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Program Report

Monetary Economics

N. Gregory Mankiw

Every consumer of the news appreciates the importance of monetary economics. Almost every day, the newspaper contains stories about inflation, deflation, or the next policy move by the Federal Reserve System.

The NBER's Program on Monetary Economics encourages systematic research to better understand monetary policy and related issues in macroeconomics. Although program members share this common goal, they display great diversity in interests, methods, and conclusions. In this brief essay, I describe several recent studies. Although the breadth of program research prevents me from being comprehensive, I offer a glimpse at the kinds of work that this NBER program has been promoting. A complete list of downloadable Working Papers produced by the Monetary Economics Program since 1995 is available at the NBER's Web site, **www.nber.org**—click on the home page option "Latest Working Papers by Program" and then select "Monetary Economics." In addition to the many Working Papers written by members of the program, three separate volumes summarize larger research projects sponsored by the Monetary Economics Program: *Monetary Policy,* edited by N. G. Mankiw (University of Chicago Press, 1994); *Reducing Inflation,* edited by C. Romer and D. Romer (University of Chicago Press, 1997); and *Monetary Policy Rules,* edited by J. B. Taylor (University of Chicago Press, 1999).

The Effects of Monetary Policy

How does monetary policy affect the economy? This question, more than any other, is at the center of research in the NBER's Program on Monetary Economics. Many papers have attempted to answer this question using various datasets and research methodologies.

In one recent study, Ben S. Bernanke and Ilian Mihov use a statistical method called "structural vector autoregression" to examine two classic propositions about the effects of monetary policy. The first proposition—the liquidity effect—states that monetary expansions lower nominal interest rates

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in the short run. The second proposition—long-run neutrality—states that monetary policy does not affect real variables (such as employment and production) in the long run. Bernanke and Mihov report that the evidence is consistent with both of these propositions.[1]

Laurence M. Ball reaches a very different conclusion about the long-run effects of monetary policy in his paper "Disinflation and the NAIRU." Ball examines the unemployment experience in a large number of OECD countries during the 1980s. He reports that countries with larger decreases in inflation and longer disinflationary periods have larger increases in the natural rate of unemployment. This finding suggests that in some countries monetary policy can have long-lasting effects on employment and production.[2]

Another paper that reports long-lasting effects of monetary policy, but of a very different kind, is "Monetary Policy and the Well-Being of the Poor," by Christina D. Romer and David H. Romer. This study finds that a cyclical boom created by expansionary monetary policy improves conditions for the poor in the short run, but that low inflation is associated with improved well-being of the poor in the long run. In contrast to Ball, who finds that reducing inflation may permanently raise unemployment, Romer and Romer find that reducing inflation can permanently improve conditions for the most needy members of society.[3]

Inflation Targeting as a Policy Framework

Members of the Program on Monetary Economics are interested not only in the effects of monetary policy but also in evaluating alternative ways of conducting that policy. Throughout the 1990s, many of the world's central banks—including

those of Australia, Canada, Finland, Israel, New Zealand, Spain, Sweden, and the United Kingdom—have adopted some form of an inflation target. Because of the widespread practical interest in this policy, many NBER researchers have recently studied this topic.

What is inflation targeting? Sometimes it merely takes the form of a central bank announcing its long-run policy intentions. Other times it takes the form of a national law that stipulates explicitly the goals of monetary policy. For example, the Reserve Bank of New Zealand Act of 1989 told the central bank "to formulate and implement monetary policy directed to the economic objective of achieving and maintaining stability in the general level of prices." The act conspicuously omits any mention of any other competing objective, such as stability in output, employment, interest rates, or exchange rates. Although the U.S. Federal Reserve System has not adopted inflation targeting, some members of Congress have proposed bills that would require it to do so.

It is tempting to interpret inflation targeting as a type of precommitment to a policy rule. Yet according to a paper by Bernanke and Frederic S. Mishkin, this interpretation would not be completely accurate. In all the countries that have adopted inflation targeting, central banks are left with a fair amount of discretion. Inflation targets are usually set as a range—an inflation rate of 1 to 3 percent, for instance—rather than as a particular number. Thus the central bank can choose where in the range it wants to be. In addition, the central banks are sometimes allowed to adjust their targets for inflation, at least temporarily, if some exogenous event (such as an easily identified supply shock) pushes inflation outside of the range that was previously announced.

In light of this flexibility, what is the purpose of inflation targeting? Although inflation targeting does leave the central bank with some discretion, it also constrains how this discretion is used. When a central bank is told to "do the right thing," it is hard to hold the central bank accountable, because people can argue forever about what the right thing is in any particular circumstance. By contrast, when a central bank has announced an inflation target, the public can more easily judge whether the central bank is meeting that target. Thus, although inflation targeting does not tie the hands of the central bank, it does increase the transparency of monetary policy and, by doing so, makes central bankers more accountable for their actions.[4]

Monitoring Inflation

Monetary policymakers and private forecasters monitor inflation closely. Each monthly release of the consumer price index is examined in detail to see if it contains warnings of the beginning of an inflation problem. But what data are best used for this purpose? That is exactly the question taken up by Michael F. Bryan, Stephen G. Cecchetti, and Rodney L. Wiggins II in their paper "Efficient Inflation Estimation."

Policymakers and forecasters have long known that monthly inflation data are noisy. As a result, they often look at some measure of "core inflation," which is usually defined as inflation excluding specific, volatile sectors such as food and energy. By contrast, Bryan, Cecchetti, and Wiggins study the use of "trimmed means" to measure the underlying inflation trend. A trimmed mean for inflation takes the average of all price changes excluding those price changes in the tails of the distribution. They find that these trimmed means provide a superior way of gauging the long-run inflation trend.[5]

How People View Inflation

Of all the problems that economists study, inflation ranks high in the public's interests. Indeed, according to Robert J. Shiller, "inflation" is the economic term that shows up most often in the media, far ahead of second-place finisher "unemployment" and third-place finisher "productivity."

Why are people so concerned about inflation? In his paper "Why Do People Dislike Inflation?" Shiller tries to answer this question directly by asking people about their attitudes toward inflation. He also compares public attitudes to those of professional economists and finds some striking differences between the two groups.

Shiller asked people whether their "biggest gripe about inflation" was that "inflation hurts my real buying power, it makes me poorer." Seventy-seven percent of the public agreed with this statement, compared with only 12 percent of economists. Shiller also asked, "Do you agree that preventing high inflation is an important national priority, as important as preventing drug abuse or preventing deterioration in the quality of our schools?" Fifty-two percent of the public fully agreed with this view, compared with only 18 percent of economists.

Another question from the Shiller survey is: "Do you agree with the following statement, 'I think that if my pay went up I would feel more satisfaction in my job, more sense of fulfillment, even if prices went up just as much'?" Forty-nine percent of the public fully or partly agreed with this statement, compared to 8 percent of economists.[6]

How should these survey results be interpreted? Although they are intriguing, the bottom line is not completely clear. Certainly, economists think very differently about

inflation than the public does. Whether that means the public needs to listen more carefully to monetary economists, or vice versa, remains an open issue.

Future Directions

Predicting the direction of research is about as easy as predicting the direction of the stock market. And for much the same reason: if people could tell where we were going, we would be there already. But like the inevitability of stock-market fluctuations, there is no doubt that research on monetary economics will remain active. As Japan wrestles with deflation and a potential liquidity trap, Russia copes with fiscal insolvency and the possibility of hyperinflation, and the United States enjoys an era of approximate price stability, monetary topics are everywhere to be seen. In every case, NBER monetary researchers are sure to be there as well.

[1] *B. S. Bernanke and I. Mihov, "The Liquidity Effect and Long-Run Neutrality," NBER Working Paper No. 6608, June 1998.*

[2] *L. M. Ball, "Disinflation and the NAIRU," NBER Working Paper No. 5520, March 1996.*

[3] *C. D. Romer and D. H. Romer, "Monetary Policy and the Well-Being of the Poor," NBER Working Paper No. 6793, November 1998.*

[4] *See B. S. Bernanke and F. S. Mishkin, "Inflation Targeting: A New Framework for Monetary Policy?," NBER Working Paper No. 5893, July 1997. Other papers on inflation targeting include B. T. McCallum, "Inflation Targeting in Canada, New Zealand, Sweden, the United Kingdom, and in General," NBER Working Paper No. 5579, February 1998; F. S. Mishkin and A. S. Posen, "Inflation Targeting: Lessons from Four Countries," NBER Working Paper No. 6126, February 1998; G. D. Rudebusch and L. E. O. Svensson, "Policy Rules for Inflation Targeting," NBER Working Paper No. 6512, April 1998; and L. E. O. Svensson, "Inflation Targeting as a Monetary Policy Rule," NBER Working Paper No. 6790, November 1998.*

[5] *M. F. Bryan, S. G. Cecchetti, and R. L. Wiggins II, "Efficient Inflation Estimation," NBER Working Paper No. 6183, September 1997.*

[6] *R. J. Shiller, "Why Do People Dislike Inflation?," NBER Working Paper No. 5539, April 1996.*

Research Summaries

Understanding Aggregate Fluctuations: The Importance of Building from Microeconomic Evidence

John C. Haltiwanger*

In recent research using longitudinal establishment-level data, a pervasive finding is that idiosyncratic factors dominate the distribution of growth rates of output, employment, investment, and productivity across establishments. Seemingly similar plants within the same industry exhibit behave quite differently in terms of real activity at cyclical and longer-run frequencies. Even in the fastest-growing industries, a significant fraction of establishments decline substantially; similarly, a large fraction of establishments in the slowest-growing industries grow dramatically. During severe recessions virtually all industries decline, but within each industry a substantial fraction of establishments grow. Likewise, during robust recoveries, a substantial fraction of establishments contract. Simply put, the underlying gross microeconomic changes in activity dwarf the net changes that we observe in published aggregates.

The tremendous observed within-sector heterogeneity raises a variety of questions for our understanding and measurement of key macro aggregates. Much of macroeconomic research and our measurement of aggregates is predicated on the view that building macro aggregates from industry-level data is sufficient for understanding the behavior of the macro economy. The implicit argument is that, at least at the detailed industry level, the assumption of a representative firm or establishment is reasonable.

The finding of tremendous within-industry heterogeneity is not by itself sufficient to justify abandoning this useful assumption. There is undoubtedly considerable canceling out of the impact of idiosyncratic shocks (for example, taste, cost, and technology) that underlie the heterogeneous fortunes across individual producers. Evidence from recent establishment-level studies of em-

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ployment, investment, and productivity growth, however, suggests that this canceling out is far from complete. It is becoming increasingly apparent that changes in the key macro aggregates at cyclical and secular frequencies are best understood by tracking the evolution of the cross-sectional distribution of activity and changes at the micro level.

A number of different factors are potentially important in this context. The observed heterogeneity in output, employment, and investment growth rates within sectors implies a large, continuous pace of reallocation of real activity across production sites. Such reallocation inherently involves substantial frictions. One obvious and important friction is that it is time- and resource-consuming for workers (and for other inputs) to reallocate across production sites. High- and low-frequency changes in key macro aggregates are likely associated with the interaction of these frictions and the pace of reallocation. The level of unemployment, as well as the growth rate of aggregate measures of real activity (for example, real output or productivity), will reflect the efficiency of the economy in accommodating the pace of reallocation. Changes in institutions, regulation, the pace of technological change, and the sectoral mix of activity all may alter the intensity of reallocative activity and the economy's ability to accommodate the reallocation.

Relatedly, it is important to consider the nature of the adjustment costs at individual production sites in changing the scale and scope of activity. Accumulating evidence of lumpy microeconomic adjustment of inputs such as employment and capital suggests the presence of nonconvexities in micro-level adjustment costs, or, at a minimum, it implies highly nonlinear adjustment at the micro level. The combination of nonlinear micro adjustment with micro heterogeneity has important implications for aggregate fluctuations. One key implication is time-varying elasticities of aggregates with respect to aggregate shocks. Roughly speaking, time-varying elasticities arise in this context because the impact of an aggregate shock depends on the distribution of individual producers' relative positions to their adjustment thresholds. From this perspective, characterizing aggregate fluctuations requires tracking how the distribution of shocks and adjustments has evolved.

Job Creation and Destruction

Much of the recent empirical analysis documenting and analyzing the connection between micro heterogeneity and aggregate fluctuations has focused on employment dynamics. My recent work, much of it with Steven J. Davis, focuses on job creation and destruction.[1] Job creation is defined as the sum of employment gains at expanding and new establishments. Job destruction is defined as the sum of employment losses at contracting and closing establishments. In manufacturing (the sector with the most readily available establishment-level data for the longest period), annual job creation and destruction rates are large in absolute terms. In a typical year, roughly one in ten manufacturing jobs is created and one in ten jobs is destroyed. In nonmanufacturing (with spottier information based on tabulations from selected states for relatively short sample periods), job creation and job destruction rates are slightly higher on average.

The large pace of implied job reallocation (measured as the sum of job creation and job destruction) in both manufacturing and nonmanufacturing sectors highlights the remarkable fluidity in the distribution of job opportunities across locations in the U.S. economy. Much of this fluidity reflects shifts within narrowly defined sectors, rather than between sectors. For example, only 13 percent of job reallocation in manufacturing reflects shifts of employment opportunities between four-digit sectors.

One important issue for the relevance of these statistics for aggregate fluctuations is the nature of time-series variation in the pace of job reallocation. In U.S. manufacturing, the pace of job reallocation varies systematically throughout the cycle at annual and quarterly frequencies. During downturns, job destruction rises sharply and job creation falls relatively mildly. Given the observed magnitude and time-series variation of job reallocation, even modest frictions are likely to yield important implications for aggregate fluctuations. In recent years, some economists have begun developing theories to explain the magnitude and cyclical behavior of job (and worker) flows and the connection to aggregate fluctuations.[2] Two types of theories have received the most attention. One treats fluctuations over time in the intensity of allocative shocks as an important driving force behind aggregate fluctuations. The other maintains that aggregate shocks are the primary driving forces underlying business cycles, but that the propagation of aggregate shocks involves intertemporal substitution effects changing the incentives for the timing of reallocation. Of course, there is an important debate about the direction of causality and thus the relative contribution of aggregate and allocative disturbances to aggregate fluctuations.[3] Regardless of the direction of causality, though, the relevant point is that understanding aggregate fluctuations requires tracking how the distribution of microeconomic changes has evolved.

Nonlinear Micro Adjustment

Thus far I have focused on the aggregate consequences generated by the resource- and time-consuming nature of reallocation. A closely related issue is that the adjustment at the individual producer level may be nonlinear. For example, about two-thirds of annual job creation and destruction are accounted for by establishments with growth rates above 25 percent in absolute magnitude. Of this group, plant start-ups account for 12 percent of annual job creation, while plant shutdowns account for about 23 percent of annual job destruction. Thus the distribution of establishment-level employment changes exhibits both considerable heterogeneity and fat tails. The lumpy changes at the micro level in combination with the heterogeneity in turn have consequences beyond those discussed earlier.

Building on the literature about the aggregation of (S,s) models, a useful means of organizing micro data to characterize the interaction of nonlinear micro adjustment and heterogeneity is the adjustment hazard framework. My work with Ricardo J. Caballero and Eduardo M. Engel has used this approach to characterize the micro and macro employment dynamics.[4] Using a measure of the gap between desired and actual employment at the micro level, the adjustment hazard measures the relationship between the size of this gap and the fraction of it that is closed by the establishment. The standard convex adjustment cost model implies a constant (flat) hazard, but our findings using micro data reveal a highly nonlinear hazard, with businesses with large absolute gaps closing a disproportionately high fraction of the gap. The combination of a nonlinear micro hazard and considerable micro heterogeneity in the cross-sectional distribution of the gaps has important implications for aggregate adjustment. Time-varying aggregate elasticities of aggregate employment emerge as the impact of an aggregate shock depends on the underlying cross-sectional distribution at the time of the shock and the endogenous dynamics of the cross-sectional distribution interacting with the nonlinear micro adjustment. Our findings indicate that the marginal responsiveness for employment varies as much as 70 percent over time. Furthermore, the impact of the time-varying marginal response is especially large during recessions; for example, the decline in the 1974–5 recession was 59 percent larger than it would have been in the absence of nonlinear adjustment.

Investment Dynamics

Nonlinearities in the adjustment dynamics of capital, driven by irreversibilities and related nonconvexities in the adjustment costs of capital, have analogous implications for aggregate investment dynamics. Several recent studies of establishment-level investment dynamics support the view that micro investment dynamics exhibit lumpy adjustment. Plant-level investment is dominated by large-scale investment episodes. Denoting these large-scale investment episodes as spikes, Russell Cooper, Laura Power, and I show that the probability of an investment spike is increasing in the time since the previous spike, lending additional support to the view of a microeconomic environment with nonconvexities in the adjustment technology.[5] Using the adjustment hazard approach in this context, my work with Caballero and Engel shows a highly nonlinear relationship between investment and fundamentals.[6] For plants with positive excess capital, the adjustment hazard is quite flat and close to zero, which is consistent with irreversibilities in investment. In contrast, plants with large shortages of capital adjust proportionally more than do plants with small shortages of capital.

As with employment dynamics, the nonlinear adjustment hazard yields time-varying elasticities of aggregate investment with respect to aggregate shocks. For investment, the marginal responsiveness is highly procyclical and varies by as much as 70 percent. The time-varying elasticities suggest a possible explanation for the often-puzzling response of aggregate investment to cost of capital and other shocks. The basic idea is that the empirical aggregate investment literature has difficulty in quantifying the relationship between aggregate investment and the cost of capital because of the failure to incorporate the time-varying responsiveness generated by the interaction of nonlinear micro adjustment and heterogeneity.

Productivity Dynamics

Several of the findings discussed earlier raise a variety of conceptual and measurement questions regarding our understanding of aggregate productivity growth. Several key, related findings are of interest. First, there is large-scale, ongoing reallocation of outputs and inputs across individual producers. Second, the pace of this reallocation varies over time (both secularly and cyclically) and across sectors. Third, much of this reallocation reflects within-sector rather than between-sector reallocation. In addition, recent evidence shows large differentials in the levels and rates of productivity growth across establishments within the same sector. The rapid pace of output and input reallocation along with differences in productivity levels and growth rates are necessary for the pace of reallocation to play an impor-

tant role in aggregate (that is, industry) productivity growth. My recent work with Lucia Foster and C. J. Krizan suggests that reallocation plays a significant role in the changes in productivity growth at the industry level.[7] While measurement-error problems cloud the results somewhat, two aspects of the results clearly point in this direction. First, our results show a large contribution from the replacement of less productive exiting plants with more productive entering plants when productivity changes are measured over five- or ten-year horizons. Second, the contribution of net entry is disproportionate—that is, the contribution of net entry to productivity growth exceeds that which would be predicted by simply examining the share of activity accounted for by entering and exiting plants. These results are particularly striking for selected service-sector industries that we investigate. There is tremendous reallocation of activity across service establishments, with much of this reallocation generated by entry and exit. The productivity growth in the selected service industries we examine is dominated by entry and exit effects. For example, the primary source of productivity growth between 1987 and 1992 for the automobile repair shop industry is accounted for by the exit of very low productivity plants.

[1] *For an overview of this work, see S. J. Davis and J. C. Haltiwanger, "Gross Job Flows," in* Handbook of Labor Economics, *O. Ashenfelter and D. Card, eds.. Amsterdam: North Holland, forthcoming; and S. J. Davis, J. C. Haltiwanger, and S. Schuh,* Job Creation and Destruction, *Cambridge: MIT Press, 1996.*

[2] *See, for example, R. J. Caballero and M. Hammour, "On the Timing and Efficiency of Creative Destruction," NBER Working Paper No. 4768, June 1994; published in* Quarterly Journal of Economics, *111 (August 1996), pp. 805–52; and D. Mortensen and C. Pissarides, "New Developments in Models of Search in the Labor Market," in* Handbook of Labor Economics, *O. Ashenfelter and D. Card, eds. Amsterdam: North Holland, forthcoming.*

[3] *See, for example, S. J. Davis and J. C. Haltiwanger, "Driving Forces and Employment Fluctuations: New Evidence and Alternative Explanations," NBER Working Paper No. 5775, September 1996.*

[4] *R. J. Caballero, E. M. Engel, and J. C. Haltiwanger, "Aggregate Employment Dynamics: Building from Microeconomic Evidence," NBER Working Paper No. 5042, February 1995; published in* American Economic Review, *87 (March 1997), pp. 115–37.*

[5] *R. Cooper, J. C. Haltiwanger, and L. Power, "Machine Replacement and the Business Cycle: Lumps and Bumps," NBER Working Paper No. 5260, September 1995; forthcoming in* American Economic Review.

[6] *R. J. Caballero, E. M. Engel, and J. C. Haltiwanger, "Plant-Level Adjustment and Aggregate Investment Dynamics,"* Brookings Papers on Economic Activity, *2 (1995), pp. 1–39.*

[7] *L. Foster, J. C. Haltiwanger, and C. J. Krizan, "Aggregate Productivity Growth: Lessons from Microeconomic Evidence," NBER Working Paper No. 6803, November 1998.*

East Asian Mysteries: Past and Present

Dani Rodrik*

East Asia has long served as a Rorschach test for economists. The region's spectacular growth from the 1960s until the crash of 1997 spawned diverse interpretations that had as much to do with the preoccupations of the analyst as with the realities on the ground.

