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Program Report

The Conference on Research in Income and Wealth

Charles R. Hulten*

In 1935, the National Bureau of Economic Research invited a consortium of universities to join with it in establishing a "program of cooperative research" in the area of economic measurement. The Conference on Research in Income and Wealth (CRIW) was founded a year later to provide conceptual support for the establishment of the U.S. National Income and Product Accounts. It was a conference in the basic sense of the word — a group of experts drawn from academia, government statistical agencies, and the business and economic policy community, meeting at regular intervals to confer on issues of importance for the development of the national accounts. While the CRIW has broadened its agenda to include measurement issues beyond the strict confines of the national accounts, the essential personality and objectives of the CRIW have remained unchanged up to the present.

The CRIW has special status at the NBER, thus setting it apart from the Bureau's regular programs. This status reflects the dual personality of the organization: it is an activity within the NBER, which exercises oversight and provides administrative support, but at the same time, it has a separate membership, steering committee, and its own dedicated funding from the government statistical agencies. Ongoing financial support is derived from the Bureau of the Census, the Bureau of Economic Analysis, the Bureau of Labor Statistics, the Board of Governors of the Federal Reserve System, and Statistics Canada. The executive committee is drawn from these agencies, from academe, and from program directors appointed by the NBER. The CRIW currently has some 300 members. Election to membership in the CRIW does not convey affiliation with the NBER, although there is considerable overlap.

* *Hulten Chairs the Executive Committee of CRIW and is an NBER Research Associate in the Program on Productivity. He is also a Professor of Economics at the University of Maryland. For links to the work discussed in this article, see www.nber.org/CRIW/.*

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The main activity of the CRIW is to hold annual conferences on subjects defined by the conference membership. The conference proceedings then appear in the series Studies in Income and Wealth, published by the University of Chicago Press for the NBER. This series now contains nearly 70 volumes. In recent years, the CRIW has joined with NBER's Program on Productivity to hold workshops at the annual Summer Institutes, and this initiative has broadened to include other NBER programs. The conference volumes published over the last decade include: *The Economics of New Goods* (1997), *Geography and Ownership as Bases for Economic Accounting* (1998), *Labor Statistics Measurement Issues* (1998), *International and Interarea Comparisons of Income, Output, and Prices* (1999), *New Developments in Productivity Analysis* (2001), *Medical Care Output and Productivity* (2001), and *Scanner Data and Price Indexes* (2003). The last three years have been particularly busy, with five regular CRIW conferences whose volumes are not yet published: *Measuring Capital in the New Economy* (2002), *Hard-to-Measure Goods and Services: Essays in Memory of Zvi Griliches* (2003), *New Architecture for the U.S. National Accounts* (2004), *Price Index Concepts and Measurement* (2004), and *Producer Dynamics: New Evidence from Micro Data* (2005). In addition, the CRIW has collaborated in three other conferences and five workshops. A listing of recent conferences and programs and workshops is available on the CRIW web page (www.nber.org/CRIW/), along with a list of volumes in the Studies in Income and Wealth series.

This list of recent conference papers is too long to describe fully in this brief report. However, there are several cross cutting themes: the importance of the revolution in information technology; the emergence of new goods and services whose quality differences are important and changing; and the globalization of economic activity. These dynamic issues provide a formidable challenge to economic measurement, since the national accounts are not a static structure, but rather one that must evolve continuously to reflect changes in the structure of the economy.

New Goods

The 1980s and early 1990s were the period in which personal computers, cell phones, video games, ATMs, and then the Internet, became common items of daily life. The growing importance of these items, as well as other aspects of the IT revolution, created a disconnect between every-day experience and

macroeconomic statistics, prompting Robert Solow to remark in 1987 that, "we see the computer revolution everywhere except in the statistics." Federal Reserve Board Chairman Alan Greenspan also noted this disconnect, and suggested that official statistics fail to capture the true dynamism of the economy. He observed that official statistics implied that productivity in the service sector was virtually non-existent, despite the widespread adoption of cost-saving processes and new products based on the IT revolution. He also told the Senate Finance Committee in 1995 that he thought that the growth rate of the consumer price index was biased upward by between one-half to one and a half percentage points per year because of mismeasurement. The Boskin Commission, impaneled to investigate the matter, put the upward bias at around one percent per year, and attributed about half to the failure of the CPI to accurately reflect product innovation.

The influence of this critique is evident in the CRIW conference, *The Economics of New Goods*. William Nordhaus, writing in this volume, traces the history of lighting and argues that, "by the very nature of their construction, price indexes miss the most important technological revolutions in history (page 54)." Writing in the same volume, Jerry Hausman points out that the CPI did not include cellular telephones in the CPI market basket until some 10 years after their introduction into the market place. He proposes, in that paper, a procedure for handling new goods based on the Hicksian reservation price. However, measurement practice has tended to adopt the hedonic price model as the appropriate framework. Price hedonics was used by the Bureau of Economic Analysis in the mid 1980s to adjust prices and quantities in the national accounts for the rapid increase in computing power, and has become the focus of attention at the BLS as a means of improving the CPI program. The hedonic price model has been given a great deal of attention at many recent CRIW conferences, including *Hard-to-Measure Goods and Services: Essays in Memory of Zvi Griliches* and *Price Index Concepts and Measurement*.

Measuring Capital

Technological innovation also causes equally serious problems for the measurement of capital, particularly for the intangible "knowledge" assets like accumulated research and development and human capital. Conventional accounting practice treats R and D expenditures as an intermediate expense that is used up in the same period in which it was produced, thereby ignoring the large body of research that finds a large rate of return to R and D as a capital investment. This issue was taken up in the 2003 conference *Measuring Capital in the New Economy*. The paper by Corrado, Hulten, and Sichel presented at this conference explores the consequences for accounting practice of counting as investment a broad list of intangibles – R and D, copyrights, films, computerized databases, development of improved organizational structures, and brand equity. Business investment in intangibles was found to be as large as the spending on tangible capital – as much as $1 trillion in recent years – and a significant portion of this amount is excluded from the existing investment figures in the NIPA.

In subsequent work reported at a CRIW/Productivity Program workshop at last year's NBER Summer Institute, a follow-on study found that the rate of growth of measured labor productivity in the non-farm business sector is strongly affected by the capitalization of this list of intangible assets, and that the proportion of growth attributed to capital formation is the dominant source of growth when intangible assets are included in the analysis.

This practice of excluding intangibles is beginning to change at the macro level, with BEA's decision to capitalize software expenditures and the planned capitalization of R and D expenditures in a satellite account to the main NIPA. This issue is taken up in the paper by Fraumeni and Okubo, "R&D in the National Income and Product Accounts: A First Look at Its Effect on GDP," in *Measuring Capital in the New Economy*. The importance of firm-specific investments in human capital is discussed in "The Relation of Human Capital, Productivity, and Market Value: Building Up from Micro Evidence" by Abowd, Haltiwanger, Jarmin, Lane, Lengermann, McCue, McKinney, and Sandusky.

National Income Accounts

New and future developments at the BEA are also discussed in the volume *New Architecture for the U.S. National Accounts*. The paper by Landefeld and Jorgenson in this volume sets out a road map for the evolution of the U.S. NIPA in "Blueprint for an Expanded and Integrated Set of Accounts for the United States." In a sense, this paper takes up the unfinished business left over from the early days of the national accounting movement. A perusal of the early volumes of the *Studies in Income and Wealth* reveals that the original intent of the "founding fathers" was to develop a fully integrated income and wealth account, with allowance for non-market production. This vision was not realized when the national accounts were first published in the late 1940s. These accounts emerged with a distinctly Keynesian personality that emphasized short-run market flows, without a balance sheet, a non-market production, or a true production account that allowed for capital services as a productive input. Following the paper by Landefeld and Jorgenson, the other contributions in *New Architecture for the U.S. National Accounts* take up these various issues. The issues involved in developing a national balance sheet and linking the BEA investment and capital stock estimates to the FRB's wealth and flow-of-funds estimates are described in "Integrated Macroeconomic Accounts for the United States: Draft SNA_USA," by Teplin, Antoniewicz, McIntosh Palumbo, Solomon, Mead, Moses, and Moulton. Non-market accounting is discussed in "A Framework for Non-Market Accounting," Abraham and Mackie, and "Principles of National Accounting for Non-Market Accounts," by Nordhaus. My paper, "Architecture of Capital Accounting: Basic Design Principles" deals with the problem of developing a production account with capital service flows, linked to the corresponding stocks of capital and

wealth. This is also taken up in the paper by Harper, Powers, Fraumeni, and Yuskavage, "An Integrated BEA/BLS Production Account: A First Step and Theoretical Considerations."

Service Sector Output

The problems associated with the measurement of service sector output represent another item of "old business" on the CRIW agenda. This sector has grown steadily since the first publication of the U.S. national accounts, increasing from 36 percent of GDP in 1947 to 56 percent by 1997. The failure to measure the output of services has been advanced as an explanation of the productivity slowdown of the mid-1970s to the mid-1990s, and was given added salience by Greenspan's skepticism about the slow growth of productivity in a sector in which the IT revolution was so apparently important. The pick up in productivity after 1995 in the service sectors and its association with IT investments focused even more attention on the measurement problem. It is therefore not surprising, given this history, that the CRIW has devoted a great deal of attention to the subject, with the 1969 conference *Production and Productivity in the Service Industries*, the 1992 *Output Measurement in the Service Sectors*, and more recently, *Medical Care Output and Productivity* (2001), *Scanner Data and Price Indexes* (2003), and the yet-to-be published proceedings *Hard-to-Measure Goods and Services: Essays in Memory of Zvi Griliches* (2003), and *Price Index Concepts and Measurement*. Other CRIW conferences and workshops had papers on banking output, insurance, and educational output.

Additional Work

The topics reviewed thus far are by no means an exhaustive list of the issues of importance to the CRIW. Strengthening the linkage between the aggregate data of the NIPA and it microfoundations is another priority, reflected in the most recent CRIW conference, *Producer Dynamics: New Evidence from Micro Data*. The problems posed by the globalization of economic activity present yet another challenge for economic measurement. What does it mean to have "national" accounts when capital and technology (and now labor as well) flow ever more freely across national boundaries? Various aspects of this question are examined in the CRIW volumes *International and Interarea Comparisons of Income, Output, and Prices* and *Geography and Ownership as Bases for Economic Accounting*, and will likely be the subject of the next CRIW conference in 2006. These problems and others will keep the CRIW as busy in the next decade as it has been in the past.

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Research Summaries

How Private Health Insurance Pools Risk

Mark Pauly*

Introduction and Theory

Most Americans obtain their health insurance in the private sector, in both group and non-group settings, and from for-profit, non-profit, and self-insured arrangements. A matter of concern to both consumers and policymakers is how the premiums that will (in some fashion) be paid for this insurance — and even the availability of insurance at any premium — vary with the insured unit's risk level. There is tension here: to cover their costs and to avoid adverse selection, insurers need to collect premiums tailored to each buyer's expected expense. But policymakers tend to regard payment of higher premiums by higher risks as unfair, and individual consumers realize that their risk level may change over time, as chronic (though not necessarily permanent) illnesses strike.

Along with several colleagues, I have been investigating both theoretical models of efficient insurance markets when risk varies (both across individuals at a given point in time and for a given individual over time) and empirical evidence on how premiums and the securing of coverage vary with risk. The theoretical point of departure is that, from a lifetime perspective, the great bulk of people who are initially low risk will want protection against large current costs *and* protection against "premium risk," the risk that premiums will jump at the onset of chronic illness. Howard Kunreuther, Richard Hirth, and I[1] have shown, as has John Cochrane,[2] that there is a theoretical solution to this problem: markets can furnish incentive-compatible insurance with "a longer time perspective," in Kenneth Arrow's words using the policy provision labeled "guaranteed renewability at class average premiums." We also have been interested in pursuing another of Arrow's insights: that institutional arrangements other than explicit and direct market transactions may emerge to deal with this problem as with others in health care and health insurance; the main candidate for this role is employment-based group health insurance. We therefore have been investigating the extent to which premiums paid vary with risk in competitive, largely unregulated insurance markets, and the underlying arrangements that support risk pooling. This investigation has largely been one of first discovering some empirical evidence and then working backwards to understand the supporting arrangement and the theory that explains their existence.

Individual Insurance Markets

Our primary empirical finding is that, in both group and non-group insurance, premiums actually paid for insurance in the United States pool the risk to a very great extent. That is, in *both markets,* actual premiums paid are not even close to being proportional to risk. To be specific: although total premiums do rise with risk in both individual and group markets, primarily in terms of reflecting the higher risk that accompanies older age (especially above age 50), they do not reflect the full amount of additional risk that characterizes individuals and families. Moreover, in both markets the premiums do not increase with the onset of chronic conditions at rates close to the expected expenses associated with those conditions Although risk pooling is present (but far from complete) in employment-based group markets, even in individual insurance markets there is relatively little risk segmentation. The difference in the extent of risk pooling in the two types of markets is modest.[3]

Our primary theoretical finding is that such risk pooling, far from being inconsistent with the operation of competitive insurance markets, is actually what would be predicted in an incentive-compatible competitive equilibrium, according to models of insurance purchase in which buyers demand and insurers (implicitly or explicitly) supply the policy feature of "guaranteed renewability."[4]

These findings are most transparent in the individual or non-group insurance market (even though it is currently a small fraction of total private insurance). We assume that early in life people are generally of similar risk (with only 3 percent of young adults reporting the presence of chronic conditions). To obtain insurance for current coverage that also protects against so-called "reclassification risk" — an increase in premiums if one contracts a chronic condition — the great bulk of individual insurance carries a provision promising "guaranteed renewability at class average rates." This means that the insurer promises to charge a premium — if the person renews coverage in the next period — which is the same for all of

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those who initially bought insurance as part of a "class." Specifically, it means that the insurer promises not to single out for above-average premiums those who develop evidence of becoming higher risks. If the insurer raises the premium, it promises to do so for everyone uniformly.

The theoretical model shows that this provision requires "frontloading" of premiums: in the early years of the time period over which a person plans to renew coverage from a given insurer, the premium exceeds the expected expense because it also includes a charge to pay any above average costs for those who later become higher risks. Recent work by Bradley Herring and me[5] compares the estimated age-time path of premiums for individual insurance when risk changes because of the onset of chronic conditions. We consider the actual path exhibited in the Medical Expenditure Panel Survey (MEPS) data. We find that the actual path is qualitatively similar to what the theory would predict (high front loading); the actual path is quantitatively close to the path predicted even by our crude risk prediction model; and (because health risk rises with age, even for healthy people), younger buyers still pay substantially less in premiums than older buyers for a given insurance policy. This occurs despite relatively high dropout from individual plans as people get jobs with coverage and return to the group insurance market. Although there have been some anecdotes about insurers slipping out of their policy provision to renew coverage at group average premiums for high risks by canceling the coverage entirely, we conclude that on average guaranteed renewability works in practice as it should in theory and provides a substantial amount of protection against high premiums to those high risk individuals who bought insurance before their risk levels changed. The implication is that, although there are some anecdotes about individual insurers trying to avoid covering people who become high risk (for example, by canceling coverage for a whole class of purchasers), the data on actual premium-risk relationships strongly suggest that such attempts to limit risk pooling are the exception rather than the rule.

We also examine the effects of state regulation requiring community rating, or putting bands on risk rating of premiums charged to newly covered individual insureds, and how different types of insurers behave in this regard. Using data from the 1980s and 1990s, we find little evidence that state regulation led to less variation with risk in premiums than did the absence of regulation. We do find that managed care plans vary their premiums with risk less than conventional insurers do.[6]

In more recent work,[7] Herring and I look at the effect of regulation on both differential premiums and differential purchases of individual insurance. We find that regulation modestly tempers the (already-small) relationship of premium to risk, and leads to a slight increase in the *relative* probability that high-risk people will obtain individual coverage. However, we also find that the increase in overall premiums from community rating slightly reduces the total number of people buying insurance. All of the effects of regulation are quite small, though. We conjecture that the reason for the minimal impact is that guaranteed renewability already accomplishes a large part of effective risk averaging (without the regulatory burden), so additional regulation has little left to change.

Guaranteed renewability is not the only factor affecting individual insurance premiums. Herring, David Song, and I[8] find that higher risk individuals engage in more aggressive search for lower premiums, with the result (as before) that the difference between premium and expected expense was much smaller for higher risk people than lower risk people. We also analyze Internet data on premiums and find that lower risk individuals (primarily young people) have relatively more to gain from using the Internet to search for lower premiums than do higher risk people. But we also find that the average gain in terms of lower premiums from using the Internet to search for individual insurance premiums is zero or negative: if there is a gain, it is primarily in reduced search time, not lower prices.

Along with Vip Patel,[9] I examine state regulations regarding guaranteed renewability. The federal HIPAA law requires states to have such a provision in their regulatory code, but leaves the interpretation and the enforcement up to the states. Patel and I find that almost all state insurance departments say that they have a guaranteed renewability provision, but in some states it is an explicit prohibition on changing rates if risk changed, whereas in other states it was implicit in the state's power to forbid "arbitrary" insurance premium rates.

Group Insurance

People who get their insurance through their jobs are thought by economists to pay in two ways. In most firms there is some explicit premium charged to the employee and deducted from take home pay on the person's pay stub; where there are multiple plan offerings, differences in these explicit premiums affect which plan people choose. The other way employees pay, and usually this applies for the much larger share of insured workers (about 75 percent on average), is in the form of lower money wages. This incidence of health benefits (and other employee benefits) on wages has strong theoretical and empirical support, but is often misunderstood by employers and policymakers, as I explain in my book *Health Benefits at Work*.[10]

Herring and I examine employment-based group insurance in the late 1980s. We find that, although the explicit employee premium did not vary with risk, it did have a huge variance across and even within firms.[11] In terms of explicit premiums, workers were not all paying anything close to the average. We find that total premiums varied little with health risk, and that obtaining group insurance was also largely independent of risk, except for low-wage workers in small firms. What we also find, however, is that the rate at which money wages increased with experience or seniority was much lower in firms offering health insurance than in otherwise similar firms that did not. This finding is consistent with larger differential incidence falling on older workers (reflecting their higher expected losses).

Herring and I also examine strategies available to employers to limit

adverse selection when multiple plans with different levels of insurance coverage are offered.[12] We look at the specific example of employers adding a high deductible (catastrophic) option, often accompanied by a spending account — similar to the Medical Savings Account or Health Savings Account now enacted into federal law. We find that adverse selection by low risks is possible if employers follow some type of contribution strategies (for example, fixed dollar contributions to all plans with premium differentials reflective of the average difference in cost across plans), but we also develop a model of optimal employer contribution strategies which greatly reduces the extent of adverse selection and, in some cases, permits both high and low risk workers to gain from the addition of such a plan.

Finally, Herring and I examine the differences between the amounts and types of insurance that people with different characteristics obtain, depending on whether they use the individual or group market.[13] We use observed demand in the individual market as the "gold standard" of the kind of insurance people would choose if they had completely free choice (though at much higher loading). We find that most characteristics that predict both the choice of any insurance and the degree of restrictiveness of the plan, such as income, education, and location, are quite similar in the individual and the group market. Most people do seem to get the kind of plan we would predict that they would want, even within group settings. We find a major difference among worker types who are heavily unionized though: in group settings (whether the firms itself was unionized or not), such workers tend to be more likely to select coverage than they would have in the individual market, and to choose coverage with fewer restrictions. There are also some differences in the effect of ethnicity (Hispanic or Black) in individual versus group markets.

Conclusion

Our overall conclusion is that private health insurance in the United States involves a great deal of risk pooling as long as individuals initially obtain insurance (whether individual or group) before they contract chronic illnesses and thus become high risks. Both private guaranteed renewability provisions and state rate regulation encourage pooling, but guaranteed renewability seems to have fewer adverse side effects in the sense of driving lower risks out of the market, albeit with slight smaller efficacy. The major difference between individual and group insurance, then, is not the price differences charged to high versus low risks. Rather, the high loading in individual insurance means that it is costly for people at all risk levels. Attention should be paid to ways to lower administrative costs across the board.

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[3] M. Pauly and B. Herring, *Polling Health Insurance Risks* (Washington: AEI Press, 1999).

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Some Perspective on Capital Flows to Emerging Market Economies

Carmen M. Reinhart*

From Hume's discussion of the specie-flow mechanism under the gold standard to the Keynes-Ohlin debate on the transfer problem associated with German reparations after the WWI, understanding the flow of capital across national borders has been central to international economics. My work on the topic has focused mainly on the flow of funds between rich and poor countries. Theory tells us that, for the recipient, foreign capital put to good use can finance investment and stimulate economic growth. For the investor, capital flows can increase welfare by enabling a smoother path of consumption over time and, through better risk sharing as a result of international diversification, a higher level of consumption.

The reality is that the effects of such flows — as seen from either recent experience or the longer sweep of history — do not fit neatly into those theoretical presumptions. As a result, my research has mostly been directed at shedding light on four questions:

1. What motivates rich-to-poor capital flows?
2. Why doesn't capital flow more from rich to poor countries?
3. What are the consequences of a surge of capital inflows for an emerging market economy?
4. How do policymakers typically respond to an incipient inflow of capital?

The Causes of Capital Inflows

The surge in capital inflows to emerging market economies in the early part of each of the past two decades was attributed initially to domestic developments, such as sound policies and stronger economic performance, implying both the good use of such funds in the recipient country and the informed judgment of investors in the developed world.[1] The widespread nature of the phenomenon became clearer over time, though, as most developing countries — whether they had improved, unchanged, or impaired macroeconomic fundamentals — found themselves the destination of capital from global financial centers. The single factor encouraging those flows was the sustained decline in interest rates in the industrial world.[2] For example, short-term interest rates in the United States declined steadily in the early 1990s and by late 1992 were a their lowest level since the early 1960s. Lower interest rates in developed nations attracted investors to the high yields offered by economies in Asia and Latin America. Given the high external debt burden of many of these countries, low world interest rates also appeared to improve their credit-worthiness and to reduce their default risk. Those improvements were reflected in a marked rise in secondary market prices of bank claims on most of the heavily indebted countries and pronounced gains in equity values. Thus, the tightening of monetary policy in the United States and the resulting rise in interest rates made investment in Asia and Latin America relatively less attractive, triggering market corrections in several emerging stock markets and a decline in the prices of emerging market debt.

This experience strongly suggests multiple forms of investor myopia: The initial decision to invest seemed more motivated by reaching for yield without an appropriate appreciation of risk, and the sudden withdrawal similarly looked more like a quick dash for the exit door than a reasoned assessment of fundamentals. Looking back, one is struck by an overwhelming sense of "déjà vu." It certainly seems a mystery why these wide swings in capital flows recur, in spite of the major costs associated with them. The common theme is that investors enter each episode of upsurge in capital flows confident in the belief that "this time it is different" and look to international financial institutions to make them whole when they later learn that it really wasn't different.

Rich-to-Poor Capital Flows

To some, the mystery of cross-border flows is not these recurrent cycles unanchored from country conditions but rather the restricted volume of these flows overall. Most famously, Robert Lucas argued that it was a puzzle that more capital does not flow from rich countries to poor countries, given back-of-the envelope calculations suggesting massive differences in physical rates of return in favor of capital poor countries.[3] Lucas argued that the paucity of capital flows to poor countries must be rooted in fundamental economic forces, such as externalities in human capital formation favoring further investment in already capital rich countries. My perspective, informed by work with Kenneth Rogoff and Miguel Savastano, is quite different.[4]

Throughout history, governments have demonstrated that "serial default" is the rule, not the exception. Argentina has famously defaulted on five occasions since its birth in the 1820s. However, Argentina's record is surpassed by many countries in the New World (Brazil, Liberia, Mexico, and Uruguay, Venezuela, and Ecuador) and by almost as many in the Old World (France, Germany, Portugal, Spain, and Turkey). Rogoff, Savastano, and I argue that this history of repeated defaults makes some countries less able to bear debt. These "debt intoler-

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ant" countries typically have other indicia of governmental failures, including bouts of high inflation, variable macroeconomic policies, and a weak rule of law.

From this perspective, the key explanation to the "paradox" of why so little capital flows to poor countries may be quite simple—countries that do not repay their debts have a relatively difficult time borrowing from the rest of the world. The fact that so many poor countries are in default on their debts, that so little funds are channeled through equity, and that overall private lending rises more than proportionally with wealth, all strongly support the view that credit markets and political risk are the main reasons why we do not see more capital flows to developing countries. If credit market imperfections abate over time because of better institutions, then human capital externalities or other "new growth" elements may come to play a larger role. But as long as the odds of non-repayment are as high as 65 percent for some low-income countries, credit risk seems like a far more compelling reason for the paucity of rich-poor capital flows.

