Editors' Summary

THE BROOKINGS PANEL ON Economic Activity held its seventy-ninth conference in Washington, D.C., on March 31 and April 1, 2005. This issue of *Brookings Papers on Economic Activity* includes the papers and discussions presented at the conference. The first four articles address the position of the United States in the global economy, an increasingly controversial subject in the research, financial, and policy communities. Since the early 1990s, U.S. current account deficits have grown almost without interruption, reaching $666 billion, or about 6 percent of GDP, in 2004. The U.S. international investment position is now one of net indebtedness approaching 30 percent of GDP, and in recent years a substantial portion of the buildup in net debt has come in the form of additions to dollar reserves by foreign central banks. Some observers see the present situation as unsustainable and warn of an abrupt depreciation of the dollar, which could destabilize financial markets and disrupt the global economy. Others are more sanguine, arguing that the present situation reflects the relative strength of the U.S. economy, consumer and business preferences, and rational financial decisions, all of which could evolve so as to make any needed adjustments gradual.

Each of the four articles takes a different approach to analyzing the situation, focusing on issues that the authors see as key. The first article models portfolio choices and how they moderate the pace of adjustment in exchange rates and current accounts. The second stresses the relative price changes that will be needed, both in the United States and abroad, to move the U.S. current account toward balance. The third considers the motivations of policymakers in China and elsewhere for accumulating dollar reserves. The fourth assesses the likelihood of an abrupt depreciation of the dollar and the economic instability that might result in the United States and abroad. The volume concludes with an article on the possible impact of slowing labor force growth on stock market returns.

THE U.S. INTERNATIONAL INVESTMENT position is affected by developments in both foreign trade and international capital flows—the market for imports and exports of goods and services and the market for foreign and domestic assets. The sustainability of the U.S. current account deficit and the consequences of reducing that deficit depend on features of both those markets. Most economic models that have been used to analyze the current account deficit assume imperfect substitutability between foreign and domestic goods and services but perfect substitutability between foreign and domestic assets. These assumptions carry strong implications for how the economy adjusts to new developments. In the first article in this volume, Olivier Blanchard, Francesco Giavazzi, and Filipa Sa provide a distinctive analysis that allows for imperfect substitutability between domestic and foreign assets and between domestic and foreign goods. With this feature, movements in exchange rates and asset prices have potentially important effects on the portfolios of international investors and strong implications for the speed with which exchange rates adjust to shocks. Compared with popular discussion and with earlier, simpler models, this rich specification provides a better understanding of past developments in the U.S. current account balance and the dollar exchange rate and a more realistic framework for assessing future prospects.

In its simplest form the authors' model has just two regions—the United States and the rest of the world—each of which supplies interest-bearing assets. The wealth of each region is given by the value of domestic assets plus net claims on foreigners. Investors diversify their portfolios, holding both foreign and U.S. assets, but exhibit home bias: given equal expected returns, they place a larger fraction of their wealth in domestic than in foreign assets. As a result, a shift in wealth to foreigners reduces the demand for U.S. assets, causing the dollar to depreciate. Similarly, an increase in private or government demand for dollar assets causes the dollar to appreciate. Because of imperfect substitutability, the relative returns on foreign and U.S. assets can vary with changes in relative supplies or shifts in the distribution of world wealth, and uncovered interest parity does not hold.

In the model the effects of a depreciation on the path of the current account balance and changes in U.S. net foreign indebtedness are conventional. The current account balance is the sum of the trade balance and net interest earnings. Dollar depreciation improves both, immediately reducing the dollar value of net interest payments and eventually reducing the U.S. trade deficit. Changes in U.S. net foreign indebtedness reflect the sum of the

current account balance and the revaluations of U.S. and foreign portfolios that arise from exchange rate movements. In the real world, asset values and therefore net debt will also change with changes in domestic interest rates, but the model ignores these so as to focus on exchange rate movements, which are the key for understanding the model's distinctive implications.

Whereas the response of the current account in the model is quite familiar, the effect of depreciation on asset demands is quite different than in conventional models where assets are perfect substitutes. Depreciation of the dollar reduces U.S. net indebtedness directly, increasing the dollar value of foreign assets held in U.S. portfolios while decreasing the value of U.S. assets in foreign portfolios. If assets were perfect substitutes, these changes in portfolio shares would be of no importance, and the expected returns on U.S. and foreign assets would always have to be equal. With fixed domestic interest rates, the expected change in exchange rates would then be zero. In such a world, real exchange rate changes are always unexpected. With imperfect substitutability, in the absence of compensating changes in expected relative rates of return, investors in both regions will want to rebalance their portfolios following an unexpected exchange rate movement. Thus an unexpected depreciation of the dollar in response to a trade shock actually increases the relative demand for U.S. assets, reducing but not reversing the depreciation. Unlike in the case of perfect substitutability, the expected returns on U.S. and foreign assets do not have to be the same after the initial adjustment. Rather than jump all the way to a new equilibrium from which no further change is expected, the dollar undergoes a sharp initial, unexpected depreciation followed by a more gradual, expected depreciation. The expected depreciation merely reduces the desired shares of U.S. assets in investors' portfolios rather than causing massive flight from dollars. The rate at which the dollar depreciates after its initial response to an adverse shock depends on the elasticity of asset demands with respect to the relative rates of return: the lower the elasticity, the more gradual the depreciation and the improvement in the current account.

Since observed outcomes are always the result of past and present shocks, the dynamics of adjustment toward the steady state are of particular interest. The authors analyze two representative cases. In response to a shock that increases the trade deficit, such as an increase in U.S. economic activity or an enlarged preference for imports, there is, as explained above, an initial, unexpected depreciation of the dollar, followed by a gradual

further, anticipated depreciation and an increase in U.S. net debt. How much of the depreciation is immediate and how much takes place on the subsequent path of adjustment depend on the response of trade to the depreciation and on the responsiveness of portfolio demands to the anticipated changes in relative rates of return. The less substitutability between foreign and U.S. assets, the smaller will be the initial depreciation, and the more rapid the subsequent depreciation. However, the eventual depreciation in the new steady state is the same, and large enough to generate a sufficient trade surplus to offset the higher interest payments on the larger debt.

The second case involves a response to a shock that increases the demand for U.S. assets, such as an increase in demand by foreign governments. In this case the reduced supply available to private portfolios leads to an initial dollar appreciation. This enlarges the trade deficit, adding to the future flow of dollar assets supplied. The subsequent path is one of a gradual, anticipated depreciation and increase in net debt. Despite the initial favorable portfolio shift, the new steady state requires a weaker dollar, since, as in the previous example, the trade surplus must be larger to offset the interest payments on the now-larger debt.