Observers with a favorable take on industrial policy saw in East Asia a confirmation of their theories on the importance of state intervention. Advocates of free markets saw instead the triumph of small government and unfettered private initiative. Trade economists viewed it as a miracle based on outward orientation, labor economists stressed the early emphasis on education, and macroeconomists pointed to the region's fiscal conservatism. Growth theorists debated the respective contributions of human capital, physical capital, and technology adoption.[1]

Interpretations of the recent crisis have had a similar quality. Critics of state-led industrialization have blamed East Asian governments for encouraging excessive investments with low marginal returns. Those who worry about moral hazard have focused on "crony capitalism." Economists skeptical of the rationality of international capital markets have viewed the crisis as yet another episode in the boom-and-bust saga of financial markets.

One reason that East Asia has something to offer to all persuasions is the region's diversity. The attitude toward economic policy ranges from the almost laissez-faire (Hong Kong) to the highly interventionist (South Korea, until recently). In terms of the rule of law, the region spans almost the entire feasible range, from Indonesia at one end to Singapore at the other. Japan and Korea are homogeneous societies, while the populations of Indonesia and Malaysia are

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ethnically diverse. Nor has growth performance been uniform: between 1960 and 1994, output per worker expanded at an average annual rate of 5.2 percent in Taiwan, compared with 2.9 percent in Indonesia.[2] Whether it is the miracle or the recent crisis that we are trying to explain, these facts suggest that there is no single East Asian story.

Growth in South Korea and Taiwan

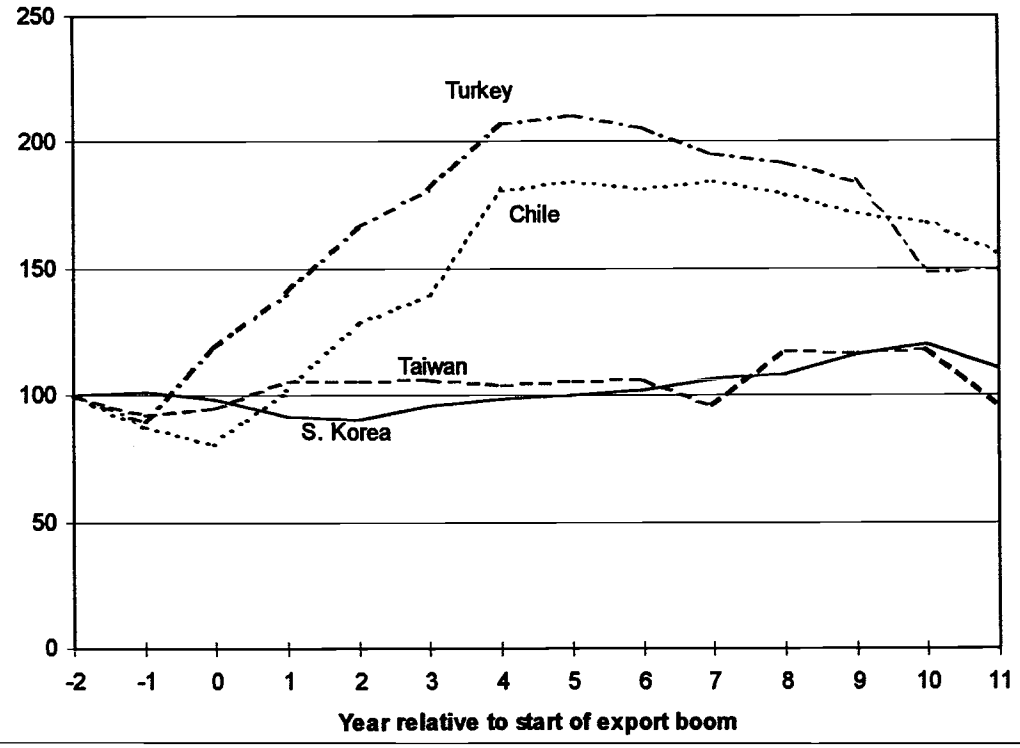
In 1960 South Korea and Taiwan were as poor as many African countries are today. Their remarkable transformation in the three decades that followed is often portrayed as an example of what export-led growth can achieve in countries that chose to open themselves to international trade. That these two countries, along with others in the region, produced sustained export booms is not controversial. Yet there is much more to their story than outward orientation.

Figure 1 shows the relative price of exportable goods in four countries that experienced export booms: South Korea, Taiwan, Turkey, and Chile.[3] Because the timing of the booms differ (early 1960s in Korea and Taiwan, early 1980s in Turkey, and late 1980s in Chile), I have aligned each country's series relative to the start of their respective booms. As the figure reveals, in Turkey and Chile the export booms were accompanied by an increase in the relative profitability of exports of 50 percent or more. By contrast, the Korean and Taiwanese export booms took place despite the absence of a significant change in relative prices. This evidence makes it hard to ascribe East Asian export performance to export incentives, whether in the form of trade liberalization, exchange-rate depreciation, or export subsidies.[4] Moreover, since export/GDP ratios were exceptionally low in both countries early on—below 5 percent in South Korea in 1960 and barely above 10 percent in Taiwan—it is difficult to imagine how exports could account for the takeoff that these economies experienced in the early 1960s.

I interpret the growth experience of the two countries differently, as the result of a coherent investment strategy that was put in place by their governments in the late 1950s (Taiwan) and early 1960s (Korea). We start by noting that both economies benefited from initial levels of schooling that were high relative to the capital stock. The "latent" return to capital, we can presume, was therefore high. For reasons having to do with market failures—among which coordination failures strike me as particularly plausible— private investment needed a push before the latent returns would be realized.[5]

Both governments gave investment a big push. By the end of the 1950s in Taiwan and the early 1960s in Korea, economic growth had become a top priority for the leadership of the two countries. In Taiwan an important turning point was the Nineteen-Point Reform Program instituted in 1960, which contained a

Figure 1
Relative price of exports in four countries experiencing export booms



wide range of tax subsidies for investment and signaled a major shift in government attitudes toward investment. In Korea the chief form of investment subsidy was the extension of credit to large business groups at negative real interest rates. In addition to providing subsidies, the Korean and Taiwanese governments also played a much more direct, hands-on role by organizing private entrepreneurs into investments that they may not have otherwise made. Finally, public enterprises played a very important role in enhancing the profitability of private investment in both countries by ensuring that key inputs were available locally for private producers downstream. Not only did public enterprises account for a large share of manufacturing output and investment in each country, but their importance actually increased during the critical takeoff years of the 1960s.

The result was a discrete jump in the profitability of private investment, and an investment boom that lasted three decades. The rise in exports was a counterpart to the increased demand for capital goods, most of which had to be imported.[6]

The Hong Kong "Exception"

The story of Singapore's development is not unlike that of Korea and Taiwan. There, too, a government strongly committed to economic growth greatly subsidized private investment—and foreign investment in particular—after 1968. But what about Hong Kong? Doesn't Hong Kong's experience with laissez-faire invalidate claims about the importance of government policies in support of industrialization?

Hong Kong's experience is distinctive in the region for another reason as well: Hong Kong is the region's only country that has not had a sustained increase in investment (as a share of GDP) since 1960. In the early 1960s Hong Kong's investment rate fluctuated between 20 and 25 percent (according to Penn World Tables data), well above the levels for Singapore, South Korea, and Taiwan. By the late 1970s all of these countries had surpassed Hong Kong's investment rate, which had not changed at all. The cost (or perhaps the benefit) of not having an industrial policy was a flat investment ratio.

The evidence can therefore be read in one of two ways. One interpretation is that the pro-investment industrial policies of the interventionist countries (South Korea, Taiwan, and Singapore) were on balance harmful, and resulted in large-scale inefficiencies in resource allocation and in marginal investments with low return. These consequences, according to this line of reasoning, in turn show up in comparatively low levels of total factor productivity growth.[7] Another interpretation is that Hong Kong was already a rich country in 1960—with a per capita GDP of 2,200 in 1985 purchasing power parity (PPP) dollars, a level that South Korea and Taiwan would not reach for at least a decade—and therefore much less in need of big-push policies of the type needed in the region's poorer countries. Hong Kong's transition to high investment appears to have taken place during the 1950s, when the island was a haven of stability in the region and a source of attraction for capital flight from China. Under this interpretation, the catch-up process would have been greatly delayed if the other governments of the region —not facing similar advantages— had emulated Hong Kong's laissez-faire policies nonetheless.[8]

Of course a third possibility is that both of these hypotheses are partially right. Perhaps an initial big push was required to override coordination and other market failures, but it was taken too far. Perhaps activist policies were maintained even though they had outlived their usefulness. The Asian financial crisis of 1997 lends some surface plausibility to this story. But we note that most countries of the region, including South Korea, had been liberalizing their economies at least since the 1980s. As I later suggest, it is equally plausible that the crisis was the product of the liberalization of these economies.

Varieties of Crises

In 1979–80 an already-overheated Korean economy was hit by several shocks: an oil price hike, a domestic harvest failure, and a political crisis stemming from the assassination of President Chung Hee Park. The current account deficit stood at 6.8 percent of GDP in 1979 and was to grow to 8.8 percent in 1980. The government was forced to go to the International Monetary Fund for a stand-by loan, and it implemented a major stabilization package in January 1980. The package had three components: a devaluation of the won by 17 percent, tightening of monetary and fiscal policies (which, however, was reversed later in the year as the magnitude of the recession became clearer), and a program aimed at improving energy efficiency in the economy. In 1980 the Korean economy contracted by 5 percent, but growth resumed thereafter, reaching 7 percent in 1981 and staying high throughout the 1980s and 1990s.

The 1980 stabilization was so successful that when the Korean economy was hit by the Asian financial crisis few observers reflected back on this earlier brush with balance-of-payments crisis. By many objective measures the situation had been more difficult in 1979–80: the current account deficit was larger and the

domestic economic and political shocks more severe. Yet the consequences of the current crisis have been more momentous: Korea's GDP has fallen by 7 percent in 1998, and the slide is expected to continue (albeit at a slower pace) in 1999.

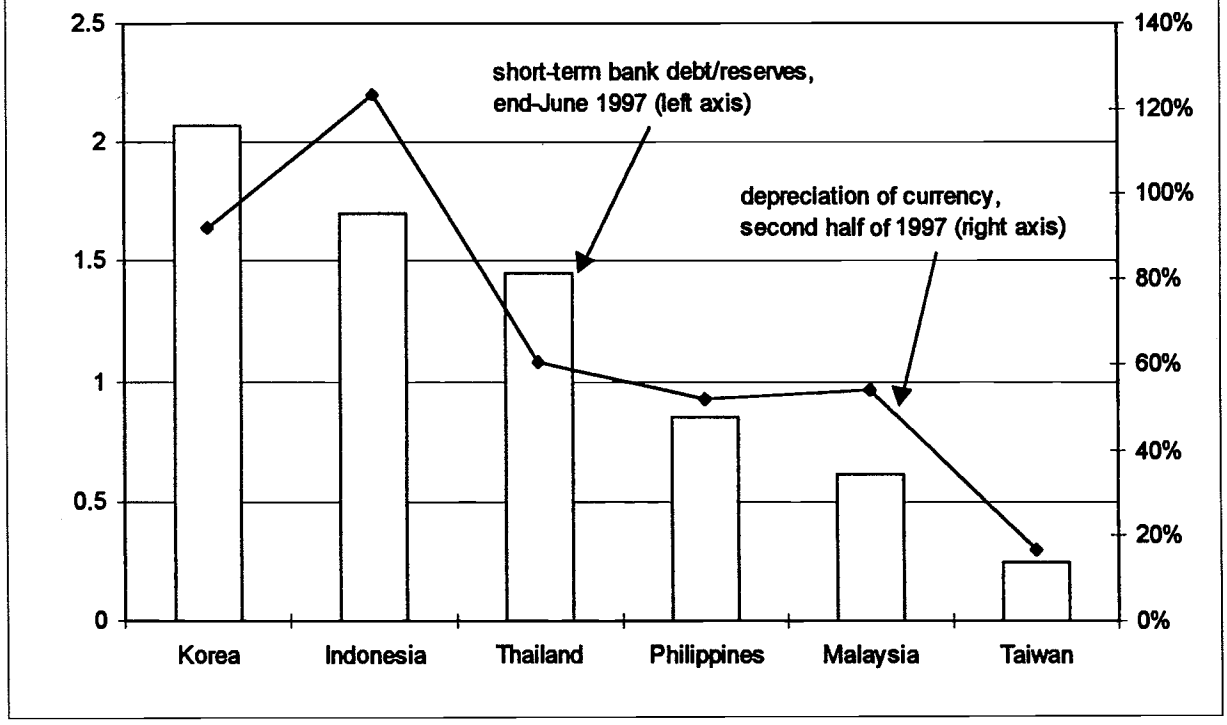
One major difference appears to be the role played by short-term capital flows. In 1979 Korea's short-term debt was around a quarter of its total external debt and fell short of the stock of foreign reserves. In 1997 short-term debt dominated its external liabilities to foreign banks, and the ratio of short-term debt to reserves stood well above 2. What is special about short-term debt in this context is its reversibility and therefore its potential to create panic. As Roberto Chang and Andres Velasco emphasize, the Asian crisis followed the now-typical pattern whereby financial liberalization results in a maturity mismatch between foreign assets and liabilities, eventually giving way to creditor panic.[9] The buildup of short-term debt that financial and capital-account liberalization engendered during the 1990s left the region vulnerable to a reversal in market sentiment and the possibility of stampede. It is perhaps this mistake—more than any other single cause—that accounts for the Asian financial crisis.

This is well illustrated by Figure 2. The figure shows the exposure to short-term debt of six East Asian countries just prior to the crisis (in mid-1997) and the cumulative depreciation of their currencies in the six months following the devaluation of the Thai baht (that is, during the second half of 1997). The three countries worst affected by the crisis (Thailand, Indonesia, and Korea) all had short-term bank debt exceeding their reserves. None was so exposed to short-term bank debt. Moreover, there is a close correlation between the extent of currency collapse experienced by each country and its short-term debt/reserves ratio. The more short-term debt a country had, the greater the penalty it received from currency markets.

There is another interesting regularity revealed by Figure 2. Indonesia and Malaysia have fared worse (not only in terms of currency collapse but also in terms of economic decline) than would have been predicted on the basis of their short-term debt exposure alone. These two countries are the least democratic of the six in the figure. Thus a lesson from the crisis is that democratic societies tend to be better at dealing with the consequences of external shocks. The case of Indonesia, where policymaking was paralyzed by riots, anarchy, and the ultimate downfall of the Suharto regime, illustrates the point in extremis.

Figure 2

Short term debt and currency collapse



The Virtues of Democracy

While democratic institutions are relatively recent in Thailand and Korea, they helped these two countries adjust to the crisis in a number of ways. First, they facilitated a smooth transfer of power from a discredited set of politicians to a new group of government leaders. Second, democracy imposed mechanisms of participation, consultation, and bargaining, enabling policymakers to fashion the consensus needed to undertake the necessary policy adjustments decisively. Third, because democracy provides for institutionalized mechanisms of "voice," in particular by giving labor a seat at the table, the Korean and Thai institutions obviated the need for riots, protests, and other kinds of disruptive actions by affected groups. Finally, democracy lowered popular support for noncooperative behavior by the society's disenchanted groups.

Systematic evidence from an earlier period of external turbulence—the late 1970s and early 1980s—confirms the importance of democracy in fostering economic adjustment. Contrary to conventional wisdom, countries with closed political systems and autonomous executives proved worse at managing the consequences of the oil shocks of the 1970s than countries in which non-elites had access to political institutions.[10] These findings, along with evidence from the recent Asian crisis, underscore the importance of having sound domestic institutions of conflict management in an era of global economic turmoil.

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[1] *For a critique of some of the prevailing interpretations, see D. Rodrik, "King Kong Meets Godzilla: The World Bank and the East Asian Miracle," in* Miracle or Design? Lessons from the East Asian Experience, *A. Fishlow et al., eds. Washington, D.C.: Overseas Development Council, Policy Essay No. 11, 1994.*

[2] *See D. Rodrik, "TFPG Controversies, Institutions, and Economic Performance in East Asia," NBER Working Paper No. 5914, February 1997; published in* The Institutional Foundation of Economic Development in East Asia, *Y. Hayami and M. Aoki, eds. London: Macmillan, 1998. Here I show that the variation in economic performance within the region is well explained by three "exogenous" determinants: initial income, initial education, and quality of institutions (itself a function of ethnic fragmentation and income inequality).*

[3] *The figure is taken from D. Rodrik, "The 'Paradoxes' of the Successful State" (Alfred Marshall Lecture),* European Economic Review *41 (April 1997), pp. 411–42.*

[4] *For a more extensive discussion and a reconciliation with the standard account, see D. Rodrik, "Getting Interventions Right: How South Korea and Taiwan Grew Rich," NBER Working Paper No. 4964, December 1994; published in* Economic Policy, *20 (1995).*

[5] *D. Rodrik, "Getting Interventions Right," D. Rodrik, "Coordination Failures and Government Policy: A Model with Applications to East Asia and Eastern Europe,"* Journal of International Economics *40 (February 1996), pp. 1–22 (revised version of "Do Low-Income Countries Have a High Wage Option?," NBER Working Paper 4451, December 1994).*

[6] *I discuss the conditions under which this process can generate an export boom without a corresponding change in relative prices in favor of exportable goods in D. Rodrik, "Trade Strategy, Exports, and Investment: Another Look at East Asia," NBER Working Paper No. 5339, November 1995; published in* Pacific Economic Review *2 (February 1997), pp. 1–24.*

[7] *An interpretation of Singapore along these lines is provided in A. Young, "A Tale of Two Cities: Factor Accumulation and Technical Change in Hong Kong and Singapore," in* NBER Macroeconomics Annual, *7, O. Blanchard and S. Fischer, eds., Cambridge, Mass.: MIT Press, 1992.*

[8] *D. Rodrik, "TFPG Controversies, Institutions, and Economic Performance in East Asia."*

[9] *R. Chang and A. Velasco, "The Asian Liquidity Crisis," NBER Working Paper No. 6796, November 1998.*

[10] *D. Rodrik, "Where Did All the Growth Go? External Shocks, Social Conflict and Growth Collapses," NBER Working Paper No. 6350, January 1998.*

Economic Analysis of Law

Steven Shavell*

Economic analysis of law involves two elements: prediction of behavior in response to legal rules, assuming that actors are forward-looking and rational, and evaluation of outcomes in relation to well-articulated measures of social welfare. Thus, in its general description, the view adopted in analyzing law is the standard one of economics. Over the past 25 years or so, a relatively small group of individuals has undertaken research in economic analysis of law, but the number of interested individuals and the pace of their work has been growing. What has been accomplished in the field is indicated in a survey I have just written with Louis Kaplow for the next edition of *The Handbook of Public Economics*.[1] A sketch of some of my current research areas will illustrate, I hope, the intellectual appeal of the field of law and economics and also the need for additional work, much of it empirical.

The Amount of Litigation

We constantly encounter the view that the legal system is a very costly social institution, whether measured by the magnitude of legal expenditures, the number of lawyers, or the sheer volume of litigation. This has contributed to a widespread belief that the amount of litigation is socially excessive and has led to various efforts to curb it (for example, by limiting damage awards or adopting no-fault automobile insurance statutes). At the same time, however, we see that some policies (such as legal aid programs) encourage litigation. What can economics say about the social desirability of the amount of litigation that we observe?

The basic answer developed in a number of papers that I have written[2] is that we can have no confidence that the actual amount of litigation activity tends toward the socially desirable—there are what may fairly be called "fundamental externalities" particular to litigation that may lead to too much or too little of it, depending on circumstance. On the one hand, there is a divergence between the private and the social costs associated with use of the legal system: the legal costs that would be incurred by a person who brings suit are only his or her own; they do not include those of the defendant or of the state. This creates a tendency toward overuse of the legal system. On the other hand, there is a divergence between the private benefits from suit—the dollar awards that would be won—and the social benefits associated with suit, inherent in the incentive effects brought about by the threat of suit. This divergence might exacerbate the cost-related tendency toward too much suit that I just noted. For example, the dollar awards that victims can win in suits might be high enough to stimulate much litigation, but at the same time the effect of suit on behavior might be quite low. (The dollar awards that victims of automobile accidents can win generate fully half of our tort litigation, but to what degree does the prospect of suit reduce the incidence of automobile accidents?) The divergence between private and social benefits might also lead to too little litigation, though. Suppose that harm is low relative to litigation costs, making it not worth victims' while to sue. But suppose further that, were suit threatened, there would be a substantial effect on the behavior of injurers. In this circumstance, suit would not be brought even though a regime in which victims would sue (say suit was subsidized or the legal costs were shifted to the injurers) might be socially desirable.

The general consequence of the existence of these underlying, significant differences between the private and the social incentives to use the legal system is that social intervention may be justified, either to discourage litigation or to encourage it, as the case may be. To ascertain what policy would be best, we need more empirical work on the costs of the legal system and its effects on behavior in different domains (such as automobile accidents, medicine, and product liability).

Public Law Enforcement

The general subject of public law enforcement—concerning the choice of degree of enforcement effort (the number of police, IRS agents, and the like), the magnitude of sanctions, and their form (fines versus imprisonment)—is of substantial importance, given the overall scope of government regulation, taxation, and crime in society. I have worked continuously in this area and have recently written surveys of it with A. Mitchell Polinsky.[3] Here are some of the themes that have emerged from the theoretical research on law enforcement.

