation, and it pretty much seems to be dead for the moment. However, at a recent talk at the business school at Columbia, the Treasury Secretary said he thought that Medicare, Medicaid, and Social Security were the biggest issues facing the United States. And his quote was, "I've always tried to live by the philosophy that when's there's a big problem you run towards it, not away from it." So the implication is that he was going to run towards this problem. The President followed up, a few weeks ago, saying he agreed, so we'll see what happens after the elections.

The projected deficits are often cited as the motivation for reform. This is just the standard picture that comes from the Social Security Administration on the projected inflows and outflows into Social Security, where in 2017 the outflows exceed the income (excluding interest), and in 2027 the same thing occurs (counting the interest), by 2042 the trust fund hits zero. On the private pension front, switching from Social Security, this is one of my favorite graphs and shows the dramatic decline in the coverage of workers by their current employer. In 1979, 60 percent of workers, who were covered by a pension plan, were covered by only a defined benefit plan, and 15 percent were covered only by a defined contribution plan. And now you see that number has flipped, to the point the numbers are almost opposite. 60 percent of workers covered by a pension plan are covered only by a DC plan and 10 percent are covered by only a DB plan. There's still a group of 30 percent in the middle that have both. So a dramatic change in the landscape of private pension coverage.

But nevertheless, I don't want you to think defined benefit plans aren't important, because when you look at the assets, they're about the same as DC. They've been declining but they're still pretty close to value. So over the 4.5 trillion that are in total DC and DB pension assets about half are still in DB plans. That's because it's the younger workers in the newer plans that are defined contribution, but the assets are still there in defined benefit plans. So you shouldn't write off the importance of defined benefit pension plans quite yet. The recent Pension Protection Act of 2006, signed into law, includes some provisions to reduce the present and future underfunding of the system. It tries to improve measurement of liabilities, but there is still a long way to go in U.S. pension reform. One of the motivations for legislations and discussion of policy reforms has been the underfunding in DB plans. You can see there was a dramatic shift up after 2000; this is the total amount of underfunding in underfunded plans. We saw a dramatic increase for reasons we'll describe in a minute.

So what is the source of this underfunding in defined benefit pension plans? Both in Social Security and in private DB pensions we've seen this underfunding. Two basic reasons. First of all, the inflows are not matched with the costs of new promises. Both firms and governments have the ability to make new future promises without any clear assessment or recognition of the present value costs of those promises. A firm can give out benefits to workers, saying that they're going to get some stream in some distant future, but there's not a current present value cost to those amounts. This relates to some of the things that were spoken about earlier by Larry

and others that were trying to measure things on a present value basis as opposed to a cash flow basis. There isn't an easy way to measure the costs of defined benefit pensions on a present value basis.

The second is that the returns on assets are not matched to the change in values of liabilities. In other words, many firms are not hedged on their holdings. And so this is a reason why even if a plan is underfunded..., whether we're talking about Social Security or private DB pensions, even if a plan is funded initially correctly, it doesn't mean that it's going to be properly funded down the road. In fact, part of the reason we saw that big underfunding had to do with the drop in interest rates and stock prices that occurred after 1999, at the same time, because the mismatch assets and liabilities, leading to increased levels of the underfunding of DB pensions.

So defined benefit systems clearly have problems, but of course we know that defined contributions systems have problems of their own. So what I'm trying to do, in joint research with John Geanakoplos at Yale, is that we are working on some reform plans. Our goal is to create a new system for Social Security and private pensions that capture the best of both systems, of the defined benefit and defined contribution models. So what I want to do is spend some time describing each of these. Before I do that, let me briefly run through some of the advantages of DC relative to DB, then I'll show you the advantages of DB to DC. Mark touched on some of these.