The authors suggest that the U.S. experience of recent years can be understood as responses to shocks like those just described. In their view a shift in private portfolio preferences toward U.S. assets led initially to an appreciation of the dollar. Independently, a shift in the preferences of U.S. consumers toward foreign goods worsened the trade balance by more than can be explained by exchange rate and income effects. As described above, both kinds of shifts predict an eventual sustained dollar depreciation to a level below that prevailing before the shift. Although the accumulation of reserves by foreign governments has supported the dollar against some currencies, the authors argue that the United States has entered the depreciation phase of the adjustment that their model predicts.

To assess future prospects, and in particular how large an eventual dollar depreciation should be expected, the authors quantify their model using estimates of present wealth, assets, portfolio shares, and net debt for the United States and the rest of the world, together with estimates of model parameter values based on existing empirical studies and some assumptions about adjustment speeds and policy preferences. For 2003 these estimates include the following: U.S. assets of $36.8 trillion, foreign assets of $33.3 trillion, and U.S. net foreign debt of $2.7 trillion; 77 percent of U.S. wealth

invested in U.S. assets, and 71 percent of foreign wealth invested in foreign assets. In the model these shares imply that a transfer of one dollar of U.S. wealth to foreigners leads to a decrease of 48 cents in demand for U.S. assets. The estimated trade elasticities imply that a 1-percentage-point reduction in the ratio of the trade deficit to GDP requires a depreciation of 15 percent.

Armed with these quantifications of their model, the authors use it to predict where the U.S. international position is headed. First they calculate the exchange rate adjustment that would be needed to maintain the present net debt position as a steady state, under the implicit assumption that the economy has already adjusted to past shocks, and introducing no important asymmetries between foreign and U.S. interest rates or growth rates. In this case the ratio of the current account deficit to GDP that can be sustained indefinitely is given by the economy's growth rate times the ratio of net debt to GDP. With 3 percent annual growth in U.S. GDP, maintaining a net debt ratio of about 25 percent requires reducing the current account deficit from its present 6 percent to 0.75 percent of GDP. With annual interest rates at 4 percent, this requires a depreciation of the dollar of 56 percent. The authors note some important qualifications to this calculation. To the extent that the present current account deficit reflects J-curve effects in response to the dollar's recent depreciation (in which a depreciation at first worsens the current account balance before improving it), it overstates the additional depreciation required. Noting that the current account continued to worsen for nearly two years after the depreciation of the mid-1980s began, they estimate that a similar path this time would mean that only a 34 percent further depreciation is needed. They also note that if the U.S. net debt ratio were allowed to stabilize at a higher level than the present, the equilibrium current account deficit could be larger.

As an alternative way to assess the dollar's prospects, the authors undertake dynamic simulations of the response to trade and portfolio shocks in which the equilibrium debt-to-GDP ratio is endogenous. Simulating permanent shocks to the trade deficit, they calculate that a 1-percent-of-GDP shift away from U.S. goods increases the equilibrium net debt ratio by 17 percentage points and causes the dollar to depreciate by 12.5 percent. Simulating shifts in asset preferences, they calculate that, in response to a shift that raises the share of U.S. assets in both U.S. and foreign portfolios by 5 percentage points, the dollar initially appreciates and then eventually

reaches an equilibrium depreciation of 15 percent with a 35-percentage-point increase in the net debt ratio. A striking feature of both simulations is how long it takes to reach equilibrium. After fifty years the adjustment is still far from complete, with the dollar still above its pre-shock level after the shift toward dollar assets, and the depreciation only about two-thirds complete after the shift in trade away from U.S. goods. Although they question the realism of these extraordinary adjustment periods, the authors believe they do correctly show that the adjustment process can be very long.

Such gradualism contrasts with the predictions of some observers that the dollar is likely to fall abruptly in the near future. To evaluate this possibility, the authors examine under what conditions their model would predict a faster depreciation than in their baseline simulations. As discussed above, the anticipated rate of depreciation is faster, the less substitutability there is between U.S. and foreign assets, with the extreme case of constant shares providing an upper bound. For this case the authors show that the anticipated rate of depreciation depends on the change in the ratio of U.S. net debt to U.S. assets: a faster rise in the debt ratio requires a more rapid depreciation to maintain portfolio balance. In a situation where the net debt ratio is rising by 5 percent a year, and with a ratio of gross assets to GDP of 3—both rough approximations of recent experience—they calculate an anticipated rate of depreciation of 2.7 percent a year. This estimate is based on anticipated portfolio shares remaining constant. In the model, however, the rate of depreciation will also be affected by any anticipated change in the relative demand for U.S. assets—a shock imposed on top of the constant-shares assumption in the previous calculation. If the demand for shares of U.S. assets in foreign or domestic portfolios is expected to decline, the expected depreciation can be much faster. For example, if the share of U.S. assets demanded in foreign portfolios is expected to decline by 2 percentage points over the coming year, the expected depreciation rises to 8.7 percent.

The authors note that there is considerable disagreement about the share of U.S. assets that foreigners will want to hold in the future. Some observers argue that foreign central banks will continue their recent policy of adding to dollar holdings. Others see a latent demand for U.S. assets by private Chinese investors who are currently restrained by capital controls. Although the authors consider these outcomes possible, they find it more likely that the relative demand for U.S. assets will decline in the near

future, as foreign central banks stop pegging the dollar or diversify their portfolios away from U.S. assets, or both. The calculations just provided for a shift in shares are then relevant. The authors also observe that the longer the peg continues, the larger both the initial and the eventual depreciation will be.

The depreciation of the dollar since its 2002 peak has been very uneven against different currencies: the dollar has fallen 45 percent against the euro, 25 percent against the yen, and not at all against the Chinese renminbi. To investigate how future adjustments would impact each of these important currencies, the authors extend the essentials of their model to include four regions rather than just two. The analysis focuses on the interrelations among the United States, Japan, the euro region, and China, ignoring the rest of the world. The authors assume that half the U.S. current account deficit is with China and a quarter with each of the others, values that approximate recent actual deficits. These deficits transfer wealth, and how that wealth is invested drives exchange rate movements. The model allows for two special features of the Chinese economy: capital controls on private financial capital inflows and outflows, and the pegging of the renminbi to the dollar. Asset preferences in each of the other three regions are allowed to differ, but all are assumed to have the same marginal response to changes in expected returns, and interest rates measured in the domestic currency are assumed to be the same in each. The authors illustrate the main forces at work using a simplified version of the model in which asset demands do not depend on expected returns. For a given U.S. current account deficit, the more dollar assets China holds, the smaller is the appreciation of the euro and yen. Surprisingly, if China holds only dollar assets, a U.S. current account deficit actually causes the dollar to appreciate against both the euro and the yen, since most of the U.S. deficit is with the region with extreme dollar preferences. If only Japan accumulates dollars, both the yen and euro appreciate, with the yen appreciating more. In this case a transfer of wealth to Japan leaves the real effective exchange rate of the euro unchanged, as the euro rises against the dollar and falls against the yen.