First, there is a general social advantage to creating desired expected sanctions by using low probabilities of detection in combination with high-in-magnitude sanctions, because low probabilities of detection conserve on enforcement expen-

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ditures. This point, first stressed by Gary Becker, is qualified for many reasons (including the risk aversion of individuals) but remains fundamental and important.

Second, there is an advantage in using fines as sanctions to the maximum extent possible before resorting to imprisonment, because fines (being a transfer of command over resources) are a much cheaper form of social sanction than imprisonment (which involves the operation of the prisons, among other things).

Third, there is an advantage of using fault-based liability over strict liability when sanctions are socially costly to impose—that is, with the use of imprisonment, or with fines when individuals are risk-averse. The advantage is that, under fault-based liability, injurers generally are induced (in the absence of mistakes) to obey fault standards, and therefore they do not ordinarily bear sanctions. Under strict liability, however, injurers are sanctioned whenever they are caught.

These themes have been refined and extended in various ways. For example, I recently worked on so-called self-reporting of violations. One example of this is a firm's reporting to the Environmental Protection Agency that it has mistakenly discharged a pollutant, or an individual's reporting his or her involvement in a traffic accident to the police.[4] Evidently, parties are willing to report themselves because if they do not and are subsequently caught, the sanction often would be higher (the sanction for failing to report a traffic accident, for instance, might be that for hit-and-run driving). There are social advantages to designing sanctions in this way; one is that it saves on enforcement costs, because injurers do not need to be found if they volunteer their identity.

I am also working on another enforcement subject, the theory of corruption of law enforcement officers. Among other things, the theory must confront the question of why corruption is socially undesirable if its deterrence-diluting effect could be offset by an increase in sanctions (which would raise the bribes paid to law enforcers and thus implicitly raise deterrence). This issue, and the optimal way to control corruption through enforcement effort and sanctions, is addressed in my current work on the topic.[5]

Liability Insurance

Liability insurance has been one of this century's most important liability-system developments. Liability insurance fundamentally alters the effect of liability because, when a liable party owns it, he or she does not pay the judgment or settlement out of pocket; the liability insurer pays the judgment. Thus the very existence of liability insurance appears to undermine the deterrent purposes of liability. Indeed, as a consequence of that fear, the sale of liability insurance was resisted for years in many countries (it was never allowed in the former Soviet Union), and today its sale is not allowed against certain types of liability (against punitive damages in certain jurisdictions). At the same time we see that liability insurance, far from being restricted, is often required (drivers must own minimal liability coverage).

These observations about liability insurance raise basic questions about its functioning, social desirability, and optimal regulation, and they were what originally aroused my interest in law and economics. After having devoted much research effort toward analysis of tort law in general, I am now reexamining the subject of liability insurance.[6]

Liability insurance does not vitiate the incentives toward risk reduction that society seeks from the liability system: the direct incentives of the liability system may be translated into the terms of insurance policies. If insurers can monitor risk-reducing actions of those who are insured, then premiums will tend to be reduced in concert with these actions, often leading those who are insured to take them when socially desirable. For example, the owner of a swimming pool might be induced to put a fence around it by the reduction in the liability insurance premium that this effort would occasion. If, however, the risk-reducing actions of those who are insured are not observable to insurers, then for familiar reasons, moral hazard will tend to lead to dulled incentives to reduce risk. But because coverage will tend to be incomplete, positive incentives to reduce risk will still exist.

It turns out (although it is by no means obvious) that the incentives resulting from the operation of the liability-insurance market are socially desirable in an appropriate second-best sense, and that the unencumbered sale of such insurance is desirable, in natural models of the liability system, provided that the parties have assets sufficient to pay for the harm that they might do.

If, however, the parties' assets are less than the harm they might cause, regulation of liability insurance—by either limiting or requiring its purchase—may be socially desirable. To understand why this is so, one should note that, given their lack of assets, risk-averse parties will tend not to purchase full liability insurance coverage, and perhaps none at all, even when it is sold at actuarially fair rates. The reason is that to purchase full coverage against a loss of, say, $1 million when one has only $100,000 in assets is to a great extent to purchase coverage against losses that one would not otherwise have to bear.

Given this bias against purchasing full liability insurance coverage, it might be desirable to mandate full coverage. This would be advantageous if insurers could observe what steps are taken to reduce risk or if insurance rates could discourage high-risk individuals from participating in certain activities. It might also be desirable, however, to have the opposite regulation: to forbid the purchase of coverage. That would be advantageous if insurers are unable to observe risk-reducing behavior. (In such a situation, mandating full coverage would create severe moral hazard.) Making parties expose all their assets to risk, rather than only a fraction of them (were they otherwise to purchase limited coverage), would increase incentives to reduce risk.

To understand when and how to regulate liability insurance, these points need to be explored, and data needs to be developed and analyzed on the nature of the judgment proof problem and of liability insurance coverage in various areas of risk.

Reward Systems as Alternatives to Patents and Copyrights

Another of my research interests is the basic alternative to intellectual property rights, which is a system of rewards. Under a reward system, innovators would be paid directly by the government for innovations—possibly on the basis of sales—and innovations would pass immediately into the public domain. Thus the author of a book would not receive a copyright but rather a payment from the government, calculated from sales of the book (perhaps together with other indicia of value). The book, being freely available to all publishers, would sell at production cost.

It turns out that reward systems were used to a fair extent in England in the late 1700s and the 1800s. Moreover, in the 1860s and 1870s, reward systems figured in one of the most intensive public-policy debates in the economics profession; they were discussed everywhere by economists—in articles, books, and pamphlets and at conferences. At that time the patent system had come under strong attack throughout Europe and was considered likely for repeal (Otto von Bismarck had recommended repeal in Prussia, and England had set up reform commissions); in some countries (Holland and Switzerland, for instance) the patent system was actually rejected for a period. Obviously the patent system ultimately won out, and the entire subject of rewards as a fundamental alternative to intellectual property rights has almost disappeared from economists' sight.

The chief virtue of a reward system, relative to copyright and patent, is that a reward system engenders incentives to innovate without conferring monopoly power on innovators. (Another virtue of a reward system is that improvements of innovations cannot be blocked by original innovators, since by definition such innovators have no intellectual property rights to their innovations.) A principal difficulty with a reward system, though, is the information that government requires to calculate rewards. Tanguy van Ypersele and I conclude in our model of innovation that intellectual property rights do not possess a fundamental social advantage over reward systems; either system could be better, depending on the circumstance.[7] Moreover, we show that a properly designed optional reward system—under which innovators choose between rewards and intellectual property rights—is unambiguously superior to intellectual property rights. An optional system is also politically feasible because industry would have nothing to fear from it, since an innovator could always choose to enjoy intellectual property rights in an innovation.

In view of the potential gains that might be obtained from eliminating monopoly pricing of many patented and copyrighted goods (consider the price versus the marginal cost of producing software and pharmaceuticals, or showing movies), the subject of rewards, and especially of optional rewards, seems worthy of renewed attention by economists.[8]

Welfare Economics versus Notions of Fairness in Normative Analysis of Law

The framework of welfare economics is very different from that used by legal academics (and, indeed, by virtually anyone who is not an economist) in evaluating the social desirability of laws. For example, in ascertaining the social desirability of a legal rule governing liability for accidents, economists usually would focus on such factors as the effect of the rule on accident frequency, litigation costs, the allocation of risk-bearing, and the distribution of income. By contrast, the noneconomic views would also generally place substantial weight on various notions of fairness. In choosing a liability rule for accidents, the noneconomic views typically would accord significant importance to such notions as whether corrective justice demands that negligent injurers pay victims.

What can be said about the way in which the noneconomic views are used by legal academics and about their relationship to welfare economics? Kaplow and I are working on a series of papers on this topic.[9] We stress the following major themes.

First, the noneconomic views are essentially used reflexively, even though very basic questions about

their applicability often are not recognized. For example, how are the demands of corrective justice affected by the possibility that wrongdoers may own liability insurance and thus in fact often do not pay their judgments? Or by the possibility that victims do not need compensation because they own first-party insurance? Or by the possibility that litigants are not people but faceless organizations? These matters aside, how are the demands of corrective justice to be weighed against the incentive effects of liability, litigation costs, and the like? We cannot find real answers to such questions (and it is unusual for them even to be noted) in the writing of legal academics and philosophers.

Second, notions of fairness are deemed to be important without apparent regard for the degree to which individuals actually care about them. Thus a noneconomic view might hold that the negligence rule, and not strict liability, should govern liability because the negligence rule is fairer than strict liability, seemingly even if not a single person in the population considers the negligence rule fairer. The noneconomic views thus appear to be in fundamental tension with individualistic social welfare functions, and implicitly to raise conflicts with Pareto optimality.

We conclude that in evaluating legal policy, the framework of welfare economics should be relied on exclusively, meaning that notions of fairness should not be accorded importance in their own right. Although this conclusion may seem extreme, its full articulation makes clear that it is not really so. It certainly accommodates the belief that it is socially desirable for individuals to have, and to be instilled with, the set of moral views that we think good (keeping promises and the like), for these lead to behavior that advances social welfare in various respects. And our conclusion also accommodates the belief that we in fact consider it important to adhere to many moral views. What is ruled out is that the policymaker give importance to any conception of morality or fairness in addition to the importance that individuals themselves attach to these notions.

Although the issues we examine in drawing our conclusions involve, in many respects, age-old philosophical debates that might not seem fruitful to discuss, we think they need to be confronted carefully and related to the framework of welfare economics, because of their influence on actual legal policy.

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[1] *L. Kaplow and S. Shavell, "Economic Analysis of Law," NBER Working Paper No. 6960, February 1999.*

[2] *S. Shavell, "The Social versus the Private Incentive to Bring Suit in a Costly Legal System,"* Journal of Legal Studies, *11 (2), (June 1982), pp. 333–9; "The Fundamental Divergence between the Private and the Social Motive to Use the Legal System,"* Journal of Legal Studies, *26 (2), (June 1997), pp. 575–612; "The Level of Litigation: Private versus Social Optimality,"* International Review of Law and Economics, *forthcoming.*

[3] *A. M. Polinsky and S. Shavell, "Public Enforcement of Law," in* The New Palgrave Dictionary of Economics and the Law, *Vol. 3, Peter Newman, ed. New York: Stockton Press, 1998; and "The Economic Theory of Public Enforcement of Law," NBER Working Paper No. 6993, March 1999.*

[4] *L. Kaplow and S. Shavell, "Optimal Law Enforcement with Self-Reporting of Behavior," NBER Working Paper No. 3822, August 1994; published in* Journal of Political Economy, *102 (3), (June 1994), pp. 583–606.*

[5] *A. M. Polinsky and S. Shavell, "Corruption and Optimal Law Enforcement," NBER Working Paper No. 6945, February 1999.*

[6] *Much of my work in tort law is summarized in S. Shavell,* Economic Analysis of Accident Law, *Cambridge: Harvard University Press, 1987. My work on liability insurance is contained in S. Shavell, "On Liability and Insurance,"* Bell Journal of Economics, *13 (1), (Spring 1982), pp. 120–32; "The Judgment Proof Problem,"* International Review of Law and Economics, *6 (1), (June 1986), pp. 45–58; and "Liability Insurance: Its Social Desirability and Optimal Regulation," which I will be presenting as the 25th annual lecture for the Geneva Association on Risk and Insurance.*

[7] *S. Shavell and T. van Ypersele, "Rewards versus Intellectual Property Rights," NBER Working Paper No. 6956, February 1999.*

[8] *A recent proposal contained in M. Kremer, "Patent Buyouts: A Mechanism for Encouraging Innovation," NBER Working Paper No. 6304, December 1997; published in* Quarterly Journal of Economics, *113 (4), (November 1998), pp. 1137–68, may be interpreted as a particular way of implementing an optional reward system.*

[9] *L. Kaplow and S. Shavell, "Fairness versus Welfare Economics in Normative Analysis of Law," unpublished paper, Harvard University, 1999.*

The Economics of GATT

Robert W. Staiger*

The General Agreement on Tariffs and Trade (GATT) is an important institution. Established in 1947 to encourage the reduction of trade barriers among its 23 member countries, GATT (and now its successor, the World Trade Organization—WTO) has grown in membership to a roster that currently exceeds 125 countries. The expanding GATT membership reflects the success that this organization has had in facilitating multilateral tariff liberalization. As a consequence of the eight negotiating rounds that GATT has sponsored, the average ad valorem tariff on industrial goods has fallen from over 40 percent to below 4 percent. In light of its significance for the world economy, an important question for economists is whether a theoretical interpretation of GATT and its main features can be provided. Much of my recent research has been an attempt to answer this question, by seeking answers to four sets of related questions.

First, a most basic question: Why do governments bother to negotiate trade agreements? After all, major policy decisions are routinely made by governments without consulting their trading partners. If a government wishes to reduce its trade barriers, why must it wait for a trading partner to reach the same conclusion? Second, given that governments do choose to negotiate trade agreements with one another, what do they hope to accomplish in agreeing to a prior set of rules by which negotiations are to proceed and outcomes abide? These rules, which are contained in the articles of GATT, remain largely a mystery to economists. How do these rules affect trade bargaining outcomes, and why would governments choose to adopt them? Third, how are these agreements enforced, and how do the limits of enforcement shape the features of GATT? And finally, can the same set of principles on which postwar multilateral liberalization has been based be applied to the host of "new" trade policy issues (for example, labor and environmental standards) currently before the WTO? This article describes my research on each of these questions.

Why Negotiate Trade Agreements?

What do governments achieve when they negotiate a trade agreement? Because trade negotiations are voluntary, each government should gain as a result of them, and this is possible only if there exists an inefficiency (relative to the governments' own preferences) that the negotiations can correct. What, then, is the source of the inefficiency that a trade agreement can correct? My research points to two possibilities.

First, governments may face credibility problems, and view trade agreements as a means by which to make policy commitments relative to their own private sectors. In joint work,[1] Guido Tabellini and I have explored the inefficiencies that can arise if the unilateral trade liberalization announced by a government is not deemed credible by its private sector. We provide some empirical evidence in support of the general position that commitments made in a trade agreement can bolster the credibility of trade policy decisions. Our empirical investigation studies U.S. tariff choices, and exploits the fact that trade policy in the United States is implemented in a variety of institutional environments. One environment that we examine is the Tokyo Round of GATT negotiations, and in particular the decision by the United States to exclude certain industries from the across-the-board tariff cuts negotiated in that round. The other is the decision by the United States to grant protection to certain industries through GATT's "escape clause" (under which a government may temporarily "escape" from its GATT commitments). We observe that in each environment the U.S. government had to decide whether to address distributional concerns by granting costly tariff increases (or forgoing beneficial tariff reductions), but that only in the former environment did GATT rules and procedures place explicit constraints on the ability of the U.S. government to subsequently reverse its decision. Therefore, only in the former environment could GATT rules serve as a potential commitment device relative to the private sector. Comparing decisions made across these two environments, we find that GATT rules did help the U.S. government make domestic trade policy commitments, for example by allowing the decision to protect to be more responsive to the cost of the production distortions that would arise as a consequence of that decision. This supports the view that GATT's rules indeed can enhance the credibility of trade policy decisions, and it suggests one possible answer to the question posed earlier: trade agreements can help governments make commitments to reduce their own trade barriers.

But this question also has a common sense answer that every trade

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policy practitioner knows: governments negotiate trade agreements not because they wish to reduce their own trade barriers but because they seek to reduce the trade barriers imposed by their trading partners, and they are willing to "pay"—with market access "concessions" of their own—for the enhanced access to foreign markets that lower foreign barriers would bring. According to this view, the real question for economists is, must this behavior be interpreted as reflecting an irrational mercantilist distraction, or can it be understood with sound economic principles? The answer to this question has serious implications for the study of GATT as an institution: if the behavior of trade negotiators makes no sense on any level, then there can be no internal logic to GATT, since this behavior is woven into the very fabric of GATT law and practice.

In joint work,[2] Kyle Bagwell and I have shown that there is a deeper economic logic behind this seemingly irrational behavior, and that it is tied to the terms-of-trade motivations familiar from the classic work of Harry G. Johnson.[3] Moreover, this logic is very general; it applies, for example, to each of the leading political economy models of trade policy (and is in fact the only reason that governments might wish to negotiate a trade agreement in these models). The logic itself is very simple, and can be described in intuitive terms, once it is observed that the terms-of-trade effects of a government's policy choices refer simply to its ability to shift the costs of its policies onto trading partners. This cost-shifting will occur if some of the incidences of a government's policies are borne by foreign exporters. Thus, for example, when a domestic government offers protection to an import-competing industry, some of the costs of that protection will be shifted abroad if foreign exporters accept lower export prices for their sales in the domestic market. When such cost-shifting occurs, governments will likely make distorted policy choices, as they do not bear the whole cost of their decisions. Consequently, from the perspective of cost-shifting, terms-of-trade effects represent a natural source of inefficiency associated with unilateral policy decisions. At the same time, these effects can help to provide an economic explanation for the mercantilist orientation of actual negotiations; they imply that each government is right to pin its hopes for a beneficial outcome of negotiations on its ability to gain enhanced access for its exporters to the markets of its trading partners. Moreover, as we discover in subsequent work, viewing the central "problem that trade agreements can solve" as a terms-of-trade-driven prisoners' dilemma reveals a simple logic to a number of GATT's key principles. These are discussed in the next section.

Why Adopt a "Rules-Based" Approach to Negotiations?

If GATT were simply the codification of a set of negotiated tariffs, would governments have been able to achieve the same degree of success in liberalizing trade barriers over the postwar period? This is a counterfactual situation that we can never observe, but economic theory—together with a knowledge of the institution—can help to provide an answer. Of course GATT is not an agreement to operate at a particular point on the efficiency frontier. Rather, it is a negotiating forum, membership in which carries an obligation to abide by a set of rules under which future negotiations can occur and future conduct will be judged.[4] While these rules are laid out in a series of GATT Articles, the pillars of GATT are the principles of reciprocity and nondiscrimination (most favored nation, or MFN), and that enforcement mechanisms form the heart of the GATT system. I will discuss reciprocity and MFN here, leaving issues of enforcement for the following section.

The principle of reciprocity is a GATT norm under which one country agrees to reduce its level of protection in return for a reciprocal concession from its trading partner. At the broadest level, this principle refers to the "ideal" of mutual changes in trade policy that bring about equal changes in import volumes across trading partners. The principle of nondiscrimination is a separate norm, under which a member government agrees that any tariff applied to the exports of a given product from one trading partner will apply equally to the exports of that product from all other trading partners. Do the principles of reciprocity and nondiscrimination serve governments as simple rules of negotiation that promote efficiency, by "undoing" the terms-of-trade-driven inefficiency that arises in the absence of an agreement? My joint work with Bagwell[5] suggests that they do.

Specifically, our work identifies at least two roles that these tandem principles can play in aiding governments as they seek to implement efficient trade agreements. First, these principles can help direct bargaining outcomes toward the tariffs that each government would have chosen had it ignored its ability to shift the costs of its protection onto trading partners through terms-of-trade effects (for example, if governments sought to maximize national income with their tariff choices, this would correspond to multilateral free trade). This feature in turn can encourage weaker countries to participate in GATT negotiations without fear of exploitation by their stronger, bigger trading

partners. Second, these principles can help to protect the value of market access concessions won by a government in a current negotiation from being eroded in a future bilateral negotiation to which it is not a party. This feature can serve to facilitate the efficient exchange of market access concessions between countries, by reducing or eliminating the potential for opportunistic bilateral agreements in the future. Each of these roles arises from basic properties of reciprocity and MFN—namely, that mutual changes in trade policy conforming to reciprocity will stabilize the terms of trade, and that MFN tariffs will ensure that all countries can trade on the same terms (face the same set of exporter prices). Together, these properties serve to neutralize the terms-of-trade motives for trade policy intervention. Consequently, as we establish in our papers, when the fundamental inefficiencies that governments seek to correct with a trade agreement arise as a result of incentives to shift costs through terms-of-trade movements, these properties create a negotiating environment with the desirable features noted earlier. These papers point out that preferential agreements—which are by their nature discriminatory—can interfere with these desirable features, to the detriment of the multilateral trading system.

How Are Trade Agreements Enforced?

As there is no "world jail," an international agreement must be self-enforcing if it is to be credible, and GATT is no exception. As a result, GATT must (and does) attempt to specify credible retaliatory measures against any country that places additional restraints on trade in a way that violates the agreement. This amounts to maintaining a balance between the short-term temptation to deviate unilaterally from an agreed-on trade policy and the long-term penalty of a consequent future loss of cooperation (that is, the cost of a future retaliatory "trade war"). Viewed in this way, it is evident that any event that alters the current temptation to cheat or the value of maintaining cooperation into the future can alter this balance, and consequently the enforceable level of cooperation may change through time. In a number of papers[6] Bagwell and I have built on this observation to evaluate and interpret several of GATT's features, including its escape-clause provisions and the impacts of preferential agreements on sustainable multilateral tariff cooperation.