First of all, they're fully funded by definition. An employer puts in some amount, an employee puts in some amount. There's no future obligations on the employer's part so by definition that pension plan is fully funded. Transparency. The accruals are well defined. The employer puts in a dollar, you put in one dollar; you know that you have accrued two dollars in your DC plan. It's not like that in your DB plan, where the accruals are not necessarily transparent or even well defined. The third is property rights and DC plans, that accrued benefits can't be taken away. One of the issues that come up surrounding Social Security is that the benefits are not legally protected. Therefore, if there's a problem with the system 15, 20 years from now, Congress could cut benefits across the board, including benefits that had been accrued already. So there's no clear property rights associated with those benefits. The fourth one is market pricing. We can look at the value in a DC account. We can look at the value at any time. We know what it's worth. We can compute household balance sheet. That's not the same with defined benefit plans, where there is no market price of those future benefits. And finally, there's generally less exposure to government political risk (for the reasons I just described) that if the system does get out of balance, there's the possibility of Congress cutting benefits. And when they do say there could be some randomness in how these benefits are changed (on the private side there's firm discretion, firm promises, a nominal payment stream to put in benefit), if they feel like it later on, they can raise the benefits to cover cost of living increases for the retirees. But there is discretion and therefore risk. And there's firm bankruptcy risk. Although PBGC does guarantee benefits on DB plans, there is a cap on the amount. So, there is some firm-specific risk that the workers are taking in DB plans, where in DC plans (where at least if they don't use them to buy their own company stock) they're not bearing the same risk.

What are the benefits of defined benefit plans as relative to defined contribution? First of all, there's a low risk implicit portfolio because they're typical guaranteed benefits. If you look at

Social Security, it's guaranteed. The payments are fixed in real terms, so there's low risk in that sense. And they're tied to economy-wide average income, so if the economy does well overall, your benefits are going to be higher as well. There's no need for complex asset allocation decisions. There's a lot of evidence now that it's difficult for defined contribution participants to figure out and implement asset allocation. It's a complicated thing to do, and there's evidence that many people don't do it particularly well. Another advantage of DB is there's a level benefits with no need for drawdown calculations. You know with Social Security you're going to get a fixed real amount for a number of years; you won't have to sit down and figure out how much to spend each year in order to not outlive your funds. And finally, there's this insurance, Mark was speaking about and others as well, that's the insurance against outliving your assets, because they typically pay benefits as long as people live.

So there are advantages to both schemes. And as I said, what we'd like to do is to reform these systems to capture the best of DB and DC. The focus of our reforms are making Social Security and private DB pensions more market oriented, without losing the advantages of the DB system, by creating a kind of hybrid plan; a market-based system with DB style benefits. So we want to shift away from DB, but not to a standard DC system. And this is going to require financial innovation and a new class of financial securities that I am going to describe. We need to create a market to trade pension liabilities, and, among other things, it's going to allow firms, participants, government and investors to observe the true market cost of new promises as they're being made. So if the government or private sector wants to make a promise, let's look at exactly what the market cost is of that and measure it accordingly.

Let me spend a couple minutes on some ideas of ours about Social Security, then I'll spend a couple minutes about our ideas on DB pension plans, and I'll sum up. So our thoughts we call our Social Security reform plan, progressive personal accounts. What we're going to do as a start is simply give individuals property rights over benefits as they accrue. We're going to create a new financial security called PAAWS, which are personal annuitized average wage security, which really does nothing more than pay people what Social Security promises to pay them anyway. They're going to get the same benefits, they just have a piece of paper that gives them property rights over those benefits. I should say before we start giving people property rights on their Social Security benefits, we have to make adjustments to put the system into balance. So we don't want to create well-established property rights and have the inability to cut benefits when we need to. So basically we're going to have to cut benefits and raise tax before we do that. But once we've done that, we want to give people property rights through this PAAWS. And again, they pay exactly what Social Security pays, both the economy wide average wage index in the retirement year and a constant inflation adjustment benefit as long as you live.

We can achieve redistribution, which the current system does, based on lifetime income by using a variable government match and we showed that sometimes people say how can we help the lower income people the way Social Security does if we move to a DC system. If you move to a system where \$1 of contribution leads to \$1 in accounts, you can't. But it turns out not to be that hard to do the redistribution with a variable government match. So low lifetime income people end up getting an extra amount from the government into these accounts, and high-income people end up getting taxed, or getting less government match into these accounts. So we can

continue to do redistribution, which is part of the reason we're calling them progressive personal accounts, as opposed to standard personal accounts. And a fixed small percentage of these claims would be pooled in the same way mortgages are pooled, and sold and traded in the marketplace. And the advantage of that I'll describe in a minute. But we want to be able to get market prices for Social Security benefits.

Here's a picture of what a PAAWS balance might look like. You might get a statement saying how many PAAWS you've accrued relative to the average wage. This is just showing how much gets accrued over time and the difference in the slopes has to do with the match rates. When people are young and haven't accumulated much they get higher matches than people who are older and get higher accumulations. And here's another way of seeing that redistribution that goes on, people who have low PAAWS balances get high matches, those with high balances get low matches. The people with low balances include younger people but also poorer people, because the higher income people work their way down the schedule more rapidly.