The authors also use this framework to analyze the effects of prospective changes in China's policies. If China stops pegging but maintains capital controls, it will have a zero current account surplus, which would require an appreciation of the renminbi against the dollar. Reserve accumulation would then cease, and the U.S. current account deficit would have to be

financed entirely by investors in Japan and Europe. This shift in wealth accumulation away from the region with extreme dollar preferences would strengthen the euro and the yen against the dollar. A diversification of China's portfolios away from all dollars would have a similar effect. The same qualitative results are also found in simulations that allow for the endogenous response of portfolio choices to expected relative returns. Thus, in the authors' analysis, China's pegging to the dollar has limited the appreciation of the euro and yen against the dollar, in contrast to the opinion of some commentators that it has increased the pressure on the euro to appreciate.

The authors briefly address the connections between domestic fiscal and monetary policy and the U.S. international position. As the U.S. current account and budget deficits have risen together in the past five years, they have frequently been paired in discussions of needed policy changes, with some commentators identifying the latter as the cause of the former and calling for reduced fiscal deficits as a possible substitute for depreciation. The authors point out, however, that these are complementary changes rather than substitutes, with interest rates a key link between the two. With the dollar depreciating under the pressure of excessive current account deficits, demand for U.S. output expands, requiring a combination of higher interest rates and fiscal deficit reduction to maintain domestic balance. Because higher interest rates would limit the immediate depreciation while requiring more in the future, smaller budget deficits are the appropriate balancing change. But, if fiscal policy is tightened without dollar depreciation, the economy is likely to weaken.

The authors conclude by summarizing the implications of their findings for understanding the recent past and projecting the future. In their view the path of the dollar since the late 1990s has been supported by increases in the demand for U.S. assets, first by private investors for equities and more recently by central bank demands for bonds. A shift in preferences away from U.S. goods has also contributed to growing trade deficits in this period. Imperfect substitution in portfolios helps account for the gradualism of exchange rate adjustments and for the persistent U.S. current account deficits that have been observed. The model predicts that a gradual depreciation of the dollar will be the prevailing trend for an extended period. However, if the expected demand for U.S. assets falls, as it would if central bank policies changed, the decline in the dollar would be more abrupt. Similarly, the gradual depreciation could be interrupted by a temporary

appreciation if investors' preferences shifted toward dollar assets, although the resulting larger trade deficits would lead to an even larger depreciation eventually. For the same reason, a rise in U.S. interest rates would strengthen the dollar only temporarily and require a larger depreciation in the longer run. The authors thus reason that a better policy mix would combine a reduction of budget deficits with a reduction of interest rates to maintain growth.

Turning to China, the authors argue that eventually the government will find it difficult to continue to sterilize interventions and will abandon its dollar peg. But the longer the peg will have supported the dollar, the larger the eventual dollar depreciation will have to be in order for the United States to service the larger accumulated foreign debt. The authors also observe that a large dollar depreciation would not necessarily be a major problem for the United States. By improving the trade balance, it would permit a reduction of budget deficits without causing a recession. However, dollar depreciation might pose a bigger problem for Japan and Europe, which are already growing slowly and which have limited scope for expansionary stabilization policies.

Some lay commentators have suggested that eliminating the federal budget deficit would automatically reduce today's massive deficit in the U.S. current account. In a 1987 paper, James Tobin identified this as one of eight "myths" about exchange rates and the current account, because it ignores the fact that improvements in the current account balance have to be earned in competition with foreign producers and will, if employment is to be maintained, require changes in exchange rates and terms of trade. In the second article in this issue, Maurice Obstfeld and Kenneth Rogoff pursue this theme. They first provide a wide-ranging discussion of recent economic developments, concluding that the U.S. current account deficit will before long have to be substantially reduced, if not eliminated. They then model the price adjustments that would be required to change import and export patterns in the United States and abroad so as to eliminate or substantially reduce the U.S current account deficit without reducing aggregate economic activity.

Although most analysts recognize that improving the trade balance will require a real depreciation of the dollar, less attention has been paid to the likely need for changes in the relative price of traded and nontraded goods both in the United States and among its trading partners. In earlier work

Obstfeld and Rogoff have argued that these adjustments are, if anything, likely to be larger than the changes in the relative prices of domestic and foreign tradable goods—the terms of trade. It is easy to show why this might be so. Without changes in production anywhere, eliminating the U.S. current account deficit, which today stands at roughly 6 percent of GDP, implies something like a 20 percent reduction in U.S. consumption of traded goods. Assume for simplicity that the traded goods of different countries are perfect substitutes, so that exchange rate changes do not change the relative price of different traded goods, but only the prices of nontraded goods relative to traded goods within countries. Then, with a unitary elasticity of substitution between traded and nontraded goods and hence constant shares, this 20 percent reduction in consumption of traded goods requires a fall in the price of nontraded goods relative to traded goods of the same percentage. In foreign countries, where, under these assumptions, consumption of traded relative to nontraded goods has to rise, the relative price of the latter must also rise. If the traded goods of different countries are not perfect substitutes, the calculations are more complicated, and the required terms of trade and real exchange rates need to be determined simultaneously. But the qualitative nature of the needed adjustment is the same.

To capture the salient features of the current international environment, the authors develop their model by assuming three world regions, representing the United States, Asia, and Europe, all linked by trade and by a matrix of international asset and liability positions. This enables the authors to model asymmetries in the trading relationships between regions and to analyze the implications of dividing the improvement in the U.S. trade account between Europe and Asia in different ways. The model is short run and static. Each region produces two goods: a nontraded good consumed only by its residents, and a traded good that is both consumed domestically and exported. Hence there are a total of six goods in the world economy. The regions are endowment economies with flexible prices, implicitly assuming factor immobility between sectors and full employment.

The preferences of consumers, and in particular the elasticities of substitution among the different goods, play the central role in determining price adjustments associated with changes in the current account. Four commodities are available to consumers in each region—their own region's traded and nontraded goods and the traded goods of the other two regions. The authors model goods preferences in each region by means of two

constant-elasticity-of-substitution (CES) consumption indexes: the first is an index of overall traded good consumption derived from a bundle of the three traded goods, and the second aggregates this index with nontraded good consumption to provide a utility measure for total consumption.

Although the functional form of these CES functions is the same across regions, the weights on the commodities differ. In particular, the traded goods index displays home bias: consumers in each region have a relative preference for the traded good that it produces and exports. Even though the law of one price (individual traded goods have the same price everywhere) holds, the price indexes for each region's bundle of traded goods will differ across regions, because each depends on the region's own consumption weighting of individual traded goods. This implies that an increase in a region's income and expenditure improves its terms of trade, raising the price of its exports relative to that of its imports. The United States and Europe exhibit mirror symmetry in their preferences for each other's traded good but place the same weight on the Asian traded good. Asia meanwhile weights the U.S. and the European traded goods the same, and the model allows the weight it places on those goods to be changed, reflecting changes in openness to trade. Whereas the weights on different goods thus differ across regions, elasticities of substitution among goods are assumed to be the same for all regions. The authors review a range of empirical studies to arrive at informed judgments about the size of these elasticities. In their baseline calculations the elasticity of substitution among tradables is assumed to be 2, implying that, ceteris paribus, a 10 percent change in the consumption of, say, an Asian import to the United States would be associated with a 5 percent change in its price relative to that of the U.S. traded good. The elasticity of substitution between nontraded goods and the index of consumption that aggregates the three traded goods is assumed to be 1, as in the simple example above.