In one paper[7] I argue that enforcement concerns in a nonstationary world may help to explain the degree to which GATT's liberalization process has spread over time. I show that an initial round of liberalization can set in motion changes in an economy's resource allocation that eventually lead to a relaxation of enforcement constraints, creating the possibility of sustaining a further round of liberalization as the process continues toward the efficiency frontier. It is encouraging for the prospects of reciprocal trade liberalization in a world of limited international enforcement power that the liberalization process can gather momentum and sow the seeds of further liberalization. It suggests that such limits need not keep the world permanently away from the efficiency frontier. But there is a more ominous side to this observation: anything that interrupts the expected future progress of the liberalization process may negatively affect the ability to sustain the liberalization that has been achieved already. This notion embodies the core feature of what has come to be known informally as the "bicycle" theory of GATT liberalization ("If you don't keep pedaling, you will fall off"). It emerges naturally when GATT's liberalization is considered from the perspective of a self-enforcing agreement.

Can GATT's Principles Be Applied to "New" Trade Policy Issues?

GATT is certainly not perfect, but most observers agree that its principles have worked remarkably well to liberalize world trade. Can these principles also be applied to the variety of new issues before the WTO? A number of these issues, such as agreements on labor and environmental standards, would extend GATT's reach well beyond traditional trade policy matters, and as such appear to encroach on traditional limits of national sovereignty. This raises fundamental questions about the structure of international economic relations among sovereign states. Therefore, an important analytical question concerns the minimal range of policies over which international negotiations must proceed if global efficiency is to be achieved.

In recent work[8] Bagwell and I have begun to explore such questions by investigating how domestic labor standards might be handled in the GATT/WTO. We consider several approaches to the treatment of domestic labor standards within a trade agreement. First we show that the "benign neglect" of labor standards within a trade agreement will result in inefficient choices for both trade barriers and labor standards, much as labor interests and social activists have claimed. However, we also show that direct negotiations over labor standards are not required to reach efficient outcomes. Instead, we describe GATT rule changes that in principle could allow governments to achieve efficient policy outcomes while continuing to negotiate over tariffs alone, thereby preserving a

degree of national sovereignty over traditionally domestic policy choices. The required rule changes would extend the logic of reciprocity as currently contained in GATT to the choice of domestic labor standards. But there is an important distinction between the GATT rule changes we suggest and the changes that have been proposed in recent WTO discussions—namely, the formal inclusion of a "social clause" that would permit restrictions to be placed on imports from countries not complying with a specified list of minimum standards. These proposed changes would allow governments to raise import restrictions in response to the weak labor standards of their trading partners. In contrast, the changes suggested by our analysis would instead allow governments to raise import restrictions in exchange for tightening their own labor standards. This reorientation, linking the permissible level of import protection in GATT to one's own labor standards rather than the labor standards of one's trading partners, is the paper's central message for the application of GATT's principles to the new trade policy issues.

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[2] *K. Bagwell and R. W. Staiger, "Reciprocal Trade Liberalization," NBER Working Paper No. 5488, March 1996.*

[3] *H. G. Johnson, "Optimum Tariffs and Retaliation,"* Review of Economic Studies *1 (2), (1953–4), pp. 142–53.*

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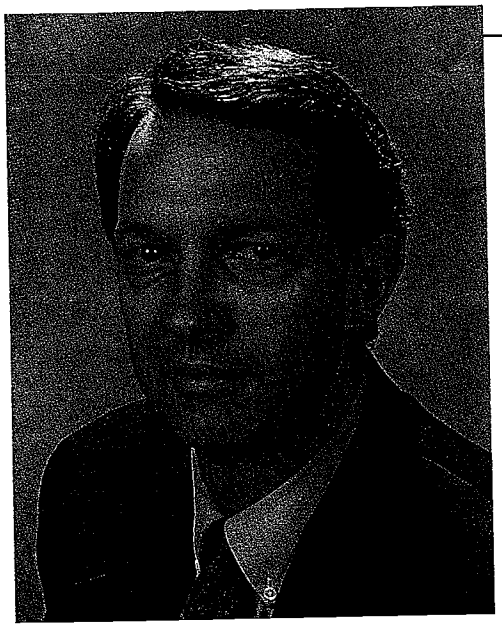
[7] *R.W. Staiger, "A Theory of Gradual Trade Liberalization," in* New Directions in Trade Theory, *A. Deardorff, J. Levinsohn, and R. Stern, eds. Ann Arbor: University of Michigan Press, 1995.*

[8] *K. Bagwell and R. W. Staiger, "The Simple Economics of Labor Standards and the GATT," NBER Working Paper No. 6604, June 1998; published in* Social Dimensions of U.S. Trade Policies, *A. V. Deardorff and R. M. Stern, eds. Ann Arbor: University of Michigan Press, forthcoming.*

NBER Profile: *John C. Haltiwanger*



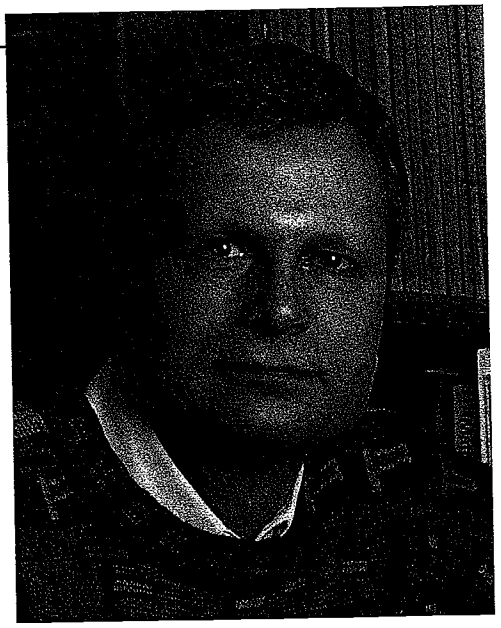
John C. Haltiwanger has been a Research Associate in the NBER's Programs on Economic Fluctuations and Growth and on Productivity since 1996 and a professor of economics at the University of Maryland since 1990. He received an Sc.B. in applied mathematics and economics from Brown University in 1977 and a Ph.D. in economics from the Johns Hopkins University in 1981.

From 1981–6, Haltiwanger was an assistant professor of economics at the University of California, Los Angeles. In 1986, he became an associate professor of economics at the Johns Hopkins University, and in 1987 he joined the Maryland economics department as an associate professor.

Haltiwanger has also served as Chief Economist at the U.S. Bureau of the Census since 1997. He is the author of numerous journal articles and working papers. He is also a co-author (with Steven Davis and Scott Schuh) of *Job Creation and Destruction*, published by the MIT Press in 1996, and a co-editor (with Marilyn Manser and Robert Topel) of *Labor Statistics Measurement Issues*, published by the University of Chicago Press in 1998.

Haltiwanger enjoys running, reading, and playing with his two children, Meagan and John.

NBER Profile: *Dani Rodrik*



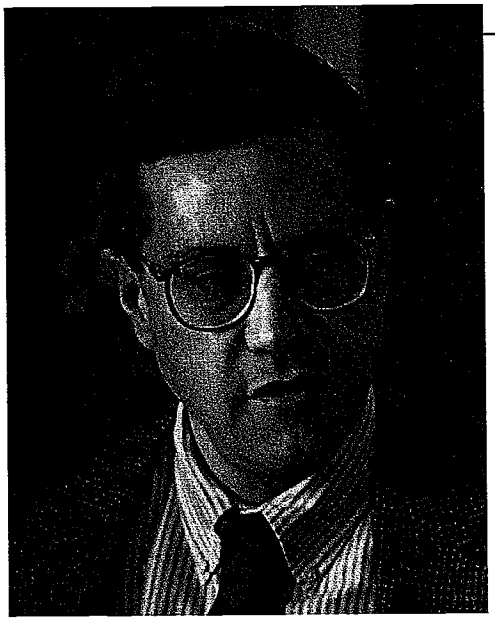
Dani Rodrik is a Research Associate in the NBER's Programs on International Trade and Investment and on International Finance and Macroeconomics and the Rafiq Hariri Professor of International Political Economy at the John F. Kennedy School of Government at Harvard University. He holds an A.B. from Harvard and an MPA and Ph.D. from Princeton University.

Rodrik is a senior advisor to the Overseas Development Council and an advisory committee member of the Institute for International Economics and the Economic Research Forum for the Arab Countries, Iran, and Turkey. A former Olin Fellow at the NBER, Rodrik has also held the Hoover Institution National Fellowship and the World Bank McNamara Fellowship. He was previously a professor of economics and international affairs at Columbia University.

Rodrik is the author of *Has Globalization Gone Too Far?* (1997), which was named one of the most important economic books of the decade by *Business Week* magazine. He is also joint editor of the *Journal of Policy Reform*. His current research interests include the consequences of international economic integration, the role of conflict-management institutions in determining economic performance, and the political economy of policy reform.

A native of Istanbul, Turkey, Rodrik now lives in Newton, Massachusetts with his wife and two daughters.

NBER Profile: *Steven Shavell*

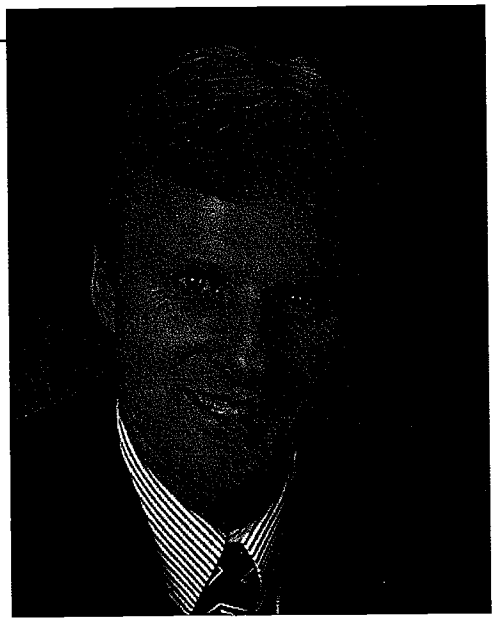


Steven Shavell directs the NBER's Program on Law and Economics, is a professor of law and economics at Harvard Law School, and is Director of the John M. Olin Center for Law, Economics, and Business at Harvard University. He received his B.A. from the University of Michigan in 1968 and his Ph.D. from MIT in 1973 after serving in the Public Health Service from 1968–70.

Shavell taught in the economics department at Harvard until 1980, when he moved full time to Harvard Law School. His research focuses on economic analysis of the basic areas of law—tort, property, contract, and criminal—and on litigation. A Guggenheim Fellowship recipient in 1983–4, Shavell has been a visiting professor at the University of Chicago. He is also a Fellow of the Econometric Society.

Shavell has two grown children and enjoys watching television in his leisure time.

NBER Profile: *Robert W. Staiger*



Robert W. Staiger has been an NBER Research Associate since 1989 and is a member of the Program on International Trade and Investment. He is also a Professor of Economics at the University of Wisconsin.

Staiger received his A.B. from Williams College and his Ph.D. from the University of Michigan. He was an Assistant Professor of Economics at Stanford University from 1985 through 1991, was promoted to tenured Associate Professor in the spring of 1991, and then joined the Wisconsin economics department in 1993. He was also a Senior Staff Economist at the Council of Economic Advisers during 1991–2 and a Fellow at the Center for Advanced Study in the Behavioral Sciences during 1996–7.

Staiger has been a Co-Editor of the *Journal of International Economics* since 1995 and an Associate Editor of the *American Economic Review* since 1998. His research interests include theoretical and empirical analysis of international trade policy rules and institutions (GATT and the WTO) and cartel behavior among firms.

Staiger lives in Madison, Wisconsin with his wife (and 5th grade classmate), Sally, a physician in pulmonary medicine. They have three children: Becky, 11; Matt, 8; and Hannah, 6. When he is not coaching soccer, attending piano recitals, reading Dr. Seuss, playing his trombone, or hitting tennis balls to their yellow Lab, Molly, Staiger is either working or sleeping.

Conferences

Inter-American Seminar on Economics

The NBER held its Eleventh Annual Inter-American Seminar on Economics in Rio de Janeiro on December 3–5. Sebastian Edwards, NBER and University of California, Los Angeles, and Afonso Bevilaqua and Marcio Garcia, PUC-Rio, organized this year's program.

Adolfo Barajas, International Monetary Fund, and **Roberto Steiner** and **Natalia Salazar**, Fedesarrollo, "Interest Spreads in Banking: Costs, Financial Taxation, Market Power, and Loan Quality in the Colombian Case, 1974–96"

Discussants: Marco Bonomo, PUC-Rio, and Ashoka Mody, World Bank

Sebastian Edwards, "Interest Rate Volatility, Capital Controls, and Contagion" (NBER Working Paper No. 6756)

Discussants: Renato Flores, EPGE/FGV, and Federico Sturzenegger, Universidad Torcuato di Tella

Julio Santaella, ITAM, and **Masao Ogaki**, Ohio State University, "The Exchange Rate and the Term Structure of Interest Rates in Mexico"

Discussants: Ernesto Schargrodsky, Universidad Torcuato di Tella, and Ernesto Talvi, CERES

Michael P. Dooley, Federal Reserve Board, "Debt Management and Crises in Developing Countries"

Discussants: José De Gregorio, University of Chile, and Rogerio Werneck, PUC-Rio

Anne O. Krueger, NBER and Stanford University, and **Aaron Tornell**, NBER and Harvard University, "Recovery from Crisis: The Role of Bank Restructuring" (NBER Working Paper No. 7042)

Discussants: Renato Fragelli, EPGE/FGV, and Gerard Caprio, Jr., World Bank

Liliana Rojas-Suarez, Deutsche Bank, "Understanding the Behavior of Bank Spreads in Latin America"

Discussants: Albert Fishlow, Council on Foreign Relations, and Sergio Werlang, EPGE/FGV

Gerard Caprio, Jr., "Banking on Crisis: Expensive Lessons from Recent Financial Crises"

Discussants: Fernando Holland de Barbosa, IBMEC, and Julio Santaella

Afonso Bevilaqua and **Mario Garcia**, "The Brazilian Banking Sector and the Macroeconomic Responses to the Recent International Financial Crises"

Discussants: Michael P. Dooley and Affonso Celso Pastore, USP

Barry Eichengreen, NBER and University of California, Berkeley, and **Ashoka Mody**, "Banks or Bonds: Comparing Bank and Bond Loan Spreads in Emerging Markets"

Discussants: Eduardo Fernandez Arias, Inter-American Development Bank, and Aaron Tornell

Jose De Gregorio, **Sebastian Edwards**, and **Rodrigo Valdes**, Central Bank of Chile, "Capital Controls in Chile: An Assessment"

Discussants: Adolfo Barajas, and Jose Carlos Dos Reis Carvalho, Bank of Pareual

Ernesto Schargrodsky, and **Federico Sturzenegger**, "Concentration and Competition in the Financial Sector"

Discussants: Liliana Rojas-Suarez, and Roberto Steiner

Barajas, Steiner, and **Salazar** examine the determinants of the high intermediation spread observed in the Colombian banking sector for more than two decades. They estimate an equation based on a bank profit maximization model that permits a decomposition into operational costs, financial taxation, market power, and loan quality. Although the average spread did not change between the preliberalization (1974–88) and postliberalization (1991–6) periods, its composition did, with market power significantly reduced and the responsiveness to loan quality increased. Colombia's progress in reducing operational costs and financial taxation and improving loan quality will determine whether it can narrow the spread.

Edwards uses high-frequency data on short-term, nominal interest rates during the 1990s in Argentina, Chile, and Mexico to analyze whether volatility contagion has spread from Mexico to the two South American nations. His results indicate quite strongly that while there has been volatility contagion from Mexico to Argentina, there has been no volatility contagion from Mexico to Chile. His results also indicate, however, that with the exception of a brief period in 1995, nominal interest rates have been more volatile in Chile than in Argentina. His results also indicate that interest-rate differentials with respect to the United States have

tended to disappear somewhat slowly in both Chile and Argentina. Moreover, after capital controls on capital inflows were imposed for Chile, interest-rate differentials there became more sluggish and tended to disappear more slowly than during the free-capital mobility period.

The Bank of Mexico relies primarily on the control of the overnight interest rate in conducting its monetary policy. Is this extremely short-term interest rate the relevant instrument for achieving exchange rate objectives? Theory suggests that the relationship between the exchange rate and the term structure of interest rates can be complicated and counterintuitive when investors are risk averse. **Santaella** and **Ogaki** investigate the effect of the term structure of interest rates on the exchange rate for Mexico. This information could be useful in helping analysts to understand and manage the operation of the Mexican floating exchange rate regime.

Governments participate in financial markets in many ways that are thought to improve the public welfare. Recent financial crises in developing countries, however, suggest that a government's periodic inability to renegotiate debt on terms that it finds acceptable generates costly reductions in real output, investment, and consumption. In this environment, optimal debt and asset management balances the benefits from a government's financial intermediation with the costs of associated crises. **Dooley** presents a preliminary theoretical framework for evaluating this trade-off.

Krueger and **Tornell** analyze the evolution of the Mexican economy between 1995 and 1998. The remarkable quick recovery seen in aggregate activity has not been uniform across the economy. The tradable sector has grown strongly, while the nontradable sector has recuperated sluggishly. This asymmetric response is intimately linked with the severe credit crunch that Mexico has experienced since 1995. Although domestic bank lending dried up, tradable firms obtained financing in the international capital market. This was not the case in the nontradable sector. Concomitant with the credit crunch is the steady increase in the share of nonperforming loans. The authors analyze the reasons for this increase and the rationale for the partial bailout policy adopted in 1995, and investigate why this policy did not solve the banking problem.

What caused the epidemic of financial crises in the last two decades of the twentieth century, and what steps can be taken to minimize countries' vulnerability? **Caprio** argues that although a variety of proximate factors contribute to financial crises, information and incentive problems are the fundamental determinants. He then develops a scoring system for the regulatory environments of a dozen Asian and Latin American financial systems in 1997, and finds that the Asian economies in crises have the lowest scores. Economies with high scores saw relatively little impact from financial crises. The scoring system also provides a guide for how countries might prioritize improvements in their regulatory environment.

Eichengreen and **Mody** analyze the determinants of spreads on syndicated bank lending to emerging markets, treating the loan-extension and pricing decisions as jointly determined. They use a dataset of some 7,000 bank loans to emerging-market borrowers in the 1990s. They find that the syndicated bank loan market is more stable across regions and over time than the international bond market. Its large number of small loans, as compared with the relatively large issues that dominate the bond market, highlight the role of international banks in providing credit to smaller borrowers about whom information is least complete.

De Gregorio, Edwards, and **Valdés** analyze the effectiveness of capital controls using the example of the Chilean experience with the unremunerated reserve requirement. They examine the effects on interest rates, the real exchange rate, and the volume and composition of capital inflows and show that the unremunerated reserve requirement may have allowed higher interest rates in Chile. There are no clear effects on the real exchange rate. However, the more persistent and significant effect is on the composition of capital inflows, tilting it toward longer maturity.

The strengthening of prudent regulation of the financial sector generally has led to increased concentration. While more prudent regulation may deliver a benefit in terms of increased solvency, more concentration typically implies higher spreads. Thus one theory is that these prudential measures imply a tradeoff between solvency and competition. **Schargrodsky** and **Sturzenegger** argue that such a tradeoff does not necessarily exist. They present a model in which product differentiation decreases with concentration, inducing more rather than less intense competition, and in turn leading to lower spreads. The authors provide evidence from a cross section of countries in favor of this alternative view.

The proceedings of this conference will be published as a special issue of the *Journal of Development Economics.*

Topics in Empirical International Economics: A Festschrift in Honor of Robert E. Lipsey

The NBER held a conference in New York on December 3–4 to honor Robert E. Lipsey, a Research Associate and head of the NBER's New York office. Lipsey joined the NBER as a Research Assistant in 1945 and has been continuously associated with the Bureau for almost 55 years. His work during those years focused on international trade and investment and on price and quantity measurement in national economic statistics. These interests were reflected in the program of the conference. Organizers Magnus Blomström, NBER and the Stockholm School of Economics, and Linda S. Goldberg, Federal Reserve Bank of New York, selected the following topics for discussion:

Michael M. Knetter and **Matthew J. Slaughter,** NBER and Dartmouth College, "Price Convergence and Product-Market Integration" (NBER Working Paper No. 6969)
Discussant: James Harrigan, Federal Reserve Bank of New York

Robert E. Baldwin, NBER and University of Wisconsin, "Inferring Relative Factor Price Changes from Quantitative Data" (NBER Working Paper No. 7019)
Discussant: Jagdish Bhagwati, Columbia University

Alan W. Heston and **Robert Summers,** University of Pennsylvania, "International Comparisons of Capital Stocks, Relative Prices, and Economic Growth"
Discussant: Jack Triplett, Brookings Institution

Drusilla K. Brown, Tufts University, and **Alan V. Deardorff** and **Robert Stern,** University of Michigan, "U.S. Trade and Other Policy Options to Deter Foreign Exploitation of Child Labor"
Discussant: Robert W. Staiger, NBER and University of Wisconsin

Charles M. Engel, NBER and University of Washington, and **Michael B. Devereux,** University of British Columbia, "The Optimal Choice of Exchange Rate Regime: Price-Setting Rules and Internationalized Production" (NBER Working Paper No. 6992)
Discussant: Anna J. Schwartz, NBER

J. David Richardson, NBER and Syracuse University, and **Chi Zhang,** Household Finance Corporation, "Revealed Comparative Advantage across Time and U.S. Trading Partners"
Discussant: Kei Mu Yi, Federal Reserve Bank of New York

Gunnar Fors, Ministry of Finance, Sweden, and **Ari Kokko,** Stockholm School of Economics, "Home Country Effects of Foreign Direct Investment"
Discussant: Guy Stevens, Federal Reserve Board of Governors

James R. Markusen, NBER and University of Colorado, and **Keith Maskus,** University of Colorado, "Multinational Firms: Reconciling Theory and Evidence"
Discussant: Ann E. Harrison, NBER and Columbia University

Birgitta Swedenborg, Center for Business and Policy Studies, Stockholm, "Swedish MNC Growth and the Swedish Economy"
Discussant: Bruce Blonigen, University of Oregon

Globalization—the integration of national economies—has become one of the most widely used buzzwords of the late twentieth century. Yet there are remarkably few statistical measures of product-market integration across time, countries, and goods. **Knetter** and **Slaughter** present new measures of product-market integration based on price and quantity data. They find some evidence of product-market integration, but this process is not uniform across time, countries, or goods. Their new measures may help to quantify globalization's extent and its effect on domestic economic outcomes.