The benefits of our approach is that it clarifies the link between contributions and benefits thus increasing transparency. As I said before, it enhances the property rights of the system and it yields financial market prices in pools of these PAAWS, so it gives individuals an estimate of the market value of their account. It also provides an estimate of the market value of system liabilities. So we want to know how much Social Security...what the current market value of Social Security liabilities are. We can gauge it, so we don't have to rely on actuarial calculations of the present value of future liabilities. We can actually get a market estimate of what those are. And of course, we open up the possibility of some trade (if we want to) in these accounts. Finally, it preserves the risk sharing and the risk redistribution of the current system.

Now, one important piece of these progressive personal accounts is not only to make the system balance initially, which is not that hard (it's politically hard, not conceptually that hard)...so one important part is to make itself balancing as we move forward. In other words, the current Social Security system, even if were in balance today, various things could happen on the demographics side or the economics that could make the system out of whack in the future, because there's no concrete link between the contributions and the promised benefits. So what we want to do is to change it above and beyond what I've described to create other financial securities that are tied to these demographic and economic variables, like fertility and mortality, and have the individual's accrue in their accounts units of these securities that are tied to these demographic variables. In this way, you can make this system automatically balance. You don't have to go and revisit every 10 years, every 15 years, or every 20 years to balance the system. We want to create an automatic system, but a market-based automatic system.

Okay, so the summary of the new financial securities, we're going to need these PAAWS which I already described, and also financial securities linked to aggregate earnings, fertility and other demographics. Are those out there now in the marketplace? No. Could they be there in the marketplace in the future? Absolutely. I think we've seen a lot of financial innovation on a variety of fronts and I think this is going to be an additional area that we can and should see financial innovation.

Okay, so that's a very brief overview of that, now let me take on the private DB pension plan. It's a similar kind of approach. We want to give people property rights to benefits as they accrue, by something we call PANTS, personal annuity units. Firms are going to purchase these PANTS on the marketplace on behalf of workers. The PANTS are going to pay \$1 each year from retirement to death, which is basically what the current DB promises. But we want to create a market for these pooled PANTS. And again, my coauthor works...in addition to his academic work, works at a hedge fund that trades mortgage backed securities. So the idea is that we would create these annuity-backed securities that would be similar to mortgage-backed securities. The way that would happen is by collateralized debt obligation where this entity buys assets which... what is really needed is long-date coupon-only treasury bonds which, we're arguing, would be an easy thing for the Treasury to issue. So we want to see coupon-only 50-year bonds issued by the Treasury, which I think they should do anyway in terms of helping people with their own financial planning. These things and other assets would be purchased by the CBO. They're going to sell the PANTS to the firms backed by this collateral. You basically sell the residual back to the financial markets. So all this is a fancy way of turning a liability, which is what this is, into an asset. You package it with a bunch of assets and sell off the residual.

So what do we need for this? Coupon-only long-dated bonds, or the inflation protected ones we call CLIPS, coupon-only long-dated inflation protected securities. And then we need these PANTS. Then we need these pooled PANTS that are going to be a form of bond tied to aggregate survival probabilities. So the benefits of our approach is that it guarantees payments of accrued interest to workers because they're fully funded and hedged. So the idea that firms could create some liabilities and back them with some amount that may or may not be equal in value to the amount that they've just promised; we're going throw that out the window and not let them do that anymore. Instead, they have to fully fund this on a market value basis. This is going to reduce the role of the PBGC, because there's less for them to insure; and eliminate firm specific risks and discretion from the DB pension system (which really is completely unnecessary). It's also going to remove the asset management role from pension funds. There's some controversy over whether it's a good thing or not. But for pension plans, asset management involves two levels of fees. One, you have to pay the asset managers who are managing the pension fund. Then, of course, the residual gets channeled off to the firms' shareholders; and the firms' shareholders hold assets; and they pay asset managers to do their thing.

So this is a somewhat controversial point, but I think one potential benefit of the approach. It provides a market price for existing benefits and liabilities. I've talked about the advantages of that already. We can get a more accurate measure of pension underfunding. There was a recent controversy in the last few weeks that surfaced over New York City pensions: how do you value these benefits? Well, if we had a market price for valuing the benefits, it would be a lot clearer and would provide an important signal on these values. And it also helps individuals complete the market value household balance sheet. And finally provides a market for trading aggregate longevity risk. We've heard about the degree of uncertainty among people about how long people are going to live, not just individuals, but in the aggregate. I think it's time for a market trading this aggregate longevity risk.