Given these preferences, the authors can solve for the prices that equate demand to supply for any global allocation of the six commodities. The bilateral terms of trade are simply the relative prices of any two regions' traded goods. Given the assumption of CES utility, the authors compute exact price indexes for each region's consumption bundle of traded goods and for its overall consumption. Ratios of the latter give the corresponding bilateral real exchange rates.

As noted earlier, even though the law of one price holds, the price indexes for the bundle of traded goods differ across regions because of

differences in consumption weighting of the three traded goods. The authors assume that each region's bundle of traded goods has a 0.25 weight in total consumption. This means that a change in a region's bilateral real exchange rate is 0.25 of the change in the region's relative price index for traded goods. That is, changes in the terms of trade, through their differing effects on regions' price levels for traded goods, can be traced directly to real exchange rates. For example, if the price of the U.S. traded good falls relative to the price of Europe's traded good—an improvement in Europe's bilateral terms of trade—the relative price of the United States' traded goods index will also fall. Hence there will be a real depreciation of the dollar relative to the euro.

Most of the burden of reducing the U.S. current account deficit has to be borne by U.S. consumers reducing their consumption of traded goods, but part of the adjustment is accomplished through valuation effects. The United States is a net debtor, with its liabilities predominantly denominated in dollars and more than half of the foreign assets held by U.S. residents denominated in foreign currencies. Depreciation of the dollar therefore actually decreases U.S. net indebtedness. Although this decrease in U.S. net worth might be expected to affect demand gradually over time, it has an immediate effect on the current account. Since foreign-denominated U.S. assets exceed foreign-denominated U.S. liabilities, and interest payments are largely denominated in the same currency as the underlying asset, the dollar value of U.S. net interest receipts rises with a depreciation.

To estimate the effect on the terms of trade and real exchange rates of reducing the U.S. current account deficit by 5 percent of GDP, the authors have to make assumptions about how the offsetting reduction in current account surpluses is distributed between Europe and Asia. They consider three scenarios: a global rebalancing scenario, where the current accounts of all three regions go to zero; a "Bretton Woods II" scenario, where Asia's currencies remain pegged to the dollar (a hypothesis analyzed at length in the paper by Michael Dooley and Peter Garber in this volume); and a muted version of the latter, where Asia maintains its current account surplus so that a reduction in Europe's surplus just balances the U.S. deficit reduction. Given the assumed baseline elasticities, the changes in consumption implied by global rebalancing imply very large real exchange rate changes. The euro appreciates in real terms by over 28 percent, and the Asian currencies by over 35 percent. The greater real appreciation for Asia reflects the fact that, initially, Asia has a much larger surplus than Europe, so that

moving to balance requires a much larger increase in its consumption of traded goods. Although these may seem like large numbers, they are not so different from what would be expected if traded goods were perfect substitutes as in the earlier example. The fact that they are not, and that there is home bias, does result in a deterioration of the U.S. terms of trade with both Europe and Asia of about 14 percent; the result is a slightly larger real depreciation than would otherwise be required.

The authors' model is developed entirely in real terms, but they are able to translate the real exchange rate changes into nominal changes by making assumptions about how domestic price levels change. If, for example, each central bank targets stability in its region's overall consumer price index, then real exchange rate changes are the only source of nominal exchange rate change. Stabilizing the GDP deflator, which has different weights than the consumer price index, gives much the same result.

The substantial depreciation of the dollar predicted by the model has a large effect on the Asian net foreign asset position: because 80 percent of Asia's foreign asset holdings, but only 34 percent of its foreign liabilities, are denominated in dollars, Asia's net foreign asset position is reduced in value by 60 percent. Although this is a substantial wealth effect, it produces only a small decline in the current account, in turn only slightly reducing the required exchange rate adjustment. Europe is in a more balanced position and suffers a much smaller loss of wealth, with a negligible effect on the required dollar depreciation.

The changes in consumption implied by the other two scenarios require quite different real exchange rate adjustments. Under the authors' Bretton Woods II scenario, Asia raises its surplus in the process of pegging to the dollar, increasing the adjustment that Europe must make. Specifically, Asia increases its surplus as a percentage of U.S. traded-goods output from its current 15 percent to 31 percent, and Europe has to move from its current 5 percent surplus, measured the same way, to a 31 percent deficit. This adjustment requires an appreciation of the euro by roughly 60 percent against both the dollar and the Asian currencies. Europe's terms of trade also rise dramatically, on the order of 25 percent. The authors conclude that sustaining Asia's peg in the context of a substantial reduction in the U.S. current account deficit is likely to be politically unacceptable for Europeans. Furthermore, even though Europe's net foreign asset position is much less sensitive than Asia's to exchange rate changes, the required appreciation of the euro would be large enough to result in a significant loss in wealth.

In the third scenario, Asia allows its currencies to rise against the dollar by roughly 20 percent, just enough to keep its current account surplus constant as the United States moves to current account balance, thus placing less of a burden on Europe than in the Bretton Woods II scenario. Although the euro still has to appreciate by nearly 45 percent against the dollar, Europe's effective exchange rate is affected much less, by 32 percent rather than 60 percent, because of Europe's substantial trade with Asia.

Although the authors believe they have made fairly optimistic assumptions about elasticities, which, if anything, understate the required price adjustments, they also report results under some alternative assumptions. Raising the elasticity of substitution between nontraded and traded goods from 1 to 2 reduces the required depreciation of the dollar significantly. In the global rebalancing scenario the real dollar-euro rate rises by 19.3 percent rather than 28.6 percent, and the Asian currencies appreciate by 22.5 percent rather than 35.2 percent—still quite significant adjustments. Eliminating the changes in the terms of trade by assuming that traded goods are near-perfect substitutes for each other has similar quantitative effects, revealing that the terms-of-trade effects were responsible for about a third of the real dollar depreciation in the baseline model.

As previously noted, because the United States' foreign debts are mostly denominated in dollars and its foreign asset holdings mostly in foreign currencies, valuation effects dampen the depreciation of the dollar required to eliminate its current account deficit. The authors show that this effect is modest: in their baseline estimates, the depreciation in terms of the U.S. effective exchange rate is about 13 percent less than it would be in the absence of valuation effects, implying that improvements in the trade balance still have to do the heavy lifting. They also show the effect of the United States losing its historical ability to borrow at a low interest rate: the effect of putting the United States on a par with other debtors is of roughly the same magnitude as the valuation effects estimated above.