Because of the indeterminacy of the commodity composition of trade in models with two or more factors and at least as many goods as factors, it is useful to interpret the Heckscher-Ohlin theorem in terms of the exchange of a country's relatively abundant productive factors for its relatively scarce factors. Testing this theorem empirically invariably involves calculating the factor content of the goods and services traded internationally. Some economists have also used measures of the factor content of trade to identify differences among the causes of observed changes in factor prices. Other authors have relied on the behavior of factor proportions within and among industries to draw conclusions about the causes of factor price changes. **Baldwin** investigates the appropriateness of linking these measures to factor price changes within the general equilibrium framework used by trade economists. He concludes that only under special assumptions are such linkages justified. Deardorff and Staiger (1988), Deardorff (1997), and Panagariya (1998) have specified sets of assumptions under which the factor content of trade can be used to indicate trade's effects on relative factor prices.

Heston and **Summers** report on an ongoing capital stock measurement project associated with the maintenance of the Penn World Table. The major concerns they discuss arise in applying the perpetual inventory methodology to the national accounts data of more than 60 countries, ranging from the poorest developing ones to the richest developed ones. Specifically, they discuss: 1) the use of countries' national accounts data expressed in domestic prices versus common international prices; 2) the importance of disaggregating total investment in cumulating capital; 3) a basis for using different depreciation rates in different countries; and 4) a criterion for determining whether straight-line or declining-balance depreciation should be used, and whether the productivity of a constant dollar's worth of capital is greater in later years.

Brown, Deardorff, and **Stern** explore issues of child labor exploitation in developing countries and the variety of trade and other policy options and programs that are available in the United States and other industrialized countries to deter such exploitation. These deterrents include U.S. trade policies, economic and technical assistance provided through the International Labor Organization (ILO), supranational measures working through the ILO or the World Trade Organization, codes of conduct, and consumer labeling. Finally, the authors present a theoretical model of family labor supply that is embedded in a standard Heckscher-Ohlin general equilibrium model of production and trade; they use it to determine how the total labor supply of the family varies when the wages of parent and child move together and when the wage of only one family member changes.

Engel and **Devereux** investigate the choice of exchange rate regime —fixed or floating—in a dynamic, intertemporal general equilibrium framework. They find that when prices are set in producers' currencies, floating exchange rates are preferred if the country is large enough or not too risk averse. On the other hand, floating exchange rates are always preferred if prices are set in consumers' currencies because floating exchange rates allow domestic consumption to be insulated from foreign monetary shocks. The gains from floating exchange rates are greater when there is internationalized production.

In the style of Lipsey, **Richardson** and **Zhang** map and interpret U.S. comparative advantage across time, trading partners, and sectors at an increasing level of commodity detail. They use Bela Balassa's index of Revealed Comparative Advantage (RCA), measured from U.S. export data. The authors call some of their indexes RRCA indexes—they measure Regional Revealed Comparative Advantage by groups of U.S. trading partners. U.S. patterns of comparative advantage seem to be different in different parts of the world, and the differences seem to have changed between 1980 and 1995, the period from which the authors' data comes.

Fors and **Kokko** examine the effects of outward foreign direct investment (FDI) on economic structure in the home countries of the multinational corporations (MNCs). Drawing on data for 17 of the largest Swedish MNCs, and looking at the population of domestic and foreign plants owned by the 17 MNCs from 1986 to 1994, the authors find that about 10 percent of the existing plants were closed or sold to other firms each year. At the same time, an almost equal number of new plants were established or acquired from other firms. These changes reflect an increasing division of labor within each MNC, but the resulting pattern of specialization does not seem to conform to predictions from simple trade theory.

Markusen and **Maskus** extend recent theory referred to as the "knowledge-capital model," which simultaneously generates motives for both horizontal and vertical multinational production. They use this model to derive predictions about foreign affiliates' pattern of production for local markets versus their production for exports as functions of country characteristics such as market sizes, size differences, and relative endowment differences. Then, using data on affiliate production and trade, the authors find that the ratio of production for export sales to production for local sale depends negatively on market size, investment, and trade costs in the host country, and positively on the relative abundance of skilled labor in the parent country (or the skilled-labor scarcity of the host country).

Does production growth abroad substitute for or complement production growth at home? **Swedenborg** revisits this and related issues for Sweden, a large net foreign investor and the only country other than the United States for which there exists comprehensive firm-level data. Her analysis is unique in that it uses panel data for Swedish MNCs covering a 30-year period. The results broadly confirm earlier findings based on cross-sectional analyses, but they also reveal that the latter tend to overestimate the relationship between variables over time. The partial effect of foreign production on exports is negative in the case of products that are "substitutes" and positive for "complements," and the net effect is zero. The overall relationship between foreign and domestic growth is positive, however, owing to economies of firm size in research and development and headquarter services that benefit both home and foreign operations.

The Administrative Costs of Individual Accounts as Part of Social Security Reform

An NBER project on the Administrative Costs of Social Security Reform is one part of a major NBER initiative that studies the U.S. Social Security system. The results of this project were presented at a conference in Cambridge on December 4. John B. Shoven, NBER and Stanford University, directed the project. The papers prepared in the project and presented at the meeting were:

John B. Shoven; and **Sylvester Schieber,** Watson Wyatt, "Administering a Cost-Effective National Program of Personal Security Accounts"

Fred T. Goldberg, Jr., Skadden, Arps, Slate, Meagher, and Flom LLP, and **Michael J. Graetz,** Yale Law School, "Reforming Social Security: How to Implement a Practical and Workable System of Personal Retirement Accounts" (NBER Working Paper No. 6970)

Discussants (for both papers): Olivia S. Mitchell, NBER and University of Pennsylvania, and Gloria Grandolini, World Bank

Gary Ferrier, University of Arkansas; **Estelle James, James Smalhout,** and **Dmitri Vittas,** World Bank, "Mutual Funds and Institutional Investments: What Is the Most Efficient Way to Set Up Individual Accounts in a Social Security System?" (NBER Working Paper No. 7049)

Discussant: David A. Wise, NBER and Harvard University

Peter A. Diamond, NBER and MIT, "Administrative Costs and Equilibrium Charges with Individual Accounts" (NBER Working Paper No. 7050)

Discussant: Martin S. Feldstein, NBER and Harvard University

James M. Poterba, NBER and MIT, and **Mark Warshawsky,** TIAA-CREF, "The Costs of Annuitizing Retirement Payouts" (NBER Working Paper No. 6918)

Discussant: David M. Cutler, NBER and Harvard University

Shoven and **Schieber** analyze several similar cost-efficient ways of organizing individual accounts, surveying the experience with privatized and partially privatized social security programs in Chile, Australia, the United Kingdom, and Sweden. Australia has a relatively new program, begun in 1973, and still in its startup phase. Nonetheless, the average administrative cost for the private accounts in that country was 0.835 percent of assets in 1997, and it is going down fairly rapidly as the average account size grows. Since U.S. financial markets are generally far more efficient and competitive than Australian markets, the United States should be able to administer a program of individual accounts for less than the Australians have. The authors also examine the administrative cost experience of U.S. 401(k) accounts. In 1997 the average total administrative cost for 401(k) plans was 0.77 percent of assets. There are reasons why social security individual accounts should be less expensive to administer (for instance, the disallowance of loans and early withdrawals), and there are other reasons that would tend to make them more expensive (lower average earnings of participants). The authors report that some large mutual fund companies currently manage individual retirement accounts (with minimum balances as low as $500) for total administrative fees ranging from 0.19 to 0.77 percent of assets.

Goldberg and **Graetz** detail one method of implementing personal retirement accounts (PRAs) as a part of Social Security reform in the United States. The method they describe is designed to minimize administrative costs and distribute those costs in what could be regarded as a fair and reasonable way; to minimize the burden on employers, especially small employers who do not currently maintain a qualified retirement plan; and to meet the expectations of Americans for simplicity, security, control, and independence. It relies on existing payroll and income tax mechanisms for collecting PRA funds and crediting PRA accounts. It provides two basic options for investments: a simple system involving a limited number of funds sponsored by the Social Security Administration and managed by private companies; and privately sponsored funds with additional investment choices. It also provides two distribution alternatives if distributions must be annuitized: an increase in Social Security benefits; and inflation-protected annuities provided directly to retirees by private companies.

Ferrier, James, Smalhout, and **Vittas** investigate the cost-effectiveness of three alternative ways of constructing funded social security pillars: individual accounts (IAs) invested in the retail market with relatively open choice; IAs invested in the institutional market with constrained choice among investment companies; and a centralized fund operating in the institutional market without individual accounts or differ-

entiated investments across individuals. Mandatory contributions with centralized collections offer a new opportunity to benefit from scale economies through the institutional market. Scale economies diminish after a point, so cost efficiencies do not dictate the elimination of choice, but rather constraints on choice. IA systems with choice do imply additional record-keeping expenses as compared with a no-choice/single-fund alternative — this is their single cost disadvantage — but these costs are determined by policy rather than technology. For modest levels of service, and with service increments unbundled, the common cost of record-keeping and participant communication will be small after the first five years and less than 0.1 percent of assets in a steady state.

Many designs for individual Social Security accounts have been proposed. For government-organized accounts, for example, the government arranges for both record-keeping and investment management. The government then spreads the costs of these accounts among the accounts, outside sources of revenue, employers, and workers. With privately organized accounts, individuals directly select private firms to perform record-keeping and investment. Equilibrium prices thus reflect selling costs as well as administrative costs. **Diamond** describes a low-cost/low-services government-organized plan and estimates that it might cost $40 to $50 per worker per year. He discusses the nature of equilibrium with privately organized accounts, concluding that the costs would be very high compared with the cost of government organization.

Poterba and **Warshawsky** present new evidence on the costs of purchasing private annuity contracts to spread a given stock of assets over an uncertain future lifetime. First, they describe life annuity contracts that are currently available in the individual single-premium/immediate-annuity marketplace. For a 65-year-old male annuity buyer, the expected present discounted value of the payouts offered by the average policy available in June 1998 was approximately 85 percent of the purchase price of such a policy. (This assumes that the individual faces average mortality risks.) The expected present value of payouts is much higher—97 percent of the purchase price—and the "cost of annuitization" is lower if the buyer faces the mortality rates of the typical annuitant. The authors then consider the individual annuity policies available to participants in the federal government's Thrift Saving Plan. Because these annuities are purchased through a large group retirement saving program, some of the administrative costs are lower than those in the national individual annuity market. Correspondingly, the expected current value of payouts is higher than that in the individual annuity marketplace. Finally, the authors describe the individual annuity products offered by TIAA-CREF, the retirement system for college and university employees. TIAA offers participating annuities which have among the highest payouts in the individual annuity market. The ability to offer these payout levels owes mainly to superior investment returns and low expenses.

These papers and their discussions are available in the "Books in Progress" section of the NBER's Web site. A revised version with a summary of the general discussion will be published by the University of Chicago Press. Its availability will be announced in a future issue of the NBER *Reporter.*

Competition Policy, Deregulation, and Reregulation

The NBER, the Tokyo Center for Economic Research (TCER), and London's Centre for Economic Policy Research (CEPR) jointly sponsored a conference on "Competition Policy, Deregulation, and Reregulation" in Tokyo on December 18–19. Takatoshi Ito, NBER and Hitotsubashi University, and Sadao Nagaoka, Hitotsubashi University, organized this program.

Mark Armstrong, Nuffield College, "Competition and Cooperation in the Pay-TV Market"

Discussants: Turuhiko Nambu, Gakashuin University, and Yasasushi Ohkusa, Osaka City University

Yosuke Okada, Shinshu University, and **Keiko Hatta,** InfoCom Research Institute, "The Effects of Deregulation and Competition on the Cellular Telephone Industry in Japan"

Discussants: Yukiko Hirao, Seikei University, and Jacques Cremer, Université des Sciences Sociales de Toulouse

Timothy F. Bresnahan, NBER and Stanford University, and **John Richards,** Stanford University, "Local and Global Competition in Information Technology"

Discussants: Akira Goto, Hitotsubashi University, and Mark Armstrong

Kenn Ariga, Kyoto University, **Kiyohiko Nishimura,** University of Tokyo, and **Yasushi Ohkusa,** "Determinants of Individual Firm Mark-up in Japan: An Econometric Study on the Impacts of Market Concentration, Market Share, and FTC Regulations"

Discussants: Timothy F. Bresnahan, and Noriyuki Yanagawa, University of Tokyo

Jacques Cremer, "Internet"

Discussants: Hioryuki Odagiri, Hitotsubashi University, and Jiro Kokuryo, Keio University

Jordi Gual, IESE Universidad de Navarra, Barcelona, "Deregulation and Market Structure in European Banking"

Discussants: Takatoshi Ito, and Takeo Hoshi, University of California, San Diego

Sadao Nagaoka and **Fukunari Kimura,** Keio University, "The Competitive Impact of International Trade: A Case of Import Liberalization of Oil Product Market in Japan"

Discussants: Kazuharu Kiyono, Waseda University, and Jordi Gual

Armstrong discusses the emerging pay-TV market, focusing specifically on the dangers of anti-competitive agreements between firms in the industry. He describes the industry's economic features and summarizes the current state of the market in the United Kingdom. He analyzes two simple formal models of the industry, discussing the danger of two vertically integrated pay-TV networks entering into collusive agreements to exchange programming with each other. He then proposes an incentive for a telecom-only firm to subsidize a pay-TV-only firm, so as to inhibit entry by combined cable TV/telecom firms.

Cellular telephone is intrinsically a network-type service, and its benefits are dependent on the extent of interconnection with a wire-based network. Demands for both fixed-line and cellular telephones are interdependent of each other. **Okada** and **Hatta** examine empirically the interdependent demand among the two networks and this demand's implication for the efficient price structure. The authors' results suggest that the comprehensive deregulation of the cellular telephone industry in 1994 induced the price structure to become more efficient.

Bresnahan and **Richards** examine the implications of changing global markets in information and communications technology (ICT) for the efficacy of demand-steering public policy in creating local rents. Both computing and telephony are undergoing changes in industry structure associated with changes in competition. The convergence of computing and telephony and the possibility of new ICT markets reinforce trends toward vertical competition. This lowers entry barriers and is likely to encourage government-supported local entrants into global ICT. The prospects for exports, command of rent-related standards, and large returns from such initiatives are not very bright, however, given the nature of vertical competition from global software and services providers. The authors predict far more demand-steering attempts than successes.

Ariga, Nishimura, and **Ohkusa** estimate individual firm-level mark-up for more than 400 major manufacturing firms in Japan. Their estimates suggest that most of these firms have significant market power, not only because of market concentration but also because of the firms' market shares, and their advertising and sales efforts. The authors then assess the impact on estimated mark-ups of

egulatory measures taken by the apanese Federal Trade Commission FTC). They find that discretionary nd nonpunitive FTC activities are irected toward the right targets and re reasonably effective, whereas njunctions, the strongest measure ndowed to the FTC, have essentially o effect on mark-ups of the firms ampled.

Cremer discusses imposing tariffs n use of the Internet. After surveying different approaches, he highights the issues raised by the network's commercialization. He then resents a new model aimed at shedling light on the pricing of the reservation of bandwidth for applications hat require long, good-quality connections (such as video conferencing, nteractive teaching, and so forth).

Gual discusses the impact of leregulation and market integration olicies on European banking. He ocuses on how enlargement of the narket affects concentration ratios, aking into account the competition effects of changes in the regulatory regime. He argues that whether European integration will increase exploitation of scale advantages depends on the extent to which banking competition depends on fixed versus variable costs. If competition focuses on variable costs, then concentration will diminish with market enlargement. If competition focuses on expenses unrelated to the level of intermediation, then concentration will not tend to decline as the market grows. This is because of the compensating effect of increased competition on fixed costs, such as exist in establishing brand image or setting up electronic banking. Evidence from 11 European Union countries from 1981 to 1995 supports Gual's model of variable cost competition. Thus, one would not expect large increases in European banking concentration as a result of market integration, but consolidation only at the level of some domestic markets.

Nagaoka and **Kimura** analyze the competitive impact of the recent import liberalization of the oil products market in Japan. In response to the import liberalization policy in March 1996, the market price of Japan's oil products declined significantly, but its domestic oil production increased significantly. Moreover, oil prices fell substantially before the actual liberalization of imports. The authors demonstrate that the implicit cartel theory can well explain such features of the impact of import liberalization. They also point out the significant welfare impact of such liberalization, caused by the expansion of supply in the market, with a large tax wedge between price and cost, and possibly because of the reduction in excessive investment, especially in distribution.

These papers will be published in a special issue of the *Journal of the Japanese and International Economies*. Sadao Nagaoka will be guest editor of the issue.

Patent Systems and Innovation

As part of a major project on Industrial Technology and Productivity sponsored by the Sloan Foundation (described at **www.nber.org/sloan**), the NBER organized a research project on Patent Systems and Innovation, directed by Adam B. Jaffe, NBER and Brandeis University, Jenny O. Lanjouw, NBER and Yale University, and Joshua Lerner, NBER and Harvard University. The results were presented at a conference on January 8 and 9 in the following papers:

Lee G. Branstetter, NBER and University of California, Davis, and **Mariko Sakakibara**, University of California, Los Angeles, "The Effect of Patent Systems on Firm Innovation: Evidence from the 1988 Japanese Patent Law Reforms"

Discussants: Wesley M. Cohen, NBER and Carnegie Mellon University, and Jeffrey Kushan, Powell, Goldstein, Frazer, and Murphy

Mark Schankerman, London School of Economics, and **Suzanne A. Scotchmer**, NBER and University of California, Berkeley, "Damages and Injunctions in the Protection of Proprietary Research Tools"

Discussants: Katharine Ku, Office of Technology Licensing, and Brian N. Wright, University of California, Berkeley

Iain M. Cockburn, NBER and University of British Columbia, and **Jenny O. Lanjouw**, "Do Patents Matter? Empirical Evidence after GATT"

Discussants: Rebecca Henderson, NBER and MIT, and James Schuttinga, National Institutes of Health

Adam B. Jaffe and **Joshua Lerner**, "Privatizing R&D: Patent Policy and the Commercialization of National Laboratory Technologies"

Discussants: Linda Cohen, University of California, Irvine, and Sam Petuchowski, Bromberg and Sunstein LLP

Bronwyn H. Hall, NBER and University of California, Berkeley, and **Rose Marie Ham**, University of California, Berkeley, "The Patent Paradox Revisited: Firm Strategy and Patenting in the U.S. Semiconductor Industry"

Discussant: Adam B. Jaffe

B. Zorina Khan, Bowdoin College, "Legal Monopoly, Patents and Antitrust Litigation in U.S. Manufacturing, 1970–98"

Discussants: Carl Shapiro, University of California, Berkeley, and Dan Wall, McCutchen, Doyle, Brown, and Enersen

Naomi R. Lamoreaux and **Kenneth L. Sokoloff**, NBER and University of California, Los Angeles, "The Market in Patented Technologies and Patterns of Inventive Activity in Historical Perspective"

Discussants: Michael Fogarty, Case Western Reserve University, and Joshua Lerner

Hugo Hopenhayn, Universidad Torcuato di Tella, and **Matthew F. Mitchell**, University of Minnesota, "Innovation Fertility and Patent Design"

Discussants: Nancy Gallini, University of Toronto, and Robert Merges, University of California, Berkeley

Does an expansion of patent scope induce more innovative effort by firms? **Branstetter** and **Sakakibara** provide evidence on this question by examining company responses to the Japanese patent reforms of 1988. Interviews with practitioners suggest that the reforms significantly expanded the scope of patent rights in Japan, but that the average response in terms of additional R and D effort and innovative output was quite modest. Interviews also suggest that a firm's organizational structure is an important determinant of the level of response. Using Japanese and U.S. patent data on 307 Japanese firms, the authors confirm that the magnitude of the response is quite small.

Licensing and other profit-sharing agreements are the source of profit on proprietary research tools. The terms negotiated in licensing agreements are determined in part by the remedies for infringement, such as damages and injunctions. **Schankerman** and **Scotchmer** investigate how ex-post-facto damages and the opportunity for injunctions against unauthorized use affect the incentives to develop research tools. They show that high damages for infringement can be counterproductive in protecting the profit of owners of research tools. The effectiveness of injunctions depends on how much capital the infringer invests in developing the commercial product before the infringed party gets an injunction.