So those are our conclusions. We think that both Social Security and private DB pension systems would benefit from reforms to make them more market-oriented. We think it's possible to create DB-like benefits with a security transparency and portability of a DB system. It's not something that's going to happen overnight. This is sort of a long run idea, but I think it's an important one. Creating these market mechanisms for trading these Social Security and pension liabilities would help plan sponsors manage and lay off risk to willing investors. We think that market prices would provide useful information, and an individual could use this information for financial planning, firms and governments; could observe the true cost of these promises as they're making them, rather than 20 or 30 years later; and rating agencies and analysts could use them to assess credit worthiness for buffer firms and government. And here's just a little bit of references for our research. Thanks.

Richard Berner: Thanks Steve and Mark. Larry Meyer, if you thought bond traders were shortsighted, how about insurance companies that sell annuities? Pricing at the end of each day or marking the market each day on the prices of annuities they sell. Are there any questions in the audience? You guys have stunned them. I have one. Let me kick it off. Mark, we just commented that annuities are expensive and the prices are volatile. Do you suggest a way that they may be market oriented for providers or sellers to reduce the volatility and make them more attractive, so you don't have that envy problem?

Mark: In a way that's not really my area because I'm not a financial engineer. I assume there are ways of doing that if you can get a pre-commitment from the buyers, and then the insurance company can hedge it. The problem, however...and that can be done...was sort of done on a group basis. Say it was done through the company's pension plan, where there was a future commitment for payments, and then an insurance company could hedge that. The problem is that, if it's done on an individual market basis, I don't see how you can get the commitment. Therefore, you can do all the hedging you want, but you're still exposed. So, what I was trying to make that as one of my central points of my presentation is that you do give up quite a bit when you move from a group basis to an individual basis. So maybe people in this audience and elsewhere, much smarter than I can, in effect, figure it out, but I think it's a big challenge.

I had a question for Steve. I don't know if this is going to be fair, but I was involved in the pension reform discussions in my prior life as part of the administration. I thought we'd put together a pretty good reform package and actually was pleased that Congress took many elements of it, including a reform to measurement of pension liabilities. It seems that Steve indicated he wasn't pleased, I wasn't quite market oriented enough. But I was aware that Steve was involved in some papers that were circulating at that time when Congress was considering the smoothing of the underlying discount rate that pension liabilities were going to be measured at. I understood the point of that paper to go in the opposite direction, that he wanted more smoothing. So perhaps Steve you could explain. Maybe I misunderstood the point of the paper or maybe I misunderstand your point now.

Steve: I have never advocated more smoothing. I think there's too much smoothing that goes on in these things. I'm not sure what you're referring to, but I'm not sure...

Mark: I'm glad I got that clarification.

Richard Berner: Okay, can you line at the microphone to pose your questions? David.

David: I had a question for Steve about the PANTS. At least the way you describe it, it pays one dollar per year of retirement, so you're still leaving the worker exposed to risk about the real wage and inflation risks. Why not have it pay out in terms of the average wage?

Steve: So in the Social Security plan, because Social Security is currently tied to the average wage and is indexed for inflation, we put it in that way. An ideal private pension plan might well do that as well. I mean we were starting with replicating the kinds of benefits that are currently in existence, but you're right, we might want to move private DB system slightly more towards the payout structure of Social Security, but not the funding of Social Security.

Closing Remarks

Laurence Meyer, Vice Chairman, Macroeconomic Advisers, LLC

Douglas Holtz-Eakin, Paul Volcker Chair and Director, Center for Geoeconomic Studies, Council on Foreign Relations

Richard Jackson, Director & Senior Fellow, Global Aging Initiative, Center for Strategic & International Studies

Laurence Meyer: First of all, on behalf of Macroeconomic Advisers, I want to say it was a great pleasure for us to partner with CFR and CSIS in organizing this conference and want to thank all the speakers. A conference like this is only as good as the speakers we attract. They're really experts in this area, all prepared very well, and really did a great job. And of course, Tonya, Courtney, and Mike who did all the work preparing, making sure this day went smoothly. What I want to do is to summarize what we learned today, what the takeaways are, what the open questions are.