The authors recognize that their model ignores some effects that might significantly change their estimates of needed dollar depreciation. In particular, they note that the realism of two of their key assumptions depends on the time horizon over which adjustments take place. In the short run, perhaps one or two years, the assumption of factor immobility appears reasonable, but the assumption of completely flexible prices seems less so. For the longer run, price flexibility seems more reasonable, but factor

immobility is implausible. The authors recognize that factor reallocation between sectors will dampen the expected real exchange rate adjustments compared with the adjustments estimated for the core model. Thus, if current account adjustments take place slowly and over many years, a smaller reduction in the real exchange rate will be required to achieve current account balance. Although they recognize that their model is incomplete in this and other ways, the authors believe that the framework they have developed for understanding needed relative price changes will be essential in any analysis of major adjustments in current accounts.

THE DETERMINANTS OF CURRENT ACCOUNT balances have been analyzed much more extensively than those of international capital flows. But the interaction of the capital and current accounts in determining exchange rates highlights that understanding capital flows is just as important as understanding trade flows. For emerging economies the role of such flows has received considerable attention and has been identified as an important factor in currency crises. However, for the U.S. dollar, which has been the world's dominant reserve currency for over half a century, there is less empirical evidence and considerable uncertainty about how its exchange rate responds to U.S. current account deficits and the accumulation of dollar assets abroad. In the third article of this issue, Michael Dooley and Peter Garber expand on what they have elsewhere called the "Revived Bretton Woods" hypothesis, which stresses the willingness of foreign official sectors to accumulate dollar liabilities, and they marshal support for their prediction that U.S. current account deficits need not trigger a major dollar devaluation or currency crisis in the foreseeable future.

Dooley and Garber first describe the key features of the global economy that underpin their Revived Bretton Woods view. The first is China's ongoing transformation from a centrally planned to a nascent market economy, which has moved hundreds of millions of underemployed workers into the global market for labor. China's continued economic development depends on employing such workers, and, in the authors' view, pursuit of this goal will override the conventional pressures of trade imbalances in China's exchange rate strategy. The second is that most successful emerging economies have been net exporters of capital, contradicting the usual assumption that successful development involves poor countries borrowing from rich ones. The authors relate this seeming anomaly to the emerging economies' need for international capital by arguing that the export of sav-

ing supports two-way trade in financial assets that improves the productivity of their domestic capital formation. In China's case access to needed international capital is currently inhibited by the country's geopolitical past and its primitive financial system. The third key feature is that the large and growing current account deficit of the United States has been funded at low interest rates by foreign private and official lenders, suggesting that the large foreign holdings of U.S. assets have not diminished the demand for further accumulation.

The motivation for emerging economies, and particularly China, in building foreign reserves is central to the authors' argument. Export promotion has long been an accepted strategy for a developing economy, and the value of building reserves became apparent when foreign capital flight from East Asia and elsewhere led to the crises of the 1990s. However, these motives by themselves neither explain recent developments nor predict how far the reserve buildups will go. Export-led growth alone does not imply the need for a trade surplus and net export of capital, nor does the precautionary motive require an indefinite buildup of reserves. However, the authors hypothesize an additional motive for building reserves, which today applies most clearly to China. Growth requires efficient capital formation, yet the domestic financial system will, for a long time, not be up to the task of channeling China's high rate of saving into a high rate of productive domestic investment. International financial intermediation can substitute for the inadequate domestic financial system, but potential foreign investors are put off by political risk. Dooley and Garber argue that China's foreign reserves act as collateral that reduces this risk. They provide an extensive discussion of the role of private collateral arrangements and the uncertainties that inhibit financial investments in their absence, citing earlier work by Ricardo Caballero and Arvind Krishnamurthy on the role of international collateral for private financing in developing economies. The authors observe that the U.S. authorities are legally empowered to freeze or seize foreign-owned assets under a range of unusual circumstances, and they identify many occasions when this has been done. Although the conditions for taking such action are not well defined or even generally understood, market participants and other governments believe that the United States will take similar action in the future against foreign governments that expropriate private foreign assets. By holding dollar reserves that are vulnerable to seizure, a country thus provides effective collateral to potential investors.

Dooley and Garber concede that the Chinese authorities may have stumbled on this role of foreign reserves inadvertently. But they argue that, having done so, the authorities now accept a continuing buildup of foreign reserves as support for continued growth in gross inward foreign investment. Hence the authors' collateral hypothesis provides a connection between China's current account surpluses (or net capital flows) and gross capital flows.

In the present geopolitical climate, the collateral hypothesis would seem more relevant to China than to the more developed Asian economies, especially Japan. But Dooley and Garber note that Japan has managed its exchange rate for many years as a way of dealing with its own employment problem, and they see some of the other Asian economies as motivated to keep their currencies aligned with China's. They also see little pressure from market forces that would cause Japan and the other economies to abandon their reserve buildups. History provides many examples of market forces overwhelming official attempts at intervention to support a weak currency, but the analysis of those cases does not necessarily apply to interventions to repress a strong currency. Nor have the constraints that often arise when undervaluation or intervention leads to excessive monetary expansion and overheating been a problem for China or for other developing Asian economies, and those constraints are clearly irrelevant for today's cyclically depressed Japan.

Having thus explained why, in their view, these buildups of dollar reserves abroad may continue, the authors turn to historical evidence of past episodes of buildups and how they have ended. From a sample of 115 developing and industrial countries for the period 1970–2004, they identify episodes in which a country ran current account surpluses for several consecutive years and the government increased its net foreign asset position by at least 25 percent of the change in national net foreign assets. They find several regularities in these episodes, one of which is that the typical episode of reserve buildup has a relatively benign ending. With few exceptions, current account surpluses grew during the period of reserve accumulation. When the accumulation stopped, current account surpluses declined on average by 2 percent of GDP in the first year, suggesting that the accumulation typically ended as a result of some shock to the previous situation. On average, a real appreciation occurred in the last three years of reserve accumulation, which in itself suggests a fundamental disequilibrium in the exchange rate and the current account. But rather than sub-

sequently appreciating, as might be expected from such a disequilibrium, currencies on average depreciated and economic growth moderated.

From this analysis of the typical experience, the authors turn to a more detailed look at Japan, China, and Korea, which together accounted for 45 percent of global reserve holdings at the end of 2004. Since 1970 Japan has had three episodes of extended reserve accumulation: the first starting in 1986 and lasting three years, the second starting in 1992 and lasting five years, and the current episode, which started in 1999. Based on the pattern of the first two episodes, the authors project a moderate real appreciation of the yen and moderate economic growth in Japan in the immediate future, with reserve accumulation ending when the current account deteriorates, at which time the real value of the yen will fall. Korea experienced net reserve accumulation from 1986 to 1989 and again from 1998 to the present. The end of the first episode coincided with a decline in the current account surplus and a slowdown in GDP growth. The authors find nothing unusual about the present episode, with reserve accumulation roughly matching the current account surpluses and the won strengthening moderately in real terms.