The Consequences of Capital Inflows

The experience of many emerging market economies is that attracting global investors' attention is a mixed blessing of macroeconomic imbalances and attendant financial crises. As to the imbalances, a substantial portion of the surge in capital inflows tends to be channeled into foreign exchange reserves. For instance, from 1990 to 1994, the share devoted to reserve accumulation averaged 59 percent in Asia and 35 percent in Latin America. Moreover, in most countries the capital inflows were associated with widening current account deficits.

This widening in the current account deficit usually involves both an increase in national investment and a fall in national saving. As one would expect from the fall in national saving, private consumption spending typically rises. While disaggregated data on consumption are not available for all emerging market economies, the import data are consistent with the interpretation that the consumption boom is heavily driven by rising imports of durable goods. (This held with particular force in the Latin American experience of the early 1990s.) In almost all countries, capital inflows were accompanied by rapid growth in the money supply — both in real and nominal terms — and sharp increases in stock and real estate prices. For example, during 1991, a major equity index in Argentina posted a dollar return in excess of 400 percent, while Chile and Mexico provided returns of about 100 percent.

Then comes the crisis because the surge in capital flows never proves durable. Unlike their more developed counterparts, emerging market economies routinely lose access to international capital markets. Furthermore, given the common reliance on short-term debt financing, the public and private sectors in these countries often are asked to repay their existing debts on short notice. Even with the recent large-scale rescue packages, official financing only makes up for part of this shortfall. Hence, the need for abrupt adjustment arises.

More often than not, contagion followed on the heels of the initial shock. The capacity for a swift and drastic reversal of capital flows — the so-called "sudden stop" problem — played a significant role.[5] An analysis of the experience of contagious financial crises over two centuries (with my colleagues Graciela Kaminsky and Carlos Vègh) finds typically that the announcements that set off the chain reactions came as a surprise to financial markets.[6] The distinction between anticipated and unanticipated events appears critical, because advance warning allows investors to adjust their portfolios in anticipation of the event. In all cases where there were significant immediate international repercussions, a leveraged common creditor was involved — be it commercial banks, hedge funds, mutual funds, or individual bondholders — who helped to propagate the contagion across national borders.

Additional work with Graciela Kaminsky indicates that contagion is more regional than global.[7] We find that susceptibility to contagion is highly nonlinear. A single country falling victim to a crisis is not a particularly good predictor of crisis elsewhere, be it in the same region or in another part of the globe. However, if several countries fall prey, then it is a different story. That is, the probability of a domestic crisis rises sharply if a core group of countries are already infected. Is the regional complexion of contagion attributable to trade links, as some studies have suggested, or to financial links — particularly through the role played by banks? Our results suggest that it is difficult to distinguish between the two, because most countries linked in trade are also linked in finance. In the Asian crises of 1997, Japanese banks played a similar role in propagating disturbances to that played by U.S. banks in the debt crisis of the early 1980s.

I identify the links between these episodes of currency crises and banking crises in another paper with Graciela Kaminsky.[8] In particular, problems in the banking sector typically precede a currency crisis, creating a vicious spiral in which the currency strains then deepen the banking problems. The anatomy of these episodes suggests that crises occur as the economy enters a recession, following a prolonged boom in economic activity that was fueled by credit, capital inflows, and accompanied by an overvalued currency.

The Policy Response

Given this experience of wide swings in foreign funding, it is not surprising that policymakers in many emerging market economies have come to fear large current account deficits, irrespective of how they are financed, but particularly if they are financed by short-term debt. The capital inflow slowdown or reversal could push the country into insolvency or drastically lower the productivity of its existing capital stock. These multiple concerns have produced multiple responses to capital inflows.

The policy of first recourse across countries and over time has been sterilized intervention.[9] To avoid some (or all) of the nominal exchange

rate appreciation that would have resulted from the capital inflow, monetary authorities have tended to intervene in the foreign exchange market and accumulate foreign exchange reserves. To offset some or all of the associated monetary expansion, central banks have most often opted to sell Treasury bills or central bank paper. Central banks also have tools to neutralize the effects on the money stock of their foreign exchange operations beyond offsetting domestic open market transactions. Importantly, the effect of the sale (purchase) of domestic currency can be offset by raising (lowering) reserve requirements to keep the money stock constant.[10] However, as long as domestic reserves do not pay a competitive interest rate, reserve requirements are a tax on the banking system. Changes in the tax can have real effects, including on the exchange value of the currency. Moreover, depending on the incidence of the reserve tax, domestic spending and production may change as well.

Fiscal austerity measures, particularly on the spending side, have been used to alleviate some of the pressures on the real exchange rate and to cool down overheating in the economy. Furthermore, fiscal surpluses deposited at the central bank have helped to "sterilize" the expansive monetary effects of foreign exchange purchases.

The process of trade liberalization has been accelerated in some cases, in the hope that productivity gains in the nontraded sector could dampen pressures on the real exchange rate. Moreover, reducing distortions associated with controls on trade may temporarily widen the current account deficit—effectively absorbing some of the inflows without boosting domestic demand.

Liberalization of capital outflows also has been a popular response to rising capital inflows. By permitting domestic residents to hold foreign assets, the conventional wisdom holds, gross outflows would increase—thereby reducing net.

Various forms of controls on capital inflows—whether in the form of taxes, quantitative restrictions, or in the guise of "prudential measures"—have been imposed on the financial sector, usually with the aim of deterring short-term inflows.[11] (Sometimes these controls take the form of prudential measures to curb the exposure of the domestic banking sector to the vagaries of real estate prices and equity markets.) One main finding of my paper with Todd Smith, however, is that the tax rate on capital inflows must be very high in order to have much effect on the capital account balance.[12] For instance, a reduction in the capital account balance by 5 percent of GDP would require a tax rate on net interest payments on foreign-held debt on the order of 85 percent for one year or 60 percent for two years.

Allowing the nominal exchange rate to appreciate (or be revalued in cases where the exchange arrangement is less flexible) also has to be considered as part of the menu of viable policy responses, particularly as inflows become persistent. As noted in my paper with Reinhart, long-lived attempts to avoid a nominal appreciation via unsterilized foreign exchange market intervention will fuel a monetary expansion (owing to the accumulation of foreign exchange reserves), which may prove inflationary. While sterilized intervention may curtail the monetary expansion, it can become both increasingly difficult to implement and costly over time. In some cases, the authorities reached the conclusion that, if an appreciation of the real exchange rate was inevitable, it was better that it occur through a change in the nominal exchange rate than through a pick-up in domestic inflation.

Often, policymakers have resorted to some combination of these policies. A repeated lesson is that the law of unintended consequences has not been repealed. Multiple policy responses to capital inflows have tended to interact in ways that were probably not anticipated by the framers of such policies. Most likely, even the best policy mix cannot altogether avoid the eventual reversal of capital flows, given that they are so sensitive to the behavior of investors in financial centers. The appropriate policy mix may dampen the amplitude of the swings in capital flows, thus ensuring a softer landing when international investors retrench. The strongest policy lesson is that conservative fiscal policy and zealous supervision of the domestic financial sector are essential at all times, especially when expectations are buoyant.

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[2] Regression evidence on the determinants of regional capital flows is provided in C.M. Reinhart and V. R. Reinhart, "What Hurts Most: G-3 Exchange Rate or Interest Rate Volatility?" in S. Edwards and J. A. Frankel, eds. *Preventing Currency Crises in Emerging Markets,* Chicago: University of Chicago Press, 2001, pp. 73-99.

[3] R. Lucas, "Why Doesn't Capital Flow from Rich to Poor Countries," *American Economic Review*, (May 1990), pp. 92-6.

[4] C.M. Reinhart and K.S. Rogoff, "Serial Default and the 'Paradox' of Rich-to-Poor Capital Flows," NBER Working Paper No. 10296, February 2004, and *American Economic Review*, 94 (2), (May 2004), pp. 53-9, and C.M. Reinhart, K.S. Rogoff, and M. Savastano, "Debt Intolerance," NBER Working Paper No. 9908, August 2003, and *Brookings Papers on Economic Activity*, (Spring 2003), pp. 1-74.

[5] A term coined by Guillermo A. Calvo (see the discussion in G.A. Calvo and C.M. Reinhart, "When Capital Inflows Come to a Sudden Stop: Consequences and Policy Options" in P. Kenen and A. Swoboda, eds., *Reforming the International Monetary and Financial System,* Washington DC: International Monetary Fund, 2000, pp.175-201.)

[6] G.L. Kaminsky, C.M. Reinhart, and C.A. Vègh, "The Unholy Trinity of Financial Contagion," NBER Working Paper No. 10061, November 2003, and *Journal of Economic Perspectives*, 17 (4), (Fall 2003), pp. 51-74.

[7] G.L. Kaminsky and C.M. Reinhart, "The Center and the Periphery: The Globalization of Financial Shocks,"

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[8] For a fuller discussion, see G.L. Kaminksy and C.M. Reinhart, "The Twin Crises: The Causes of Banking and Balance-of-Payment Problems," *American Economic Review*, 89 (3), (June 1999), pp. 473-500.

[9] I have documented the typical policy responses in C.M. Reinhart and V.R. Reinhart, "Some Lessons for Policy Makers Who Deal with the Mixed Blessing of Capital Inflows," in M. Kahler, ed., *Capital Flows and Financial Crises*, Council on Foreign Relations Book, Ithaca, NY: Cornell University Press, 1998, pp. 93-127.

[10] This is discussed in C.M. Reinhart and V.R. Reinhart, "On the Use of Reserve Requirements in Dealing with the Capital-Flow Problem," *International Journal of Finance and Economics,* 4 (1), (January 1999), pp. 27-54.

[11] A survey of the literature on capital controls is provided in N. Magud and C.M. Reinhart, "Capital Controls: An Evaluation" in S. Edwards, ed., *International Capital Flows*, forthcoming from the University of Chicago Press.

[12] C.M. Reinhart and R.T. Smith, "Temporary Controls on Capital Inflows," NBER Working Paper No. 8422, August 2001, and *Journal of International Economics,* 57 (2), August 2002, pp. 327-51.

Prospects for Social Security Reform in the United States

Kent Smetters*

One of the most far-reaching shifts in fiscal policy around the world during the past two decades has been the fundamental restructuring of public pension systems. Over two dozen countries across five continents have converted at least part of their pay-as-you-go, defined-benefit, public pension systems into systems based on funded, defined-contribution accounts. Several additional countries are currently in the process of conversion, and even more countries, including the United States, are debating it.

The shift toward defined-contribution plans in the *private* sector has increased the mobility of workers, because traditional defined-benefit plans have a "lock-in effect" that discourages employees from switching employers. Therefore, the conversion of *public* pension plans to the defined-contribution model sometimes has been lumped together as part of this same "modernization" movement. However, that explanation is problematic, because public pension plans are typically already fairly portable across employers. With a few exceptions, the public pension benefit formula in most countries is dependent on the wages of the worker regardless of the actual employer.

In fact, the public plan conversions seem fairly puzzling at first. To be sure, many common arguments have been put forth in favor of "personal accounts" including the potential to earn higher rates of return in equities, increased national savings, as well as greater bequeath-ability. However, even if we believed that a portion of the equity premium were a "freebie" and not just a compensation for risk, higher returns could be earned by a public pension system by investing in equities, which has the added benefit of potentially improving risk sharing across generations.[1] National saving also could be increased by pre-funding the traditional pension system. The traditional pension scheme also could be complemented with a life insurance payment upon death that replicated the bequeath-ability aspect of personal accounts.

Indeed, in a deterministic setting, the traditional public defined benefit pension systems in theory could achieve the same economic objectives as personal accounts. In the presence of idiosyncratic risks, traditional defined-benefit systems more easily allow for sharing wage and longevity uncertainty.[2] Relatively larger transaction costs in defined contribution plans, as well as problems associated with financial literacy, moral hazard, and adverse selection, only seem to buttress the case for the traditional design. So why are more and more countries abandoning the traditional design for the funded, defined contribution model that, in theory, is no better than the traditional design and potentially even worse?

Adding to the puzzle is that these reforms have taken on numerous shapes and sizes across the world. While, politically, the adoption of personal accounts are often linked to demographic concerns (for example, retirement of baby boomers in the United States), the actual evidence does not seem to support this motive for personal accounts. Indeed, the *largest* reforms occurred in less developed countries where future demographic problems are projected to be the *least* severe, including Chile (1981), Columbia (1993), Peru (1993), Mexico (1997), Bolivia (1997), El Salvador (1998), and Kazakhstan (1998). In each of these countries, the vast majority of the final expected retirement benefit is

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derived from income produced by assets held in the new defined-contribution accounts. In contrast, more modest reforms occurred in countries with higher per-capita incomes where demographic problems are more severe, including Switzerland (1985), the United Kingdom (1986), Denmark (1990), Australia (1992), Argentina (1994), China (1995), Uruguay (1996), Hungary (1998), Sweden (1998), and Poland (1999). These countries have adopted systems that blend defined contribution accounts with a defined benefit. Some countries with the most serious demographic problems, including Germany and Japan, have passed only minor reforms. So, why are the largest reforms appearing in countries with the least amount of demographic problems?

One central theme appears to emerge that might help to explain these puzzles: the public pension conversions appear to represent a fundamental distrust in the ability of the government to provide secure retirement resources.[3] The exact nature of the distrust, though, differs between developing and developed countries, consistent with the differences in the magnitudes of pension reforms.

Traditional pay-as-you-go pension systems require a significant amount of trust between workers of different generations — the so-called "social contract." The median voter who supports a pay-as-you-go pension system is typically a middle-aged worker: she has no incentive to support a system that might not be viable when she is retired.

In developing countries, where reforms have been the largest, the distrust in the government provision of public pensions appears to be conditioned on past downward movements in the real value of benefits (often caused by inflation), misuse of retirement resources, and other risks and inequities in the pre-reform public pension systems. Workers in developing countries don't trust the government to run even a strict pay-as-you-go system. Funded defined-contribution accounts, therefore, give workers an independence from the government. The concomitant increase in the level of funding is not the primary objective of reform but simply a necessary byproduct of securing a safer retirement income independent of the substantial level of trust required by a pay-as-you-go financed scheme. Personal retirement accounts in these countries probably would have been created even without demographic concerns.

In contrast, in developed countries, where reforms have been smaller, previous downward benefit adjustments and inequities, while existing, have been less important. Instead, the primary objective in these countries *is* to pre-fund future benefits since many of these countries face more severe demographic problems. Partial pre-funding of future benefits avoids more drastic changes, whether benefit cuts or tax increases, down the road. However, the governments in these countries are not trusted enough to properly save or invest the required additional resources. So, in developed countries, the creation of personal accounts is a byproduct of attempts to increase funding. But the reforms are smaller because they are mainly motivated by demographics. If these countries faced no demographic pressures, the incentive to partially privatize would be greatly reduced.

The United States

According to the 2005 Social Security Trustees' Report, the U. S. Social Security system currently faces a shortfall equal to about $11.1 trillion, which is equal to the present value of all future projected benefits minus the present value of all future projected payroll taxes after subtracting the value of the trust fund.[4] This shortfall is equal to about 3.5 percent of future payroll. The shortfall in the Medicare program, including the commitments on general revenue, is about seven times larger. Absent benefit cuts, placing Social Security and Medicare on a permanently sustainable course could hypothetically be achieved by increasing payroll taxes from their current rate of 15.3 percent of wages to about 36.1 percent of wages — immediately and forever. For each 5 years in which action were delayed, the required immediate and permanent payroll tax hike increases by about 10 percent, or by about 1.5 percent of wages.

These calculations, however, unrealistically and optimistically assume that people continue to work and earn just as much as before the change in fiscal policy. New empirical evidence by Prescott (2004), though, suggests otherwise: he attributes the sizable difference in the average number of working hours per worker in the United States versus many European countries to the differences in tax rates, largely used to finance state-based retirement benefits.[5] Even using a much smaller labor supply elasticity than implied by his study, raising payroll taxes could substantially reduce household savings and output relative to controlling the growth rate of Social Security benefits.[6]

Personal accounts themselves, however, don't improve or worsen Social Security's financial outlook. Contrary to some proponents, personal accounts don't offer a "free lunch" by reducing Social Security's shortfall. At the same time, contrary to many opponents, personal accounts, when designed similarly to President Bush's recent proposal, don't add an additional burden to the Social Security system. The appearance of "transition costs" from creating personal accounts simply reflects the fact that the federal cash-flow budget system fails to account for the long-term liabilities in the nation's entitlement programs.[7] While the diversion of payroll taxes to personal accounts increases the amount of debt held by the public, the unfunded obligations in the Social Security program are reduced by an equal amount in present value. The federal budget tracks the increase in the debt but not the concomitant reduction in obligations.

The Social Security Trust Fund

Currently, the Social Security system collects more in revenue than it pays in benefits. The excess is placed into the Social Security Trust Fund. The Trustees currently project that outlays will begin to exceed revenue around 2017, at which time the Trust Fund will be tapped in order to pay

benefits. The Trust Fund is projected to become depleted around 2041, after which only about 74 percent of benefits can be paid.

Central to the debate on how to reform Social Security is whether the Social Security trust fund really represents a "store of value." To be sure, the assets in the Trust Fund are "real" in the sense that the U.S. Treasury will honor the claims made by the Social Security Administration. But the relevant question is whether Congress really uses Trust Fund surpluses to reduce the amount of debt held public, thereby increasing the government's ability to pay future benefits. Or, does Congress simply use Trust Fund surpluses to hide *additional* spending or tax reductions elsewhere in the federal budget? Congress is potentially able to mask larger non-Social Security deficits because the federal unified budget combines the Trust Fund surpluses with non-Social Security deficits even though, as a pure technicality, Social Security is officially "off budget."

If Trust Fund surpluses are partly hiding fiscal looseness elsewhere in the budget then diverting future Social Security surpluses to personal accounts might require more fiscal restraint on policymakers in the future, that is, personal accounts may be a superior "lock box." Keeping the money away from politicians, though, trades one risk for another, namely, keeping the money away from pensioners *before* they retire. Nonetheless, personal accounts would likely improve the informational content of government spending.

It is not hard to find Republican and Democrats who believe that Congress routinely "spends the Trust Fund" whenever Congress runs a unified deficit. But if Congress would have run the same "on budget" deficits (excluding Social Security) without Trust Fund surpluses then the Trust Fund surpluses were actually *saved*.

Empirically, over the passed six decades, "on budget" (non-Social Security) and "off budget" (Social Security) surpluses have been uncorrelated, which appears to suggest that Trust Fund surpluses have not been used to hide non-Social Security deficits. However, macroeconomic shocks and changes in attitudes over time toward the size of government would tend to create an upward bias (positive correlation). When controls for these factors are added to the regression model, the correlation turns negative and statistically significant even at the 2 percent level over the entire sample period.[8] In fact, the results suggest that the *entire* Trust Fund buildup since 1983 has been used to hide *additional* spending or tax reductions elsewhere in the budget. It appears that Trust Fund surpluses failed to reduce the debt held by the public!

Probably the most suggestive indication that Congress has routinely used Trust Fund surpluses to mask larger non-Social Security deficits is the evidence of a structural break when unified budget accounting was adopted in 1970. Before 1970, Trust Fund surpluses certainly existed, although they dwindled over time as Congress increased the generosity of benefits during the 1970s. But there is no evidence that Congress used Trust Fund surpluses to hide larger deficits elsewhere in the budget before 1970. The evidence only appears after the adoption of the unified budget accounting scheme.

Social Security Privatization with Second Best Taxes

It is generally believed that allowing workers to divert a portion of their pay-as-you-go payroll taxes to private accounts would require levying a new tax in order to continue to pay the Social Security benefits of those retired at the time of privatization. In other words, privatization simply substitutes one distorting tax for another, producing no efficiency gains. This conventional wisdom, though, is based on the standard life-cycle model with just two periods.

Recent research, using a multi-period life-cycle model, has shown how to privatize in a way that reduces labor supply distortions to current and future generations without hurting initial retirees — a Pareto improvement.[9] The two most common methods of privatization fail to reduce distortions, though, because, ironically, they provide "transition relief" in an effort to protect the value of previous contributions. *Partial* transition relief, however, can lead to Pareto gains.

Upon extending the life-cycle model to three or more periods, a household's accrued benefit — which is observable by the government — becomes a source for an efficient implicit lump sum tax that can be used to replace some future revenue that would have been collected from that household using a distorting labor income tax. Equivalently, this implicit wealth levy can afford participants a higher return on their future contributions, thereby reducing the effective tax rate on their labor supply. A back-of-the-envelope calculation suggests that the efficiency gains for the United States could exceed $1 trillion, although this calculation should be interpreted with some caution because it ignores the transaction and other costs associated with personal accounts.

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[1] If Social Security purchased equities with its excess contributions, risk sharing could be potentially improved across generations. See H. Bohn, "Should the Social Security Trust Fund hold Equities? An Intergenerational Welfare Analysis," *Review of Economic Dynamics*, 2 (3) (July 1999), pp. 666-97. It is possible to replicate this same effect using a capital income tax without direct government ownership. See K. Smetters, "The Equivalence of the Social Security's Trust Fund Portfolio Allocation and Capital Income Tax Policy," NBER Working Paper No. 8259, April 2001.

[2] S. Nishiyama and K. Smetters, "Does Social Security Privatization Produce Efficiency Gains?" NBER Working Paper, forthcoming.

[3] K. Smetters and C. Park, *A Matter of Trust: Understanding A Matter of Trust: Understanding Worldwide Public Pension Conversion*, in progress.

[4] The 2005 OASDI Trustees Report, Table IV, B6.

[5] E. Prescott, "Why Do Americans Work More than Europeans?" *Federal Reserve Bank of Minneapolis Quarterly Review*, 28 (1) (July 2004), pp. 2-13.

[6] L.J. Kotlikoff, K. Smetters, and J.

Walliser, "Finding a Way Out of America's Demographic Dilemma," NBER Working Paper No. 8258, April 2001.

[7] See the discussion in J. Gokhale and K. Smetters, "Measuring Social Security's Financial Problems," NBER Working Paper No. 11060, January 2005.

[8] K. Smetters, "Is the Social Security Trust Fund Worth Anything?" *American Economic Review (Papers and Proceedings*), 94 (2) (May 2004) pp. 176–81. Also see, S. Nataraj and J.B. Shoven, "Has the Unified Budget Undermined the Federal Government Trust Funds?" NBER Working Paper No. 10953, December 2004.

[9] K. Smetters, "Social Security Privatization with Elastic Labor Supply and Second-Best Taxes," NBER Working Paper No. 11101, February 2005.

Behavioral Finance

Jeremy C. Stein*

Much of my research over the last several years has been in the broad area of behavioral finance. Some of this work investigates the beliefs of less-than-fully rational investors — the valuation models they use, and the particular sources of information that they pay attention to. Another part focuses on the constraints that professional arbitrageurs face because of the agency problems inherent in delegated money management. Finally, a third strand explores the connection between investor irrationality and corporate-finance outcomes.

Simple Models

In attempting to make even the most basic kinds of forecasts, we can find ourselves inundated with a staggering amount of potentially relevant raw data. A large literature in psychology suggests that people simplify such forecasting problems by focusing their attention on a small subset of the available data. One powerful way to simplify is with the aid of a theoretical model. A parsimonious model will focus the user's attention on those pieces of information deemed to be particularly relevant for the forecast at hand; the user will disregard the rest. For example, an investor with an "honest-accounting" model of the world who examines a firm's annual report may focus on earnings per share, while ignoring much of the other material in, say, the footnotes.

Of course, even people who use very simple models are likely to give up on these models when they fare poorly — as the honest-accounting model is likely to have done in recent years — and to move on to alternatives. Motivated by this idea, Harrison Hong and I study the implications of learning in an environment where the true model of the world is multivariate, but in which agents update only over the class of simple univariate models.[1] If a particular simple model does a poor job of forecasting over a period of time, it is eventually discarded in favor of an alternative — yet equally simple — model that would have done better over the same period. This theory makes several distinctive predictions. For example, it suggests that a high-priced glamour stock has particularly low conditional expected returns, and particularly high conditional volatility, in the wake of recent bad news about fundamentals, because this high-price/bad-news configuration suggests that the potential for a "paradigm shift" among investors is elevated.

In a related vein, Philippe Aghion and I examine a setting in which a firm can devote its efforts either to increasing sales growth or to improving per-unit profit margins, for example by cutting costs.[2] If the firm's manager is concerned with the current stock price, she will tend to favor the growth strategy when the stock market is following a valuation model that pays more attention to performance on the growth dimension. Conversely, it can be rational for the stock market to weight observed growth measures more heavily when it is known that the firm is following a growth strategy. This two-way feedback between firms' business strategies and the market's valuation model can lead to purely intrinsic fluctuations in sales and output, creating excess volatility in these real variables even in the absence of any external source of shocks.

Local and Social Influences on Investment Decisions

A number of recent papers show that investors tend to have a strong local bias in their portfolio choices. This bias shows up not only as a preference for domestic as opposed to foreign stocks, but perhaps more strikingly as a preference for those domestic stocks that are headquartered close by.[3] While the existence of within-country local bias now seems to be incontrovertible, there is little evidence to date regarding its equilibrium asset-pricing implications.