We start out, first of all the demographic drivers. Here we were told by Richard Jackson it really wasn't the retirement of the baby boom cohort that was so important, it affected the timing, but the really key demographic drivers are low fertility rates and high life expectancy. But for us as economists to link it to our models, to link it to the macroeconomics, the drive is here for really two things: it was the aging of the population and the slowing population growth. And what's so important about it is that these two things have opposite implications for the movement of interest rates. That's very important because it gave us this concept of offsetting effects that despite the potentially important effect of demographic change, because they have offsetting effects, the net impact on rates might be relatively small. The aging of the population itself was important in the saving rate, leading to a reduction in both public and private saving and public saving through the entitlement problem. The slowdown of population growth fed into the story of weaker investment and impact on taxes.

Now when Richard began his presentation, he also made very clear that we do want to look upon this in a global perspective for a variety of reasons. One of the important facts here is not just the pervasive demographic forces in play, but the fact that these trends are occurring with different intensities and sometimes different timing around the world. So the United States might have a smaller demographic problem here in the sense that the power of these events, fertility rates are high, we have immigration for example, so we might not have the same intensity of those forces in play as other OECD countries. But, on the other hand, much more so than in the developing world. And those differentials are important. So the economics and the drivers here are really these first three things of the ones that most people really focused on: life-cycle affects on saving, and the really quite an interesting discussion about how much and how important these were.

I mean the general view of those who were presenting the empirical result were in the final analysis that life-cycle forces were relatively weak, relatively modest, as simple models give us a story about life-cycle that suggests dissaving as people get through time and space, but we just don't see that in a lot of the data. But there was a fair amount of debate about that, whether or not when the rates of return on equities is a lot lower than over the last 20 years, whether or not there will be more tendency to dissave or not. But the general story is life-cycle gives a decline in the private saving rate, but one which is probably relatively modest.

The second one is what happens to deficits and public saving, and I think most of those in the survey felt that if there were a really critical story. If there was a large impact, this is where it was going to come from. And many people pointed out it wasn't so much public pension programs as much as health programs. And for health programs, the United States was disadvantaged relative to everyone else due to the difficulty under our system of making significant changes. And of course, the story here too is that this potentially the most important, but it is also the one in which policy comes into play. Any forecast, any projection has to reflect some assumptions about how quickly and how effective the policy response will be, and obviously we had some very significant differences.

In the fiscal panel, we had two very stark examples of one of the train wreck and one of a rather dramatic set of proposals that could stabilize the deficit to GDP ratio. Doug would say that's not the most realistic outcome. The most realistic outcome is something in between, some muddling through. What the survey responses suggested was the most outcome. Some significant increase in deficit to GDP ratio relevant to where we are today and relevant to historical norms. And as you're doing this analysis and processing it through, you want to include that in your exceptions.

The third one was one that was probably not in the consciousness of many people, when they think of global aging. When we talk about global aging there's global aging and the slowdown in population and we leave the latter out sometimes, but also this connection that the slowdown in population growth is a force lowering the interest rates. This is the sauce of the regularity that was pointed out. Lower population growth or lower productivity growth, anything that lowers trend growth in GDP tends to result in lower real interest rates.

Somebody from the floor asked: how, in light, of that could you possibly get higher rates? Because, this is just one force. In our models, if the only thing that changes is population growth and productivity, then that relationship would always work very smoothly. But here we have the potential for something else: a change in the saving rate in the economy, and it could in principle overturn that. Productivity growth we just really don't know a lot about how productivity growth is going to response, particularly in terms of total factor productivity growth. We'll come back to change in asset allocation that can be important and obviously an emphasis on open economy issues and capital flows could be very important.

One problem we ran into today is how to ask these questions? And we're really asking the comparative dynamic question: do we really want to know are interest rates going to be higher or lower than they otherwise would be as a result of global aging; or do we want to know whether interest rates will be higher or lower period, taking into account other things that will take place. So we have people worried about the term premium, is it going to stay lower or rise. That's

independent, I would suggest, of global aging, and we're trying to ask this comparative dynamic question. But that really does complicate the story since there are a lot of things going on as well.