China's episode of reserve accumulation is the longest in the entire sample, extending from 1990 to the present. Small current account surpluses were roughly matched by reserve accumulation from 1990 to 2001. Since then, however, China's experience has been without modern precedent: the current account surplus has grown rapidly, and private capital inflows have been roughly as large; hence reserve accumulation has been about twice as large as the surplus. Because the authorities have been able to control inflation, the authors see no pressure to end the accumulation. However, they suggest that the buildup might end if an interruption of direct investment inflows or liberalization of capital outflows were to lead to a real depreciation of the renminbi.

From these examinations of past episodes, the authors draw several generalizations. They find almost no support for the idea that reserve accumulations end with speculative attacks that force the currency to appreciate. Rather, they typically end when the current account surplus declines substantially or swings into deficit, and they are followed by a real depreciation and a modest downturn in the economy. One implication is that episodes of reserve buildups do not end with capital losses on the government's reserves. Nor do they end with recessions generated by a sharp real appreciation. From this evidence the authors judge that there are no constraints or

obvious risks based on historical experience that would keep today's current account surplus economies from continuing to finance U.S. current account deficits, as the Revived Bretton Woods hypothesis predicts. Dooley and Garber expect that China's present financial repression of capital flows and distortion of the real exchange rate will end when the country's industrial sector has grown sufficiently and the domestic financial system has become capable of efficient intermediation. But they also expect that this will take a long time.

MANY ANALYSTS AND COMMENTATORS in the business and financial press see the U.S. international net debtor position as a major risk on the economic horizon, not only for the United States but possibly also for the global economy. In the fourth article in this volume, Sebastian Edwards examines the recent history of the U.S. current and capital accounts, models some likely paths for them in the years ahead, and examines historical episodes of sustained deficits and growing foreign indebtedness in other countries for clues to how serious a risk the present U.S. situation entails.

Edwards starts with a brief history of the U.S. international position in the three decades since exchange rates began floating in the early 1970s. Focusing on the real trade-weighted exchange rate of the dollar and the ratio of the U.S. current account balance to GDP, he identifies two extended episodes of major imbalance. The first began in the early 1980s, when the current account went deeply into deficit following a sharp real appreciation of the dollar. This episode resolved when a steep depreciation that began in 1985 returned the current account briefly to balance by 1991. The second is the present enlargement of the deficit to record levels, which started with a period of appreciation of the dollar from the mid-1990s to 2002 and has continued despite the real depreciation that followed.

Each year's current account deficit worsens the U.S. net international investment position (NIIP) by a corresponding amount. But the NIIP, which is measured in dollars, is also affected by changes in the valuation of assets held across borders. These valuation effects occur as exchange rate movements change the dollar value of foreign assets held by U.S. nationals. In the 1980s valuation effects that were predominantly positive partly offset the adverse effects of large current account deficits on the U.S. NIIP. Nevertheless, by 1986 the United States had become a net debtor, and the massive deficits of the current episode have increased the net debt position to about 30 percent of GDP. However, because the returns on U.S. assets held

by foreigners have been systematically lower than the returns on foreign assets held by U.S. nationals, the income component of the current account has to date remained positive. The entire current account deficit thus consists of an enormous deficit in goods and services trade and a modest deficit in transfers to foreigners.

Edwards turns next to an analysis of where the U.S. current account, real exchange rate, and NIIP are likely to go from here. The three are, of course, interrelated, with the main linkages coming from the exchange rate affecting the trade balance, portfolio investments affecting the demand for dollars, and the balance between portfolio and trade flows affecting the exchange rate. Edwards captures these interrelationships in a model whose main features include elements of the models of Blanchard, Giavazzi, and Sa and of Obstfeld and Rogoff in their papers in this volume. Asset demands are driven by wealth, with a bias for home assets and exogenously determined portfolio shares. (The inclusion of demand by foreign central banks can be treated as a shift in this home bias.) Trade flows are driven by the real exchange rate, which affects the relative prices of traded and nontraded goods and services, and by fluctuations and growth in incomes; the magnitude of these effects is determined by price and income elasticities in the United States and abroad. With this model Edwards is able to analyze long-run equilibriums, that is, the eventual adjustments to real exchange rates and current accounts that can be expected in response to various shocks. With some simplifying assumptions, the sustainable ratio of the U.S. current account to GDP is proportional to the growth rate of U.S. nominal GDP, with the proportionality depending on the relative returns and riskiness of its assets and the degree of integration of capital markets—factors captured in the portfolio balance parameters.

To go further and characterize the dynamic path of such adjustments to equilibrium, Edwards includes partial adjustments for asset holdings, which allow for imperfections in countries' capital markets, and for the current account, which allow for consumption smoothing. As an example of the resulting rich dynamics, he shows that a decline in home bias in the rest of the world, which would increase the sustainable U.S. current account deficit, would lead initially to the deficit overshooting its new equilibrium level.

Edwards applies his model to the current situation by calibrating its parameters using values from earlier studies and values for the dynamic adjustment terms that best explain the behavior of the U.S. current account since

1996. He then uses the calibrated model to simulate the effect of shocks to portfolio choices, focusing on a specification in which the desired proportions of foreign and domestic assets remain fixed after the shock. The simulations also assume that annual economic growth rates in the United States and abroad average 3 percent and that the terms of trade do not change. In his base case, foreigners are assumed to gradually increase the desired proportion of dollar asset holdings in their portfolios from the present 30 percent to 40 percent in 2010, while U.S. nationals reduce their desired holdings of U.S. assets from 73 percent to 71 percent over the same period. These portfolio shifts have the effect of doubling foreigners' net demand for U.S. assets to an amount equal to 60 percent of U.S. GDP by the end of the period. With this increase in demand for U.S. assets, the dollar appreciates in real terms for the first four years and then depreciates rapidly, eventually approaching a new equilibrium 19 percent below its initial 2005 level. The current account deficit initially continues to grow, peaking at 7.3 percent of GDP after four years. It declines sharply thereafter, approaching an equilibrium ratio of 3.2 percent of GDP after a few more years. The reversal of the trade deficit is even sharper and larger because the growing net debt position raises net income payments to foreigners. The main qualitative findings from this base case are robust under a range of alternative assumptions about the model's parameters.