Hong, Jeffrey Kubik, and I explore these asset-pricing effects.[4] We begin by constructing a variable we call RATIO which, for any given region at any point in time, is equal to the aggregate book value of all firms headquar-

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tered in the region divided by the aggregate income of all households living in the region. Intuitively, RATIO measures the supply of shares in a region relative to the potential demand for these shares, so we expect it to have a negative impact on stock prices. The data support this hypothesis. For example, if one goes from the Census region with the highest value of RATIO (the Middle Atlantic), to the region with the lowest value (the Deep South), holding all else equal, the implied increase in the stock price is on the order of 8 percent. For smaller-capitalization companies, the corresponding number is roughly 15 percent.

Digging deeper, we find that our results are intimately connected to regional variation in population density. That is, regions with low population density — of which the Deep South is an example — tend to have low values of RATIO, which are associated with higher stock prices. This is because most of the variation in RATIO across regions is driven by the book value component, which is very sensitive to population density. In other words, in spite of low per-capita income, the Deep South is associated with higher stock prices because of an "only-game- in-town" effect: any one company headquartered there faces relatively little competition for local investors' dollars, because so few *other* companies are headquartered there.

In related work, Hong, Kubik, and I examine social influences on investor behavior, at the level of both individuals and professional money managers. With respect to individuals, we hypothesize that their decision about whether to participate in the stock market is influenced by social interaction: in our model, any given "social" investor finds the market more attractive when more of his peers participate.[5] We test this theory using data from the Health and Retirement Study and find that social households — those who interact with their neighbors, or attend church — are indeed substantially more likely to invest in the market than non-social households, controlling for wealth, race, education, and risk tolerance. Moreover, consistent with a peer-effects story, the impact of sociability is stronger in states where stock-market participation rates are higher.

In the context of professional money managers, we show that a given mutual fund manager is more likely to buy (or sell) a particular stock in any quarter if other managers in the same city are buying (or selling) that same stock.[6] This pattern shows up even when the fund manager and the stock in question are located far apart, so it is distinct from anything having to do with local preference. This evidence can be interpreted in terms of an epidemic model in which investors spread information about stocks to one another by word of mouth.

Limited Arbitrage by Open-End Funds

The vast majority of professionally-managed investment vehicles (mutual funds, hedge funds, and the like) are structured on an open-end (as opposed to closed-end) basis, making it possible for their clients to liquidate shares on demand. Both theory and evidence suggest that the open-end form imposes serious constraints on arbitrageurs, since they are exposed to the risk of withdrawals if they perform poorly in the short run. This risk can make it dangerous for them to put on trades that are attractive in a long-run sense, but where convergence to fundamentals is unlikely to be either smooth or rapid.[7] For example, open-end funds are unlikely to want to bet heavily against something like the dot-com bubble of the late 1990s.

Given the obvious drawbacks, why is the open-end form so dominant? One answer, in a survival-of-the-fittest spirit, might be that open-ending is an optimal response to agency problems. If a fund is set up on a closed-end basis, dispersed investors have no recourse in the face of managerial misbehavior, and may see their entire investment slowly eaten away. In contrast, if the fund is open-end, investors can liquidate their positions at the first sign of trouble, thereby avoiding large losses attributable to mismanagement or theft.

In a recent paper, I take issue with the survival-of-the-fittest view.[8] While maintaining the premise that agency considerations play a crucial role in the decision to open-end, I show that when there is also asymmetric information about managerial quality, the end result may be a degree of open-ending that is *socially excessive*. This is because any one high-quality manger will be tempted to go open-end to signal confidence in his ability, and thereby lure assets under management away from his competitors. This business-stealing effect sets off a counterproductive race to be open-ended, with both high-quality and low-quality managers ultimately being forced to open-end in order not to lose their investors.

Owen Lamont and I present some empirical evidence which is consistent with the idea that the open-end nature of professional arbitrage firms makes it difficult for them to buck aggregate mispricings.[9] We examine some basic data on the evolution of aggregate short interest, both during the dot-com era and at other times in history. In a striking contrast to the patterns seen in the cross-section of stocks, total short interest moves in a countercyclical fashion. For example, short interest in NASDAQ stocks actually declines as the NASDAQ index approaches its peak. Moreover, this decline does not seem to reflect a substitution away from outright short-selling and towards put options: the ratio of put-to-call volume displays the same countercyclical tendency. One possible interpretation is that as stock prices rise, funds specializing in short-selling realize negative returns, experience outflows of assets under management, and thus have to cut back their positions. More generally, the evidence also suggests that short-selling does not play a particularly helpful role in stabilizing the overall stock market.

Corporate Finance

Stock-market inefficiencies like the dot-com bubble are of particular interest to economists to the extent that they influence the allocation of real resources, such as corporate investment. Malcolm Baker, Jeffrey Wurgler, and I attempt to address this

question.[10] We use a simple model to outline the conditions under which corporate investment is in fact sensitive to non-fundamental movements in stock prices. The key prediction of the model is that stock prices have a stronger impact on the investment of "equity dependent" firms — those firms that need external equity to finance marginal investments. Using an index of equity dependence based on the work of Kaplan and Zingales (KZ), we find strong support for this hypothesis.[11] In particular, firms that rank in the top quintile of the KZ index have investment that is almost three times as sensitive to stock prices as firms in the bottom quintile.

In another corporate-finance application, Baker and I try to understand how non-financial managers might be able to successfully time the market for seasoned equity offerings (SEOs) even without access to any private information or special insight about future stock returns.[12] We build a model in which increases in liquidity - such as lower bid-ask spreads, a lower price impact of trade, or higher turnover - predict lower subsequent returns in both firm-level and aggregate data. The model features a class of irrational investors, who underreact to the information contained in order flow, thereby boosting liquidity. In the presence of short-sales constraints, high liquidity is a symptom of the fact that the market is dominated by these irrational investors, and hence is overvalued. If managers do nothing more than simply follow a rule of thumb that involves issuing when the SEO market is particularly liquid — perhaps because their investment bankers find it easier to underwrite issues at such times — then their financing decisions will tend to forecast aggregate stock returns.

Baker, Joshua Coval, and I argue that a bias toward inertial behavior on the part of investors — a tendency to take the path of least resistance — can have significant consequences for corporate financial policy.[13] One implication of investor inertia is that it improves the terms for the acquiring firm in a stock-for-stock merger, since acquirer shares are placed in the hands of investors who, independent of their beliefs, do not resell these shares on the open market. In the presence of a downward-sloping demand curve, this leads to a reduction in price pressure, and hence to cheaper equity financing.

We develop a simple model to illustrate this idea, and present supporting empirical evidence. Both individual and institutional investors tend to hang on to shares granted them in mergers, with this tendency being much stronger for individuals. Consistent with the model and with this cross-sectional pattern in inertia, acquirers targeting firms with high institutional ownership experience more negative announcement effects and greater announcement volume. Moreover, the results are strongest when the overlap in target and acquirer institutional ownership is low and when the demand curve for the acquirer's shares appears to be steep. Overall, this framework may be helpful in explaining why stock-for-stock mergers are a more significant source of equity finance for many firms than SEOs: with SEOs, unlike with mergers, there is no scope for placing shares with inertial investors, so the adverse price impact associated with issuance is likely to be more pronounced.

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[1] H. Hong and J. C. Stein, "Simple Forecasts and Paradigm Shifts," NBER Working Paper No. 10013, October 2003.

[2] P. Aghion and J. C. Stein, "Growth vs. Margins: Destabilizing Consequences of Giving the Stock Market What it Wants," NBER Working Paper No. 10999, December 2004.

[3] See, for example, J. Coval and T. Moskowitz, "Home Bias at Home: Local Equity Preference in Domestic Portfolios," *Journal of Finance*, (December 1999), pp. 2045-73.

[4] H. Hong, J.D. Kubik and J. C. Stein, "The Only Game in Town: Stock-Price Consequences of Local Bias," working paper.

[5] H. Hong, J.D. Kubik, and J. C. Stein, "Social Interaction and Stock-Market Participation," NBER Working Paper No. 8358, July 2001, and *Journal of Finance*, (February 2004), pp. 137-63.

[6] H. Hong, J.D. Kubik, and J. C. Stein, "Thy Neighbor's Portfolio: Word-of-Mouth Effects in the Holdings and Trades of Money Managers," NBER Working Paper No. 9711, May 2003, and *Journal of Finance*, forthcoming.

[7] See A. Shleifer and R.W. Vishny, "The Limits of Arbitrage," *Journal of Finance*, (March 1997), pp. 35-53.

[8] J.C. Stein, "Why Are Most Funds Open End? Competition and the Limits of Arbitrage," NBER Working Paper No. 10259, January 2004, and *Quarterly Journal of Economics*, (February 2005), pp. 247-72.

[9] O.A. Lamont and J. C. Stein, "Aggregate Short Interest and Market Valuations," NBER Working Paper No. 10218, January 2004, and *American Economic Review*, (May 2004), pp. 29-32.

[10] M. Baker, J. C. Stein, and J. Wurgler, "When Does the Market Matter? Stock Prices and the Investment of Equity-Dependent Firms," NBER Working Paper No. 8750, February 2002, and *Quarterly Journal of Economics*, (August 2003), pp. 969-1005.

[11] S. Kaplan and L. Zingales, "Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints?" *Quarterly Journal of Economics*, (February 1997), pp. 169-215.

[12] M. Baker and J.C. Stein, "Market Liquidity as a Sentiment Indicator," NBER Working Paper No. 8816, February 2002, and *Journal of Financial Markets* (June 2004), pp. 271-99.

[13] M. Baker, J. Coval, and J.C. Stein, "Corporate Financing Decisions When Investors Take the Path of Least Resistance," NBER Working Paper No. 10998, December 2004.

NBER Profile: *Mark V. Pauly*

Mark V. Pauly is a Research Associate in the NBER's Program on Health Care and the Bendheim Professor in the Department of Health Care Systems at the Wharton School of the University of Pennsylvania.. Also at the Wharton School, Pauly is a Professor of Health Care Systems, Insurance and Risk Management, and Business and Public Policy; he is a Professor of Economics in the School of Arts and Sciences at the University of Pennsylvania as well. Pauly holds a Ph.D. in economics from the University of Virginia.

A former member of the Physician Payment Review Commission and an active member of the Institute of Medicine, Pauly's work on the economics of moral hazard was the first to point out how health insurance coverage may affect patients' use of medical services. His subsequent work has explored the impact of conventional insurance coverage on preventive care, on outpatient care, and on prescription drug use in managed care. He is currently studying the effect of poor health on worker productivity. In addition, he has explored the influences that determine whether insurance coverage is available and, through several cost effectiveness studies, the influence of medical care and health practices on health outcomes and cost. His interests in health policy deal with ways to reduce the number of uninsured through tax credits for public and private insurance, and appropriate design for Medicare in a budget-constrained environment.

Pauly is co-editor-in-chief of the *International Journal of Health Care Finance and Economics* and an associate editor of the *Journal of Risk and Uncertainty*. He has served on Institute of Medicine panels on public accountability for health insurers under Medicare and on improving the financing supply of vaccines. He is also a former member of the advisory committee to the Agency for Health Care Research and Quality, and most recently a member of the Medicare Technical Advisory Panel.

Pauly's major hobby is "keeping the rate of renovation of a 120-year-old house ahead of the rate of deterioration."

NBER Profile: *Carmen M. Reinhart*

Carmen M. Reinhart is a Research Associate in the NBER's Program on International Finance and Macroeconomics and a Professor of Economics at the School of Public Policy and the Economics Department of the University of Maryland. She received her Ph.D. from Columbia University in 1988.

Reinhart held positions as Vice President at the investment bank Bear Stearns and, more recently, as Deputy Director at the Research Department of the International Monetary Fund. She has written and published on a variety of topics in macroeconomics and international finance and trade including: capital flows to developing countries; capital controls; inflation stabilization; balance of payments and banking crises; and contagion. Her work has been published in leading scholarly journals, including the *American Economic Review*, the *Journal of Political Economy*, the *Quarterly Journal of Economics*, and the *Journal of Economic Perspectives* and featured in the financial press, including *The Economist*, *The Financial Times*, *The Washington Times*, and *The Wall Street Journal*. She also serves on the editorial board of the American Economic Review.

Reinhart lives in Washington, D.C. with her husband, an economist who is Director of the Division of Monetary Affairs at the Federal Reserve Board, and teenage son. Her hobbies include cooking, watching old movies, and wondering why her family ever adopted a basset hound.

NBER Profile: *Kent Smetters*

Kent Smetters is a Research Associate in the NBER's Programs on Public Economics and Aging and an associate professor at The Wharton School at the University of Pennsylvania. He received his Ph.D. in economics in 1995 from Harvard University, and then worked for the U.S. Congress from 1995-8 before coming to the University in Pennsylvania as an assistant professor. He was also the Kaiser Visiting Professor of Economics at Stanford University during the 2000-1 academic year.

Smetters was appointed Deputy Assistant Secretary for Economic Policy of the U.S. Treasury on July 3, 2001, and served in that position until August 30, 2002. He remains active in Washington, DC, and recently served as a member of the Blue Ribbon Panel on Dynamic Scoring for the Joint Committee on Taxation of the U.S. Congress. He has written extensively on Social Security reform.

Conferences

Innovation Policy and the Economy

The NBER's sixth annual conference on Innovation Policy and the Economy took place in Washington on April 19. The conference was organized by NBER Research Associates Adam B. Jaffe of Brandeis University, Joshua Lerner of Harvard University, and Scott Stern of Northwestern University. The following papers were discussed:

Dennis A. Yao, **James J. Anton**, and **Hillary J. Greene**, Harvard University, "The Policy Implications of Weak Patent Rights"

Adam Jaffe and **Josh Lerner**, "Innovation and its Discontents"

Fiona Scott Morton, NBER and Yale University, "Consumer Benefit from Use of the Internet"

Ernst Berndt, NBER and MIT, and **Adrian Gottschalk** and **Matthew W. Strobeck**, MIT, "Opportunities for Improving the Drug Development Process: Results from a Survey of Industry and the FDA"

Richard B. Freeman, NBER and Harvard University, "Does Globalization of the Scientific/Engineering Workforce Threaten U.S. Economic Leadership?"(NBER Working Paper No. 11457)

Richard Gilbert, University of California, Berkeley, "Market Structure and Innovation – What Do We Know?"

Yao, **Anton**, and **Greene** explore a range of work on the economic and policy implications of "weak" patents — patents that have a significant probability of being overturned or are relatively easy to circumvent — for innovation and disclosure incentives, antitrust policy, and organizational incentives and entrepreneurial activity. Weak patents cause firms to rely more heavily on secrecy. Thus, the competitive environment is characterized by private information about the extent of the innovator's know-how. In such an environment, weak patents increase the likelihood of imitation and infringement, reduce the amount of knowledge that becomes publicly disclosed, and potentially reduce the incentives to innovate. Further, weak patent rights increase the likelihood of patent litigation over commercially valuable patents and raise the specter of anticompetitive settlements. Finally,

there are some implications for weak property rights in settings involving employee-inventors and employee misuse of confidential information. In the former case, an increase in the strength of some legal property rights such as patents is a force that reduces the employer's ability to prevent employees from leaving with valuable know-how, in part because stronger property rights increase the value of the employee's start-up option. In the latter case, an increase in legal penalties for breach has the expected effect of decreasing breach of confidentiality.

In the last two decades, the role of patents in the U.S. innovation system has changed profoundly. Two apparently mundane changes in patent law and policy have subtly but inexorably transformed the patent system into a competitive weapon to attack rivals, thereby increasing the cost and risk of innovation. **Jaffe** and **Lerner** review the changes in patent policy that have led to the current situation. Then they highlight several principles at the heart of what any reform of the patent system ought to be seeking to accomplish, as well as the limitations that reform efforts are likely to face.

Scott Morton discusses the sources of consumer surplus that are likely to exist because of the types of Internet sites being used. She also discusses the problems involved in measuring all the gains from use of the Internet. Web sites that make traditional sales generate consumer surplus through availability, variety, and convenience to the consumer. Price comparison sites allow consumers to quickly and easily gather price quotes from a variety of sellers, which results in the consumer paying a lower price. Information sites provide information which the consumer can use to pick an appropriate activity or execute a task more efficiently; often these sites save consumers time in mundane tasks such as buying tickets, checking the weather, or getting driving directions. Likewise, matching sites (such as eBay) improve transactions by hugely increasing the quality of the match compared to the local garage sale. While it's clear that the Internet increases price competition, so that consumers pay less for products, it also improves daily life by increasing the variety, quality, and availability of products and information. These gains are particularly useful to people with high transactions costs (busy, rural) and uninformed people. Of course there are existing and potential attempts by firms to hold on to their profits in the face of consumers' lowered search and transaction costs. Corporate responses include lobbying for legal protection, altering product design, restricting the information shared with consumers (obfuscation), and engaging in differential pricing.

Berndt, **Gottschalk**, and **Strobeck** focus on the interactions between the Food and Drug Administration (FDA) and the biopharmaceutical companies that perform drug R and D. To assess the current issues and the state of communication and interaction between the FDA and industry, the authors carried out a survey of industry leadership in R and D and regulatory positions, as well as senior leadership at the FDA with responsibility for drug evaluation and oversight. Based on 49 industry and 8 FDA interviews, the authors find that industry seeks additional structured and informal interactions with the FDA, especially during Phase II of development. Overall, industry places greater value on additional communication than the FDA. Furthermore, industry interviewees indicate that they are willing to pay fees during clinical development to ensure that the FDA can hire additional, well-qualified staff to assist with protocol reviews and decisionmaking.

Freeman presents four propositions showing that changes in the global job market for science and engineering (S&E) workers are eroding U.S. dominance in S&E, which diminishes the country's comparative advantage in high-tech goods and services and threatens the country's global economic leadership. First, the U.S. share of the world's S&E graduates is declining rapidly as European and Asian universities, particularly from China, have granted more S&E degrees. Second, the U.S. job market has worsened for young S&E worker and engineers relative to many other high-level occupations, which discourages U.S. students from going on in these fields, but which still attracts large immigrant flows, particularly from developing countries. Third, populous low-income countries such as China and India can compete with the United States in high-tech industries by having many S&E specialists even though those workers are a small proportion of the country's work forces. This threatens to undo the "North-South" pattern of trade in which advanced countries dominate high tech while developing countries specialize in less skilled manufacturing. Finally, diminished comparative advantage in high-tech will create a long period of adjustment for U.S. workers, of which the offshoring of IT jobs to India, growth of high-tech production in China, and multinational R and D facilities in developing countries, are harbingers.

The effect of market structure on innovation incentives has been a controversial subject in economics since Joseph Schumpeter advanced the theory that competitive markets are not necessarily the most effective organizations to promote innovation. The incentive to innovate is the difference in profits before and after innovation occurs. The concept is straightforward, yet differences in market structure, the characteristics of innovations, and the dynamics of discovery leads to seemingly endless variations in the theoretical relationship between competition and expenditures on research and development or the outputs of R and D. **Gilbert** surveys the economic theory of innovation, focusing on horizontal market structure, the distinction between product and process innovations, and the role of exclusive and non-exclusive right to innovation, and attempts to draw conclusions from the different models. Exclusive rights generally lead to greater innovation incentives in more competitive markets, while non-exclusive rights generally lead to the opposite conclusion, although there are important exceptions. Gilbert reviews the large literature on empirical studies of innovation, and argues for greater reliance on industry-specific case studies.

These papers will appear in an annual volume published by the MIT Press. Its availability will be announced in a future issue of the *Reporter*. They can also be found at "Books in Progress" on the NBER's website.

Asset Pricing with Imperfect Trading

An NBER-Universities Research Conference on "Asset Pricing with Imperfect Trading" was held in Cambridge on May 13 and 14. NBER Research Associates Darrell Duffie of Stanford Business School and Owen A. Lamont of Yale School of Management organized this program:

Lauren B. Cohen, University of Chicago; **Karl B. Diether**, Ohio State University; and **Christopher J. Malloy**, London Business School, "Supply and Demand Shifts in the Shorting Market"
Discussant: Tyler Henry, University of Washington

Ronnie Sadka, University of Washington, and **Anna Scherbina**, Harvard University, "Analyst Disagreement, Mispricing, and Liquidity"
Discussant: Adam Reed, University of North Carolina at Chapel Hill

Robert Novy-Marx, University of Chicago, "On the Excess Returns to Illiquidity"
Discussant: Robert F. Stambaugh, NBER and University of Pennsylvania

Nicolae Garleanu, University of Pennsylvania; **Lasse Heje Pedersen**, New York University; and **Allen M. Poteshman**, University of Illinois at Urbana-Champaign; "Demand-Based Option Pricing"
Discussant: Joshua D. Coval, NBER and Harvard University

Harrison Hong, Princeton University, and **Jialin Yu**, Columbia University, "Gone Fishin': Seasonality in Speculative Trading and Asset Prices"
Discussant: Kent D. Daniel, NBER and Northwestern University

Antti Petajisto, Yale University, "Why Do Demand Curves for Stocks Slope Down?"
Discussant: Arvind Krishnamurthy, Northwestern University

Sandro C. Andrade and **Mark S. Seasholes**, University of California, Berkeley, and **Charles Chang**, Cornell University, "Trading Shocks, Asset Prices, and the Limits of Arbitrage"
Discussant: Malcolm Baker, NBER and Harvard University

Andrea Frazzini, Yale University, and **Owen Lamont**, "Dumb Money: Mutual Fund Flows and the Cross-Section of Stock Returns"
Discussant: Stefan Nagel, Stanford University

Using proprietary data on stock loan fees and stock loan quantities from a large institutional investor, **Cohen**, **Diether**, and **Malloy** examine the link between the shorting market and stock prices. Using a unique identification strategy, they are able to classify shifts in the supply and demand for shorting. They find that shorting demand is an economically and statistically important predictor of future stock returns. The magnitude of this effect is large: an increase in shorting demand leads to negative abnormal returns of 2.54 percent in the following month. Further, they find that the shorting market is an important mechanism for revelation of private information into prices. Specifically, they show that their results are stronger in environments with less public information flow, and that *net* of shorting costs, trading strategies based on their identification strategy yield over 3 percent per month on average.

Sadka and **Scherbina** document a close link between mispricing and liquidity by investigating stocks with high analyst disagreement. Previous research finds that these stocks tend to be overpriced, but prices correct downward as uncertainty about earnings is resolved. The authors conjecture that one reason mispricing has persisted is that analyst disagreement coincides with high trading costs. Indeed, they show that in the cross-section the less liquid stocks tend to be more severely overpriced. Also, increases in aggregate market liquidity accelerate convergence of prices to fundamentals. As a result, returns of the initially overpriced stocks are negatively correlated with the time series of innovations in aggregate market liquidity.

Novy-Marx argues that the high expected returns observed on illiquid assets should be expected theoretically but are not actually a premium for illiquidity, *per se*. Instead, illiquidity — like size — is a proxy for *any* unobserved risk. Therefore, liquidity should have explanatory power in any asset-pricing model that is not perfectly specified: low measured liquidity will forecast high expected returns. The magnitude of the expected premium can be similar to that associated with the omitted risk factor.

Garleanu, **Pedersen**, and **Poteshman** model the demand-pressure effect on prices when options cannot be hedged perfectly. The model shows that demand pressure in one option contract increases its price by an amount proportional to the variance of the unhedgeable part of the option. Similarly, the demand pressure increases the price of any other option by an amount proportional to the covariance of their unhedgeable parts. Empirically, the authors identify aggregate positions of dealers and end users using a unique dataset, and show that demand-pressure effects help to explain well-known option-pricing puzzles. First, end users are net long index options, especially out-of-money puts, which helps to explain their apparent expensiveness and the smirk. Second, demand patterns help to explain the cross section of prices and the skews of single-stock options.

Hong and **Yu** develop and test a theory of seasonality in asset prices based on the idea that speculative trading generates a price premium. The authors hypothesize that trading of all

types, including speculative trades, declines when investors are away on vacation but only the prices of speculative assets (those with abnormally high share turnover) will drop at the same time. They test their hypothesis using data from the U.S. and Chinese stock markets. As predicted, they find that turnover in the U.S. stock market drops significantly in the summer (when investors are gone fishin') and that the prices of dot-com and liquid, high turnover stocks are lowest during the summer when compared to other stocks. In China, where investors go on vacation only during the Chinese New Year (January and February), turnover and the prices of speculative stocks bottom out during the first two months of the year. The authors rule out alternative explanations, such as seasonal variations in trading costs.

Representative agent models, including the Capital Asset Pricing Model, are not consistent with existing empirical evidence for steep demand curves for individual stocks. **Petajisto** resolves the issue by proposing that stock prices are set instead by two separate classes of investors. Individual investors price the market portfolio based on their collective risk aversion. Individual investors also delegate part of their wealth to active money managers who use that wealth to price stocks in the cross-section. In equilibrium the fee charged by active managers has to equal the before-fee alpha they earn. This produces wide pricing bounds for individual stocks and can account for several empirically observed puzzles, such as the magnitude of the S and P 500 index premium.