Now one interesting sort of question that we spent just a little time on (and some would argue, just the right amount of time, maybe others would disagree) is the impact of the fiscal strains from global aging on monetary policy. We fortunately did get a question from the floor whether there was an incentive to have inflation, because inflation could resolve the problem, and we got a really interesting response from Larry. Brian asked the question, and he said it wouldn't be very helpful; that's why you have to have a lot of inflation. So if you like that answer, then you get the potential hyperinflation story. Most people are very satisfied with the story, the Fed would never allow this to happen. I think I would argue that you already see in the rhetoric of the Fed the emphasis on keeping the deficit under control so that it doesn't become a pressure point. But I think the most likely story here is that the Fed will do what it needs to do to control inflation.

Having said that, if you look at the surveys, not everyone was completely convinced. The fact of the matter was that 45 percent of the survey respondents said there would be no change in inflation, but more than 40 percent said there would be an increase of up to 1 percentage point of higher inflation. So we did hear the story that we might see higher inflation or fear of inflation. And that fear of inflation might be part of the story that could ultimately come into the markets.

Now what determines real interest rates and the story here is that it is not about monetary policy, nothing to do with interest rates in the long run. This is about saving, investment, at full employment. If there is a shock and saving is lower, interest rates will be higher. If there's a shock in investment, then interest rates will be lower, is basically the story. On the savings side we had the three components of saving: private saving, modestly lower; we had government saving, lower and maybe more of a problem (maybe that could be a larger change). And what might happen to foreign saving? A lot of disagreement in this survey about whether or not the capital flows, inflows to the United States would be larger or slower, exacerbate or dampen, so really quite a lot of disagreement. Obviously with Jeremy Siegel, that was a key part of the story we'll come back to. So the story here really is that saving and investment both decline and the question is which declines by more. For most of the panelists, they were willing to say both the same, so noting the impact on interest rates, but lower saving and lower investment. But in the final analysis it becomes an empirical issue. The theory takes only so far. It identifies the moving parts, it tells us there are offsetting effects, it tells us to go to the computer and try and do the best we can to see how these things net out.

If you've never seen a neoclassical growth model and would like to keep it that way, close your eyes for the next minute or so. This is a closed economy, it is a very simple model, it won Bosworth the Nobel prize in economics (I would point out to Solow, he was one of my teachers). But scenario one is that decline in population, that N here is the rate of population growth, it lowers that line. We get what David Weil called the capital deepening effect and the slope of the production function there is the marginal product of capital, and the marginal product of capital falls. That's the real interest rate in this model, that's a lower population growth lowering interest rates, that's where it comes from. The next one is the decline in the savings rate, that

little S , is the savings rate. That declines and we end up with a shift towards a lower capital labor ratio and to a steepening of the tangency there marginal product of capital. That's the interest rate. Interest rates rise if saving declines, interest rate fall if population growth slows, both together they're offsetting.

Another financial consideration: there was a lot of discussion about changes in portfolio allocation that was very interesting. There was a general understanding that people have less risk appetite as they age, and so there was a sense that equity premium should rise as part of this process. That produces a very interesting asymmetry, because it tends to mean that the equity returns are going to have to be higher, the yields to equities are going to have to be higher than the prospective rate to get people to hold equities. And because there is an increase in the demand for fixed income obligations, it can put some downward pressure relative to what otherwise would have occurred on interest rates. Another interesting fact nevertheless was that if you take a look at portfolios of someone who is 60 years old today, maybe they should be holding more equities than they might have 10 years ago, as we come to understand life expectancies today. And if you're 60 and you're going to live to 90, that's a long way to go. Maybe you should be thinking about this in another 10 years, so when does this come into play?

I think we had the biggest problem as we were thinking about the survey and collecting the results and how to talk about what happens to equity and markets. Fortunately, Bill Dudley gave us a good explanation and good economic lesson about how to think about this. So it's a very simply story really in terms of prospective going forward. If there are no shifts in portfolio allocation and real interest rates go up, then the return on equities has to go up, the prospective rate of return on equities has to go up. Of course if the equity premium rises, it has to go up doubly. Now the problem in the survey was that respondents had to deal with the fact that the way in which prospective yields might go up in part from equity prices going down so the holding period yields calculated over a period where this transition was taking place could be lower as a result. So we had this confusion between prospective rates of return going forward and this transition period. And then, of course, we had the discussion of potential innovations that could do it, so ultimately an empirical question.

And here's how the panel sort of ended up, we had Kotlikoff with the fiscal train wreck, huge increase in interest rates, hyperinflation, that's one story, that's clearly an extreme. No one else bought into that, but what you had more generally was that most people thought the effects were offsetting. Even if they were large, that capital flows, in the case of Jeremy, was enough to offset what would have been a large effect, raising real interest rates so the decline in the saving which he considered to be overwhelmingly more important obviously than the decline in investment.