Edwards simulates alternative assumptions about portfolio choice to test what difference they make to the outcome. If, after the initial five years, foreign investors gradually reduce their holdings of U.S. assets to 50 percent rather than 60 percent of U.S. GDP, the real depreciation and current account reversals are steeper and eventually greater. After three years the depreciation is 24 percent and the current account deficit has shrunk by 5.3 percent of GDP. Both changes continue for two more years, overshooting their eventual equilibrium values: an exchange rate about 23 percent below, and a current account deficit about 3.5 percent of GDP smaller than, 2004 values. Although the size of these changes is within U.S. historical experience, once the changes get under way, their abruptness, which comes from dollar accumulations abroad reaching an assumed limit, could be destabilizing. Edwards notes that different parameters for the adjustment process could produce less abrupt changes, but he regards the qualitative characteristics of the simulations as representative of the model's dynamics. And he notes that all the reported simulations assume foreign demand for U.S. assets far exceeding today's 30 percent of GDP.

Large, abrupt swings in current account balances have often been accompanied by disruptions to employment and growth in the affected economies. Edwards looks to international experience with such reversals to see whether it offers any insight into what is in store if the United States undergoes the kind of changes predicted by his simulations. He defines two types of current account reversal, one in which the current account deficit declines by at least 6 percent of GDP within a three-year period, and one in which it declines by at least 4 percent in a single year. For the period 1971-2001 he finds that the first type of reversal occurs in 9.2 percent of all country-years, and the second type in 11.8 percent of all country-years. He reports a number of other interesting findings, including a close association of reversals and currency crises, a particular exchange rate pattern that typifies reversals, and a correlation of reversals with economic growth. However, the great majority of the reversals he finds are for small or less developed countries. The corresponding incidences of the two types of current account reversal for industrial countries are only 2.7 percent and 2.0 percent, and most of those reversals occurred in small countries. Among the larger industrial countries, only Italy (in 1975) and Canada (in 1982) experienced reversals in this thirty-year period. Thus, although Edwards's rich analysis of historical reversals illuminates the structural and economic conditions—and the problems—typically associated with them, the relevance to the current U.S. situation is unclear.

Edwards believes nonetheless that it is very likely that the United States will undergo a major adjustment in the not-too-distant future, which will modify the present global imbalances between the U.S. and rest-of-world current accounts. He identifies three main unresolved issues that will shape how that adjustment unfolds. One is how central banks conduct their reserves policy in a global economy with mostly flexible exchange rates. He notes that, in contrast to the argument made by Dooley and Garber in this volume, many observers believe that foreign central banks that have been accumulating dollar reserves will reduce their demand for dollar assets in the future, unleashing an abrupt collapse in the value of the dollar. Another issue is how world interest rates, which influence global investment, will be affected by a major adjustment to the U.S. current account. And the third is how private sector saving and government budget balances evolve, and whether, in tandem with interest rate adjustments, they will succeed in maintaining global economic growth as the correction of today's current account imbalances works itself out.

MOST INFORMED OBSERVERS FORECAST a substantial decline in the growth of the labor force in future decades. The baby-boom generation is approaching retirement, no new explosion of fertility is in sight, and the growth in female labor force participation that began in the 1960s is seen as largely complete. Some forecasters also predict a slowing of productivity growth in the longer run, although this is more controversial: the Social Security Administration's 2005 trustees' report projects that hours worked will grow by only 0.3 percent a year from 2015 to 2045, a slowdown of 1.2 percentage points from the average for this measure from 1958 to 2004. The trustees also predict that long-run productivity growth will moderate from its pace of the last fifteen years and that together these two factors will lead to a slowdown of GDP growth of between 1.6 and 2.2 percentage points a year. Along with increases in longevity, these projections are the major reason that the Social Security system in its present form will be unable to maintain current benefits into the indefinite future. Given this outlook, if equity investments earn as high a return as they have over the postwar period on average, then investing a portion of the Social Security trust fund in equities, or creating private accounts to allow individual workers to do so, seems an attractive and almost costless way to improve the system's prospects. However, in the fifth article in this issue, Dean Baker, Bradford DeLong, and Paul Krugman question this reasoning, arguing that rates of return on equities are unlikely to match their historical levels if the pessimistic projections of labor force and productivity growth in the trustees' report are correct.

Standard economic growth models provide a relevant framework for analyzing the long-run effects of labor force and productivity growth on national income growth and the rate of return to capital. The authors begin by reviewing the predictions of the mainstay of growth analysis, the Solow model. In steady state the growth rate of national income is the sum of the growth rates of hours worked and labor-augmenting technical progress, and the capital stock grows at the same rate as income. At any income growth rate the net saving rate determines the capital-to-output ratio, which in turn determines wage rates and the rate of return to capital. It is easy to show that a change in the rate of growth of labor input or labor productivity results in a proportional change in the rate of return to capital, with the proportionality being the ratio of capital's share of income (which is assumed constant) to the gross saving rate.

The Solow model takes the saving rate as given, so that the output-to-capital ratio and the rate of return to capital fall with a reduction in growth.

But a sufficient decline in the saving rate will keep the return to capital constant. This leads the authors to analyze two canonical models that address the effect of changing demographics on saving and hence on the rate of return. The first is the Ramsey model, a highly stylized model that assumes that the representative household lives forever, maximizing utility over a consumption path into the indefinite future. Population growth in this model is captured by assuming that the size of the representative household grows over time. Household saving decisions maximize the welfare of this dynastic household, given the projected growth in household size. Usually it is assumed that the household's utility in a given period is simply the sum of the utilities of the members present in that period, and that the household decisionmaker, contemplating the future, gives the same weight to the utility of the new members as to his or her own. (The authors call this "perfect familial altruism.") With these assumptions and the assumption that utility is proportional to the logarithm of consumption (log utility), the steady-state rate of return rises one for one with labor productivity growth, as does the growth rate of consumption per worker. However, the rate of return is unaffected by population growth. The reason for this can most easily be seen by abstracting from productivity growth, so that consumption per capita is constant through time. Without population growth, the infinitely lived individual will want to accumulate capital to the point where the rate of return equals the rate of time preference. With population growth, the same condition will hold. The fact that a forgone unit of consumption by each household member today has to be divided among $1 + n$ members tomorrow is just balanced by the fact that there will be $1 + n$ fully weighted members tomorrow. So, as with a single individual, the rate of return will be driven to the rate of time preference.

Why are these results different from those of the Solow model? In both models, in the steady state, each new member of the labor force has to be equipped with capital. In the Solow model the saving rate is constant, so that the capital-to-labor ratio is higher when there are fewer workers to equip with capital. In the Ramsey model the saving rate falls to keep the capital-to-labor ratio and the rate of return to capital unchanged. Baker, DeLong, and Krugman find the assumption of perfect familial altruism in the Ramsey model implausible, particularly when many of the future members of society are expected to be immigrants unrelated to today's members. They show that if there is less than perfect altruism, so that current generations give less weight to future generations than to themselves, then, when

population growth slows, saving does not fall enough to maintain the previous rate of return on capital.