Andrade, **Chang**, and **Seasholes** examine the relationship between trading shocks and asset prices. They outline a simple market-clearing model in which some investors place orders that are uncorrelated with asset fundamentals. Their empirical results document pervasive price pressure at a daily, weekly, and monthly frequency. The authors sort stocks into deciles based on trading shocks. Initial distortions in the extreme deciles are over 200bp and prices take five weeks to mean-revert back to pre-shock levels. The model predicts that trading in one stock can affect prices of other stocks. Empirically, the authors find support for the model and show that the temporary price impact doubles during periods when many stocks experience similarly signed shocks. Finally, trading shocks are able to explain approximately half of observed co-movement in stock returns. These results provide insights into the limits of arbitrage and a market's ability to absorb demand shocks.

Frazzini and **Lamont** use mutual fund flows as a measure of individual investor sentiment for different stocks. They find that high sentiment predicts low future returns at long horizons. Fund flows are dumb money: by reallocating across different mutual funds, retail investors reduce their wealth in the long run. This dumb money effect is strongly positively related to the value effect. High sentiment also is associated with high corporate issuance, interpreted as companies increasing the supply of shares in response to investor demand.

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Current Account Imbalances

NBER Research Associate Richard H. Clarida of Columbia University organized an NBER Conference on "G7 Current Account Imbalances: Sustainability and Adjustment", which was held on June 1 and 2. These papers were discussed:

Richard H. Clarida, and **Manuela Goretti** and **Mark Taylor**, University of Warwick, "Are There Thresholds of Current Account Adjustment in the G7?"
Discussant: Robert E. Cumby, NBER and Georgetown University

Pierre-Olivier Gourinchas, NBER and University of California, Berkeley, and **Helene Rey,** NBER and Princeton University, "From World Banker to World Venture Capitalist: The U. S. External Adjustment and the Exorbitant Privilege"
Discussant: Jose De Gregorio, Central Bank of Chile

Philip R. Lane, Trinity College Dublin, and **Gian Maria Milesi-Ferretti**, International Monetary Fund, "A Global Perspective on External Positions"
Discussant: Richard Portes, NBER and London Business School

Hamid Faruqee and **Douglas Laxton**, International Monetary Fund; **Dirk Muir**, Norges Bank; and **Paolo Pesenti**, Federal Reserve Bank of New York, "Smooth Landing or Crash? Model-Based Scenarios of Global Current Account Rebalancing"
Discussant: Lars E.O. Svensson, NBER and Princeton University

Aart Kraay, World Bank, and **Jaume Ventura**, NBER and Universitat Pompeu Fabra, " The Dot-Com Bubble, the Bush Deficits, and the U.S. Current Account"
Discussant: Joseph Gagnon, Federal Reserve Board

Michael P. Dooley, NBER and University of California, Santa Cruz; **David Folkerts-Landau**, Deutsche Bank; and **Peter Garber**, NBER and Brown University, " Direct Investment, Rising Real Wages, and the Absorption of Excess Labor in the Periphery" (NBER Working Paper No. 10626)
Discussant: Shang-Jin Wei, NBER and IMF

Menzie D. Chinn, NBER and University of Wisconsin, and **Jeffrey A. Frankel**, NBER and Harvard University, "Will the Euro Eventually Surpass the Dollar as Leading international Reserve Currency?" (NBER Working Paper No. 11510)
Discussant: Edwin Truman, Institute for International Economics

Maurice Obstfeld, NBER and University of California, Berkeley, and **Kenneth S. Rogoff**, NBER and Harvard University, "The Unsustainable U.S. Current Account Position Revisited" (NBER Working Paper No. 10869)
Discussant: Kristin Forbes, NBER and MIT

Muge Adalet, Victoria University, Wellington, and **Barry Eichengreen**, NBER and University of California, Berkeley, "Current Account Reversals: Always a Problem?"
Discussant: Frederic S. Mishkin, NBER and Columbia University

Catherine L. Mann and **Katharina Plueck**, Institute for International Economics, " The U.S. Trade Deficit: A Disaggregated Perspective"
Discussant: Peter Kenen, Princeton University

Caroline Freund, World Bank, and **Frank Warnock**, University of Virginia, " Current Account Deficits in Industrial Countries: The Bigger They Are, The Harder They Fall?"
Discussant: Assaf Razin, NBER and Tel Aviv University

Clarida, **Goretti**, and **Taylor** find evidence of threshold behavior in current account adjustment for the G7 countries, such that the dynamics of adjustment towards equilibrium depend upon whether the current-account/ net output ratio breaches estimated, country-specific current account surplus or deficit thresholds. Both the speeds of adjustment and the size of the thresholds differ significantly across countries. In addition, there are shifts found in the means and variances of exchange rate changes, stock returns, and interest differentials that coincide with the current account adjustment regimes identified by the model.

Does the center country of the International Monetary System enjoy an "exorbitant privilege" that significantly weakens its external constraint, as has been asserted in some European quarters? Using a newly constructed dataset, **Gourinchas** and **Rey** perform a detailed analysis of the historical evolution of U.S. external assets and liabilities at market value since 1952. They find strong evidence of a sizeable excess return of gross assets over gross liabilities. Interestingly, this excess return has increased after the collapse of the Bretton Woods fixed exchange rate system. It is mainly attributable to a "return discount": within each class of assets, the total return (yields and capital gains) that the United States has to pay to foreigners is smaller than the total return the United States gets on its foreign assets. There is also evidence of a "composition effect": the United States tends to borrow short and lend long. As financial globalization accelerated its pace, the United States transformed itself from a World Banker into a World Venture Capitalist, investing greater amounts in high yield assets

such as equity and FDI. The authors use these findings to cast some light on the sustainability of the current global imbalances.

Lane and **Milesi-Ferretti** highlight the increased dispersion in net external positions in recent years, particularly among industrial countries. They provide a simple accounting framework that disentangles the factors driving the accumulation of external assets and liabilities (such as trade imbalances, investment income flows, and capital gains) for major external creditors and debtors. They also examine the factors driving the foreign asset portfolio of international investors, with a special focus on the weight of U.S. liabilities in the rest of the world's stock of external assets. Finally, they relate the empirical evidence to the current debate about the roles of portfolio balance effects and exchange rate adjustment in shaping the external adjustment process.

Faruqee, Laxton, Muir, and **Pesenti** re-examine the issues surrounding global rebalancing through the lens of a dynamic, multi-region model of the world economy. The authors first define a baseline scenario of global adjustment, based on the premise that the world macroeconomic imbalances of the early 2000s can be attributed to a combination of several related but distinct tendencies: a negative U.S. fiscal shock, a decrease in the U.S. private savings rate, an increase in the demand for U.S. assets abroad, particularly in Asia, a positive shock to productivity growth in emerging Asia, and a negative shock to productivity growth in Japan and the Euro Area. The baseline scenario projects a build-up of government debt and a decline in net foreign assets in the United States. A gradual depreciation of the exchange rate allows the U.S. current account deficit to move to a sustainable level in 10 years time. The authors then assess a few alternative scenarios relative to the baseline. A sudden portfolio reshuffling in the rest of the world results in higher real interest rates in the United States and a significant depreciation of the dollar in effective terms. The trade balance improves significantly but there is a large contractionary effect on U.S. growth. The adoption of a flexible exchange rate regime in emerging Asia can help reduce variability in both regional output and inflation variability. Other simulations consider the effects of fiscal adjustment in the United States, as well as the effects of growth-enhancing reforms in Europe and Japan.

Over the past decade the United States has experienced widening current account deficits and a steady deterioration of its net foreign asset position. During the second half of the 1990s, this deterioration was fueled by foreign investment in a booming U.S. stock market. During the first half of the 2000s, this deterioration has been fuelled by foreign purchases of rapidly increasing U.S. government debt. A somewhat surprising aspect of the current debate is that stock market movements and fiscal policy choices have been treated largely as unrelated events. Stock market movements usually are interpreted as reflecting exogenous changes in perceived or real productivity, while budget deficits usually are understood as a mainly political decision. **Kraay** and **Ventura** challenge this view and develop two alternative interpretations. Both are based on the notion that a bubble (the "dot-com" bubble) has been driving the stock market, but they differ in their assumptions about the interactions between this bubble and fiscal policy (the "Bush" deficits). The "benevolent" view holds that a change in investor sentiment led to the collapse of the dot-com bubble and the Bush deficits were a welfare-improving policy response to this event. The "cynical" view holds instead that the Bush deficits led to the collapse of the dot-com bubble as the new administration tried to appropriate rents from foreign investors. The authors discuss the implications of each of these views for the future evolution of the U.S. economy and, in particular, its net foreign asset position.

Dooley, Folkerts-Landau, and **Garber** set out the political economy behind Asian governments' participation in a revived Bretton Woods System. The overriding problem for these governments is rapidly integrating a large pool of underemployed labor into the industrial sector. The principal constraints are inefficient domestic resource and capital markets, and resistance to import penetration by labor in industrial countries. The system has evolved to overcome these constraints through export-led growth and growth of foreign direct investment. Periphery governments' objectives for the scale and composition of gross trade in goods and financial assets may dominate more conventional concerns about international capital flows.

Might the dollar eventually follow the precedent of the pound and cede its status as leading international reserve currency? To answer the question, **Chinn** and **Frankel** econometrically estimate determinants of the shares of major currencies in the reserve holdings of the world's central banks. Significant factors include: size of the home country, inflation rate (or lagged depreciation trend), exchange rate variability, and size of the relevant home financial center (as measured by the turnover in its foreign exchange market). The authors do not find that net international debt position is an important determinant. They do find that the relationship between currency shares and their determinants is non-linear, but changes are felt only with a long lag. The advent of the euro interrupts the continuity of the historical dataset. So, Chinn and Frankel estimate parameters on pre-1999 data and then use that data to forecast the EMU era. Their equation correctly predicts a (small) narrowing in the gap between the dollar and euro over the period 1999-2004. Whether the euro might rival or surpass the dollar as the world's leading international reserve currency in the future appears to depend on two things: 1) do the United Kingdom and enough other EU members join euroland so that it becomes larger than the U.S. economy, and 2) does U.S. macroeconomic policy eventually undermine confidence in the value of the dollar, in the form of inflation and depreciation? According to Chinn and Frankel, under two important scenarios – that the remaining EU members, including the United Kingdom, join EMU by 2020, or that the recent depreciation trend of the dollar persists into the future – the euro may sur-

pass the dollar as leading international reserve currency by 2022.

Obstfeld and **Rogoff** show that when one takes into account the global equilibrium ramifications of an unwinding of the U.S. current account deficit, currently running at nearly 6 percent of GDP, the potential collapse of the dollar becomes considerably larger (more than 50 percent larger) than in their previous estimates. It is true that global capital market deepening appears to have accelerated over the past decade and that this deepening may have helped the United States to allow a record-breaking string of deficits. Unfortunately, though, global capital market deepening turns out to be of only modest help in mitigating the dollar decline that almost inevitably will occur in the wake of global current account adjustment. As their earlier analysis showed, and the model of this paper reinforces, adjustments to large current account shifts depend mainly on the flexibility and global integration of goods and factor markets. Whereas the dollar's decline may be benign, as in the 1980s, Obstfeld and Rogoff argue that the current conjuncture more closely parallels the 1970s, when the Bretton Woods system collapsed. Finally, they use their model to dispel some common misconceptions about what kinds of shifts are needed to help close the U.S. current account imbalance. For example, faster growth abroad helps only if it is relatively concentrated in non-tradable goods; faster productivity growth in foreign tradable goods will actually exacerbate the U.S. adjustment problem.

Adalet and **Eichengreen** analyze the pre-1970 history of international capital flows and current account reversals, contrasting it with recent experience. They find that the incidence of reversals has been unusually great in recent years. The only prior period that matched the last three decades in terms of frequency was the 1920s and 1930s, two decades notorious for the instability of capital flows. In contrast, reversals were less common in the Bretton Woods and pre-World War I gold standard eras. The fact that reversals were relatively few, small, and undisruptive under the gold standard is striking, given the absence of impediments to capital flows and the large size of current account balances. Detailed analysis of particular cases points to the degree of market flexibility and to how reversals were managed as part of the explanation for these patterns.

There are a number of worrisome features of the U.S. current account deficit. In particular, its size and persistence, the extent to which it is financing consumption as opposed to investment, and the reliance on debt inflows raise concerns about the likelihood of a sharp adjustment. **Freund** and **Warnock** examine episodes of current account adjustment in industrial countries to assess the validity of these concerns. They find that: 1) larger deficits take longer to adjust and are associated with significantly slower income growth (relative to trend) during the current account recovery than smaller deficits; 2) neither persistent deficits nor large net foreign debt positions are accommodated by more extensive exchange rate adjustment or slower growth; 3) consumption-driven current account deficits involve significantly larger depreciations than deficits financing investment; and 4) the composition of the financing of the deficit is orthogonal to exchange rate movements and income growth during adjustment. These findings are consistent with earlier work showing that, in general, current account adjustment tends to be associated with slow income growth and a real depreciation. Overall, the results support claims that the size of the current account deficit and the extent to which it is financing consumption matter for adjustment.

Mann and **Pluck** prepare new estimates of the elasticity of U.S. trade flows using bilateral trade data for 31 countries, different measures of expenditure, and including alternative proxies for global supply-cum-variety. They examine four different categories of goods based on the Bureau of Economic Analysis's "end-use" classification system: autos, industrial supplies and materials (excluding energy), consumer goods, and capital goods. These four categories behave differently from a panel aggregated over the full commodity set. The authors find that industrial and developing countries have different income and relative price elasticities for these four product groups. The relative prices for the industrial countries have plausible parameter values. Variety is an important variable for capital goods. Whereas the authors obtain more plausible values for the trade elasticities, consistent with theoretical priors, their predictions for imports are poor compared to the benchmark model that uses U.S. GDP as the measure of expenditure. On the other hand, their new estimates do better at predicting exports than does the benchmark model that uses GDP as the measure of expenditure.

The University of Chicago Press will publish these papers and discussions in an NBER conference volume. Many of the papers also can be found at "Books in Progress" on the NBER's website.

International Seminar on Macroeconomics

The NBER's 28th Annual International Seminar on Macroeconomics (ISOM), organized by Jeffrey A. Frankel, NBER and Harvard University, and Christopher Pissarides, London School of Economics, was held on June 17-18 at the Magyar Nemzeti Bank (Central Bank of Hungary) in Budapest. Francesco Giavazzi, NBER and Bocconi University, serves as co-chair of ISOM with Frankel. The following papers were discussed at the conference:

Tito Boeri and **Pietro Garibaldi**, Bocconi University, "Shadow Sorting"
Discussants: Robert E. Hall, NBER and Stanford University, and Christopher Pissarides

Yann Algan, Universite Marne la Vallee, and **Pierre Cahuc**, Universite Paris 1, " The Roots of Low European Employment: Family Culture?"
Discussants: Tito Boeri, and Alessandra Fogli, New York University

Marianne Baxter and **Robert King**, NBER and Boston University, "Fiscal Externalities and Optimal Taxation in an Economic Community"
Discussants: Pierpaolo Benigno, NBER and New York University, and Francesco Giavazzi

Balazs Vilagi, Magyar Nemzeti Bank, " Dual Inflation and the Real Exchange Rate in New Open Economy Macroeconomics"
Discussants: Richard Clarida, NBER and Columbia University, and Refet Gurkaynak, Federal Reserve Board

Prakash Loungani, IMF, and **Assaf Razin**, NBER and Tel Aviv University, " Globalization and Disinflation: The Efficiency Channel"
Discussants: Robert King, and Philip Lane, Trinity College Dublin

Refet S. Gurkaynak, and **Justin Wolfers**, NBER and University of Pennsylvania, "Macroeconomic Derivatives: An Intitial Analysis of Market-Based Macro Forecast, Uncertainty, and Risk"
Discussants: Christopher Carroll, NBER and Johns Hopkins University, and Adam Szeidl, University of California, Berkeley

Zsolt Darvas and **Gyorgy Szapary**, Magyar Nemzeti Bank, and **Andrew K. Rose**, NBER and University of California, Berkeley, "Fiscal Divergency and Business Cycle Synchronization: Irresponsibility is Idiosyncratic"
Discussants: Roberto Rigobon, NBER and MIT, and Lucrezia Reichlin, European Central Bank

Linda S. Goldberg, Federal Reserve Bank of New York, "Trade Invoicing in the Accession Countries: Are They Suited to the Euro?"
Discussants: Charles Engel, NBER and University of Wisconsin, and Richard Portes, NBER and London Business School

In an equilibrium model of the labor market with market frictions, **Boeri and Garibaldi** investigate the border between formal employment, shadow employment, and unemployment. From the labor demand side, firms optimally create legal or shadow employment through a mechanism that is akin to tax evasion. From the labor supply side, heterogeneous workers sort across the two sectors, with high productivity workers entering the legal sector. This worker sorting is fully consistent with most empirical evidence on shadow employment. The model also sheds light on the "shadow puzzle": the increasing size of the shadow economy in OECD countries despite improvements in technologies for detecting tax and social security evasion. Shadow employment is correlated with unemployment, and is tolerated because the repression of shadow activity increases unemployment. The model implies that shadow wage gaps should be lower in depressed labor markets and that deregulation of labor markets is accompanied by a decline in the average skills of the workforce in both legal and shadow sectors. Based on microdata on two countries with a sizeable shadow economy — Italy and Brazil — Boeri and Garibaldi find empirical support for these implications of the model. They suggest that policies aimed at reducing the shadow economy are likely to increase unemployment. Yet, from the job creation standpoint, income support for unemployment may be better than shadow repression.

OECD countries experienced largely divergent employment rates over the last decades. But the bulk of the cross-national and cross-temporal heterogeneity of unemployment relies on specific demographic groups: prime-age women, younger, and older individuals. **Algan** and **Cahuc** argue that family labor supply interactions and cross-country heterogeneity in family culture are key to explaining these stylized facts. The authors provide a simple labor supply model in which heterogeneity in family preferences can account for cross-country variations in the level and the dynamics of employment rates of demographic groups. Next, they demonstrate — based on international individual surveys — that family conceptions do differ across countries and are shaped largely by national features. They also show that cross-country differences in family culture cause cross-national differences in family conception. Studying the correlation between employment rates and family conception, the authors then show that the stronger preferences for family activities in European countries may explain both their lower female employment

rate and the fall in employment rates among youth and seniors.

The Stability and Growth Pact is a continuing source of economic controversy within Europe. The Pact recognizes that individual member states experience divergent business cycle conditions that may lead them to run deficits at certain points in time. However, the pact is designed to encourage member states to adopt fiscal policies that imply zero deficits on average and to limit their deficits to 3 percent of GDP at any point in time. **Baxter** and **King** study the nature of fiscal externalities within an economic community, such as Europe, that lacks explicit rules for fiscal policy coordination, assuming that each country chooses its tax rates optimally given the fiscal stance of other countries. Allowing for real shifts to country productivity and public expenditure, the authors find that the fiscal deficit can be a poor indicator of fiscal externalities: countries with different labor and consumption tax rates can exert exactly the same external effect but have very different fiscal deficit behavior. Trade deficits are, by contrast, much more informative about the effects that an individual country has on other members of the community.

Vilagi studies how the models of the new open economy macroeconomics, which usually focus on the relationship between the nominal exchange rate and the external real exchange rate, can explain the coexistence of permanent dual inflation: diverging inflation rates for tradable and non-tradable goods and real appreciation in emerging market economies. He shows that the impact of asymmetric sectoral productivity growth on the real exchange rate depends heavily on the market structure, and that the models of new open economy macroeconomics can be reconciled with the Balassa-Samuelson effect only if pricing to market is added to models. He also demonstrates that the presence of nominal rigidities and frictions in capital accumulation help to explain the appreciation of the external real exchange rate and the slow adjustment of the relative price of non-tradables to tradables.

Razin and **Loungani** analyze how globalization induces monetary authorities, guided by the welfare criterion of a representative household, to put greater emphasis on reducing the inflation rate than on narrowing output gaps. The authors demonstrate that, with capital account liberalization, the representative household is able to smooth fluctuations in consumption, and thus becomes relatively insensitive to fluctuations in the output gap. With trade liberalization the economy tends to specialize in the production of relatively few varieties of goods. The specialization in production resulting from trade openness increases the distortion associated with fluctuations in the inflation rate. Therefore, when trade and financial openness increase, policymakers (guided by efficiency considerations) become more aggressive about inflation and less responsive to the output gap. The authors provide evidence on the effect of trade and capital openness on preferences towards fluctuations in the output gap and in inflation, which support their theory's predictions.

In September 2002, a new market in "Economic Derivatives" was launched allowing traders to take positions on future values of several macroeconomic data releases. **Gurkaynak** and **Wolfers** provide an initial analysis of the prices of these options. They find that expectations derived from these market prices are somewhat more accurate than survey-based forecasts, and that they better predict financial market responses to surprises in data. These derivatives also provide market-implied probabilities of the full range of specific outcomes, allowing the authors to measure uncertainty, assess its driving forces, and to compare this measure of uncertainty with the dispersion of point-estimates among individual forecasters (a measure of disagreement). The authors also assess the accuracy of market-generated probability density forecasts. One consistent theme is that few of the behavioral anomalies present in surveys of professional forecasts survive in equilibrium, and that these markets are remarkably well calibrated. Finally, the authors assess the role of risk, finding little evidence that risk aversion drives a wedge between market prices and probabilities.

Using a panel of 21 OECD countries and 40 years of annual data, **Darvas, Rose,** and **Szapary** find that countries with similar government budget positions tend to have business cycles that fluctuate more closely. That is, fiscal convergence (in the form of persistently similar ratios of government surplus/deficit to GDP) is systematically associated with more synchronized business cycles. The authors also find that reduced fiscal deficits increase business cycle synchronization. The Maastricht "convergence criteria," used to determine eligibility for EMU, encouraged fiscal convergence and deficit reduction. Thus the crieria may have indirectly moved Europe closer to an optimum currency area, by reducing countries' abilities to create idiosyncratic fiscal shocks. These empirical results are economically and statistically significant and robust.

The accession countries to the euro area increasingly are binding their economic activity — external and internal — to the euro area countries. One direction of this phenomenon concerns the currency invoicing of international trade transactions, by which accession countries have reduced their use of the U.S. dollar in invoicing international trade transactions. Theory predicts that the optimal invoicing choices for accession countries depend on the composition of goods in exports and imports and on the macroeconomic fluctuations of trade partners, both bearing on the role of herding and hedging considerations within exporter profitability. These considerations yield country-specific estimates about the optimal degree of Euro-denominated invoicing of exports. **Goldberg** finds that the exporters of some accession countries, even in their trade transactions with the euro zone and other European Union countries, might be pricing a larger-than-optimal share of their transactions in euros rather than in dollars, thus taking on excessive risk in international markets.

The MIT Press will publish these papers in an annual conference volume later this year. They are also available at "Books in Progress" on the NBER's website.