If you looked at the panel as a whole, what we had was a bit of a more tilt towards higher interest rate. About a third in the panel thought there would be no discernable effect on rates, but something close to half thought that interest rates would be higher. About a quarter thought by about 25 basis points and another quarter as much as 50 basis points higher. So there was a little bit of a tilt here towards a story about higher rates and it seemed to be driven, for the most part, by concern over fiscal consequences.

Okay, so here's the bottom line. There are offsetting effects from the demographics. Single most important concern is the rise in the budget deficit, some disagreement about the direction of the effect on capital flows, but some people think that's an important part of the story. The consensus on short term real interest is no effect or higher, less consensus on equity returns in part because of the question, but most expected not much of an effect.

So that's my summary. I think that's where it is. I must say I came up with the idea of this conference because I was confused about a lot of the issues. I think I'm less confused about the issues today, and I thank all those that participated in the conference for educating me, and I hope educating you as well. And now I'll turn it over to my partners.

Richard Jackson: First of all, let me thank Larry and Doug for this wonderful opportunity to co-host this event. I think it was a very interesting and very productive discussion today. I'd also like to thank the panelists for a series of really, I think, the clearest and most informative presentations on the issue that I've ever heard. And on my side, I'd like to give a special word of thanks to Keisuke Nakashima, Rebecca Strauss, and Serena Lin who helped put things together on our end. I'm going to cover some of the same issues again that Larry did, perhaps taking, from time to time, a somewhat contrarian view. I simply want to draw out a couple of the points that I think are important, and where there is still significant room for advancing our understanding.

First on life-cycle savings. I think there was a broad consensus that the empirical linkage is relatively weak. I think it was Barry Bosworth, and others as well, that pointed out that the elderly in the developed world today actually do relatively little dissavings. What seems less clear is how relevant this finding necessarily is for the life-cycle pattern of savings in the future. The generation that's retired over the last 10 to 15 years, after all, is the generation that won the lottery. They won the lottery in the wage market, in the stock market, they won the lottery in the housing market, and they won the lottery in the terms of a huge unanticipated increase in Social Security wealth. One at least has to reflect on how things might play out 10 or 15 years from now, when a different generation with a very different economic experience is retiring, and a generation, moreover, that will likely be facing very significant cuts in public retirement benefits. If it were done entirely on the benefit side, in the United States on the order of about 35 percent beneath promised benefits, in Japan and a number of European countries, perhaps on the order of 40-60 percent. I'm not sure how that all adds up. Clearly what I'm suggesting is tomorrow's elderly may dissave more, but perhaps tomorrow's young people will save more. So I'm not sure what the net result is there, either.

The second issue, of course, is potential GDP. I think a number of participants rightly stressed the importance of that, and that that's it been too neglected in discussion today. Here I'd just like to second that, and point out again that the demographically induced shifts in potential GDP growth are very large. We're looking at a swing in the United States, a potential subtraction of about 1 percent over the next 15-20 years, and a number in Japan and a number of European countries, more on the order of 1.5 percent. It seems to me that that might have a potentially large effect on rates of return, which may or may not be offset on the savings side.

A second issue related to the workforce slowdown I want to touch on again, because I think it's something we need to reflect on, and that's the presumption that there will be capital deepening and the suggestion that this will raise productivity. Of course, if savings does decline, whether because there is a private life-cycle effect or rising public savings, perhaps we won't see that much capital deepening because also the vintage effect that David Weil referred to. And there are really two vintage effects here. One is the human capital vintage effect, the rising median age of the workforce, how long ago you went to college, that whole complex of issues. Then there's the vintage effect having to do with physical capital. In expanding economies this is just an argument that seems to be plausible. I don't know if it's right, but in demographically expanding economies there may be more opportunities to invest, a higher turn over of capital stock, more opportunity for learning by doing. Tomorrow's economies, if we really are looking at a long-term stagnation in real GDP growth, perhaps we should be thinking more in terms of how to manage a depreciating capital stock. It's unclear to me that there's a dynamic at work here which points to long-term increases in productivity or at least that that's ambiguous.

Global capital flows I certainly agree that this is a big part of the solution, but what strikes me as interesting is that two diametrically opposed scenarios are often cited as the solution. On the one hand, some people say that an aging developed world is going to invest in younger and faster growing countries, and that's going to prop up returns and our standard of living. On the other hand, we have Jeremy Siegel's scenario in which a younger and faster developing world will send the savings to us, and that's going to prop up our aging welfare state.