Cockburn and **Lanjouw** seek to identify and create data sources that can be used to establish empirically whether, in response to the substantial strengthening of the global patent system created by the GATT, there has been (or will be) any shift in R and D investment and product development toward markets in less developed countries (LDCs) or toward tropical diseases. After studying patent records and scientific publications and surveying pharmaceutical and biotechnology firms and tropical disease specialists, they conclude that strengthening intellectual property rights (IPRs) does make developing country markets more attractive, but

there are long lags which suggest that the actual effect on pharmaceutical R and D may take many years to become fully visible. Using the example of the dramatic increase in patent applications for the treatment of malaria since the early 1990s, the authors conclude that the historical absence of IPRs has played an important role in retarding the development of new treatments for this disease; there are, however, a number of potential confounding factors, primary among them the spate of recent initiatives targeting malaria by public-sector institutions.

Despite their magnitude and potential economic impact, federal R and D expenditures outside of research universities have not been scrutinized much by economists. **Jaffe** and **Lerner** examine the impact of post-1980 initiatives designed to encourage patenting and technology transfer at national laboratories and how the features of those "labs" affected their success in commercialization. Using both case studies and databases related to the U.S. Department of Energy's laboratories, they find that the policy changes substantially affected the patenting activity by the national laboratories, which gradually reached parity with research universities in patents per R and D dollar. Using citation data, the authors show that the quality of the laboratory patents, unlike those developed at universities, has remained constant or even increased as their number has grown. Also, competition for laboratory management contracts may increase, and research "focus" may decrease, the commercial impact of laboratory R and D.

Hall and **Ham** examine the patent strategies of firms in an industry characterized by rapid technological change and cumulative innovation. Recent evidence suggests that firms in the semiconductor industry do not rely heavily on patent protection to recoup their R and D investments, despite the strengthening of U.S. patent rights in the early 1980s. At the same time, the propensity of semiconductor firms to patent (relative to their R and D spending) has increased dramatically. The authors explore this apparent paradox by differentiating among types of U.S. semiconductor firms and analyzing these firms' patenting activities over the past 20 years. Their preliminary results suggest that the importance of patents to semiconductor firms has indeed increased during the "propatent" period, but for reasons that challenge traditional views of the patent system. On the one hand, stronger patent rights may have facilitated entry by firms in niche product markets; on the other, the 1980s shift in U.S. patent policies may have spawned "patent portfolio races" among large manufacturers in this industry.

Khan presents an empirical analysis of the patent and antitrust interface in the manufacturing sector between 1970 and 1998. She investigates the influence of innovation on the likelihood of federal government antitrust charges, controlling for firm-specific factors such as the company's size, its sales growth, and its advertising intensity. Specifically, she considers whether innovative firms that engage in high levels of patenting or R and D are more likely to be engaged in federal antitrust litigation. She also assesses an example, in the area of R and D joint ventures, in which antitrust policy appears to have influenced the rate and direction of inventive activity.

Lamoreaux and **Sokoloff** argue that the particular features of the U.S. patent system encouraged the development of market trade in rights to patented technology, that this trade grew in volume and sophistication over the nineteenth century, and that this growth was most pronounced in regions of the country that were early leaders in patenting and where, as a result, it was most profitable to make investments in institutions facilitating the exchange of patent rights. The authors further argue that, especially in the regions of early patenting, the growth of this market trade in turn encouraged a rapid rise in patenting per capita. Using a variety of original sources, the authors trace the growth of patent trade, its geographical scope, the changes in the way that patents were assigned, the increased use of formal intermediaries to match buyers and sellers of patented technology, and how this trade affected patentees' creative work. They find an increase in the proportion of patents granted to inventors with ten or more patents over their careers. Inventors who were most involved in the market obtained significantly more patents over their careers (and also had longer patenting careers) than those who did not assign their patents at issue or who retained a partial stake in their inventions. They also find that inventors who most specialized in invention and were most involved in the market were also most likely to employ formal intermediaries to handle their assignments.

Despite great heterogeneity in the types of inventions patented using design patents, the protection offered is surprisingly homogeneous. Offering a menu of patents may be important even if the patent office cannot observe the differences, though. **Hopenhayn** and **Mitchell** consider a model in which the patent office has two patent instruments—breadth of protection and the time period of protection—to offer and can attach a fee to the various patents it offers. In many situations, breadth can serve a different function from length of protection and is therefore a useful instrument. The authors also show that if breadth can be used to sort different projects, it may dominate a fee-for-length system such as the one currently in place. One example shows a case in which breadth indeed can sort projects and thus is preferable to fees.

Risk Aspects of Investment-Based Social Security Reform

John Y. Campbell, Director of the NBER Program on Asset Pricing, and NBER President Martin S. Feldstein, both of Harvard University, organized a project on Risk Aspects of Investment-Based Social Security Reform. The results of the project were discussed at a conference held on January 15–16. The papers produced in the project and the conference discussants were:

Marianne Baxter and **Robert G. King**, NBER and University of Virginia, "The Role of International Investment in a Privatized Social Security System"

Discussant: David Backus, NBER and New York University

Henning Bohn, University of California, Santa Barbara, "Social Security and Demographic Uncertainty: The Risk-Sharing Properties of Alternative Policies" (NBER Working Paper No. 7030)

Discussant: Kevin M. Murphy, NBER and University of Chicago

John McHale, Harvard University, "The Risk of Social Security Benefit-Rule Changes: Some International Evidence" (NBER Working Paper No. 7031)

Discussant: David A. Wise, NBER and Harvard University

Martin S. Feldstein; Elena Rangelova, Harvard University, and **Andrew A. Samwick**, NBER and Dartmouth College, "Portfolio Risk in the Transition to Investment-Based Social Security" (NBER Working Paper No. 7016)

Discussant: Robert J. Shiller, NBER and Yale University

Antonio Rangel, Stanford University, and **Richard J. Zeckhauser**, NBER and Harvard University, "Can Market and Voting Institutions Generate Optimal Intergenerational Risk Sharing?" (NBER Working Paper No. 6949)

Discussant: Thomas J. Sargent, NBER and Stanford University

Andrew B. Abel, NBER and University of Pennsylvania, "The Social Security Trust Fund, the Riskless Investment Rate, and Capital Accumulation" (NBER Working Paper No. 6991)

Discussant: Deborah J. Lucas, NBER and Northwestern University

Kent Smetters, University of Pennsylvania, "Arbitrage Pricing of Unfunded Benefit Guarantees: Rationale and Computations"

Discussant: David Wilcox, U.S. Treasury

Zvi Bodie, Boston University, "Financial Engineering and Social Security Reform"

Discussant: Stephen Ross, NBER and MIT

Jeffrey Brown, MIT, **Olivia S. Mitchell**, NBER and University of Pennsylvania, and **James M. Poterba**, NBER and MIT, "The Role of Real Annuities and Indexed Bonds in a Mandatory Annuitization System" (NBER Working Paper No. 7005)

Discussant: Mark Warshawsky, TIAA-CREF

John Y. Campbell, and **Joao Cocco, Francisco Gomes**, and **Pascal Maenhout**, Harvard University, "Investing Retirement Wealth: A Life Cycle Model" (NBER Working Paper No. 7029)

Discussant: Amir Yaron, University of Pennsylvania

Thomas E. MaCurdy and **John B. Shoven**, NBER and Stanford University, "Asset Allocation and Risk Allocation: Can Social Security Improve Its Future Solvency Problem by Investing in Private Securities?" (NBER Working Paper No. 7015)

Discussant: Stephen P. Zeldes, NBER and Columbia University

International investment of retirement savings in an investment-based Social Security system could yield important benefits to U.S. citizens. To gauge the potential magnitude of these benefits, **Baxter** and **King** contrast the current Social Security system with alternative private investment vehicles—specifically, variable rate annuities. Within a private retirement account, standard portfolio analysis suggests benefits from an internationally diversified portfolio equal to a 20 to 40 percent increase in wealth at the retirement date. Much larger hedging benefits could be obtained by switching from domestic to foreign assets in private retirement accounts accruing before the retirement date, as individuals accumulate retirement wealth during their working life. The extent of these benefits depends on the magnitude of the co-movements of asset returns and labor incomes and requires a detailed analysis of life cycle saving decisions.

As the U.S. population ages, the growing retirees-to-workers ratio increases the burden of public retirement systems. Is it efficient to maintain a defined-benefit social security system? What would be the effect of reducing the pay-as-you-go benefits and encouraging private retirement savings? **Bohn** examines these questions in a neoclassical growth model with overlapping generations and demographic uncertainty. In this model a defined-benefits social security system is more efficient ex-ante than a defined-contribution system, if

the birth rate changes, because small cohorts generally enjoy favorable wage and interest rate movements: they are in the labor force when the capital-labor ratio is high, and they earn capital income when the capital-labor ratio is low. A defined benefit system helps to offset the effect of these factor price movements by imposing higher taxes on small cohorts. Neither the defined-benefits system nor any of its main alternatives is fully efficient, however, because all fail to adjust current retiree benefits in response to anticipated future demographic changes. In the case of changes in life expectancy, the efficient policy response depends on the predictability of deaths at the individual level and on the availability of annuities. Reduced benefits can be efficient if annuities markets are missing and the mortality change is such that accidental bequests decline, but not otherwise.

Against a background of projections of sharply increasing elderly dependency rates, workers in the major industrial economies are apprehensive that their social security benefit entitlements will be cut before or after they retire, leaving them with inadequate retirement income. **McHale** looks at recent benefit rule changes in the G7 countries to see what can be learned about such political risk in pay-as-you-go pension systems. From this small sample, he finds that projections of rising costs under current rules are inducing reforms, and that these reforms often have a major impact on the present discounted value of promised benefits for middle-aged and younger workers. Usually, however, the benefits of the retired and those nearing retirement are protected. The phasing in of benefits cuts raises the question as to why younger workers are willing to take significant cuts in their implicit wealth while protecting the currently old. McHale explores one possible answer through a simple model: these workers fear even larger cuts in their benefits if the tax burden on future workers rises too high.

Feldstein, Ranguelova, and **Samwick** study the effects of personal retirement accounts invested in a mixture of stocks and bonds. They trace the time path from a pure pay-as-you-go system to both a fully investment-based system and a mixed system that combines pay-as-you-go and investment-based components. After analyzing this transition in terms of the expected return on a stock-bond portfolio, the authors use historic evidence on variations in rates of return to measure the risk that individual retirees would face along the transition path. More specifically, they calculate the probability distribution of benefits relative to the future benefits promised in current law for different birth cohorts of retirees along the transition path. They also examine a system in which the government would guarantee that retirees receive at least the benefits promised in current law and assess the risk to taxpayers. The authors conclude that investment-based plans require savings that are small relative to projected taxes and involve little risk to retirees or taxpayers.

Are market and voting institutions capable of producing optimal intergenerational risk sharing? To answer this question, **Rangel** and **Zeckhauser** consider a simple endowment economy with uncertainty and overlapping generations. The authors characterize the transfers necessary to restore efficiency and compare them with the transfers that take place in markets and voting institutions. They study both ex-ante and interim risk sharing and find serious problems in both types of institutions. Markets cannot generate ex-ante risk sharing because agents can trade only after they are born. Furthermore, markets generate interim efficient insurance in some but not all economies because they cannot generate forward (old-to-young) intergenerational transfers. This market failure could be corrected by government intervention. However, as long as government policy is determined by voting, intergenerational transfers might be driven more by redistributive politics than by risk-sharing considerations. Successful government intervention can arise, even though agents can only vote after they are born, but only if the young determine policy in every election.

Abel develops a model to analyze the equilibrium equity premium and growth rate of the capital stock in the presence of a defined-benefit social security system. If the social security trust fund increases the share of its portfolio held in risky capital, the equilibrium equity premium falls in the following period, and it does so along a constant growth path. This change in the portfolio of the social security trust fund will increase the growth rate of capital in the following period, and, if a certain sufficient condition is satisfied, it will increase the growth rate of the capital stock along a constant growth path. Calibration of the model indicates that it can match the historical average equity premium and the historical average growth rate of the capital stock using plausible values of the preference parameters. In addition, the sufficient condition for the growth rate of the capital stock to increase along a constant growth path is satisfied. Quantitatively, the effects on the riskless interest rate and the growth rate of capital are small.

Many plans to reform the mostly unfunded U.S. Social Security system implicitly contain unfunded obligations of their own. One example is the promise that the assets in the new private accounts will produce an annuitized retirement benefit at least equal to what the participant would have received under Social Security.

Unless the government reneges on this promise, future workers would have to be taxed on a pay-when-needed basis to make up for shortfalls. **Smetters** uses a simplified version of his 1998 model and reports that large pay-when-needed minimum-benefit guarantees can be very costly—so costly, in fact, that they can undermine and possibly reverse the salutary economic effects traditionally associated with investment-based reforms. Such reforms can lead to large long-run gains, however, with minimum benefit level guarantees comparable (relative to average wages) to levels promised in several Latin American countries.

Bodie explores ways to use the concepts and techniques of financial engineering to improve the menu of investment choices offered to people for their retirement and to manage the system of retirement-income guarantees. He makes the following points: First, financial intermediaries can offer personal investment accounts that "replicate" the best features of defined-benefit pensions. These accounts could provide some choice regarding participation in the "upside" potential of the stock market without jeopardizing the minimum level of benefits mandated by law. Second, the existence of inflation-protected U.S. Treasury bonds makes government guarantees of personal investment accounts unnecessary. Third, guaranteeing investments in common stocks against the risk of a "shortfall" can be very costly and creates the potential for a moral hazard. Finally, government can play a (perhaps unique) role in enriching the investment opportunity set by issuing securities that are linked to an index of per capita consumption spending.

Brown, Mitchell, and **Poterba** explore the demand for and feasibility of inflation-indexed annuity products in the decumulation phase of a "mandatory accounts" retirement saving system. First they describe the operation of both real and nominal-annuity individual annuity markets in the United Kingdom. The widespread availability of real annuities in that country dispels the argument that private insurance markets could or would not provide real annuities to retirees. Second, the authors consider the current structure of two insurance products available in the United States—the Irish Life Freedom Indexed CPI Annuity and the TIAA-CREF variable annuity linked to the CREF Indexed Linked Bond Account. The former is a real annuity, but the expected present discounted value of payouts from the real annuity is substantially lower than that from nominal annuities. The CREF annuity product does not provide a guaranteed stream of real payouts, and as such it is not a real annuity. Then the authors investigate the potential of investments in stocks, bonds, and bills to provide retiree protection from inflation. The real return on equities has been very substantial over the last seven decades, and a retiree who receives income linked to equity returns has on average fared very well. This is primarily because stocks offer a high average return, however, and not because stock returns move in tandem with inflation. This finding casts doubt on the "inflation insurance" properties of equity investments. Finally, the authors estimate the amount that typical consumers would be prepared to pay for real annuities, nominal annuities, and variable pay-out/equity-linked annuities with their retirement accumulations. For plausible degrees of risk aversion, individuals are not prepared to pay very much for inflation protection, they conclude.

If household portfolios are constrained by borrowing and short-sales restrictions, or by the fixed costs of participating in risky asset markets, then alternative retirement savings systems may affect household welfare by relaxing these constraints. **Campbell, Cocco, Gomes,** and **Maenhout** use a model of optimal life cycle portfolio choice to explore the empirical relevance of these issues. They find ex-ante welfare gains of 10 to 25 percent from the investment of half of retirement wealth in the equity market. These gains are realized mainly because the higher average return on equities permits a lower social security tax rate on younger households, which helps households smooth their consumption over the life cycle. The authors also find that realistic heterogeneity of risk aversion and labor income risk can strongly affect optimal portfolio choice over the life cycle, which provides one argument for a privatized social security system with an element of personal portfolio choice.

MaCurdy and **Shoven** examine the risk of having the central Old Age Survivors and Disability Insurance (OASDI) Trust Fund invested in private securities. They note that the net transaction is an asset swap, with the U.S. government selling bonds to the public and using the proceeds to buy a portfolio of common stocks of equal value. The asset reallocation does not increase saving, wealth, or gross domestic product. Would it actually improve the finances of the Social Security system? The authors look at several cases, including 10-year and 20-year fixed-interest-rate bonds and 10- and 20-year inflation-indexed debt. The predicted failure rate from the bootstrap simulations of future returns ranges from 14 to 31 percent. For instance, when the authors examine the counterfactual issuance of 20-year inflation-indexed bonds, they find that the asset swap strategy failed 15 years in a row between 1959 and 1973. Clearly, this policy cannot reliably reduce the actuarial deficit of Social Security. Individual accounts and defined contribution pension plans certainly

involve significant risks. An individual who shifts from bonds to stocks runs the same or greater risk that the move will be counterproductive after 10 or 20 years. However, the defined contribution plans have the advantage that their risks are rather straightforward. Furthermore, people who want to minimize risks can invest in safe assets such as inflation-indexed bonds. The authors conclude that an OASDI Trust Fund invested in private securities would generate risk for Americans, but the precise incidence of that risk would likely remain ambiguous.

Analytic Models of Currency Crisis

An NBER Conference on Analytic Models of Currency Crisis, organized by Research Associate Paul Krugman of MIT, took place in Cambridge on February 5. The following papers were discussed:

Ricardo J. Caballero, NBER and MIT, "Emerging Market Crises: An Asset Market Perspective" (NBER Working Paper No. 6843)
Discussant: Andres Velasco, NBER and New York University

Roberto Chang, Federal Reserve Bank of Atlanta, and **Andres Velasco**, "Financial Fragility and the Exchange Rate Regime" (NBER Working Paper No. 6469)
Discussant: Maurice Obstfeld, NBER and University of California, Berkeley

Guillermo Calvo, University of Maryland, "Understanding the Russian Virus"
Discussant: Carmen Reinhart, University of Maryland

Giancarlo Corsetti, Yale University, **Paolo A. Pesenti**, Federal Reserve Bank of New York, **Nouriel Roubini**, Council of Economic Advisers, and **Cedric Tille**, Princeton University, "Competitive Devaluations: A Welfare-Based Approach" (NBER Working Paper No. 6889)
Discussant: Roberto Rigobon, MIT

V. V. Chari, the University of Minnesota, and **Patrick J. Kehoe**, Federal Reserve Bank of Minneapolis, "Hot Money" (NBER Working Paper No. 6907)
Discussant: Paul Krugman

Caballero notes that although internal policy mismanagement can be cited in most recent emerging market crises, it seldom accounts fully for the severity of these crises. Almost invariably, the reluctance of international investors to provide the resources that would limit the extent of the reversal plays a key role in bringing a previously overheated economy to a costly halt. Domestic assets depreciate dramatically, and otherwise solvent investment projects and production, especially in the nontradable goods sector, lack financiers and are shut down. The ultimate reason for this breakdown is the inadequacy (real or perceived) of the country's international collateral. Caballero shows that this insufficiency and its consequences stem from microeconomic contractual problems. Fire sales of domestic assets arise naturally as the result of desperate competition for scarce international collateral. The contractual problems also lead to insufficient domestic collateral, which restricts the transfer of any surplus arising from the use of international collateral by its users and providers.

Chang and **Velasco** present a simple model that can account for the main features of recent financial crises in emerging markets. The international illiquidity of the domestic financial system is at the center of the problem. Illiquid banks are necessary and sufficient for financial crises to occur. Domestic financial liberalization and capital flows from abroad (especially if short term) can aggravate the illiquidity of banks and increase banks' vulnerability to exogenous shocks and shifts in expectations. A bank collapse multiplies the harmful effects of an initial shock, because a credit squeeze and the costly liquidation of investment projects cause real output to drop and asset prices to collapse. Under fixed exchange rates, a run on banks becomes a run on the currency if the Central Bank attempts to act as a lender of last resort.

The Tequila and Asian crises took the world by surprise and had global repercussions, but in their wake financial turmoil remained somewhat regionally confined: advanced economies' financial sectors were little touched by either crisis. However, the recent Russian crisis may have more serious implications. **Calvo** addresses why its negative effects seem deeper, why credit to emerging markets economies (EMs) has frozen, and why a major recession in those economies is becoming more likely.

He argues that after Russia's debt repudiation, the capital loss suffered by Russian bondholders triggered "margin calls" on highly leveraged "informed" investors, forcing them to sell some of their EM holdings to "noninformed" investors. As a result, EM security prices dropped by more than conventional fundamentals could explain. Moreover, because informed investors are liquidity-constrained, EM security prices may be slow to recover; this implies that EMs may face sharply higher interest rates for an extended period of time. The resulting fall in aggregate demand will lower output and employment through different channels. Calvo highlights the sudden change in the relative price of Russia's nontradable goods caused by just such a contraction in aggregate demand. He argues that if financial turmoil is not quickly turned around, it may interfere with production and cause a negative output shock; thereafter, EMs would fail to recover even if informed investors were no longer liquidity-constrained.

Corsetti, Pesenti, Roubini, and **Tille** study the international transmission of exchange rate shocks. If relative prices and terms of trade exhibit some flexibility in conforming to the law of one price, then a devaluation by one country is "beggar-thy-neighbor" in relation to that of another country because of its effects on cost-competitiveness in a third market. Yet because of direct bilateral trade among the two countries, there is a large range of values for which a country is better off by maintaining a peg in response to its partner's devaluation. If deviations from the law of one price are to be considered the dominant empirical paradigm, then the beggar-thy-neighbor effect based on competition in a third market may disappear. A country's devaluation, however, has a negative welfare impact on the economies of its trading partners, based on the deterioration of their export revenues and profits and the increase in disutility from higher labor effort for any level of consumption.