East Asian Seminar on Economics Focuses on Fiscal Policy and Management

The NBER's Sixteenth Annual East Asian Seminar on Economics (EASE), sponsored jointly with Hong Kong University of Science and Technology (HKU), Philippine Institute for Development Studies (PIDS), China Center for Economic Research (CCER), Singapore Management University (SMU), Korea Development Institute (KDI), Tokyo Center for Economic Research (TCER), Chung-Hua Institution for Economic Research (CIER), and the Australian Productivity Commission, took place in Manila, Philippines, on June 23-25. The organizers were NBER Research Associates Takatoshi Ito, of Tokyo University, and Andrew K. Rose, of University of California, Berkeley. The theme of the meeting was fiscal policy and management. The following papers were discussed:

Roger Gordon, NBER and University of California, San Diego, and **Wei Li,** University of Virginia, "Financial, Taxation, and Regulatory Structures in Developing Countries"
Discussants: Francis Lui and Ponciano Intal

Roberto Mariano and **Delano Villanueva,** SMU, "Sustainable External Debt Levels: Estimates for Selected Asian Countries"
Discussants: Francis Lui and Rosario Manasan

Seok-Kyun Hur, KDI, "Measuring the Effectiveness of Fiscal Policy in Korea"
Discussants: Wei LI and Yum-Keung Kwan

Raj Chetty, NBER and University of California, Berkeley, and **Adam Looney**, Federal Reserve Board, "Social Insurance in Developing Economies"
Discussants: Roger Gordon and Mario Lamberte

Chih-Chin Ho, National Taiwan University, and **Brian Erard**, B. Erard & Associates, "Estate and Gift Taxation in Taiwan: An Analysis of the Current System and Some Proposals for Reform"
Discussants: Takatoshi Ito and Felipe Medalla

Wilson Au-Yeung, Jason McDonald, and **Amanda Sayegh,** Australian Treasury, "Australian Government Balance Sheet Management"
Discussants: Youngsun Koh and Eli Remolona

Yum-Keung Kwan, City University of Hong Kong, "The Direct Substitution between Government and Private Consumption in East Asia"
Discussants: Kiyoshi Mitsui and Mario Lamberte

Xin-Qiao Ping and **Jie Bie,** CCER, "Fiscal Decentralization and Local Public Good Provision in China"
Discussants: Takero Doi and Cielito Habito

Gilberto Llanto, PIDS, "Dealing with Contingent Liabilities: The Philippines"
Discussants: Jason McDonald and Shigeki Kunieda

Tadashi Fukui, Kyoto Sangyo University, and **Yasushi Iwamoto,** University of Tokyo, "Policy Options for Financing the Future Medical and Long-Term Care Costs in Japan"
Discussants: Epictetus Patalinghug and Raj Chetty

Young-Sun Koh, KDI, "Reforming the Fiscal Management System in Korea"
Discussants: Gilberto Llanto and Chong Hyun Nam

Takero Doi, Keio University; **Toshihiro Ihori,** University of Tokyo, and **Kiyoshi Mitsui**, Gakushuin University, "Sustainability, Debt Management, and Public Debt Policy in Japan"
Discussants: Eli Remolona and Michael Alba

Laurence J. Kotlikoff, NBER and Boston University, and **Hans Fehr** and **Sabine Jokisch,** University of Wurtzberg, "Japan's Coming Generational Storm"
Discussants: Yasushi Iwamoto and Dante Canlas

Young Jun Chun, University of Incheon, "Population Aging, Fiscal Policies, and National Saving: Prediction for Korean Economy"
Discussants: Laurence J. Kotlikoff and Shigeki Kunieda

Observed economic policies in developing countries differ sharply from those in developed countries and from those forecast by existing models of optimal policies. For example, developing countries rely little on broad-based taxes, and make substantial use of tariffs and seignorage as nontax sources of revenue. **Gordon** and **Li** contrast the implications of two models designed to explain such anomalous policies. One approach, on which they published in 2005, focuses on the greater difficulties faced in poor countries in monitoring taxable activity, and explores the best available policies given such difficulties. The other, building on Grossman-Helpman (1994), presumes that political-economy problems in developing countries are worse, leading to worse policy choices. In this paper, they compare the contrasting theoretical implications of the two models with the data, and find that the

political-economy approach does poorly in reconciling many aspects of the data with the theory. In contrast, the forecasts from their model are consistent with the data currently available.

High ratios of external debt to GDP in selected Asian countries have contributed to the initiation, propagation, and severity of the financial and economic crises in recent years, reflecting runaway fiscal deficits and excessive foreign borrowing by the private sector. Applying the formal framework proposed by Villanueva (2003) to a selected group of Asian countries, **Mariano** and **Villanueva** estimate the external debt thresholds beyond which further debt accumulation will have negative effects on growth and will become unsustainable. Their framework extends the standard neoclassical growth model that incorporates global capital markets. "Sustainability" is measured in terms of the steady-state ratio of the stock of external debt-to-GDP, as functions of real world interest rates, risk spreads and their responsiveness to external debt burdens and market perceptions of country risk, marginal propensities to save out of national disposable income and foreign borrowing, rates of technical change, and parameters of the production function. The major policy implications are that in the long run, fiscal consolidation and the promotion of private saving are critical, and that reliance on foreign saving in a globalized financial world has limits, particularly when the risk spreads are positively correlated with rising external debt levels.

Using VAR models, **Hur** estimates a trajectory of GDP induced by variations in fiscal expenditure and taxation policy. By assigning different combinations of identifying restrictions on the disturbances and measuring the corresponding fiscal multipliers, he compares the robustness of the estimated values of fiscal multipliers with respect to the restrictions. His empirical analysis of Korean data (from 1979 to 2000) reveals that the size and the significance of the estimated fiscal multipliers in Korea are very small, or that they are decaying very fast.

Chetty and **Looney** assess the potential welfare gain from introducing social safety nets in developing economies. Using panel surveys of households in Indonesia and the United States, they find that food consumption falls by approximately 10 percent when individuals become unemployed in both countries. This finding is surprising given that the United States has an extensive social safety net while Indonesia has virtually none. Prior studies have interpreted such results as evidence that social insurance is of limited value in developing economies. The authors show that this conclusion is incorrect if the consumption path is smooth, because individuals are highly risk averse. Exploratory tests suggest that Indonesian households are indeed quite risk averse because of subsistence constraints. Therefore, social safety nets may be valuable in low-income economies despite the smoothness of consumption.

The taxation of property left to one's heirs is among the oldest forms of taxation, dating back at least to the time of Ancient Egypt. In Taiwan, as in various other countries, this practice continues today, with citizens and foreign residents both subject to estate and gift taxation. However, there is concern that the current estate and gift tax structure in Taiwan may be contributing to resource distortions and capital flight as a result of efforts by wealthy citizens and residents to avoid taxation. In this paper, **Ho** and **Erard** summarize the current structure of estate and gift taxation in Taiwan, review operational statistics on tax payments, and explore the implications of some alternative proposals for short-run reform. They also briefly discuss the scope for longer-term reform involving the integration of the estate and gift tax systems.

Since almost eliminating net debt, the Australian government's attention has turned to the financing of broader balance sheet liabilities, such as public sector superannuation. Australia will be developing a significant financial asset portfolio in the "Future Fund" to smooth the financing of expenses through time. This raises the significant policy question of how best to manage the government balance sheet to reduce risk. **Au-Yeung, McDonald,** and **Sayegh** provide a framework for optimal balance sheet management. Their major conclusions are that: 1) fiscal sustainability depends on both the expected path of future taxation and the risks around that path; 2) optimal balance sheet management requires knowledge of how risks affect the balance sheet (and therefore volatility in tax rates); and 3) the government's financial investment strategy should reduce the risk to government finances from macroeconomic shocks that permanently affect the budget. Based on this framework, the authors find that a Future Fund portfolio that included (among other potential investments) domestic nominal securities and equities of selected countries would reduce overall balance sheet risk.

Kwan investigates the extent of direct substitution between government and private consumption in nine East Asian countries. His regression uncovers a significantly positive elasticity of substitution between government and private consumption, implying that government and private consumption on average are substitutes in East Asia. A country-by-country analysis, however, reveals diversity in the substitutability estimates. The four North East countries — China, Hong Kong, Japan, and Korea – tend to share similar and small values of the substitution elasticity. For the five ASEAN countries studied here, the relationship between private and government consumption vary substantially, both in the sign and the magnitude of the elasticity of substitution. Private and government consumption in Malaysia and Thailand are strong substitutes, but they are complements in Indonesia and Singapore. The Philippines is in between, with a near-zero elasticity of substitution.

Fiscal incentives are closely related to extra-budgetary revenues. Using their definition, **Ping** and **Bei** explore the effects of "fiscal incentives" under decentralization on the responsiveness of public good provision to real local needs. China could have some special problems with fiscal decentralization: first, with a huge amount of extra-budgetary revenue, the size of local government could expand, resulting in

a heavier burden on local citizens and peasants. Second, there may be decreasing returns to scale in local extra-budgetary expenditures. Third, "urbanization" (measured as the ratio of rural population to the total population) is negatively correlated with local extra-budgetary expenditures on urban maintenance. In China, the process of industrialization and urban construction are not consistent.

Llanto draws the attention of policymakers and legislators to the fiscal risk brought by the contingent liabilities arising from explicit or implicit government guarantees. He discusses the current attempt of the Philippine government to address this outstanding issue. His paper uses the experience of providing guarantees to infrastructure projects, which have given rise to large amounts of contingent liabilities, to illustrate the fiscal risk faced by the government. Drawing from existing literature (Lewis and Mody 1997, Mody and Patro 1996, Irwin and others 1997, Mody 2000), Llanto shows how the Philippine government may organize a management framework for contingent liabilities. He concludes by pointing out the need for the government to develop credible regulatory and competition policy frameworks to minimize the demand for guarantees in the future.

To analyze the sustainability of a social security system, it is necessary to make long-term forecasts of the economy and the population for 50 years or longer. However, it is not possible to predict such a long term because of uncertainty over future circumstances. **Fukui** and **Iwamoto** discuss this and consider possible improvements for government forecasts and some ideas for social security reforms. They assume that all present factors except population structure will be sustained in the future. They project the labor force, economic growth, health care expenditures, and long-term care costs mechanically, rather than constructing a sophisticated model for forecasting. Their estimates of health care expenditures and the long-term care service costs are roughly consistent with those estimated by others, and are a bit less than the projection made by the Ministry of Health, Labor and Welfare (MHLW). The MHLW forecast overstates the future increase in social security costs somewhat, although even the authors' projections show considerable growth in costs. Then the authors conduct some policy simulations that consider how to finance future health and long-term care costs. They project these costs from FY2004 to FY2100. They show that the balanced-budget operation of health and long-term care insurance will create a large inequity of burdens among generations. Raising the premium immediately and prefunding for future rising costs will help to equate the burdens of generations. The premium would have to be raised by around 90 percent immediately.

Koh presents an overview of the development of public finance in Korea since the 1970s; analyzes its current status; explains the institutional setup and assesses the recent reform efforts; and proposes directions for change to maintain financial health and maximize the productivity of public spending. The Korean government has maintained strong fiscal discipline since the early 1980s, keeping its budget more or less in balance and its debt at low levels. There were large deficits after the economic crisis of 1997, but a return to surplus in 2000 thanks to the buoyant economy and consolidation efforts. The surplus has continued since then. However, various risk factors can adversely affect the government's finances. The aging population and the technological catch-up with advanced economies imply much slower economic growth in the decades ahead. While revenue growth slows, the demand for public expenditure is increasing rapidly. The financial sector's restructuring in the wake of economic crisis has left irretrievable debts (9 percent of 2004 GDP) in the public sector, and that burden is expected to fall mostly on taxpayers. All public pension schemes have structural problems because of the imbalance between contributions and benefits. Some of them (those for civil servants and military personnel) are already in serious trouble. Economic cooperation with North Korea will demand more and more government support in the future. Spending on social welfare programs has increased substantially after the crisis, and is set to increase further. Government expenditure as a percentage of GDP has stabilized since 2001 at around 25 percent after rising rapidly in the 1990s, but it may resume its growth and result in worsening fiscal balances when these risk factors materialize.

Doi, Ihori, and **Mitsui** analyze sustainability issues with Japan's fiscal policy and then discuss the debt management policy based on the maturity structure of government bonds. They also investigate the coordination between fiscal and monetary authorities in the direction of fiscal reconstruction. Partial default by the fiscal authority is not effective in the long run, because the gross rate of return on debt adjusts to offset changes in the size of default. Inflationary taxes levied by the central bank will not have such an offsetting effect. Thus, the emergency reform by the monetary authority may well be better than the emergency reform by the fiscal authority as a way to avoid bankruptcy. Given the present maturity structure of bonds, Japan's debt management policy should be based on the smoothing rule: as the termination date hovers within a ten-year period, it is preferable not to raise taxes or the inflation rate, or to cut expenditures, but rather to reserve fiscal resources, even if the reliance on government bonds rises temporarily. It is also necessary not to cut taxes or to increase expenditures much, but instead to reduce reliance on government bonds gradually when there are relatively few expiring bonds. Moreover, it is necessary to restrain the increasing trend of reliance on government bonds.

Kotlikoff, **Fehr**, and **Jokisch** develop a dynamic, life-cycle, general equilibrium model to study the interdependent demographic, fiscal, and economic transition path of China, Japan, the United States, and the EU. Each of these countries/regions is entering a period of rapid and significant aging that will require major fiscal adjustments. But the aging of these societies may be a cloud with a silver lining, in this case, in the form of capital deepening that will raise real wages. In a previous model that excluded China, these authors predicted that tax hikes needed to pay benefits along the

developed world's demographic transition would lead to a major capital shortage, reducing real wages per unit of human capital over time by one fifth. A reformulation of their original model to incorporate government investment suggests that this concern was overstated. With the inclusion of government investment, they find much less crowding out over the course of the century and only a 4 percent long-run decline in real wages. Adding China to the model further alters, indeed dramatically alters, the model's predictions. Even though China is aging rapidly, its saving behavior, growth rate, and fiscal policies are currently very different from those of developed countries. If successive cohorts of Chinese continue to save like current cohorts, if the Chinese government can restrain growth in expenditures, and if Chinese technology and education levels ultimately catch up with those of the West and Japan, then the model's long run looks much brighter. China eventually becomes the world's saver and, thereby, the developed world's savior with respect to its long-run supply of capital and long-run general equilibrium prospects. Indeed, rather than seeing the real wage per unit of human capital fall, the West and Japan see it rise by one fifth by 2030 and by three fifths by 2100. Even if the Chinese time preference rate gradually approaches that of the Americans, real wages in 2030 are roughly 17 percent higher in 2030 and 4 percent higher at the end of the century.

Chun evaluates the effects of population aging and fiscal policies on national saving in Korea. To predict the national savings rate for Korea over the next several decades, he uses a life-cycle model that incorporates the generational accounting approach needed to assess the distribution of fiscal burden across generations. He finds that rapid population aging and long-term budgetary imbalance will substantially lower the national savings rate in Korea. In addition, estimation results for consumption functions with respect to various kinds of wealth suggest that the annuitization of wealth because of the maturing of public pensions and the introduction of reverse annuity mortgages is likely to further decrease the savings rate in the future.

The University of Chicago Press will publish these papers in an NBER Conference Volume. Many of them are also available at "Books in Progress" on the NBER's website.

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Bernanke to Chair CEA

Former NBER Research Associate Ben S. Bernanke, who had been a member of the National Bureau's Program of Research on Monetary Economics, has been confirmed by the Senate to become Chairman of the Council of Economic Advisers. Bernanke replaces NBER Research Associate N. Gregory Mankiw, who will be returning to Harvard University.

Bernanke currently serves on the Federal Reserve System's Board of Governors. In addition, he also serves as Professor of Economics and Public Affairs at Princeton University, a position he has held for twenty years. Bernanke previously taught at Stanford University, New York University, and MIT. He earned his bachelor's degree from Harvard University and his Ph.D. from MIT.

Six of the recent Chairs of the President's Council of Economic Advisers were also NBER Research Associates prior to their nominations: Martin Feldstein, appointed by Ronald Reagan; Michael Boskin, under President George H.W. Bush; Joseph Stiglitz, President William J. Clinton; and R. Glenn Hubbard, N. Gregory Mankiw, and Harvey Rosen, President George W. Bush.

Acemoglu Receives John Bates Clark Medal

NBER Research Associate Daron Acemoglu, a professor of economics at MIT, received the American Economics Association's John Bates Clark Medal this year. The award is given every two years to the economist under the age of 40 who has made the most substantial contribution to the field of economics.

Acemoglu is a member of the NBER's Programs on Labor Studies and on Economic Fluctuations and Growth. He received the medal for his work on how a nation's political and social institutions play a key role in guiding its economic destiny.

Acemoglu received his B.A. from the University of York University in 1989 and his Ph.D. from the London School of Economics in 1992. Previous Clark medalists among NBER Research Associates were: Zvi Griliches, Daniel L. McFadden, Martin S. Feldstein, Joseph E. Stiglitz, James J. Heckman, Jerry A. Hausman, Sanford J. Grossman, Paul R. Krugman, Lawrence H. Summers, David Card, Kevin M. Murphy, Andrei Shleifer, and Steven Levitt.

NBER Researchers Lead American Economics Association

Three NBER Research Associates are the President, nominee for President-Elect, and immediate Past President, respectively, of the American Economics Association (AEA).

The AEA's Executive Committee has chosen Thomas J. Sargent as the nominee for President-Elect, to succeed Daniel L. McFadden. Sargent is a Professor of Economics at New York University and a member of the NBER's Program on Economic Fluctuations and Growth.

McFadden became AEA President in January 2005. He is a professor of economics at the University of California, Berkeley, and a member of the NBER's Program on Aging.

NBER President Martin Feldstein, a professor of economics at Harvard University, was President for 2004.

Behavioral Responses to Taxation

The NBER's Program on Public Economics met in Cambridge on April 7 to discuss "Behavioral Responses to Taxation." Program Director James M. Poterba of MIT organized the meeting. These topics were discussed:

Seth H. Giertz, Congressional Budget Office, "Recent Literature on Taxable Income Elasticities"

Craig Johnson, U.S. Treasury, "The Use of the Portfolio Allocation General Equilibrium Model to Evaluate the Economic Effects of Reform"

Susan Yang, Joint Committee on Taxation, "Dynamic Scoring with Government Debt in a Neoclassical Growth Model"

Wojciech Kopczuk, NBER and Columbia University, "Tax Bases, Tax Rates, and the Elasticity of Reported Taxable Income"
Discussant: Nada Eissa, NBER and Georgetown University

Christopher L. House, University of Michigan, and **Matthew D. Shapiro**, NBER and University of Michigan, "Temporary Investment Incentives: Theory with Evidence from Bonus Depreciation"
Discussant: Austan Goolsbee, NBER and University of Chicago

Jesse Rothstein, NBER and Princeton University, "Estimation of Tax Incidence from Variation Across the Wage Distribution: The Earned Income Tax Credit"
Discussant: Jeffrey Liebman, NBER and Harvard University

Giertz reviews the literature on taxable-income elasticity, primarily focusing on empirical studies examining the U.S. tax changes of 1981, 1986, 1990, and 1993 and the bracket creep of the late 1970s and early 1980s. He provides background on the importance of the elasticity of taxable income, both for forecasting income tax revenue and for assessing the efficiency implications of tax rate changes. He then discusses the major methodological issues, emphasizing the difference in methodologies used and the sensitivity of estimates to an array of factors, including sample selection, the tax reform under examination, and econometric techniques (or model specification). Although Giertz recognizes advances in the literature in recent years, he concludes that responses to tax rate changes are far from fully understood and that there is much to be gained from continued research on this topic.

Johnson uses a general equilibrium model with a detailed household sector that allows for portfolio choice to examine the economic effects of the recent reductions in individual tax rates on ordinary income, capital gains, and dividends, and the implications of the resulting portfolio shift for revenue estimating. His model focuses on tax distortions in household portfolio decisions and the ensuing effects on the allocation of physical capital across production sectors. Taxes distort both real and financial decisions and real and financial variables are determined simultaneously. Businesses and the government sector issue securities to meet their demand for capital. Meanwhile, households and pension funds acquire securities in a manner consistent with their risk-return preferences. The resulting portfolio choices affect market rates of return, which in turn affect the cost of capital to sectors issuing securities. Total factor supplies are fixed, and the model is closed to international capital flows. The model predicts that the combined static individual tax revenue estimate should be reduced by approximately 10 percent when accounting for the behavioral responses included. The behavioral offsets to the static revenue estimate are considerably larger when the dividend and capital gains cuts are examined in isolation from the ordinary rate cuts. For dividend taxes, the revenue offset ranged from 22 to 36 percent; for capital gains taxes, the offset ranged from 44 to 67 percent.

Neoclassical growth models predict positive growth effects throughout the entire transition path after a reduction in capital or labor tax rates when lump-sum taxes or transfers are used to balance the government budget. In contrast, debt-financed tax cuts can generate a complex set of dynamic interactions between current and expected future policy. **Yang** considers the consequences of bond-financed tax reductions that bring forth adjustments in expected future government consumption, capital tax rates, or labor tax rates. Through the resulting intertemporal distortions, current tax cuts can lower growth. Static scoring of tax revenue impacts, which assumes no feedback from taxes to national income, does not necessarily overstate the revenue loss when compared with dynamic scoring.

Tax reforms usually change both tax rates and tax bases. Using a panel of income tax returns spanning the two major U.S. tax reforms of the 1980s and a number of smaller tax law changes, **Kopczuk** finds that the elasticity of income reported on personal income tax returns depends on the available deductions. This highlights the fact that this key behavioral elasticity is not an immutable parameter but rather can be controlled to some extent by policymakers. One implication is that base broadening reduces the marginal efficiency cost of taxation. The results are very similar for all income categories, indicating that the rich are more responsive to tax rates because tax rules that apply to them are different (their tax base is narrower). The point estimates indicate that the Tax Reform Act of 1986 reduced the marginal cost of collecting a dollar of tax revenue, with roughly half of this reduction attributable to the base broadening and the other half to the tax rate reduction. The analysis in this

paper also offers a reconciliation of disparate estimates obtained by previous studies of the tax responsiveness of income.

House and **Shapiro** consider the economy's reaction to a temporary tax subsidy for investment. Because the eventual payoff from acquiring a long-lived capital good is unrelated to the date of purchase or installation, there are powerful incentives to delay or accelerate investment to take advantage of predictable intertemporal variations in cost. For such goods, the elasticity of investment demand is nearly infinite. Consequently, for a temporary tax change, the price of long-lived capital goods fully reflects the tax subsidy regardless of the elasticity of investment supply. This result is very general and relies only on an arbitrage argument. Thus, contrary to conventional wisdom, price data provide no information on the elasticity of supply. Instead, because the price of investment goods shifts by exactly the amount of the subsidy, the elasticity of investment supply can be inferred from quantity data alone. The bonus depreciation allowance passed in 2002 and increased in 2003 provides a sharp test of the theory. In the law, certain types of long-lived capital goods qualify for substantial tax subsidies while others do not. The data show that investment in capital that qualified for the subsidy was substantially higher than in capital that did not. The adjustment cost parameters implied by the data are in line with estimates from earlier studies. Market prices do not react to the subsidy, which suggests that internal adjustment costs not reflected in market prices are important for investment decisions.

Rothstein proposes a new approach to estimating the incidence of federal income taxes, using variation in exposure to tax changes across the wage distribution to provide identifying variation in the impacts of these changes on labor markets for workers of different skill levels. Focusing on the mid-1990s expansion of the Earned Income Tax Credit, Rothstein extends the approach of DiNardo, Fortin, and Lemieux (1996) to permit fully nonparametric estimation of labor supply and wage schedule changes for female workers during this period. He finds compelling evidence that the EITC expansion caused substantial increases in the labor supply of low- and mid-skill single women with children. Both the margin of increase — large changes in participation and no changes in hours conditional on participation — and its distribution across tax brackets indicate that reductions in average tax rates were far more important than changes in marginal rates. Estimates of changes in wages are much less precise, but generally indicate that wages increased slightly and insignificantly with labor supply, consistent with perfectly elastic labor demand. Rothstein finds, however, that EITC-eligible women's wages fell relative to those of similarly-skilled but ineligible women. This is not consistent with standard incidence models, but he speculates about possible explanations.

Public Economics

The NBER's Program on Public Economics met in Cambridge on April 8. Members discussed these papers:

Eric M. Engen, American Enterprise Institute, and **R. Glenn Hubbard**, NBER and Columbia University, "Federal Government Debts and Interest Rates (NBER Working Paper No. 10681)

William G. Gale and **Peter R. Orszag**, Brookings Institution, "Budget Deficits, National Savings, and Interest Rates"

John J. Wallis, NBER and University of Maryland, and **Barry R. Weingast**, Stanford University, "Equilibrium Federal Impotence: Why the States and Not the American National Government Financed Economic Development in the Antebellum Era"
Discussant: Brian Knight, NBER and Brown University

Dennis Epple and **Holger Sieg**, NBER and Carnegie Mellon University; **Richard Romano**, University of Florida; and **Sinan Sarpea**, Carnegie-Mellon University, "Profiling in Bargaining Over College Tuitions"
Discussant: Richard Zeckhauser, NBER and Harvard University

Don Fullerton, NBER and University of Texas, and **Garth Heutel**, University of Texas, "The General Equilibrium Incidence of Environmental Mandates"
Discussant: Hilary Sigman, NBER and Rutgers University

Using a standard set of data and a simple analytical framework, **Engen** and **Hubbard** reconsider and add to empirical evidence on the effect of federal government debt and interest rates. They begin by analytically deriving the effect of government debt on the real interest rate and find that an increase in government debt equivalent to one percent of GDP would increase the real interest rate by about two or three basis points. They present their own empirical analysis in two parts. First, they examine a variety of conventional reduced-form specifications linking interest rates and government debt and other variables. In particular, they estimate three types of specifications to permit comparisons among different approaches taken in previous research: the effect of an expected, or projected, measure of federal government debt on a forward-looking measure of the real interest rate; of an expected, or projected, measure of federal government debt on a current measure of the real inter-

est rate; and of a current measure of federal government debt on a current measure of the real interest rate. Most of the statistically significant estimated effects are consistent with the prediction of the simple analytical calculation. Next, the authors provide evidence from vector autoregression analysis. In general, these results are similar to those found in the reduced-form econometric analysis and are consistent with the analytical calculations. Taken together, the bulk of these empirical results suggest that an increase in federal government debt equivalent to one percent of GDP, all else equal, would be expected to increase the long-term real rate of interest by about three basis points, although one specification suggests a larger impact, while some estimates are not statistically significantly different from zero. By presenting a range of results with the same data, the authors illustrate the dependence of estimation on specification and definition differences.