So I think we at least need to examine some of the assumptions, some of their implicit assumptions. And I have two specific issues I would encourage you to focus your attention on. The one I think mentioned in my presentation this morning is: to what extent really are there realistically enough investment opportunities in the developing world to offset the decline in investment demand in the developed world? China itself faces its own major long-term aging challenge. Just as an example, my colleague Paul Hewitt sometimes talks about whether we will want to be investing in the Azerbaijan fund. So two points there that I think we need to look at more closely which brings us to the final point: which is the fiscal linkage, the tail that wags the dog? There clearly was a consensus that this is the biggest issue. I agree 100 percent on that. My views on how this might unwind, well, I think Herb Stein is right, of course. Things that are unsustainable tend to stop. But that, of course, begs the real question, which is: how; when; and after how many more years of damage to the economy and living standards. I'm not sure it will require a fiscal train wreck to change course, but it may require a hard landing of some kind, perhaps through the current account.

What I am more sure of is that the ultimate adjustments will occur largely on the old age benefits side. I don't think we're going to solve this problem in the long-run, primarily by raising taxes, and we're certainly not going to solve it by cannibalizing the rest of the budget. It's important to note that a lot of other developed countries are moving rather aggressively in this direction. In Japan and Germany they've actually partially indexed pension benefits, not just for future retirees, but for current retirees, to the demographic dependency ratio. Again, I want to thank everybody for what I think has been an enormously productive day, and let me turn it over for the final word to Doug.

Doug Holtz-Eakin: Thank you and let me add to my thanks to the MA staff and the CSIS staff, I want to thank Chad Waryas at the CFR not only for keeping me in line every day but finding extra time to push this conference along to. Most has been said, let me just give you some impressions that I came away with. First impression, striking one, was Barry Bosworth. Think globally, and if one thinks of the world as having a single unified financial market that goes back to first principles, and asks why do we have financial markets? What are their economic purpose? To permit intertemporal trade and consumption, to intermediate between savings and investors, separate ownership control, spread risk, all the things that financial markets are intended to improve the economic outcomes. At the heart of those are number one, to price outcomes. Financial markets have to ruthlessly price economic outcomes and that turns out to be devilishly difficult because not only are there all the uncertainties that make the economic outcomes normally difficult but also some policy changes, especially in the United States, that would have to be priced as well. But it turns out to be hard to get your head around. It's also true that there's significant disagreement about the second role of the financial market would play which would be to provide incentives for individuals, to channel savings to different vehicles, to channel investment to different activities, to stimulate productivity growth as necessary. All of this strikes me as quite difficult even in textbook single global financial markets.

That means that we do have to decide this on the basis of empirics, as Larry pointed out, and there striking impression number two was just the spectacle of a cage match between four not mutually exclusive research techniques called extrapolation, GE simulation, reduced form regressions, and the survey of conference participants. We don't know enough to really answer this question very well, and I think it came through again and again. It will be a challenge going forward to get better empirical information to answer this question. The third thing that I really took away was, we don't perhaps, yet, have a single set of unified global financial markets and that's important because there's phenomenal heterogeneity across the globe in current conditions and the future demography. There's phenomenal heterogeneity across individuals in their propensities to save and accumulate wealth. There's phenomenal heterogeneity in investment opportunities and the returns, and to the greater extent that these financial markets remain segmented or, God forbid, we go back in globalization and segment capital markets even more, the problems of figuring out the pricing in that much more heterogeneous and segmented world will be infinitely harder (and they're hard to begin with). Keeping an eye on the degree to which financial markets continue to mature and deepen around the world is very important.

And that led me to my last impression, which is, the most important things that will happen over the next several decades from the point of the view of the financial markets and valuation will be innovation in financial markets. We do not yet have the kinds of textbook financial markets that allow us to put up the neoclassical growth model, put up the real variables, and presume the financial outcomes. Instead, we're going to have to work very hard to make sure financial innovation continues to produce the kind of price discovery instrument that get us close to the textbook models and allow us to get a handle on both major economic welfare improvements for aging population and also the pricing of those in a global economy. But I want to thank all the conference participants. This was an extraordinarily lucid discussion of a very difficult topic. I certainly want to commend the attendees for their endurance and vigor, and with that we are adjourned.