There are several reasons why the Ramsey model is ill suited for analyzing the effects of demographic change on saving and the rate of return. There is no meaningful way to analyze saving for retirement in a model where individuals live and work forever. Nor can the model analyze the effects on saving of changes in birth and death rates, the age of retirement, or uncertainty about the length of life. However, the second canonical model the authors examine, the Diamond overlapping-generations model, can readily incorporate such features. In this model, versions of which have been used by other authors to estimate empirically the effects of demographic change in the United States and elsewhere, individuals are assumed to go through a life cycle of earning, saving, and consuming. Each agent lives two periods, working and saving when young and consuming the returns on capital acquired through that saving when old. Generations all have the same preferences but differ in consumption opportunities as productivity grows over time. Individuals are assumed to maximize the present value of the utility of consumption over their two-period lifetimes, using log utility and with no bequest motive. Output is given by a Cobb-Douglas function combining the labor input of the young and the capital owned by the old.

Even though it abstracts from some realistic features of the typical life cycle, the Diamond model shows the fundamental differences that arise from assuming finite rather than infinite horizons. First, the rate of return bears no necessary relationship to the pure rate of time preference. Households optimally allocate their income over two periods, and so determine individual household saving, but aggregate saving depends crucially on the demographic structure.

With log utility, the fraction of income saved is independent of the rate of return—income and substitution effects just balance—making the analysis quite simple. In the absence of population or productivity growth, aggregate (net) saving would be zero: in every period the dissaving of retirees just balances the saving of the equally numerous young. With population growth there are more savers relative to dissavers, so that the capital stock grows along with the labor force in steady state. However, since the saving of one generation of workers is used by the more numerous next generation, the capital-to-labor ratio is lower and the rate of return higher than with a constant population. If saving per worker were fixed, the capital-to-

labor ratio would fall at a rate proportionate to the growth in the number of workers. The resulting increase in the steady-state real rate of return would have no effect on saving with log utility, but the lower wage would reduce the saving of workers, resulting in an even greater increase in the rate of return than would otherwise be the case. And, if the utility function were less elastic than under log utility, as most analysts believe, the increase in the return to capital would in turn reduce saving, raising the rate of return even further. Productivity growth—an increase in the labor equivalence of a worker—divides one generation's saving among a greater number of equivalent workers and has the same effect as labor force growth on the rate of return and wages.

The authors conclude that there are good reasons to believe that the rate of return on capital will fall if population growth and productivity growth slow. Since capital is the underlying asset generating returns for the owners of firms, it is hard to construct a scenario where a permanent decline in the rate of return on capital does not imply a similar decline in equity returns. The authors illustrate this by examining the implications of the standard Gordon equation for equity prices. The rate of return on an equity claim is its current yield plus capital gains. In the absence of news that affects a company's prospects, the price of its stock grows with its dividends. The Gordon equation simply shows that the price of a stock is equal to its current dividend divided by the expected rate of return minus the growth rate of dividends. Applying this equation to projections for the aggregate economy, the authors calculate that, if real GDP grows at the 1.5 percent annual rate consistent with the 2005 trustees' report, and assuming a constant capital share, real earnings on capital will likewise grow at 1.5 percent a year, as will dividends in the absence of changes in firm's debt-equity ratio or the dividend payout rate. With this growth rate and the current dividend yield, the Gordon equation implies an expected annual real rate of return on stocks of 4.4 percent, considerably less than the 6.5 percent annual real return averaged over the past half-century. Thus the authors conclude that this measure of market expectations is consistent with the fall in the rate of return on capital that they infer from their analysis of growth models.

How might future stock market returns be higher than this calculation suggests? The authors discuss several possibilities but in the end are skeptical of their importance. The capital in the growth models corresponds to all productive assets in the economy, including, for example, those of unincorporated enterprises. Thus the rate of return to capital in traded firms

could be higher than the return to capital as a whole in the economy. But the authors see no reason to expect that this is so. A firm's earnings and dividends typically go through a life cycle, so that the growth in dividends for the economy as a whole, reflecting the emergence of new firms, may differ from that of existing firms. But the authors suggest that this difference may mean lower rather than higher dividend growth for a broad stock index. Nor do the authors see much room to increase dividend payout rates. With a decline in the rate of return to capital, increased payouts to stockholders have to come either at the expense of bondholders or from a reduction in retained earnings. Although reducing leverage could temporarily raise the fraction of earnings paid to stockholders, such reductions could not continue indefinitely.

As the authors show using the Solow model, a reduction in the saving rate could maintain a higher rate of return to capital by avoiding the increase in the capital-to-labor ratio. In that case, although growth in output would still fall as a result of the fall in growth rates of population and productivity, with growth in earnings and dividends following suit, the dividend yield would be higher, with less retained earnings and household saving required to grow capital at the lower rate. Because there would be less capital along the economy's growth path, the rate of return would be maintained despite the lower growth rate.

The most interesting possibility for maintaining a higher rate of return is a shift in the distribution of world investment away from the United States to regions where the labor force is growing faster and potential returns are higher. The authors reason that, if American companies were to increase their investment abroad, the growth of earnings of companies in the index could exceed the rate of growth of the domestic economy. However, they calculate that achieving the historical 6.5 percent return by this approach would require that companies increase their foreign investment by historically unprecedented proportions, unless that investment substituted for U.S. domestic investment.

The authors also point out that, unless the U.S. trade balance changes, any such increase in U.S. firms' investment abroad will have to be balanced by increased capital inflows of the same magnitude, reducing returns on domestic capital. Hence, if there is no change in U.S. saving, there will be no net effect on the growth of the domestic capital stock, and thus no effect on the rate of return in the United States. They do not address the possibility that any improvement in the trade balance, coming perhaps from dollar

depreciation, would reduce domestic investment for a given level of saving. Restoring balance in U.S. trade would reduce net capital inflows, domestic investment, and growth in the domestic capital stock by the same amount. Since the current account deficit today is near 6 percent of GDP, a major fraction of the capital deepening associated with slowed population and productivity growth could be avoided in this way.

Historically, equities have paid a significantly higher return than bonds, resulting in a large (and, many argue, excessive) risk premium on equities. If this equity premium can be counted on to persist, it would seem to provide a good reason for private investors, or the Social Security trust fund, to invest more heavily in equities and less heavily in bonds. But the authors observe that the reason for the high premium remains a puzzle, a fact that argues for caution in adopting any strategy to capitalize on the premium in the future. Insofar as the premium reflects a failure of markets to efficiently allocate risk among individuals, it could make sense for the government, the agent with the greatest ability to manage systematic risk, to take a direct position in equities. But if, as some believe, the growing sophistication of markets is already in the process of eliminating the equity premium, the gains from switching to equities from bonds will disappear. In that case any attempt to exploit the premium would fail in the long run.

The authors acknowledge that much uncertainty remains about what the future holds for economic growth. But, they argue, the main inference of their analysis is that it is precisely in those cases when growth slows that returns to equities are likely to be lower than historical experience. Thus, if slower growth does contribute to the Social Security problem, investment in equities is likely to disappoint as a solution.