Gale and **Orszag** provide new estimates of the effects of fiscal policy on national saving and interest rates. They find that between 50 and 80 percent of increases in unified deficits are consumed, which implies that deficits reduce national saving. They also find that a sustained increase in the projected unified deficit equal to 1 percent of GDP raises interest rates by 25 to 35 basis points, and a sustained increase of that magnitude in the projected primary deficit (the unified deficit excluding interest payments) raises interest rates by 44 to 67 basis points. Indeed, despite a rancorous public debate, there appears to be a surprising degree of convergence in recent estimates of the effects of fiscal policy on interest rates: results from a variety of econometric studies imply that an increase in the unified deficit of 1 percent of GDP, sustained over ten years, would raise interest rates by 30 to 60 basis points.

Why did the states and not the federal government promote economic development during the antebellum era? **Wallis** and **Weingast** argue that the impotence of the federal government stemmed from political constraints on Congress. They develop a theory of legislative choice that illuminates the problems Congress faces. First, majority rule legislatures have difficulty voting to fund large infrastructure projects with geographically concentrated benefits if the expenses are spread over all through general taxation. Second, benefit, or Lindahl, taxation affords a potential way out of this problem. Third, majority rule legislatures easily finance large packages of small projects, such as rivers and harbors or lighthouses. The final piece of the puzzle is institutional: although states could use benefit taxation, the Constitution prevents the national government from using it. Hence states but not the federal government could undertake large infrastructure investments. The authors show how actual spending from 1790 to 1860 fits the model's predictions.

Prospective college students are uncertain about whether they will be admitted to any given institution and thus typically apply to several. Part of this uncertainty is attributable to the fact that the applicant does not know how the college will "read" his or her record. Different colleges will receive different signals about the underlying skills of a student. **Epple**, **Romano**, **Sarpea**, and **Sieg** model the admission process of a single college as a bargaining game between the college and a potential student with sequential moves and asymmetric information. Their model predicts that the college makes an initial offer based on the information in the application package. If a student obtains an outside offer and reveals it to the college, then the college receives additional information incorporated in the outside offer. This information may trigger a counter-offer that improves financial aid for the applicant. The empirical analysis in this paper suggests that counter-offers typically are not correlated with any information that is available at the initial admission stage. However, counter-offers respond strongly to the information content of the outside offer received by a potential student. The empirical evidence is consistent with the notion that signaling and profiling are important aspects of the college admission process.

Regulations that restrict pollution by firms also affect decisions about use of labor and capital. Thus they affect relative factor prices, total production, and output prices. For non-revenue-raising environmental mandates, what are the general equilibrium effects on the wage, the return to capital, and relative output prices? Perhaps surprisingly, **Fullerton** and **Heutel** cannot find any existing literature that even asks that question, in any model. Their paper starts with the standard two-sector tax incidence model and modifies one sector to include pollution as a factor of production that can be a complement or substitute for labor or for capital. Then they look at four types of mandates, and determine conditions for each that place more of the burden on labor or on capital. Stricter regulation does not always place less burden on the factor that is a better substitute for pollution. Also, a restriction on the absolute amount of pollution creates scarcity rents, and thus raises the dirty sector's output price by more than a relative restriction on pollution per unit of output. In some perverse cases that the authors identify, some of those policies might *reduce* the dirty sector's output prices.

Environmental Economics

The NBER's Working Group on Environmental Economics met in Cambridge on April 8 and 9. NBER Research Associate Don Fullerton, University of Texas, Austin, organized this program:

David Popp, NBER and Syracuse University, "Exploring Links Between Innovation and Diffusion: Adoption of NO*x* Control Technologies at U.S. Coal-Fired Power Plants"
Discussant: Wayne Gray, NBER and Clark University

William A. Brock and **M. Scott Taylor**, NBER and University of Wisconsin, "The Green Solow Model" (NBER Working Paper No. 10557)
Discussant: William Nordhaus, NBER and Yale University

Akie Takeuchi, **Maureen Cropper,** and **Antonio Bento**, University of Maryland, "The Welfare Effects of Urban Land Use Policies on Slum Dwellers: The Case of Mumbai"
Discussant: Patrick Bayer, NBER and Yale University

Jay P. Shimshack, Tufts University; **Michael B. Ward**, University of California, Santa Barbara; and **Timothy K.M. Beatty**, University of British Columbia, "Are Mercury Advisories Effective? Information, Education, and Fish Consumption"
Discussant: Anna Alberini, University of Maryland

Denise L. Mauzerall, **Babar Sultan**, **Namsoug Kim**, and **David F. Bradford**, Princeton University, "Charging NO*x* Emitters for Health Damages: An Exploratory Analysis"
Discussant: William Pizer, Resources for the Future

While many studies have looked separately at innovation and adoption of technologies, the two processes are linked. Advances (and expected advances) in a single technology should affect both its adoption rate and the adoption of alternative technologies. Moreover, advances made abroad may affect adoption differently from improvements developed domestically. **Popp** combines plant-level data on U.S. coal-fired electric power plants with patent data pertaining to NO*x* pollution control techniques to study these links. He shows that technological advances, particularly those made abroad, are important for the adoption of newer post-combustion treatment technologies, but have little effect on the adoption of older combustion modification techniques. Moreover, Popp provides evidence that adaptive R and D by U.S. firms is necessary before foreign innovations are adopted in the United States Expectations of future technological advances delay adoption. Nonetheless, as in other studies of environmental technologies, the effect of other explanatory variables is dominated by the effect of environmental regulations, demonstrating that the mere presence of environmental technologies is not enough to encourage its usage.

Brock and **Taylor** demonstrate that a key empirical finding in environmental economics, The Environmental Kuznets Curve (EKC), and the core model of modern macroeconomics, the Solow Model, are intimately related. Once the authors amend the Solow model to incorporate technological progress in abatement, the EKC is a necessary by-product of convergence to a sustainable growth path. The amended model — which they dub the "Green Solow" — generates an EKC relationship between the flow of pollution emissions and income per capita, and the stock of environmental quality and income per capita. The resulting EKC may be hump shaped or strictly declining. The authors explain why current methods for estimating an EKC are likely to fail whenever they do not account for cross-country heterogeneity in either initial conditions or deep parameters. Then they develop an alternative empirical method, closely related to tests of income convergence used in the macro literature, and investigate preliminary tests of the model's predictions using data from OECD countries.

A key issue in slum upgrading is whether residents are made better off by improving housing in situ, or by being relocated. The answer to this question depends on the tradeoffs people are willing to make between commuting costs, housing costs, and housing and neighborhood attributes. **Takeuchi**, **Cropper**, and **Bento** quantify these tradeoffs by estimating a model of residential location and commute mode choice using data for 5,000 households in Mumbai, India. The authors compute compensating variation for in situ improvements in housing (better roofs and piped water) and for programs that relocate slum dwellers to better housing. The short-run benefits of relocation programs (that is, benefits holding workplace location fixed) depend crucially on how much they distance workers from their jobs. The utility of relocation programs also depends on neighborhood composition, measured in terms of religion and mother tongue.

Shimshack, **Ward**, and **Beatty** examine responses to a national FDA advisory that urged at-risk individuals to limit store-bought fish consumption because of the dangers of methyl-mercury. The authors find that both education and newspaper readership are important determinants of consumption response, suggesting that information acquisition and assimilation are key factors for risk avoidance. While the advisory was effective for some groups, the authors do not find a response among the relatively large group of at-risk households that met neither the education nor the readership criteria.

Mauzerall, **Sultan**, **Kim**, and

Bradford present a proof-of-concept analysis of the measurement of the health damage of ozone (O3) produced from nitrogen oxides (NO*x* = NO + NO2) emitted by individual large point sources in the eastern United States. Using a regional atmospheric model of the eastern United States — the Comprehensive Air Quality Model with extensions (CAMx) — they quantify the variable impact that a fixed quantity of NO*x* emitted from individual sources can have on the downwind concentration of surface O3, depending on temperature and local biogenic hydrocarbon emissions. They also examine the dependence of resulting ozone-related health damage on the size of the exposed population. The investigation is relevant to the increasingly widely used "cap and trade" approach to NO*x* regulation, which presumes that shifts of emissions over time and space, holding the total fixed over the course of the summer O3 season, will have a minimal effect on the environmental outcome. By contrast, this research shows that a shift of a unit of NO*x* emissions from one place or time to another could result in large changes in resulting health effects because of ozone formation and exposure. The authors indicate how the type of modeling carried out here might be used to attach externality-correcting prices to emissions. Charging emitters fees that are commensurate with the damage caused by their NO*x* emissions would create an incentive for emitters to reduce emissions at times and in locations where they cause the largest damage.

Labor Studies

The NBER's Program on Labor Studies met in Cambridge on April 15. Program Director Richard Freeman and Research Associate Lawrence Katz, both of Harvard University, organized the meeting. These papers were discussed:

Derek Neal, NBER and University of Chicago, "Why Has Black-White Skill Convergence Stopped?" (NBER Working Paper No. 11090)

David Card, NBER and University of California, Berkeley, and **Jesse Rothstein**, NBER and Princeton University, "Racial Segregation and the Black-White Test Score Gap"

Edward P. Lazear and **Ulrike Malmendier**, NBER and Stanford University, and **Roberto A. Weber**, Carnegie Mellon University, "Sorting in Experiments"

Muriel Niederle, NBER and Stanford University, and **Lise Vesterlund**, University of Pittsburgh, "Do Women Shy Away from Competition?"

Henry S. Farber, NBER and Princeton University, "Reference Dependent Preferences and Labor Supply: The Case of New York City Taxi Drivers"

David Blanchflower, NBER and Dartmouth College, and **Andrew Oswald**, Warwick University, "The Wage Curve Reloaded"

All data sources indicate that black-white skill gaps diminished over most of the twentieth century. However, black-white skill gaps, as measured by test scores among youth and educational attainment among young adults, have remained constant or increased in absolute terms since the late 1980s. **Neal** examines the potential importance of discrimination against skilled black workers, changes in black family structures, changes in black household incomes, black-white differences in parenting norms, and education policy as factors that may contribute to the recent stability of black-white skill gaps. Without changes in public policy or the economy that facilitate investment in black children, even best case scenarios suggest that approximate black-white skill parity is not possible before 2050. Equally plausible scenarios imply that the black-white skill gap will remain quite significant throughout the twenty-first century.

Card and **Rothstein** study the effects of school and neighborhood segregation on the relative SAT scores of black students across different metropolitan areas, using large microdata samples for the 1998-2001 test cohorts. Without controlling for neighborhood segregation, they find that school segregation is negatively associated with black relative test scores, and with relative employment and education outcomes measured in the 2000 Census. In models that include both school and neighborhood segregation, though, the effect of relative exposure to black schoolmates is uniformly small and statistically insignificant, while neighborhood segregation has a strong negative effect. Instrumental variables estimates that are identified by the components of school segregation associated with desegregation plans, or with the geographic features of a city, confirm this finding. However, models that include school segregation, neighborhood segregation, and measures of the relative exposure of blacks to other characteristics of their neighbors show much weaker effects of neighborhood segregation. This suggests that race per se is not the primary source of these effects; rather, it is exposure to more economically successful neighbors.

Experiments provide a controlled environment in which factors can be isolated and studied more easily than in the real world, but often they are challenged on their applicability to the real world. One major feature of experiments is that they select subjects randomly, while markets do not draw individuals randomly. Markets allow people to sort to certain activities and away from others based on their preferences, beliefs, and skills. **Lazear**,

Malmendier, and **Weber** design an experiment to demonstrate the importance of sorting in the context of social preferences. When individuals are constrained to play a dictator game, nearly two thirds of the subjects share. But when the same subjects are allowed to avoid the situation altogether, less than one third tend to share. This dramatic reversal of proportions demonstrates the importance of accounting for sorting when applying experimental results to the real world. The authors also show that institutions designed to entice pro-social behavior actually may induce adverse selection. Increasing the total surplus available for sharing first induces those individuals who are least willing to share to sort back into the dictator game. Thus the impact of social preferences remains much lower when sorting is possible than in a mandatory dictator game, even if sharing is subsidized by higher payoffs.

Competitive high-ranking positions still are occupied largely by men, and women in academia remain scarce in engineering and sciences. Suggested explanations for this fact focus mostly on discrimination and differences in abilities or preferences (in terms of work hours or field of study). **Niederle** and **Vesterlund** explore an additional factor, namely that women and men may differ in their selection into competitive environments. In a laboratory experiment, the authors examine an environment in which women and men perform equally well under both a noncompetitive piece rate and a competitive tournament scheme. Participants then are asked to choose the incentive scheme for their next performance. The authors find that twice as many men as women choose the tournament over the piece rate. This gender gap in tournament entry cannot be explained by performance before or after the entry decision has been made. While men are more optimistic about their relative performance than women, this difference can only explain a small share of the gender gap in tournament entry. Finally, the authors show that gender differences exist even when participants simply decide how to be paid for a past performance. They use this decision as a control for non-tournament specific gender differences (such as risk aversion, feedback aversion, general overconfidence), and find a large residual gender effect when participants select tournament compensation for a future performance.

Recent theoretical work has focused on the importance of reference-dependent preferences. Typically, this work assumes a discontinuity in marginal utility at some base reference level. Marginal utility below this kink in the utility function is higher than marginal utility above the kink. **Farber** develops an empirical model of daily labor supply that incorporates reference-dependent preferences, and applies it to data on the daily labor supply of New York City taxi drivers. His estimates suggest that there may be a reference level of income on a given day that affects labor supply. However, the reference level varies substantially from day to day for a given driver. This seriously limits the predictive power of the reference point model and undermines the usefulness of the construct of the reference income level as a determinant of labor supply.

Blanchflower and **Oswald** provide evidence for the existence of a wage curve — a microeconometric association between the level of pay and the local unemployment rate — in modern U.S. data. Consistent with recent evidence from more than 40 other countries, the wage curve in the United States has a long-run elasticity of approximately –0.1. In line with the paper's theoretical framework: wages are higher in states with more generous unemployment benefits; the perceived probability of job-finding is lower in states with higher unemployment; and employees are less happy in states that have higher unemployment. The authors conclude that it is reasonable to view the wage curve as an empirical law of economics.

Education Program

The NBER's Program on Education met in Cambridge on April 22. Program Director Caroline M. Hoxby of Harvard University organized the meeting. These papers were discussed:

Sarah J. Reber, University of California, Los Angeles, "Desegregation and Educational Attainment for Blacks: Evidence from Louisiana"

Dan A. Black, Syracuse University, and **Jeffrey A. Smith**, NBER and University of Maryland, "Estimating the Returns to College Quality with Multiple Proxies for Quality"

Nazmul Chaudhury, Jeffrey Hammer, and **F. Halsey Rogers,** World Bank; **Michael Kremer**, NBER and Harvard University; and **Karthik Muralidharan**, Harvard University, "Missing in Action: Teacher and Health Worker Absence in Developing Countries"

Jordan D. Matsudaira, University of Michigan, "Sinking or Swimming? Evaluating the Impact of English Immersion versus Bilingual Education on Student Achievement"

Ofer Malamud, University of Chicago, and **Christian Pop-Eleches**, Columbia University, "The Effect of Vocational Training on Labor Market Outcomes: Evidence from an Educational Reform in Romania"

Brian A. Jacob, NBER and Harvard University, and **Lars Lefgren**, Brigham Young University, "What Do Parents Value in Education? An Empirical Investigation of Parents' Revealed Preferences for Teachers"

The desegregation of Southern schools following the Supreme Court's 1954 *Brown* decision was one of the more important innovations in U.S. education policy in the twentieth century. **Reber** assesses the effects of desegregation of Louisiana schools on its intended beneficiaries, black students. Substantial reductions in segregation between 1965 and 1970 were accompanied by large increases in per-pupil funding in Louisiana, allowing districts to "level up" school spending in integrated schools to that previously experienced only in the white schools. Pre-existing black-white spending gaps were largest in districts with higher shares of initial black enrollment, so blacks in those districts experienced larger increases in funding than their counterparts in lower black enrollment-share districts. However, blacks in high black enrollment-share districts experienced smaller increases in exposure to whites (who were higher-income). A single standard deviation increase in initial black enrollment share was associated with an additional increase in per-pupil funding of $290 (2003 dollars) but a 14 percentage point smaller increase in exposure to whites. Blacks in high black enrollment-share districts also experienced larger improvements in educational attainment, suggesting that the increase in funding associated with desegregation was more important than the increased exposure to whites. A single standard deviation increase in initial black enrollment share was associated with an additional improvement in high school graduation rates of about 3.3 percentage points.

Existing studies of the effects of college quality on earnings typically rely on a single proxy variable for college quality. **Black** and **Smith** question the wisdom of this approach, given that a single proxy likely measures college quality with substantial error. They begin by considering the parameter of interest and its relation to the parameter estimated in the literature; this analysis reveals the potential for substantial bias. Then they consider three econometric approaches to the problem that involve the use of multiple proxies for college quality: combining the multiple proxies via factor analysis; using the additional proxies as instruments; and a GMM estimator derived from a structural measurement error model that generalizes the classical measurement error model. Their estimates suggest that the existing literature understates the wage effects of college quality.

Chaudhury, **Hammer**, **Kremer**, **Muralidharan**, and **Rogers** report results from surveys in which enumerators made surprise visits to primary schools and health clinics in Bangladesh, Ecuador, India, Indonesia, Peru, and Uganda and recorded whether teachers and health workers were present. Averaging across the countries, about 19 percent of teachers and 35 percent of health workers were absent. In these countries, the absent education and health providers are rarely replaced by substitutes, unlike in developed countries. When providers are absent, clients either are not served or are served by fewer providers. The authors explore a wide range of potential determinants of absence at the individual, facility, and state/country levels. Absence is not concentrated among a small number of frequently absent providers, but rather seems to be fairly widespread. Absence rates are generally higher in poorer regions; when school infrastructure is poor; and when a school hasn't been inspected recently. Higher-ranking and more powerful providers, such as headmasters and doctors, are absent more often than lower-ranking ones. The relationship between absence and contractual terms for teachers seems more complicated than often hypothesized.

In recent years, the role of bilingual education as the dominant pedagogy for teaching immigrant students has been challenged by federal and state policy reforms. Critics of bilingual education contend that bilingual

programs hinder achievement by reducing incentives to learn English and by trapping students in classrooms with low-performing peers. Proponents argue that learning occurs most rapidly when students master concepts in their native language first, and therefore that bilingual education programs promote achievement. To distinguish between these competing views, **Matsudaira** exploits quasi-random assignment of students to bilingual and mainstream (English-immersion) classes generated by discontinuous program eligibility rules in a large urban school district. In the District, eligibility for bilingual programs is determined by a test of English proficiency: students scoring below a preset threshold level are eligible for bilingual classes; students scoring above this threshold are not eligible. Using information on achievement and program participation from a large administrative dataset, Matsudaira compares students scoring just below and just above this threshold for several years following the proficiency test. Compared to students scoring just above the threshold, students scoring just below it are nearly 90 percent more likely to participate in a bilingual program and are surrounded by peers with significantly lower average achievement scores. Despite these striking differences in classroom environments, however, he finds negligible differences in achievement in both reading and math (measured by tests given in English) across these two groups of students. These results speak directly to current policy debates over the most effective method of educating immigrant children. In addition, the results inform a broader debate regarding the importance of educational peer effects, because bilingual programs involve learning in classes surrounded by a group of peers who have markedly lower average achievement scores and are more similar in ethnic background than those in mainstream English-immersion classes.

Vocational training and general education are the two predominant forms of secondary schooling around the world. Most studies that compare the effect of vocational and general education on labor market outcomes in the cross-section suffer from selection bias because less able students are more likely to enroll in vocational programs. To avoid this bias, **Malamud** and **Pop-Eleches** exploit a 1973 educational reform in Romania that shifted a large proportion of students from vocational training to general education. Using data from the 1992 Romanian Census, the authors analyze the effect of this policy in the context of a transition economy that experienced a decline in manufacturing and a reallocation of labor to new jobs. They find that cohorts affected by the policy were significantly less likely to work in manual or craft-related occupations but no less likely to be unemployed or out of the labor force than their counterparts who were not affected by the policy. Therefore, the authors conclude that the cross-sectional differences in labor market outcomes between graduates of vocational and general schools are largely a consequence of selection.

Using a unique dataset showing the number of parent requests for individual elementary school teachers and information on teacher attributes, including principal reports of teacher characteristics that are typically unobservable (to the econometrician), **Jacob** and **Lefgren** examine parents' preferences about their children's education. The authors present reduced-form estimates of the relationship between teacher characteristics and parent requests, and then develop and estimate a structural model of parent choice that provides estimates of preference and cost parameters. They find that, on average, parents strongly prefer teachers that principals describe as good at promoting student satisfaction and place relatively less value on a teacher's ability to raise standardized math or reading achievement. These aggregate effects, however, mask striking differences across family demographics. Low-income and minority families strongly value student achievement and are essentially indifferent to the principal's report of a teacher's ability to promote student satisfaction. The results are reversed for higher-income and non-minority families. Moreover, the authors find that low-income and minority families are substantially less likely to request a particular teacher. There is also some evidence that parents have preferences regarding certain teacher characteristics and even certain aspects of classroom organization. For example, parents attempt to avoid first-year teachers and mixed-grade classrooms.

Health Economics

The NBER's Program on Health Economics, directed by Michael Grossman of City University of New York, met in Cambridge on April 22. They discussed these papers:

Bjorn Lindgren, **Fredrik Andersson**, and **Kristian Bolin**, Lund University, "Breast Cancer Survival, Work, and Earnings in Sweden"

William N. Evans, NBER and University of Maryland, and **Javier Espinosa**, University of Maryland, "Marriage Protection or Marriage Selection?"

Sandra L. Decker, NBER and International Longevity Center; **Irena Dushi**, International Longevity Center; and **Partha Deb**, Hunter College, "Medicare at Age 65: Does It Level the Playing Field?"

Robert Kaestner, NBER and University of Illinois, and **Jose Guardado**, University of Illinois, "Medicare Reimbursement, Nurse Staffing, and Patient Outcomes"

Ted Joyce, NBER and Baruch College, "Changes in Abortions and Births Following Texas Parental Notification Statute: A Regression Discontinuity Approach"

Jeff DeSimone, NBER and University of South Florida, and **Edward Schumacher**, Trinity University, "Compensating Wage Differentials and AID Risks" (NBER Working Paper No. 10861)

In two recent studies, Bradley et al. (2002, 2005) examined the consequences of breast cancer for women's labor market attachment. Using cross-section data from the first wave of the U.S. Health and Retirement Study, linked to longitudinal Social Security earnings data, they first found that breast cancer survivors were less likely to be employed, but if employed worked more hours and had higher earnings and wage rates. Their 2005 paper used a longitudinal dataset created from 445 telephone interviews with women diagnosed with breast cancer 6, 12, and 18 months after diagnosis. A matched control group was created by drawing a sample from the Current Population Survey. Here Bradley and co-authors found that breast cancer survivors were less likely to work 6 months after diagnosis, as in their first study, but also that breast cancer survivors worked fewer hours, contrary to their previous result. **Andersson**, **Bolin**, and **Lindgren** theoretically analyze the individual's response to severe illness and its dependence on the institutional structure. They also replicate the estimates performed in the U.S. studies using data from Sweden, where healthcare is financed by general taxes and available to all residents, irrespective of labor market status. They find that breast cancer survivors, compared to the general female population: are less likely to be employed full-time; do not differ significantly regarding wage rates; and work fewer hours.

Researchers from a variety of fields have noted a sharp rise in mortality for widows soon after the death of their spouses. Because of assortative mating, married couples tend to share many of the same characteristics, so this result may reflect an omitted variable bias rather than a causal relationship. In the paper by **Espinosa** and **Evans** is the notion that some causes of death reveal more information about the surviving spouse than others. In the extreme, if a cause of death was assigned randomly, then these types of deaths could be used to identify the marriage protection effect. In practice, one cannot specify what causes of death are randomly assigned, but instead can identify those that are not correlated with observed characteristics. Specifically, Espinosa and Evans use data from the National Longitudinal Mortality Survey and the National Health Interview Survey Multiple Cause of Death supplement to create longitudinal datasets of married couples aged 50 to 70. They initially use this sample to identify those causes of death that are predicted by socio-economic status (income and education) and those that are not. They refer to these two types of deaths as informative and uninformative causes of death, respectively. If the heightened mortality of surviving spouses is subject to an omitted variables bias, in single-equation models, the authors should find a stronger marital protection effect for informative deaths than for uninformative causes of death. In Cox proportional hazard models, they find the death of a spouse from an uninformative cause has a smaller impact on mortality than a death from an informative cause. They also find that for husbands the death of a spouse from an uninformative cause generates a statistically significant increase in mortality.