The conventional wisdom is that capital flows between developing countries and developed countries are more volatile than can be justified by fundamentals. **Chari** and **Kehoe** construct a simple model in which frictions in international financial markets, together with occasional fiscal crises, lead to excessive volatility of capital flows. The financial market frictions inhibit the transmission of information across investors and lead to herdlike behavior. The fiscal crises lead to standard debt-default problems. For borrowing countries, these crises act as tests by fire. If a country's economy survives these tests, its reputation is enhanced, and future capital flows become less volatile. Failing this test is associated with a loss of reputation and a decline in the amount of capital flows.

Bureau News

Shleifer to Receive Clark Medal

The 1999 John Bates Clark Award of the American Economic Association will be given to NBER Research Associate Andrei Shleifer of Harvard University. Shleifer was honored for his empirical research on financial markets, commercial law, and corporate securities, particularly in countries making the transition from socialism to a market economy.

Shleifer has been a member of the NBER's Program in Asset Pricing since 1986. He holds a bachelor's degree from Harvard and a Ph.D. from MIT.

The Clark Medal is awarded every other year to the economist under the age of 40 who is judged to have made the most significant contribution to economics. Past recipients of the John Bates Clark Award who have been associated with the NBER are: Milton Friedman, 1951; Zvi Griliches, 1965; Gary S. Becker, 1967; Daniel McFadden, 1975; Martin Feldstein, 1977; Joseph E. Stiglitz, 1979; A. Michael Spence, 1981; James J. Heckman, 1983; Jerry A. Hausman, 1985; Sanford J. Grossman, 1987; Paul R. Krugman, 1991; Lawrence H. Summers, 1993; David Card, 1995; and Kevin M. Murphy, 1997.

NBER Announces Nonprofit Fellowships

The NBER has just announced that it will award dissertation fellowships on "The Economics of the Nonprofit Sector" to two graduate students for the coming academic year: Chris Jepsen, Northwestern University, whose topic is "Measuring the Educational Impact of Student Attendance at Catholic Primary Schools"; and John Straub, University of Wisconsin, who is studying "Fund-Raising Crowd-Out by Government Grants: A Study of Non-Commercial Radio Stations." This is the third year of an NBER program designed to encourage research on nonprofit institutions by NBER Research Associates and Faculty Research Fellows, and to support dissertation research on the same subject by graduate students in economics who work closely with them.

Faculty grants were made to: Marianne Bertrand, Princeton University, who will study "What Drives Nonprofits? Evidence from Managerial Pay, Performance, and Market Competition in Nonprofit Hospitals"; and William Gentry, Columbia University, who will analyze "Financing and Investment Behavior of Not-for-Profit Organizations."

Behavioral Macroeconomics

The NBER held a meeting on Behavioral Macroeconomics in Cambridge on December 11. George Akerlof, University of California, Berkeley, and Robert J. Shiller, NBER and Yale University, organized this program.

Lawrence Ausubel, University of Maryland, "Adverse Selection in the Credit Card Market"

Discussant: Richard J. Zeckhauser, NBER and Harvard University

Marianne Bertrand, NBER and Princeton University, and **Sendhil Mullainathan**, NBER and MIT, "Is There Discretion in Wage Setting? A Test Using Takeover Legislation" (NBER Working Paper No. 6807)

Discussant: Truman Bewley, Yale University

Andrew Caplin, NBER and New York University, and **John V. Leahy**, NBER and Boston University, "Anticipation, Uncertainty, and Time Inconsistency"

Discussant: Ted O'Donoghue, Cornell University

Carl Campbell, Dartmouth College, "An Efficiency Wage Model of the Wage Curve, the Phillips Curve, and the Natural Rate of Unemployment"

Discussant: Gil Mehrez, Georgetown University

David I. Laibson and **Edward L. Glaeser**, NBER and Harvard University, and **Caroline Souter**, Harvard University, "What is Social Capital?"

Discussant: Raphael Di Tella, Harvard University

John Shea, NBER and University of Maryland, "Nominal Illusion: Evidence from Major League Baseball"

Discussant: Peter A. Diamond, NBER and MIT

Ausubel examines the results of large-scale randomized trials in pre-approved credit card solicitations for direct evidence of adverse selection. He finds first that there is adverse selection on observable information: respondents to solicitations are substantially worse credit risks than non-respondents. Second, solicitations offering inferior terms (for example, a higher introductory interest rate, a shorter duration to the introductory offer, or a higher post-introductory interest rate) yield customer pools with worse observable credit-risk characteristics than solicitations offering superior terms. Third, there is evidence of adverse selection on hidden information: even after controlling for all information known by the card issuer at the time the account is opened, customers who accept inferior offers are significantly more likely to default. Fourth, recipients of credit card solicitations appear to over-respond to the introductory interest rate relative to the duration of the introductory offer and to the post-introductory interest rate. This is consistent with Ausubel's "underestimation hypothesis," that consumers may systematically underestimate the extent of their current and future credit card borrowing.

Anecdotal evidence suggests that uncontrolled managers let wages rise above competitive levels. Testing this belief, however, has proved difficult because independent variation in the extent of managerial discretion is needed. **Bertrand** and **Mullainathan** use states' passage of anti-

takeover legislation as a source of such independent variation. These laws, passed in the 1980s, seriously limited takeovers of firms incorporated in legislating states. Because many view hostile takeovers as an important disciplining device, these laws potentially raised managerial discretion in affected firms. If uncontrolled managers pay higher wages, then wages might be expected to rise following enactment of these laws. Using firm-level data, the authors find that relative to a control group, annual wages for incorporated firms in those states passing laws did indeed rise by 1 to 2 percent, or about $500 per year. Their results suggest that managerial discretion significantly affects wages.

We all experience feelings related to our uncertainty about the future, such as hopefulness, anxiety, and suspense. Psychologists have long recognized the importance of these anticipatory emotions, with anxiety theory being one of the most dynamic fields of psychological research. **Caplin** and **Leahy** provide a new model of decisionmaking under uncertainty in which they allow for a quite general class of anticipatory emotions. While their general theory is relatively unstructured, it nevertheless delivers some novel results in almost all areas of application, primarily because of the time inconsistency of individual preferences. As time passes, so do the anticipatory emotions associated with the presence of uncertainty. Once these feelings have passed, they lose their earlier importance in determining preferences, and preferences may change as a result. The general theory has many applications. How does anxiety affect savings and portfolio choice? What is so exciting about gambling? How can medical information be provided to encourage preventative measures such as check-ups? How can a teacher stimulate curiosity and evaluate student performance without creating excessive anxiety? Can an abstract create interest in a line of research?

Campbell develops an efficiency wage model that differs in several important respects from other such models. At the microeconomic level, the model generates a wage curve relationship between unemployment and wage levels. At the macroeconomic level, it generates a Phillips Curve relationship between unemployment and wage changes; wages, prices, and unemployment are endogenous and the economy eventually returns to a natural rate of unemployment. The natural rate of unemployment and the slopes of the wage curve and Phillips Curve are both functions of microeconomic parameters, so Campbell can use his model to determine how microeconomic changes affect macroeconomic performance.

Measuring social capital—that is, the propensity to trust—is problematic. **Laibson, Glaeser,** and **Soutter** compare self-reports of trust to behavioral measures of trust. Behavioral trust is measured as the amount of money that individuals are willing to risk with others. The authors' trust measures identify persistent individual heterogeneity in the propensity to trust. However, conventional attitude survey questions about trust do a poor job of predicting the propensity to trust across different situations. Questions about explicit, past trusting behavior are better predictors of future trusting behavior. Social connection and racial homogeneity appear to increase the amount of trust and trustworthiness. Human capital also predicts an increased propensity to trust.

Baseball teams use statistical information on player performance in their personnel decisions. However, the real value of these nominal statistics varies over time and place because of differences in playing conditions over time and across stadiums. **Shea** finds that teams do a good job at deflating nominal statistics for pure time-series variation in the run-scoring environment but a poor job at deflating for cross-section and cross-section/time-series variation. Teams seem to be systematically fooled into believing that players whose statistics are inflated by extreme ballparks are better than equally talented players playing in neutral ballparks.

Higher Education

The NBER's Research Group on Higher Education met in Cambridge on December 11. Charles T. Clotfelter, NBER and Duke University, Director of the Research Group, organized this program:

William Johnson, University of Virginia, "Distributional Issues in the Public Support of Higher Education"
Discussant: William Becker, Indiana University

Ronald G. Ehrenberg, NBER and Cornell University, and **Jaroslava Mykula**, Cornell University, "Do Indirect Cost Rates Matter?" (NBER Working Paper No. 6976)
Discussant: John Siegfried, Vanderbilt University

Charles F. Manski, NBER and Northwestern University, **John Newman**, World Bank, and **John V. Pepper**, University of Virginia, "Using Performance Standards to Evaluate Social Programs with Incomplete Outcome Data: General Issues and Application to a Higher Education Block Grant Program"
Discussant: Eric A. Hanushek, NBER and University of Rochester

Caroline M. Hoxby, NBER and Harvard University, and **Bridget Terry**, Harvard University, "Explaining Rising Income and Wage Inequality among the College Educated" (NBER Working Paper No. 6873)
Discussant: Christopher Jencks, Harvard University

Paula Stephan and **Grant Black**, Georgia State University, "Bioinformatics: Does the U.S. System Lead to Missed Opportunities in Emerging Fields? A Case Study"
Discussant: Jerry R. Green, NBER and Harvard University

Johnson estimates the dollar amount of public higher education subsidies received by U.S. youth and considers how those subsidies are distributed vis-a-vis parental and parent-child lifetime income. If subsidies do not affect economic behavior and are financed by taxes which are proportional to income, then their distributional effects are either roughly neutral or mildly progressive. Johnson also considers the direct subsidy to public institutions and the indirect subsidy to private institutions through favorable tax treatment. He suggests that when their effect on schooling decisions is considered, subsidies may actually generate their cost in added discounted tax revenue.

Ehrenberg and **Mykula's** analysis suggests that changes in indirect cost rates influence the allocation across institutions of total federal research funding, direct cost funding, indirect cost funding, and the number of grants. On balance, increases in indirect cost rates benefit institutions and faculty that are already large recipients of federal research funding. In contrast, reductions in indirect cost rates benefit institutions and faculty that are not initially large recipients of funding. Federal funders appear to use the funds that are freed up by reductions in indirect cost rates to "spread" their research funding over a larger set of institutions. Reductions in average indirect cost rates at private universities during the 1990s can be seen as part of this process.

Manski, Newman, and **Pepper** examine how performance standards could be set and applied in the face of problems with measuring outcomes. Their central message is that the proper way to implement standards varies with the prior information that the evaluator can credibly bring to bear to compensate for incomplete outcome data. If this prior information is strong enough, the traditional practice of using a single threshold to separate acceptable outcomes from unacceptable ones is appropriate. An evaluator with weaker prior information, however, should set two thresholds rather than one. The performance of the program then would be deemed acceptable if the observed auxiliary outcomes met the higher *acceptance threshold* and unacceptable if they fell below the lower *nonacceptance threshold*.

The incomes and wages of college-educated Americans have become significantly more dispersed since 1970. **Hoxby** and **Terry** analyze this growing dispersion in terms of three possible sources: 1) the "extensive margin," or the increasing demographic diversity of people who attend college; 2) an increasing return to cognitive ability; and 3) the "intensive margin," which combines the increasing self-segregation (on the basis of ability) of students among colleges and the increasing correlation between the average ability of a college's student population and its expenditure on education inputs. The authors find that about 70 percent of the growth in inequality among recipients of bachelor's degrees can be explained with observable demographics, measures of ability, and college attributes. About 50 percent of the growth in inequality among people who have two years of college education can be explained similarly. Of the inequality growth that can be explained, about

one-fourth is associated with the extensive margin, one-third with an increased return to measured ability, and five-twelfths with the intensive margin. If the intensive margin is not taken into account, the role of increasing returns to cognitive ability is greatly overstated.

Universities have been slow to start programs in bioinformatics/computational biology despite evidence that the field is "hot." **Stephan** and **Black** explore why this is so and provide a case study of whether the U.S. system of higher education leads to missed opportunities in emerging fields. Four interrelated factors may be important. First, the structure of research funding means that faculty have little incentive to establish such "hot" programs. Second, the interdisciplinary nature of the field creates disincentives to the establishment of programs. Third, the quick fix—turning life scientists into computational biologists—is not possible given the skills and quantitative abilities of individuals in the biomedical life sciences. Finally, the educational system responds differently when demand is driven by industry as opposed to being driven by universities and research laboratories.

Productivity

Members and guests of the NBER's Program on Productivity met in Cambridge on December 11. Program Director Zvi Griliches and Research Associate Ariel Pakes, both of NBER and Harvard University, chose the following papers for discussion:

Gregory Crawford, Duke University, and **Matthew Shum**, University of Toronto, "Uncertainty and Learning in Pharmaceutical Demand"

Discussant: Steven T. Berry, NBER and Yale University

Dan Ackerberg and **Michael Riordan**, Boston University, and **Matilde Machado**, Institute of Economic Analysis, Spain, "Estimation of a Production Process for a Health Care Treatment: Preliminary Analysis"

Discussant: Igal Hendel, NBER and Princeton University

Peter Davis, MIT, "The Welfare Effects of Market Discrimination in the Provision of Retail Service: Movie Theaters"

Discussant: Tom Holmes, University of Minnesota

Aline Gron, Northwestern University, "Cost Pass-Through in the U.S. Automobile Market"

Discussant: James A. Levinsohn, NBER and University of Michigan

Zvi Griliches, **Tor Klette**, Oslo University, and **Jarle Moen**, Norwegian School of Economics and Business Administration, "Evaluating the Effects of Government-Sponsored Commercial R and D: Microeconometric Studies" (NBER Working Paper No. 6947)

Discussant: John Van Reenan, University of California, Berkeley

Different drugs have different effectiveness and different side effects, so uncertainty is an important component of prescription drug choice. This uncertainty can cause patients and doctors to experiment with various drugs until they find a good match. **Crawford** and **Shum** specify and estimate a dynamic model of pharmaceutical choice under uncertainty—one in which patients in the anti-ulcer drug market choose a drug in order to minimize the present discounted value of costs associated with treatment. The authors find that this market is split. For *casual* patients, quality differentials between drugs matter, since a high-quality drug can substantially lower the expected treatment length (and therefore the associated expected treatment costs).

Ackerberg, Riordan, and **Machado** study public funding of substance abuse treatment. Although the productivity of health care treatments is notoriously difficult to measure, the authors attempt to measure and compare the productivity of different treatment programs. They estimate their model using an admission-discharge dataset for patients receiving outpatient treatment for alcohol abuse provided by publicly funded treatment agencies in Maine, and from a contract dataset for these treatment agencies. They show that potentially large gains are possible if the less productive agencies adopt the "technologies" (that is, practice styles or management techniques) of the more productive agencies.

Davis considers the welfare implications of retail location decisions. Retailers explicitly consider both the geographic distribution and demographic characteristics of the population when making location decisions. Davis uses a model of demand for retail services that incorporates the actual distribution of consumers' locations, incomes, ages, and races to quantify the welfare effects of market "discrimination" for or against con-

sumers with specific demographic characteristics for the provision of retail services.

Gron examines the degree of cost pass-through in the U.S. automobile market in a framework that incorporates the effect of cost changes on input decisions as well as product market decisions. She finds that accounting for firms' factor market decisions significantly increases measured cost pass-through, but she does not find full cost pass-through or constant markups. Gron shows that cost shocks common to all manufacturers affect prices more than model-specific cost shocks do. She also finds that European and Asian firms pass through less than 100 percent of cost changes, while U.S. firms appear to amplify cost changes in their pass-through behavior. Finally, Gron shows that this effect is correlated with the manufacturer's nationality rather than the location of production.

A number of market failures are associated with R and D investments, and the OECD countries have spent significant amounts of public money on programs intended to stimulate innovative activities. Yet compared with the size of the programs and politicians' emphasis on technology policy, efforts to evaluate the economic effects of R and D subsidies have been rather modest. Firms naturally will try to get funding for projects that are privately profitable even without government support, and it is unclear whether subsidies on average tend to substitute for or complement private R and D. At the same time, it is questionable whether governments are capable of deciding which projects have potentially large social returns. **Griliches, Klette,** and **Møen** review the limited microeconometric literature on the effects of government-sponsored commercial R and D, and discuss the substantial and methodological questions that remain unanswered.

Economic Fluctuations and Growth

Members of the NBER's Program on Economic Fluctuations and Growth met on February 5 in Menlo Park, California. Robert King, NBER and the University of Virginia, and Edward C. Prescott, Federal Reserve Bank of Minneapolis, organized the following program:

Wouter J. den Haan, NBER and University of California, San Diego, and **Gary Ramey** and **Joel Watson,** University of California, San Diego, "Liquidity Flows and Fragility of Business Enterprises"
Discussant: Timothy Kehoe, Federal Reserve Bank of Minneapolis

Thomas Cooley, University of Rochester, and **Vincenzo Quadrini,** Duke University, "Monetary Policy and the Financial Decisions of Firms"
Discussant: Simon Gilchrist, NBER and Boston University

Julia Thomas, Carnegie Mellon University, "Lumpy Investment, Partial Adjustment, and the Business Cycle: A Reconciliation"
Discussant: John V. Leahy, NBER and Boston University

Daron Acemoglu, NBER and MIT, and **Fabrizio Zilibotti,** Institute for International Economic Studies, "Productivity Differences" (NBER Working Paper No. 6879)
Discussant: Charles I. Jones, NBER and Stanford University

Stephen Parente, University of Pennsylvania, and **Richard Rogerson** and **Randall Wright,** NBER and University of Pennsylvania, "Homework in Development Economics: Household Production and the Wealth of Nations"
Discussant: Mark Gersovitz, Johns Hopkins University

Robert Tamura, Clemson University, "From Agriculture to Industry: Human Capital and Specialization"
Discussant: Paul M. Romer, NBER and Stanford University

Den Haan, Ramey, and **Watson** consider the efficiency of financial intermediation and the propagation of business-cycle shocks in a model of long-term relationships between lenders who may be constrained in their short-run access to liquidity and entrepreneurs. The authors show that relationships are subject to breakup when liquidity is low. Surprise liquidity outflows cause persistent damage by breaking up relationships, because there exist matching frictions in the formation of new relationships. Feedback between aggregate investment and the structure of intermediation greatly magnifies the effects of shocks. For large shocks, financial collapse may become inescapable in the absence of external intervention.

Cooley and **Quadrini** develop a

general equilibrium model with heterogeneous, long-lived firms in which financial factors play an important role in production and investment decisions. In the model, the production and investment behavior of small and large firms differs substantially and responds differently to monetary shocks. The authors find that small firms are more sensitive to monetary shocks than large firms. The response of the economy to monetary shocks is characterized by greater persistence than is typically found in other monetary business cycle models. Also, monetary policy shocks have only a small impact on aggregate output but they lead to considerable volatility in financial markets, particularly in stock market returns.

Distributed lag specifications perform well in describing aggregate investment. Such specifications typically are rationalized through the assumption of convex adjustment costs that imply smooth partial adjustment of capital. However, much of the capital stock adjustment within individual production units is discrete and occasional. Neoclassical models of the business cycle preclude such lumpy factor adjustments. Furthermore, to replicate important volatilities and co-movements of investment and output, these models must essentially eliminate convex adjustment costs. **Thomas** uses an equilibrium generalized (S,s) model to reconcile lumpy establishment-level investment and aggregate partial adjustment while maintaining business cycle performance. She also illustrates the importance of general equilibrium considerations for the timing and magnitude of investment activity in generalized (S,s) models.

Acemoglu and **Zilibotti** observe that many technologies used by less developed countries (LDCs) are developed in the Organization for Economic Development (OECD) economies, and as such are designed to make optimal use of the skills of these richer countries' workforces. Because of differences in the supply of skills, some of the tasks perfomed by skilled workers in the OECD economies will be carried out by unskilled workers in LDCs. As a consequence, productivity in the LDCs will be low. Even when all countries have equal access to new technologies, this mismatch between skills and technology can lead to sizable differences in total factor productivity and output per worker. The authors also suggest that productivity differences should be highest in medium-technology sectors, and that the trade regime and the degree of intellectual property right enforcement in the LDCs have an important effect on the direction of technical change and on productivity differences.

Parente, Rogerson, and **Wright** introduce home production into the neoclassical growth model and examine its consequences for development economics. In particular, they study the extent to which one can account for international income differences with differences in policies that distort capital accumulation. In models with home production, such policies not only reduce capital accumulation but also change the mix of market and nonmarket activity; hence these models can generate larger differences in output than standard models for a given policy differential. The authors also show how the welfare implications of policy differences (and thus the welfare implications of differences in market income) change when they explicitly incorporate home production.

Tamura develops a model with endogenous technological change to analyze the transition from agriculture to industry. Initial production is agricultural, with land as a fixed factor. Population growth reduces per capita income, but human capital accumulation can offset this effect and produce technological change. With human capital accumulation, the economy switches from autarkic agriculture to specialized industrial market production, which involves coordination costs that fall as average human capital increases and rises as market size increases. Greater task specialization also increases per capita income. Tamura agrees that there are increasing returns to market participation and that the level of human capital limits the size of the market. Because human capital accumulation also permits population growth, his model predicts a positive correlation between population growth and economic growth. The model further generates: 1) slow population growth, slow income growth, and a negative correlation between population growth and income growth during the agricultural phase; 2) transition dynamics that can be identified with an industrial revolution; and 3) a balanced growth path of higher population growth and rapid income growth in the industrial phase.