Decker, **Dushi**, and **Deb** estimate the effect of gaining Medicare coverage at age 65 on the use of health services and on health outcomes. Using six waves of data from the Health and Retirement Study (HRS), they show that those who have been uninsured use fewer health services than others before the age of 65, but more after the age of 65. Although the availability of supplementary insurance reduces the equalizing effect of Medicare on the use of health services, a significant equalizing effect still remains. Turning 65 also discontinuously increases the probability of being diagnosed with certain medical conditions, such as diabetes.

Kaestner and **Guardado** study the effect of plausibly exogenous changes in Medicare reimbursement — caused by geographical reclassification — on hospital staffing (nurses) and patient outcomes. For patient outcomes, they focus on nurse-sensitive

measures — outcomes that are sensitive to changes in the quantity of nursing care — and in-hospital mortality. The authors use a quasi-experimental research design based on a pre- and post-test with comparison group approach. The treatment group is hospitals that are geographically reclassified, which leads to changes in Medicare reimbursement rates of about 10 percent on average. The comparison group is either hospitals in the area of reclassification (destination), or hospitals in the originating geographical area. Using these groups, the authors compare changes in outcomes surrounding the change in reimbursement. Estimates of the association between changes in Medicare reimbursement and patient outcomes are mixed. Changes in reimbursement are associated with both better and worse outcomes. Moreover, the association between changes in Medicare reimbursement and patient outcomes is not consistent with the association between changes in reimbursement and nursing resources. Increases in Medicare reimbursement are associated with a decrease in nursing resources, but increases in reimbursement are not consistently associated with an increase in adverse events, particularly associated with nursing care.

Joyce analyzes changes in abortions and births among teens in Texas after enforcement of a parental notification law in January 2000. The data are unique because they contain information on a teen's exact date of birth, which enables the author to overcome an important source of the misclassification bias. Researchers in previous studies of parental involvement laws have measured a teen's age at the time of the birth or abortion. However, three quarters of all 17-year olds who conceive as minors, and who thus are exposed to the law, give birth as 18-year olds. This latter group of teens is often included among the comparison group, which results in biased estimates of the effect of the law on fertility and even abortion. Using age at conception to define exposure, Joyce finds that abortions in Texas to 17-year olds fell conservatively 12 percent after the law. The decline in abortions was limited to white Non-Hispanics and Hispanics. There was a small increase in births, between 2 and 4 percent, among the 17-year olds exposed to the law, but that change is sensitive to the statistical specification.

DeSimone and **Schumacher** examine the effect of HIV/AIDS infection risks on the earnings of registered nurses (RNs) and other health care workers. The authors combine data on metropolitan statistical area (MSA) AIDS prevalence rates with annual 1987-2001 Current Population Survey (CPS) and quadrennial 1988-2000 National Sample Survey of Registered Nurses (SRN) data. Holding constant the wages of control groups that likely are not exposed to AIDS risks and group-specific MSA fixed effects, a 10 percent increase in the AIDS rate raises RN earnings by about 0.8 percent after 1992, when AIDS rates were falling but a more comprehensive categorization of AIDS was used by the CDC. AIDS wage differentials are much larger for RNs and non-nursing health practitioners than for other nursing and health care workers. This suggests that the differential represents compensation for job-related exposure to potentially HIV-infected blood.

Higher Education

The NBER's Working Group on Higher Education met in Cambridge on April 30. The group's Director, Charles T. Clotfelter of Duke University, organized this program:

Mark C. Long, University of Washington, "College Quality and Early Adult Outcomes"
Discussant: Peter Arcidiacono, Duke University

Bradley R. Curs, University of Missouri, and **Larry D. Singell, Jr**. and **Glen R. Waddell**, University of Oregon, "Money for Nothing? The Institutional Impact of Changes in Federal Financial Aid Policy"
Discussant: Ronald G. Ehrenberg, NBER and Cornell University

Susan Dynarski, NBER and Harvard University, "Finishing College: The Role of Schooling Costs in Degree Attainment"
Discussant: Christopher M. Cornwell, University of Georgia

Todd R. Stinebrickner, University of Western Ontario, and **Ralph Stinebrickner**, Berea College, "The Causal Effect of Studying on Academic Performance"
Discussant: Brian Jacob, NBER and Harvard University

Hideo Akabayashi and **Michio Naoi**, Keio University, "Why is there No 'Harvard' among Japanese Private Universities?"
Discussant: Michael Rothschild, NBER and Princeton University

Eric P. Bettinger, NBER and Case Western Reserve University, and **Bridget T. Long**, NBER and Harvard University, "Mass Instruction or Higher Learning? The Impact of Class Size in Higher Education"
Discussant: Steven Rivkin, NBER and Amherst College

Using panel data from the National Education Longitudinal Study, **Long** estimates the effect of college quality on a set of early adult outcomes. He compares the results using ordinary least squares (OLS) with three alternative methods of estimation. In general, he finds that college quality does have positive signifi-

cant effects on the outcomes studied, using the OLS estimates. However, there is some evidence of positive selection bias in the results. The four specifications all find evidence of positive effects of several college qualities on educational attainment, but mixed evidence for the effects on earnings. This study points to the importance of examining the educational production function as a complex process with many inputs, each of which can have its own effects on outcomes of interest.

Using new institution-level data, **Curs**, **Singell**, and **Waddell** assess the impact of changing levels of federal aid on institution-level Pell revenues. They also ask whether changes in the federal Pell Grant program correlate differently with the college access of needy students at institutions of different levels of selectivity. While it is not surprising that institutional Pell revenues are sensitive to the generosity of the Pell Grant program in general, the authors document significant and interesting asymmetries across institutional selectivity, both in terms of magnitude and in terms of which channel accounts for the measured sensitivity, Pell-award values or Pell enrollment.

Half of college students drop out before completing a degree. While there is strong evidence that financial aid can increase college *attendance,* there is little evidence that it increases degree completion or even years of completed schooling. However, it is completed schooling that is rewarded by the labor market. **Dynarski** exploits the introduction of two large state financial aid programs to estimate the impact of aid on completed schooling. She finds that the aid programs increase the share of the population that completes a college degree by 3 percentage points. The effects are strongest among women, with white, non-Hispanic women increasing degree receipt by 3.8 percentage points and the share of Hispanic and nonwhite women attempting or completing any years of college increasing by 6 and 8 percentage points, respectively. While the estimation strategy cannot separately identify the effect of aid on entry and persistence, Dynarski establishes fairly tight bounds on the persistence effect, concluding that the aid programs increase the college persistence rate by between 6 and 11 percent.

Using an Instrumental Variable (IV) approach, **Stinebrickner** and **Stinebrickner** examine the causal effect of studying on grade performance. They take advantage of new data from Berea College in the Berea Panel Study that includes information about student time-use. They find that studying has a very important causal effect on student grade performance and that the IV estimate is much larger than the Ordinary Least Squares estimate. The difference between these two estimates arises primarily because individuals react to grade shocks in a particular semester by changing their study effort in that semester. These findings sound a cautionary alarm about the use of fixed effects estimators in cases where behavioral responses to information may be present. This paper is perhaps the first to identify a specific underlying avenue through which peer effects are transmitted in educational contexts; it also provides evidence that video games can have a large causal effect on educational outcomes.

The social and academic reputation of private universities in Japan lags far behind that of the national universities. **Akabayashi** and **Naoi** argue that this arises from the heavy subsidy provided by, and the low tuition fees set by, the central government for the national universities. Using simulations based on an assignment model of heterogeneous students and universities, the authors show that the levels of national university tuition fees and subsidies influence the equilibrium distribution of tuition fees and the academic quality of the private universities. Using cross-section data on Japanese universities, the authors find that private university tuition fees are lower in prefectures where the quality of the national university is high, as theoretically predicted.

Bettinger and **Long** attempt to measure the effects of collegiate class size on student outcomes such as persistence, subsequent course selection, and major choice. While class size is a perennial issue in the literature on primary and secondary schooling, it has been largely ignored in research on higher education. Nonetheless, the impact of class size in college is potentially very important because it affects everything from competitive rankings (20 percent of the *U.S. News and World Report* formula focuses on class size) to university budgets. Moreover, the range of possible class sizes is substantial in higher education (as many as 700 per lecture in this data), suggesting large differences in students' classroom experiences and possibly large effects on students' outcomes as well. Few researchers have focused on collegiate class size, though, because data are rarely available. In addition, there are inherent selection problems because higher ability students appear to systematically avoid large classes. To address this hole in the literature, the authors use a unique dataset that includes detailed class size, faculty, and student characteristics; they track two cohorts of nearly 41,000 students in four-year, public colleges in Ohio. Using an instrumental variables approach to control for selection bias, they find that an increase in class size leads to a higher likelihood of dropping out and a reduction in subsequent student interest in a subject.

Political Economy

The NBER's Working Group on Political Economy met in Cambridge on April 30. Group Director Alberto Alesina of Harvard University organized this program:

Rafael Di Tella, Harvard University; **Sebastian Galiani**, Universidad de San Andres, Argentina; and **Ernesto Schargrodsky**, Universidad Torcuato Di Tella, Argentina, "Property Rights and Beliefs: Evidence from the Allocation of Land Titles to Squatters"
Discussant: Esther Duflo, NBER and MIT

Stefano Dellavigna, NBER and University of California, Berkeley, and **Ethan Kaplan**, University of California, Berkeley, "The Fox News Effect: Media Bias and Voting"
Discussant: Jesse Shapiro, Harvard University

Asim Ijaz Khwaja, Harvard University, and **Atif Mian**, University of Chicago, "Do Lenders Favor Politically Connected Firms? Rent Provision in an Emerging Financial Market"
Discussant: Efraim Ben Melech, Harvard University

Guido Tabellini, Bocconi University, "Culture and Institutions: Economic Development in the Regions of Europe"
Discussant: Romain Wacziarg, NBER and Stanford University

Alexander Dyck, University of Toronto; **David Moss**, Harvard University; and **Luigi Zingales**, NBER and University of Chicago, "Media versus Special Interests"
Discussant: Andrei Shleifer, NBER and Harvard University

Gene M. Grossman, NBER and Princeton University, and **Elhanan Helpman**, NBER and Harvard University, "A Protectionist Bias in Majoritarian Politics" (NBER Working Paper No. 11014)
Discussant: Allan Drazen, NBER and University of Maryland

Possessing property rights may change the beliefs that people hold. **Di Tella**, **Galiani**, and **Schargrodsky** study this hypothesis using a natural experiment from a squatter settlement in the outskirts of Buenos Aires, ensuring that the allocation of property rights is exogenous to the characteristics of the squatters. Significant differences exist in the beliefs that squatters with and without property rights declare that they hold. For example, property rights make squatters' beliefs closer to those that favor the workings of a free market, including materialist and individualist beliefs (such as the belief that money is important for happiness, or the belief that one can be successful without the support of a large group). These effects appear large. The value of a (generated) index of pro-market beliefs for squatters without property rights is 78 percent of that of the general Buenos Aires population. The value for squatters who receive property rights is 98 percent of that of the general population. In other words, giving property rights to squatters causes a change in their beliefs that makes them indistinguishable from the general population, in spite of the large differences in the lives they lead. This experiment is less informative as to precisely how property rights change beliefs, although there is suggestive evidence of a behavioral channel.

Does the media affect voting? **DellaVigna** and **Kaplan** address this question by looking at the entry of Fox News into cable markets. Between October 1996 and November 2000, the conservative Fox News Channel was introduced into the cable programming of 20 percent of U.S. towns. Using a dataset of voting data for 8,634 towns, the authors ask if Republicans gained vote share in towns where Fox News entered the cable market by the year 2000. They find no significant effect of the introduction of Fox News on the vote share in Presidential elections between 1996 and 2000. In fact, they can rule out an effect of Fox News larger than 0.5 percentage points. The results are robust to town-level controls, state and county fixed effects, and alternative specifications. They also find no significant effect of Fox News on voter turnout. These results imply that Fox News convinced between 0 and 1.5 percent of its viewers to vote Republican. This evidence is consistent with the view that voters are sophisticated and filter out media bias. Alternatively, voters may display a form of confirmatory bias.

Corruption by the politically connected often is blamed for economic ills, particularly in less developed economies. Using a loan-level dataset of more than 90,000 firms representing the universe of corporate lending in Pakistan between 1996 and 2002, **Khwaja** and **Mian** study rents to politically connected firms in banking. Classifying a firm as "political" if its director participates in an election, the authors examine the extent, nature, and economic costs of provision of political rents. They find that political firms borrow twice as much and have 50 percent higher default rates. Such preferential treatment occurs exclusively in government banks — private banks provide no political favors. Using firm fixed effects and exploiting variation across time or lenders, the authors show that the observed political preference is driven by the political status of the firm and not by any unobserved firm characteristic. The political rents thus identified increase with the strength of the firm's politician and whether he or his party is in power; they fall with the degree of electoral participation in his constituency. Direct evidence rules out

alternative explanations, such as socially motivated lending by government banks to politicians. The economy-wide costs of the rents identified are estimated to be 0.3 percent to 1.9 percent of GDP every year.

Does culture have a causal effect on economic development? The data on European regions suggest that it does. Culture is measured by indicators of individual values and beliefs, such as trust and respect for others, and confidence in individual self-determination. To isolate the exogenous variation in culture, **Tabellini** relies on two historical variables used as instruments: the literacy rate at the end of the nineteenth century and the political institutions in place over the past several centuries. The political and social history of Europe provides a rich source of variation in these two variables at a regional level. The exogenous component of culture attributable to history is strongly correlated with current regional economic development, after controlling for contemporaneous education and for national effects. Moreover, the data do not reject the over-identifying assumption that the two historical variables used as instruments only influence regional development through culture. The indicators of culture that Tabellini uses in this paper also are strongly correlated with economic development and with available measures of institutions in a cross-country setting.

Dyck, **Moss**, and **Zingales** argue that profit-seeking media firms can play an important role in reducing the influence of powerful economic interests on policymaking. Motivated to reach big audiences by the lure of large profits, media firms typically seek to transform real events and issues — including public policy issues — into entertaining stories. In so doing, they end up informing the public about these issues and events, thus overcoming the standard problem of rational ignorance (Downs 1957) that lies at the heart of the economic theory of regulation and Stigler's hypothesis of regulatory capture. Consistent with this idea, the authors document that the rise of investigative journalism through "muckraking" magazines helps to explain the emergence of important progressive-era legislation in the early part of the twentieth century. To clarify the circumstances under which media can serve as a constraint on the political influence of vested interests, and why this constraint is often not more effective, the authors introduce a simple model of profit-maximizing media. The model suggests that the media are particularly effective in this role when the audience is large, when an issue can be more easily converted into entertaining news, and when subscriptions are a more important source of revenues than advertising.

Grossman and **Helpman** develop a novel model of campaigns, elections, and policymaking in which the ex ante objectives of national party leaders differ from the ex post objectives of elected legislators. This generates a distinction between "policy rhetoric" and "policy reality" and introduces an important role for "party discipline" in the policymaking process. The authors identify a protectionist bias in majoritarian politics. When trade policy is chosen by the majority delegation and legislators in the minority have limited means to influence choices, the parties announce trade policies that favor specific factors, and the expected tariff or export subsidy is positive. Positions and expected outcomes monotonically approach free trade as party discipline strengthens.

Health Care

The NBER's Program on Health Care met in Cambridge on May 6. Research Associate Michael Chernew of the University of Michigan organized this program:

Martin Gaynor and **William B. Vogt**, NBER and Carnegie Mellon University, and **Jian Li**, Carnegie Mellon University, "Is Drug Coverage a Free Lunch? Cross-Price Elasticities and the Design of Prescription Drug Benefits"

Tomas Philipson, NBER and University of Chicago; **Darius Lakdawalla**, NBER and RAND Corporation, and **Richard Wang**, Astrazenica, "Advertising and Intellectual Property in the U.S. Pharmaceutical Industry"

John R. Moran, Syracuse University, and **Kosali Ilayperuma Simon**, NBER and Cornell University, "Income and the Use of Prescription Drugs by the Elderly: Evidence from the Notch Cohorts" (NBER Working Paper No. 11068)

Jeffrey DeSimone, NBER and University of South Florida, and **Edward J. Schumacher**, Trinity University, "Compensating Wage Differentials and AIDS Risk" (NBER Working Paper No. 10861)

Amalia R. Miller, University of Virginia, "The Impact of Midwifery-Promoting Public Policies on Medical Interventions and Health Outcomes"

Janet Currie, NBER and University of California, Los Angeles, and **Mark Stabile**, NBER and University of Toronto, "Child Mental Health and Human Capital Accumulation: The Case of ADHD"

Recently, many U.S. employers have adopted more stringent prescription drug benefits. In addition, the U.S. government will offer prescription drug insurance to approximately 42 million Medicare beneficiaries in 2006. **Gaynor**, **Li**, and **Vogt** use data from Medstat on individual claims and benefit design from 1997-2001 to examine the dynamic structure of demand for health care, focusing specifically on whether prescription drugs are (dynamic) complements or substitutes for inpatient and outpatient care. The authors study the effect of changing consumers' copayments for prescription drugs on the quantity demanded and expenditure on prescription drugs, and on inpatient and outpatient care, allowing for effects in the year of the copayment change and the following year. The results show that a one dollar increase in the consumer copayment for drugs has the following effects: in the first year after the change, drug spending, outpatient spending, inpatient spending, and total spending fall by $9.71, $6.46, $3.39, and $20.39, respectively. In the second year after the change, drug spending falls by $8.35, while inpatient spending, outpatient spending, and overall spending rise by $10.71, $13.03, and $22.85, respectively. Raising consumer drug copayment by $1 per prescription actually *increases* overall spending by about $1 per enrollee per year over two years (ignoring discounting). This implies that more generous prescription drug benefits may be costly in the short run, but can generate cost savings in the long run. These long-run effects should be taken into account when estimating the expected cost of programs like the Medicare prescription drug benefit.

In addition to spending a vast amount of resources on Research and Development (R and D), the pharmaceutical industry is engaged in a substantial amount of marketing of their products, through both detailing to doctors and direct-to-consumer advertising to patients. Given that the share of sales devoted to marketing is larger than the share devoted to R and D by pharmaceutical firms, there has been a substantial debate about whether there is excessive marketing and whether it could be better allocated to productive R and D. However, previous economic analysis of advertising, R and D, and intellectual property ignores the impact one has on the other, making welfare evaluations of policies that affect both R and D and marketing infeasible. **Lakdawalla** and **Wang** seek to remedy this problem by first analyzing the impact that intellectual property design has on the efficient degree of advertising by pharmaceutical firms and, vice versa, the impact advertising has on the efficient design of intellectual property. They estimate the demand and supply schedules underlying these efficiency effects using patent-expirations in the U.S. pharmaceutical markets from 1990-2003 as an instrument. Such expirations display the interesting pattern that — for a large share of drugs — there are output reductions post-expiration because advertising is reduced more than prices are. The authors estimate the quantitative degree to which there is excessive advertising by U.S. drug manufacturers under current intellectual property law and the degree to which current intellectual property rights are inefficiently designed because of marketing.

Moran and **Simon** use exogenous variation in Social Security payments created by the Social Security benefits notch to estimate how retirees' use of prescription medications responds to changes in their incomes. In contrast to estimates obtained using ordinary least squares, instrumental variables estimates based on the notch suggest that lower-income retirees exhibit considerable income sensitivity in their use of prescription drugs. These estimates are potentially useful for thinking about the health implications of changes in transfer payments to the elderly and for evaluating the benefits of the

recently enacted Medicare prescription drug benefit.

DeSimone and **Schumacher** examine the effect of HIV/AIDS infection risks on the earnings of registered nurses (RNs) and other health care workers. They combine data on metropolitan statistical area (MSA) AIDS prevalence rates with annual 1987-2001 Current Population Survey (CPS) and quadrennial 1988-2000 National Sample Survey of Registered Nurses (SRN) data. Holding constant wages of control groups that are likely not exposed to AIDS risks and group-specific MSA fixed effects, the authors find that a 10 percent increase in the AIDS rate raises RN earnings by about 0.8 percent in post-1992 samples, when AIDS rates were falling but a more comprehensive categorization of AIDS was used by the CDC. AIDS wage differentials are much larger for RNs and non-nursing health practitioners than for other nursing and health care workers, suggesting that this differential represents compensation paid for job-related exposure to potentially HIV-infected blood.

Miller measures the impact of midwifery-promoting public policy on maternity care in the United States, using national Vital Statistics data on births spanning 1989-99. State laws mandating insurance coverage of midwifery services are associated with an 11- to 17-percentage point rise in midwife-attended births. The laws did not increase rates of unassisted vaginal deliveries or lead to consistent effects on maternal mortality or APGAR scores. They did, however, lead to a statistically significant drop in neonatal deaths of about 18/100,000 births. Divergence between OLS and natural experiment estimates suggests that women are selecting into provider groups based on unobserved preferences and health.

Currie and **Stabile** examine U.S. and Canadian children with symptoms of Attention Deficit Hyperactivity Disorder (ADHD), the most common child mental health problem. This work offers a number of innovations: 1) they use large nationally representative samples of children from both countries. 2) They focus on an ADHD screener that was administered to all children rather than on diagnosed cases. 3) They address omitted variables bias by estimating sibling-fixed effects models. 4) They examine a range of outcomes and compare the effects of ADHD to the effects of physical health conditions. 5) They ask how the effects of ADHD and the probability of treatment for ADHD are mediated by income. Currie and Stabile find that ADHD symptoms have large negative effects on future test scores and schooling attainment. The severity of the effects and the pervasiveness of the symptoms suggest that efforts to find better ways to teach the relatively small number of children diagnosed with ADHD could have a larger payoff in terms of improving the academic outcomes of large numbers of children with milder symptoms.

Market Microstructure

The NBER's Working Group on Market Microstructure met in Cambridge on May 6. Organizers Bruce Lehmann of NBER and University of California, San Diego, Duane Seppi of Carnegie Mellon University, and Avanidhar Subrahmanyam of University of California, Los Angeles, chose these papers to discuss:

Markus K. Brunnermeier, Princeton University, and **Lasse Heje Pedersen**, NBER and New York University, "Market Liquidity and Funding Liquidity"
Discussant: Guillaume Plantin, Carnegie Mellon University

Hendrik Bessembinder, University of Utah; **William Maxwell**, University of Arizona; and **Kumar Venkataraman**, Southern Methodist University, "Market Transparency and Institutional Trading Costs"
Discussant: David Lesmond, Tulane University

Mike Aitken, University of New South Wales; **Niall Almeida**, Deutsche Bank AG; **Frederick Harris**, Wake Forest University; and **Thomas McInish**, University of Memphis, "Order Splitting and Order Aggressiveness in Electronic Trading"
Discussant: Pankaj Jain, University of Memphis

H. Henry Cao, University of North Carolina, and **Hui Ou-Yang**, Duke University, "Bubbles and Panics in a Frictionless Market with Heterogeneous Expectations"
Discussant: Bruno Biais, Toulouse University

Ekkehart Boehmer, **Eric Kelley**, and **Christo Pirinsky**, Texas A&M University, "Institutional Investors and the Informational Efficiency of Prices"
Discussant: Tarun Chordia, Emory University

Robert Engle, NBER and New York University, and **Zheng Sun**, New York University, "Forecasting Volatility Using Tick by Tick Data"
Discussant: Charles Jones, Columbia University

Brunnermeier and **Pedersen's** model links a security's market liquidity — that is, the ease of trading it — to traders' funding liquidity — that is, their availability of funds. Traders provide market liquidity; their ability to do so depends on their funding, that is, their capital and the margins charged by their financiers. In times of crisis, reductions in market liquidity and funding liquidity are mutually reinforcing, leading to a liquidity spiral. The

model here provides a natural explanation for the empirically documented features that market liquidity: 1) can suddenly dry up (that is, is fragile); 2) has commonality across securities; 3) is related to volatility; 4) experiences "flight to liquidity" events; and 5) comoves with the market. Finally, the model shows how the Fed can improve current market liquidity by committing to improve funding in a potential future crisis.

Bessembinder, **Maxwell**, and **Venkataraman** estimate trade execution costs for a sample of institutional (insurance company) trades in corporate bonds before and after the initiation of public transaction reporting for some bonds through the TRACE system in July 2002. Their results indicate a remarkable 50 percent reduction in trade execution costs for bonds eligible for TRACE transaction reporting; they also suggest the presence of a "liquidity externality" that results in a 20 percent reduction in execution costs for bonds not eligible for TRACE reporting. They estimate larger trading cost reductions for less liquid and lower-rated bonds, and for larger trades. These key results are robust to allowances for changes in variables, such as interest rate volatility and trading activity, which might also affect execution costs. The authors also find decreased market shares for large dealers and a smaller cost advantage for those dealers post-TRACE, suggesting that the corporate bond market has become more competitive after TRACE implementation. The point estimates show annual trading cost reductions of roughly $1.2 billion per year for the entire corporate bond market, reinforcing the fact that market design can have first-order effects, even for relatively sophisticated institutional customers.

Aitken, Almeida, Harris, and **McInish** examine the orders of active and passive institutional investors across five (bid) steps of the limit order book; they also test recent theories of order aggressiveness in limit order placement decisions. The authors document that institutional investors break their desired quantities into several limit orders submitted simultaneously at multiple prices. Active institutions submit more aggressive orders than passive institutions and increase order aggressiveness through the day, consistent with hypothesized responses to observed changes in execution risk and the cost of non-execution. These findings highlight the importance of limit order information beyond the best quotes.

When investors have differences of opinion about the payoffs of a stock, Harrison and Kreps (1978) demonstrated, there is a speculative bubble in the stock price: that is, the stock price can exceed the valuation of the most optimistic investor. A crucial condition supporting this result in their model is that investors are not allowed to short sell the stock. **Cao** and **Ou-Yang** demonstrate that speculative bubbles may arise even without their short sales constraint. They also show that asset panics may arise: that is, the stock price may be lower than the valuations of all individual investors. In particular, even if the short sales constraint binds, asset panics can arise. This result suggests that Miller's (1977) insight — that the short sales constraint causes the stock price to be above the average valuation — is not robust in a dynamic framework. In the case of a bubble, the model here generalizes the Harrison-Kreps notion of a resale option: investors believe that they can resell the stock later at a higher price. In the case of a panic, this model develops the notion of a buyback option: investors believe that they can sell the stock now and buy it back later at a lower price. The authors develop intuitive sufficient conditions for bubbles and panics and show that under certain conditions, bubbles and panics can arise even when investors have almost homogeneous expectations.

The fraction of domestic equity held by institutional investors has quadrupled during the past four decades, and a prominent share of trading activity is attributable to institutions. Yet, prior research offers diverging views on how these developments affect equity markets. In particular, we know little about how institutions affect the informational efficiency of share prices, one important dimension of market quality. **Boehmer**, **Kelley**, and **Pirinsky** study a broad cross-section of NYSE-listed stocks between 1983 and 2003, using measures of the relative informational efficiency of prices that are constructed from transactions data. They find that stocks with a higher fraction of institutional ownership are priced more efficiently, and this result is robust across a variety of specifications. Moreover, they demonstrate that increases in actual institutional trading volume are associated with greater efficiency, and this effect appears to be distinct from the one associated with cross-sectional differences in institutional holdings.

Using tick-by-tick data, **Engle** and **Sun** build an econometric model for estimating the volatility of unobserved efficient price change. They model the joint density of the marked point process of duration and tick-by-tick returns within an ACD-GARCH framework. First they model the duration variable as an ACD process that could potentially depend on past returns. Then they model the return variable, conditioning on its current duration as well as on past information. The observed return process admits a state space model, where the unobserved efficient price innovation and microstructure noises serve as state variables. After adjusting for bid-ask spread and a non-linear function of durations, tick by tick returns are distributed independently of durations, with volatility that admits a GARCH process. The authors apply this model to frequently traded NYSE stock transactions data. Contemporaneous duration appears to have little effect on the conditional volatility per trade, which means that per second volatility is inversely related to the duration between trades. This is consistent with the result of Engle (2000) and Easley and O'Hara (1987). The authors obtain a new estimate of daily, realized volatility as well as the volatility of efficient price changes. Volatility is forecast over calendar time intervals by simulation, and the distribution of the number of trades is central in forming these forecasts.

Corporate Governance

NBER researchers whose interest is corporate governance met in Cambridge on May 12. NBER Research Associate Lucian Bebchuk of Harvard Law School organized their program:

David Yermack, New York University, "Golden Handshakes: Rewards for CEOs Who Leave"
Discussant: David S. Scharfstein, NBER and Harvard University

David F. Larcker, **Scott A. Richardson**, and **Irem Tuna**, University of Pennsylvania, and **Andrew J. Seary**, Simon Fraser University, "Back Door Links Between Directors and Executive Compensation"
Discussant: Henry Hansmann, Yale University

Lucian Bebchuk, and **Yaniv Grinstein**, Cornell University, "Pay and Size"
Discussant: Arturo Bris, Yale University

Martin J. Conyon, **John E. Core**, and **Wayne R. Guay**, University of Pennsylvania, "How High is U.S. CEO Pay? A Comparison with U.K. CEO Pay"
Discussant: Alexander Dyck, University of Toronto

Lily Qui, Brown University, "Which Institutional Investors Monitor? Evidence from Acquisition Activity"
Discussant: Stuart Gillan, Arizona State University

Andres Almazan, **Jay C. Hartzell**, and **Laura T. Starks**, University of Texas, "Active Institutional Shareholders and Costs of Monitoring: Evidence from Executive Compensation"
Discussant: Florencio Lopez-de-Silanes, NBER and Yale University

Kose John, **Lubomir Litov**, and **Bernard Yeung**, New York University, "Corporate Governance and Managerial Risk Taking: Theory and Evidence"
Discussant: Rene M. Stulz, NBER and Ohio State University

Mihir A. Desai, NBER and Harvard University; **Alexander Dyck**, University of Toronto; and **Luigi Zingales**, NBER and University of Chicago, "Theft and Taxes"
Discussant: Enrico Perotti, Universiteit van Amsterdam

Yermack studies separation payments made when CEOs leave their firms. In his sample of *Fortune 500* companies, these packages are widespread and lucrative. Almost 80 percent of exiting CEOs receive separation pay, and its mean present value exceeds $4.5 million. Severance is positively associated with future pay that CEOs might expect until age 65 and is higher when CEOs depart involuntarily. Shareholders react negatively when separation agreements are disclosed, but only in cases of voluntary CEO turnover. Some evidence suggests that severance pay acts as a bonding device between the board and CEO, while other evidence accords with theories of rent extraction.

Larcker, **Richardson**, **Seary**, and **Tuna** ask whether links between inside and outside directors have an impact on CEO compensation. Using a comprehensive sample of 22,074 directors for 3,114 firms, the authors develop a measure of the "back door" distance between each pair of directors on a company's board. Specifically, using the entire network of directors and firms, they compute the minimum number of other company boards that are required to establish a connection between each pair of directors (*ignoring* the obvious link that occurs when directors are on the same board). The back door distance is one measure of the existence and strength of the communication channel between board members that can be used to influence decisions by the full board. The authors show that CEOs at firms with a relatively short back door distance between inside and outside directors, or between the CEO and the members of the compensation committee, earn substantially *higher* levels of total compensation (after controlling for standard economic determinants and other personal characteristics of the CEO and the structure for board of directors). This statistical association is consistent with recent claims that the monitoring ability of the board is hampered by "cozy" and possibly difficult to observe relationships between directors.

Bebchuk and **Grinstein** study the extent to which decisions to expand the size of public companies — by issuing new equity to finance acquisitions or investments, or by avoiding dividends or repurchases — are followed by increases in executive pay. The authors find that, controlling for past stock performance, the compensation of continuing CEOs (both in absolute terms and relative to their compensation earlier in their service) is positively correlated with the net amount of shares issued earlier during the CEO's service. This effect is economically meaningful: holding other things equal (including past stock performance), the average compensation of CEOs in the top quartile in terms of net share issuances in the preceding three years is 25 percent higher than the average compensation of CEOs in the bottom quartile. Further, stock returns are correlated with higher subsequent CEO pay only to the extent that they contribute to firm expansion; just the part of stock returns that is not distributed as dividends is correlated with subsequent CEO pay. The identified link between firm expansion under a CEO and subsequent executive pay could provide CEOs with incentives to expand firm size, even when such expansion would not maximize shareholder value.

Conyon, **Core**, and **Guay** examine U.S. and U.K. CEO pay and incen-

tives from 1997 to 2003. Pay is the total of cash pay, stock and option grants, and other pay. The authors measure incentives as the change in value of the CEO's equity holdings for a 1 percent stock return, which equates $100 in stock to $1 in incentives. Controlling for firm characteristics, U.S. CEOs have higher compensation and much higher incentives. In 2003, U.S. CEO pay was 1.6 times U.K. CEO pay, as compared to about 2.2 times in 1997. U.S. CEO incentives in 2003 were about 5.2 times U.K. CEO incentives, as compared to 8.4 times in 1997. These narrowing differences over time result from substantial increases in U.K. pay and incentives and flat U.S. pay and incentives. Although U.S. pay is higher than U.K. pay, the much higher incentives imply that U.S. CEOs receive less pay per unit of incentives (about $15 in pay for each $1 in incentives) than U.K. CEOs (about $48 in pay for each $1 in incentives). This ratio is roughly constant over time. When normed by the larger amount of risky incentives held, U.S. CEO pay does not appear large compared to U.K CEO pay.

Qiu shows that the presence of large public pension fund shareholders will reduce firms' acquisition activity, after controlling for ownership endogeneity, firm-level governance provisions, and other firm characteristics. Public pension funds particularly reduce the acquisition frequency by cash-rich and low-*q* firms, and the likelihood of "buying-growth" acquisitions. When firms with large public pension fund presence *do* acquire other firms, they perform relatively better in the long run. The opposite is the case for mutual fund shareholders — their presence encourages acquisitions by firms with potentially higher agency costs, and is associated with worse M and A performance.

Although evidence suggests that institutional investors play a role in monitoring management, not all institutions are equally willing or able to serve this function. **Almazan**, **Hartzell**, and **Starks** present a stylized model that examines the effects of institutional monitoring on executive compensation. The model predicts that institutions' influence on managers' pay-for-performance sensitivity and level of compensation is reduced when institutions have greater implied costs of monitoring, but that these effects are attenuated when the firm-specific cost of monitoring is high. These empirical results are broadly consistent with the notion that independent investment advisors and investment managers have advantages in monitoring firms' management.

John, **Litov**, and **Yeung** study how the investor protection environment affects corporate managers' incentives to take value-enhancing risks. In their model, the manager chooses higher perk consumption when investor protection is low. Since perks represent a priority claim held by the manager, lower investor protection leads the manager to implement a suboptimally conservative investment policy, effectively aligning her risk-taking incentives with those of the debt holders. By the same token, higher investor protection is associated with riskier investment policy and faster firm growth. The authors test these predictions in a large Global Vantage panel. They find strong empirical confirmation that corporate risk-taking and firm growth rates are positively related to the quality of investor protection.

Desai, **Dyck**, and **Zingales** analyze the interaction between corporate taxes and corporate governance. They show that the characteristics of a taxation system affect the extraction of private benefits by company insiders. A higher tax rate increases the amount of income that insiders divert and thus worsens governance outcomes. In contrast, stronger tax enforcement reduces diversion and, in so doing, can raise the stock market value of a company in spite of the increase in the tax burden. The authors also show that the corporate governance system affects the level of tax revenues and the sensitivity of tax revenues to tax changes. When the corporate governance system is ineffective (that is, when it is easy to divert income), an increase in the tax rate can reduce tax revenues. The authors test this prediction in a panel of countries. Consistent with the model, they find that corporate tax rate increases have smaller (in fact, negative) effects on revenues when corporate governance is weaker. Finally, this approach provides a novel justification for the existence of a separate corporate tax based on profits.

Corporate Finance

The NBER's Program on Corporate Finance met in Cambridge on May 13. Malcolm Baker, NBER and Harvard Business School, and Jeffrey Wurgler, NBER and New York University, organized this program:

Marianne Bertrand, NBER and University of Chicago; **Simon Johnson** and **Antoinette Schoar**, NBER and MIT; and **Krislert Samphantharak**, University of California, San Diego, "Mixing Family with Business: A Study of Thai Business Groups and the Families Behind Them"
Discussant: Randall Morck, NBER and University of Alberta

Bo Becker, University of Illinois, "Geographical Segmentation of U.S. Capital Markets"
Discussant: Jeremy C. Stein, NBER and Harvard University

Roman Inderst, INSEAD, and **Holger M. Mueller**, New York University, "Keeping the Board in the Dark: CEO Compensation and Entrenchment"
Discussant: Dirk Jenter, NBER and MIT

Simeon Djankov and **Caralee McLiesh**, World Bank, and **Andrei Shleifer**, NBER and Harvard University, "Private Credit in 129 Countries"
Discussant: Luigi Zingales, NBER and University of Chicago

Simi Kedia, Rutgers University, and **Thomas Phillipon**, NBER and New York University, "The Economics of Fraudulent Accounting"
Discussant: Chris Hennessy, University of California, Berkeley

Sergei A. Davydenko and **Julian R. Franks**, London Business School, "Do Bankruptcy Codes Matter? A Study of Defaults in France, Germany, and the U.K."
Discussant: C. Fritz Foley, NBER and Harvard University

A large fraction of business groups around the world are run by families. **Bertrand**, **Johnson**, **Samphantharak**, and **Schoar** analyze how the structure of the families behind these business groups affects the groups' organization, governance, and performance. To address this question, they construct a unique dataset of the family trees and the business groups they run for 70 of the largest business families in Thailand. The authors show that the group head and his brothers hold the majority of family positions within each group. However, there is also a positive relationship between family size and involvement of family members in the business group, especially when the ultimate control has passed from the founder to one of his descendants. Interestingly, groups that are run by larger families (more male siblings of the group head) tend to have lower performance. This negative performance effect coincides with a larger number of small firms in these group, more fragmented internal capital markets, and possibly more tunneling along the pyramidal structure of the groups. These performance and within-group resource allocation effects are again especially pronounced in groups where the founder is no longer active and ultimate control has been passed to one of his descendant. One hypothesis that emerges from the analysis is that part of the decay of family-run groups over time may be attributable to infighting for group resources as control becomes more diluted among different family members.

Is the U.S. capital market integrated geographically? If not, does segmentation affect economic outcomes? And, has deregulation changed the extent of segmentation? **Becker** attempts to answer these questions using demographic variation in savings behavior. Metropolitan areas with a large fraction of seniors have higher local volumes of bank deposits. Since many banks are dependent on deposit financing, this is likely to affect local loan supply and economic activity. Using the fraction of seniors as an instrument, Becker shows the effect of deposit supply on local economic outcomes, including the number of firms, the fraction of small firms, and the number of new firms started. He examines manufacturing firms in particular because they are the least likely to be affected by local demand conditions, and because data is available further back. As predicted, deposit supply has a strong positive effect on outcomes. The supply is more important in industries that are heavily dependent on external finance. These base-line results are robust to variation in the definition of local market, and to the inclusion of controls for local wealth, as well as to the use of lagged demographic variables. Finally, deregulation of intrastate branching has significantly cut the effect of local deposit supply, suggesting that one benefit of deregulation is improved geographical capital allocation.

The CEO's control over information in the boardroom limits the board's ability to monitor the CEO. **Inderst** and **Mueller** examine how the incentives of CEOs to hide negative information from the board depend on the CEOs' compensation structure, and how the board can structure CEO compensation optimally to mitigate the problem. The optimal compensation package consists of options and severance pay. Option pay forces the CEO "to put his money where his mouth is" by making it as costly as possible for him to falsely assert that the firm's future prospects are good. This minimizes the amount of severance pay needed to compensate the CEO for being fired, thus minimizing his rents. The model suggests how deregulation and technological changes in the 1980s and 1990s may

have contributed to the dramatic increase in both CEO pay and forced turnover during the same period.

Djankov, **McLiesh**, and **Shleifer** investigate cross-country determinants of private credit, using new data on legal creditor rights and private and public credit registries in 129 countries. They find that both creditor protection through the legal system and information sharing institutions are associated with higher ratios of private credit to GDP, but that the former is relatively more important in the richer countries. An analysis of legal reforms also shows that improvements in creditor rights and in information sharing precede faster credit growth. Also, creditor rights are extremely stable over time, contrary to the convergence hypothesis. Finally, the authors find that legal origins are an important determinant of both creditor rights and information sharing institutions.

Kedia and **Philippon** study the consequences of earnings management for the allocation of resources among firms, and argue that fraudulent accounting has important economic consequences. First, the authors build a model in which the costs of earnings management are endogenous and show that, in equilibrium, bad managers hire and invest too much, distorting the allocation of real resources. The authors then test the predictions of the model using new historical and firm-level data. They show first that periods of high stock market valuations are systematically followed by large increases in reported frauds. Then they show that, during periods of suspicious accounting, insiders sell their stocks, while misreporting firms hire and invest like the firms whose income they are trying to match. When they are caught, they shed labor and capital and improve their true productivity. In the aggregate, this model seems to account for the recent period of jobless and investment-less growth.

Davydenko and **Franks** study how bankruptcy codes and creditors' rights affect distressed reorganizations in different countries. Using a sample of 2280 small firms that defaulted on their bank debt in France, Germany, and the United Kingdom, the authors find that large differences in creditors' rights across countries lead banks to adjust their lending and reorganization practices to mitigate the expected credit or unfriendly aspects of bankruptcy law. In particular, French banks respond to a creditor-unfriendly bankruptcy code by requiring more collateral than lenders elsewhere, and by relying on particular collateral forms that minimize the statutory dilution of their claims in bankruptcy. Despite such adjustments, bank recovery rates in default differ substantially across the three countries, with medians of 92 percent in the United Kingdom, 67 percent in Germany, and 56 percent in France. Notwithstanding the low level of creditor protection, low recovery rates, and high historical bankruptcy rates in France, the authors find, pre-distress loan spreads there are similar to those found in the creditor-friendly United Kingdom. They conclude that, despite significant adjustments in lending practices, bankruptcy codes still sharply affect default outcomes.

Economic Fluctuations and Growth Research Meeting

The NBER's Program on Economic Fluctuations and Growth held its summer research meeting in Cambridge on July 16. NBER Research Associates David Laibson of MIT and Michael Woodford of Columbia University organized the meeting. These papers were discussed:

Simi Kedia, Rutgers University, and **Thomas Philippon**, NBER and New York University, "The Economics of Fraudulent Accounting"
Discussant: Franklin Allen, University of Pennsylvania

Troy Davig, College of William and Mary, and **Eric M. Leeper**, NBER and Indiana University, "Fluctuating Macro Policies and the Fiscal Theory"
Discussant: Jordi Gali, NBER and CREI

Fatih Guvenen, University of Rochester, "Learning Your Earning: Are Labor Income Shocks Really Very Persistent?"
Discussant: Jonathan Parker, NBER and Princeton University

Xavier Gabaix, NBER and MIT, "The Granular Origin of Aggregate Fluctuations"
Discussant: Steven N. Durlauf, NBER and University of Wisconsin

Robert Shimer, NBER and University of Chicago, "Reassessing the Ins and Outs of Unemployment"
Discussant: Steven J. Davis, NBER and University of Chicago

Guido Lorenzoni, NBER and MIT, "Imperfect Information, Consumers' Expectations, and Business Cycles"
Discussant: Laura Veldkamp, New York University

Kedia and **Philippon** study the consequences of earnings management for the allocation of resources among firms. They argue that fraudulent accounting has important economic consequences. First they build a model in which the costs of earnings management are endogenous and show that, in equilibrium, bad managers hire and invest too much, distorting the allocation of real resources. Then they test the predictions of the model using new data. They find that periods of high stock market valuations are followed systematically by

large increases in reported frauds. During periods of suspicious accounting, insiders sell their stocks, while misreporting firms hire and invest just like the firms whose income they are trying to match. When caught, these firms shed labor and capital and improve their true productivity. In the aggregate, this model seems to account for the recent period of jobless and investment-less growth.

Davig and **Leeper** estimate regime-switching rules for monetary and tax policy over the post-war period in the United States and impose that estimated policy process on a model with nominal rigidities. Decision rules are locally unique and produce a stationary long-run rational expectations equilibrium; lump sum tax shocks always affect output and inflation. In the model, tax non-neutralities arise solely through the mechanism articulated by the fiscal theory of the price level. The authors quantify that mechanism and find it to be important in U.S. data, reconciling a popular class of monetary models with the evidence that tax shocks have substantial impacts. Because long-run policy behavior determines the existence and uniqueness of equilibrium, it is possible to glean more accurate, qualitative inferences from full-sample information in a regime-switching environment than by conditioning on policy regime.

Guvenen studies the consumption-savings-behavior "heterogeneous income profiles" (HIP) model (Lillard and Weiss, 1979). In a life-cycle model, one assumes that individuals enter the labor market with a prior belief about their individual-specific profiles and learn over time in a Bayesian fashion. Guvenen finds that learning is slow, and thus initial uncertainty affects decisions throughout the life cycle. This allows one to estimate prior uncertainty from consumption behavior observed later in life. This procedure implies that 40 percent of the variation in income growth rates can be forecast by individuals at time zero. The resulting model is consistent with several features of consumption data, including: the substantial rise in within-cohort consumption inequality (Deaton and Paxson, 1994); the non-concave shape of the age-inequality profile; and the fact that consumption profiles are steeper for more highly educated individuals (Carroll and Summers, 1991). These results bring fresh evidence from consumption data on the nature of income risk.

The empirical distribution of firms is fat-tailed. **Gabaix** shows how, in a world with fat-tailed firm size distribution, idiosyncratic firm-level fluctuations aggregate up to non-trivial aggregate fluctuations. He illustrates why and how this happens, and contends that aggregate fluctuations in large part come from idiosyncratic shocks to firms. He shows empirically that idiosyncratic volatility is indeed large enough for GDP volatility. The idiosyncratic movements of the largest 100 firms in the United States appear to explain about 40 percent of variations in output and the Solow residual. This "granular" hypothesis suggests new directions for macroeconomic research, in particular that macroeconomic questions can be clarified by looking at the behavior of large firms.

Shimer uses readily accessible data to measure the probability that an employed worker becomes unemployed and that an unemployed worker finds a job: the ins and outs of unemployment. The job finding probability is strongly procyclical; the separation probability is nearly acyclical, particularly during the last two decades. Using the underlying microeconomic data, Shimer shows that these results are not attributable to compositional changes in the pool of searching workers, or to movements of workers in and out of the labor force. These results contradict the conventional wisdom that guided the development of macroeconomic models of the labor market during the last 15 years.

Lorenzoni presents a model of business cycles driven by shocks to consumers' expectations about aggregate productivity. Agents are hit by heterogeneous productivity shocks; they observe their own productivity and a noisy public signal of aggregate productivity. The shock to this public signal, or "news shock", has the features of an aggregate demand shock: it increases output, employment, and inflation in the short run and has no effects in the long run. The dynamics of an economy after an aggregate productivity shock also are affected by the presence of imperfect information: after a productivity shock, output gradually adjusts to its higher long-run level, and there is a temporary negative effect on inflation and employment. The fraction of short-run fluctuations explained by the news shock increases with the level of idiosyncratic noise and is non-monotonic in the precision of the public signal. For relatively high levels of idiosyncratic uncertainty, news shocks can generate realistic levels of short-run volatility.

Bureau Books

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Analyses in the Economics of Aging

Analyses in the Economics of Aging, edited by David A. Wise, is now available from the University of Chicago Press. This NBER Conference Report costs $85.00.

Analyses in the Economics of Aging summarizes new research on several popular and some less-examined topics including retirement savings, the cost and efficiency of medical resources, and the predictors of health events. The volume begins with a discussion of the risks and merits of 401(k) plans. Subsequent chapters present analysis of the growth of Medicare costs; the different aspects of disability; and the evolution of health, wealth, and living arrangements over the lifetime. Keeping with the global tradition of previous volumes, *Analyses in the Economics of Aging* also includes comparative studies on savings behavior in Italy, the Netherlands, and the United States; an examination of household savings among different age groups in Germany; and a chapter devoted to population aging and the plight of widows in India. This volume should be of interest to any specialist or policymaker concerned with ongoing changes in savings and retirement behaviors.

Wise directs the NBER's Program of Research on the Economics of Aging and is the John F. Stambaugh Professor of Political Economy at Harvard University's John F. Kennedy School of Government.

International Trade in East Asia

International Trade in East Asia, edited by Takatoshi Ito and Andrew K. Rose, is available from the University of Chicago Press for $80.00. This is the 14th volume in the NBER series on East Asia Seminars on Economics.

The practice of trading across international borders has undergone a number of changes, many of which have consequences for the world trading community. In *International Trade in East Asia*, a group of esteemed contributors summarize the empirical aspects of international trade that pertain specifically to East Asian countries such as China, Japan, Korea, and Taiwan.

This volume includes twelve studies that highlight trading practices which exist between countries within as well as outside of the region. The contributors bring into focus some of the endemic and external barriers to international trade and discuss strategies for improving productivity and fostering trade relationships. The studies of factors that drive exports, the influence of research and development, the effects of foreign investment, and the ramifications of different types of protectionism will resonate in particular with the financial and economic communities who are trying to keep pace with this dramatically altered landscape.

Ito and Rose are both NBER Research Associates in the Program on International Finance and Macroeconomics. Ito is also a professor at the University of Tokyo. Rose is the B.T. Rocca Professor of Economic Analysis and Policy at Berkeley's Haas School of Business.

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NBER Working Papers

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