Industrial Organization

The NBER's Program on Industrial Organization, directed by Nancy L. Rose of MIT, met at the NBER's California office on February 5–6. Glenn Ellison, NBER and MIT, organized the meeting at which the following papers were presented:

Otto Toivanen, Helsinki School of Economics, and **Michael Waterson**, University of Warwick, "Market Structure and Entry: Where's the Beef?"

Discussant: Francine Lafontaine, NBER and University of Michigan

Glenn Ellison, and **Sara Fisher Ellison**, MIT, "Strategic Entry Deterrence and the Behavior of Pharmaceutical Incumbents Prior to Patent Expiration"

Discussant: Judith A. Chevalier, NBER and University of Chicago

Martin Pesendorfer, NBER and Yale University, "Horizontal Mergers in the Paper Industry" (NBER Working Paper No. 6751)

Discussant: Wallace Mullin, NBER and Michigan State University

Ken Hendricks and **Joris Pinkse**, University of British Columbia, and **Robert H. Porter**, NBER and Northwestern University, "Structural Estimation in First-Price, Symmetric Common-Value Auctions"

Discussant: Susan Athey, MIT

John List, University of Central Florida, and **David Lucking-Reiley**, Vanderbilt University, "Demand Reduction in Multi-Unit Auctions: Evidence from a Sports Card Field Experiment"

Discussant: Robert Wilson, Stanford University

Daniel Ackerberg and **Maristella Botticini**, Boston University, "Endogenous Matching and the Empirical Determinants of Contract Form"

Discussant: Michael D. Whinston, NBER and Northwestern University

Amil Petrin, University of Chicago, "Quantifying the Benefits of New Products: The Case of the Minivan"

Discussant: Aviv Nevo, NBER and University of California, Berkeley

Toivanen and **Waterson** study the effects of market structure on entry using data from the fast-food (counter-service burger) industry in the United Kingdom from 1991 to 1995. During this period, the market was a duopoly. The authors find that the firms' entry decisions were not endogenous to one another; that market structure matters greatly; that each firm is more likely to enter markets where it is not present but its rival is, rather than where neither firm is present; and that firms are affected differently by demand and cost variables. They conclude that the level of market competition cannot be very high.

Ellison and **Ellison** examine the behavior of pharmaceutical incumbents in the period just before they lose patent protection. The authors' data contain advertising, product proliferation, and pricing information for drugs that lost patent protection between 1986 and 1992. Because there is no strategic incentive to deter entry in markets so small, or large, as to make such deterrence unnecessary or impossible, one way to learn whether firms are influenced by a desire to deter entry is to investigate whether behavior is nonmonotonic in the size of the market. Consistent with an entry-deterrence model, Ellison and Ellison find that incumbents in intermediate size markets are the most likely to reduce detail advertising and to increase the proliferation of presentations in the year before patent expiration.

Pesendorfer analyzes mergers and acquisitions in the U.S. paper and paperboard industry which experienced a wave of horizontal mergers during the mid-1980s. He studies the implications of the mergers on consumers, rival firms, and welfare. Comparing equilibrium investment decisions prior to and after the merger wave, he finds that the efficiency of most acquiring firms increases after an acquisition: total economic welfare increased by $583.5 million as a result of the mergers, he estimates.

Hendricks, Pinkse, and **Porter** study federal auctions for wildcat leases on the Outer Continental Shelf from 1959 to 1970. These leases enable bidders to privately acquire (at some cost) "noisy" but informative signals about the amount of oil and gas that may be present. The authors differentiate between potential bidders who do not bid because they have either not acquired signals or have received poor signals. The data on ex post outcomes also allows the authors to identify and estimate bid functions and to test the comparative static prediction that bidders will bid less aggressively when they expect more competition.

Recent auction theory suggests that multi-unit, uniform-price auctions, such as those used by the U.S. Treasury for debt sales, entail demand reduction incentives that may cause inefficient allocations and reduced revenue. **List** and **Lucking-Reiley** present their results from a field experiment in which nearly $10,000 worth of sports cards were sold in

two-unit, two-person, sealed-bid auctions. As predicted, the authors find significant demand reduction on second-unit bids in uniform-price auctions relative to Vickrey auctions. However, in contrast with the theory, they find that an individual's first-unit bids are significantly higher in the uniform-price than in the Vickrey treatment. The bid differences are large enough to affect the allocation of goods, as split allocations significantly more often result in the uniform-price treatment. The authors find no significant difference in revenues across auction formats.

Theoretical work on contracts often identifies an "optimal" contract as a function of the characteristics of the principal and agent who are contracting. **Ackerberg** and **Botticini** examine the econometric implications when some of the theoretically relevant characteristics are only partially observed (proxied) or unobserved. They show that if there are incentives for particular types of agents to contract (or match) with particular types of principals, then the estimated coefficients on the observed characteristics may be misleading. This matching generates a correlation between the observable characteristics of one party and the proxy errors of the other, causing biases in many or all coefficients of interest. The authors suggest a number of solutions to this problem, applying these solutions to a historical dataset on agricultural contracts between landlords and tenants in fifteenth-century Tuscany.

Petrin develops new methods for empirically analyzing welfare changes in equilibrium models of differentiated-goods markets. He estimates the value to consumers and producers of the introduction of the minivan and finds that traditional representative consumer methods overestimate its welfare benefits, primarily because the distribution of consumer tastes is misspecified. He also measures the minivan's impact on the profits of producers. He concludes that large improvements in consumers' standards of living arise from competition as firms, ignoring the externalities they impose on one another, cannibalize the profits and market share of their competitors by continually introducing new and different goods.

Japan Project

Members of the NBER's Japan Project, directed by Anil K Kashyap of NBER and the University of Chicago, met in Menlo Park, California, on February 6. Their program was:

Ramana Ramaswamy, International Monetary Fund, and **Christel Rendu**, London Business School, "Japan's Stagnant Nineties: A Vector Autoregression Perspective"

Discussant: Ben S. Bernanke, NBER and Princeton University

Michael D. Bordo, NBER and Rutgers University, and **Jongwoo Kim**, Rutgers University, "The Relationship between the Monetary Regime and Output: A Structural VAR Model of the Japanese Experience, 1919–96"

Discussant: Kenneth D. West, NBER and University of Wisconsin

Kenji Nishizaki and **Tsutomu Watanabe**, Bank of Japan, "Output-Inflation Tradeoff at Near-Zero Inflation Rates"

Discussant: Christopher D. Carroll, NBER and Johns Hopkins University

Hisashi Nakamura and **Shigenori Shiratsuka**, Bank of Japan, "Extracting Market Expectations from Option Prices: Case Studies in Japanese Option Markets"

Discussant: Kent D. Daniel, NBER and Northwestern University

Lee G. Branstetter, NBER and the University of California, Davis, and **Mariko Sakakibara**, the University of California, Los Angeles, "The Effect of Patent Systems on Japanese Innovation: Evidence from the 1988 Japanese Patent Law Reforms" (see "Patent Systems and Innovation" earlier in this issue)

Discussant: Charles I. Jones, NBER and Stanford University

Ramaswamy and **Rendu** ask what slowed Japanese growth during the 1990s. They show that negative shocks to residential and nonresidential investment were important. The negative shocks to private investment essentially reflect the 1990s unwinding of the overinvestment that took place in the second half of the 1980s. Despite the massive collapse of asset prices in 1990s Japan, negative shocks to private consumption were relatively small. This most likely reflects low household ownership of equities and a lack of urgency about increasing precautionary savings because of the low unemployment rate. The authors conclude, some-

what surprisingly, that negative shocks to public consumption did play a role in dampening activity in the 1990s. They attribute this to Japanese policy choices in the 1990s which favored public investment over public consumption. The external sector was not a major deterrent to activity despite the significant appreciation of the yen in the first half of the decade.

Bordo and **Kim** examine the relationship between the exchange rate or monetary regime and the path and volatility of output using the Japanese experience from the gold standard to the post-Bretton Woods floating exchange rate period. They ask whether adherence to a floating exchange rate regime helped the Japanese economy to absorb shocks that originated from domestic and foreign sources. First they determine the relative size and importance of shocks for output fluctuations across monetary regimes in Japan. Their results imply that the floating exchange rate did help to insulate Japanese output from foreign shocks in the short run, but that this effect was not significant for longer periods. In the interwar and the floating-exchange-rate period, the direction of total foreign shocks was opposite that of the Japanese business cycle, and domestic shocks played a significant role in determining recessions and expansions. However, in the Bretton Woods period, the direction of foreign shocks and the business cycle matched well, while domestic shocks and business cycles moved in opposite directions.

The Japanese consumer price index (CPI) inflation rates have been declining since the first quarter of 1991. The CPI inflation rates were negative in the second and third quarters of 1995; since then, they have been in the narrow range of zero to 1 percent. **Nishizaki** and **Watanabe** use the Japanese data to explore whether the relationship between the rate of inflation and the slackness of the economy (the short-run Phillips curve) depends on the level of inflation. They test a hypothesis that the short-run Phillips curve becomes flatter as the inflation rate approaches zero, paying particular attention to controlling for other factors that affect the inflation rate. They use the skewness of the distribution of relative price changes as a measure of supply shocks; to control for changes in the expected inflation rate, they use information contained in the cross-prefecture Phillips curve; they construct a panel dataset consisting of the inflation rate and the ratio of job offers to applicants in 46 prefectures from 1971 to 1997; and finally they transform the observed two variables by subtracting the appropriate national averages. They find that the slope of the short-run Phillips curve becomes smaller as the inflation rate approaches zero: the estimated slope in 1990s Japan is smaller than before, and this regularity holds even when they control for such variables as supply shocks and expected inflation.

Nakamura and **Shiratsuka** focus on the recently developing financial derivatives markets in Japan, examining the usefulness of option prices as an information variable for monetary policy implementation. A set of option prices provides them with information on the whole probability distribution of the future values of underlying assets. Such information enables them to examine the development of market expectations. The authors estimate a time series of implied probability distributions from daily option prices on stock prices and long-term government bond futures for a sample of three periods: 1) the period of a collapsing bubble in the stock market in 1989–90; 2) the period of serious stock market slump in 1992–4; and 3) the period of increasing anxiety in the market about a possible deflationary spiral in 1995.

Insurance Research Group

The NBER's Insurance Research Group held a meeting in Cambridge on February 12–13. Kenneth A. Froot, NBER and Harvard University, Director of the Research Group, and Howard C. Kunreuther, NBER and University of Pennsylvania, organized the meeting and selected the following papers for presentation:

Brad Herring and **Mark Pauly**, University of Pennsylvania, "Efficient Employer Choices in Multi-Plan Offerings with Adverse Selection: An MSA Example"

Discussant: Richard J. Zeckhauser, NBER and Harvard University

Christopher K. Hsee, University of Chicago, and **Howard C. Kunreuther**, "Insurance Purchase as Expressions of Feelings"

Discussant: Paul Slovic, Decision Research

David Rode, Baruch Fischhoff, and **Paul Fischbeck**, Carnegie-Mellon University, "Catastrophic Risk and Securities Design"

Discussant: Steven Goldberg, USAA

Property and Casualty Insurance Group

Adam B. Jaffe, NBER and Brandeis University, and **Thomas Russell**, Santa Clara University, "Financial Markets and Financial Intermediaries: The Case of Catastrophic Insurance"

Discussant: Kenneth A. Froot

Robert W. Klein, Georgia State University, and **Paul R. Kleindorfer**, University of Pennsylvania, "The Supply of Catastrophe Insurance under Regulatory Constraints"

Discussant: James Ament, State Farm Fire and Casualty Co.

Neil Doherty, University of Pennsylvania, "Hedging, Compensation, and Earnings Surprises"

Discussant: Peter A. Diamond, NBER and MIT

David A. Moss, Harvard Business School, "When All Else Fails: Government as the Ultimate Risk Manager"

Discussant: John Major, Guy Carpenter & Company, Inc.

Anne Beatty, Pennsylvania State University, **Anne Gron**, Northwestern University, and **Bjorn Jorgensen**, Harvard University, "Corporate Risk Management and Product Liability Insurance"

Discussant: Jeremy C. Stein, NBER and MIT

Stewart C. Myers, NBER and MIT, and **A. Lawrence Kolbe**, The Brattle Group, "Taxing Mutual and Stock Life Insurance Companies"

Discussant: David F. Bradford, NBER and Princeton University

Allen Berger, Federal Reserve Board, **David Cummins**, University of Pennsylvania, **Mary Weiss**, Temple University, and **Hongmin Zi**, Sejong University, "Economies of Scope in Financial Services: An Analysis of the U.S. Insurance Industry"

Discussant: Gordon Stewart, Insurance Information Institute

Herring and **Pauly** outline a feasible employee premium contribution policy that would reduce the inefficiency associated with adverse selection when a limited-coverage insurance policy is offered alongside a more generous policy. The authors define "efficient premium contribution" and show that it leads to an efficient allocation across plans of persons who differ by risk, but that it may also redistribute against higher risks. The authors also simulate the additional option of a catastrophic health plan (CHP) accompanied by a medical savings account (MSA). The efficiency gains from adding the MSA/CHP option are positive but small; the adverse consequences for high risks under an efficient employee premium are also small.

Hsee and **Kunreuther** study individual insurance behavior and document an "affection effect" in the decision to purchase coverage and then to invest the time and energy in making an insurance claim after suffering a loss. People who feel more affection toward an article they are shipping are more willing to buy an insurance policy covering damage to the item than others, holding the amount of coverage and all other normatively relevant factors constant. If the article is damaged, those with greater affection for it are also more willing to go through the trouble of collecting the compensation. The authors explain these findings via a "consolation hypothesis": that people perceive insurance compensation not just as a monetary payment but as a token of consolation. They suggest that decisions can be influenced heavily by affective factors that are often ignored in normative analyses; also, the same amount of money can evoke different feelings and have different uses depending on its source.

Losses from catastrophic events constitute an increasing problem for the property and casualty insurance industry. These losses have significant repercussions not only for insurance firms but also for governmental policymakers and consumers. One way to deal with these risks is through securitizing them, which should provide greater flexibility (and the ability to experiment with

alternative arrangements) than would governmental programs. Securitization would also allow risks of local disasters to be spread across global capital markets. By most accounts, though, previous attempts at securitizing insurance risks have met with minimal success. **Rode, Fischhoff,** and **Fischbeck** examine possible barriers to securitization, focusing on behavioral responses to such novel instruments. These include the difficulties of conveying the associated risks, even to investors who are sophisticated about finance (but still hesitant about model risk and structural uncertainties).

The recent crisis in the private catastrophe insurance market has been met by increased provision of insurance by various state agencies. **Jaffe** and **Russell** analyze the causes of the private market collapse before discussing some innovations that might permit its re-emergence. They argue that the fundamental difficulty with private market provision of catastrophe insurance is lack of liquidity. A single $50 billion loss event would require an infusion of external capital, and raising such capital ex post facto is next to impossible. This suggests that the industry's only option is to arrange for capital flows ex ante. Catastrophe bonds have a number of excellent incentive features in this regard. The authors conclude by discussing whether such bonds are best issued by insurers, reinsurers, or directly by the entities at risk.

Klein and **Kleindorfer** examine several important issues with respect to the supply of catastrophe insurance for residential property and insurers' strategic responses to the increased risk of natural disasters. They first describe the characteristics and regulation of residential property insurance. They then propose a model to consider the tradeoffs in a multi-line insurance company between the benefits of spatial economies in marketing and distribution of insurance products and the increased capital costs for catastrophic lines of correlated risks. This model motivates an empirical analysis of the market for homeowners' insurance in Florida. The analysis demonstrates some insurers' relatively high geographic concentration of exposures in areas in the paths of hurricanes. It also suggests the existence of cross-subsidies (among lines and among rating territories) as a result of regulatory constraints.

Most explanations of why firms hedge are based on the transaction cost associated with financial distress and the nonlinearity of taxes. However, it is common for risk managers to explain hedging in terms of earnings smoothing. If a firm takes a sudden hit in quarterly earnings, this will have a large negative impact on stock price. This rationale may be contrasted with the emerging evidence that firms tend to hedge selectively those risks that are not central to the business and are least likely to carry information about future earnings. **Doherty's** model explains this behavior in terms of information asymmetry. With insiders having better cash-flow information than outsiders, hedging of noncore risk purges earnings signals of noise. Then the underlying information in the earnings can be extracted by outsiders. Doherty examines a compensation structure that would induce managers to adopt this hedging strategy. His work qualifies earlier studies which suggest that options simply discourage hedging.

Moss argues that risk management constitutes a core function of government and then explores the government's inherent strengths and weaknesses as a risk manager. He first introduces the notion of public risk management and clarifies a few crucial concepts (such as the distinction between risk reduction and risk shifting) within a public context. He then highlights the vast extent of risk-related failures in the private sector and surveys the likely sources of these failures. Although economists have focused most of their attention on information problems (and especially asymmetric information problems, such as adverse selection and moral hazard), the existence of perception problems and commitment problems are equally important in motivating government interventions in the private-sector allocation of risk.

Beatty, Gron, and **Jorgensen** examine firms' risk-management response to an exogenous disruption in the insurance markets known as "the liability crisis." Product liability premiums increased rapidly and insurance availability declined during the crisis of 1985 and 1986. The authors use this event to study which firms retain risk and to examine the various tradeoffs involved in corporate self-insurance. They find that firms that choose to retain risk tend to have greater risk-bearing ability; such firms also have lower leverage, lower net operating losses, and managers who have more out-of-the-money options. The authors also examine the effect of self-insurance on firm risk. If risk-management decisions are independent of financial and other business decisions, then previously insured and now self-insured firms will be more risky than those that remain insured. However, the authors find that risk-management decisions are not independent of financial and other business decisions: firms that increase their risk-bearing through self-insuring also reduce their riskiness, as measured by the variation on stock returns.

Myers and **Kolbe** reconsider the theory of taxation of policyholder-funded investments in mutual insurance companies. The authors assume a consistently applied prepayment tax system for mutuals. They show that a mutual and stock company undertaking the same investment receive the same rate of return but

not the same net present value (NPV). If there is an option to invest in the future and NPV may be positive, then the option is worth more to the mutual company. The authors also consider whether carry-forward of taxes prepaid by the mutual could serve as collateral for insurance policies.

The U.S. insurance industry provides a particularly informative environment in which to analyze economies of scope, because it consists of numerous specialist firms offering either life or property-liability insurance as well as a significant number of firms offering both types of insurance. However, there is no extant literature on economies of scope between these two segments of the industry. **Berger, Cummins, Weiss,** and **Zi** extend the literature with the first study to estimate revenue and profit scope economies for the insurance industry, and one of a growing few studies to estimate revenue and profit economies in financial services. They also innovate by allowing the cost, revenue, and profit functions to differ for specializing and joint-production firms. Their results suggest that the traditional method of measuring scope economies, using the same function for specialists and joint producers, may give misleading results. Their new approach shows that significant cost scope economies exist for insurers. However, these are offset by revenue diseconomies, so that the net effect on profit economies is generally insignificant.

Development of the American Economy

The NBER's Program on the Development of the American Economy, directed by Claudia Goldin of Harvard University and the NBER, met in Cambridge on March 6. The following papers were presented:

Paul Rhode, NBER and University of North Carolina, "Technology, Markets, and the Dynamics of Business Location: The Pacific Coast Aircraft Industry, 1909–39"

Carolyn M. Moehling, NBER and Ohio State University, "Family Structure, School Attendance, and Child Labor in the American South, 1910"

Joseph P. Ferrie, NBER and Northwestern University, "A New View of the Italian American Economic Performance and the Impact of Place of Origin, 1850–1920"

Michael D. Bordo and **Hugh Rockoff**, NBER and Rutgers University, and **Michael Edelstein**, Queens College, City University of New York, "Was Adherence to the Gold Standard a 'Good Housekeeping Seal of Approval' during the Interwar Period?"

Lance E. Davis, NBER and California Institute of Technology, and **Robert Gallman**, University of North Carolina, "Waves, Tides, and Sandcastles: The Impact of Foreign Capital Flows on Evolving Financial Markets in the New World, 1865–1914"

Two important and related developments in the twentieth-century U.S. economy are the growth of the aerospace sector and the expansion of manufacturing in the Pacific region. **Rhode** explores why aircraft production was concentrated on the West Coast before World War II. Around 1939, the region accounted for one-half of national aircraft production workers (9.5 times its share of all manufacturing). Traditional explanations focus on the roles of climate—in reducing costs and allowing easier testing and delivery—and the military. Rhode instead highlights the vanguard role that the Pacific Coast firms played in the "airframe revolution" of the early 1930s, achieving technological leadership with planes specifically designed for Western markets. He re-interprets the role of climate as increasing the region's "air-mindedness" and fostering an exceptionally large home market that promoted growth of this export activity. He argues that high volatility of demand prevented the industry's previous leaders from gaining much momentum from their earlier starts.

The percentage of children living apart from one or both parents was substantially higher for blacks than for whites even in the early twentieth century. **Moehling** examines how these racial differences in family structure affected the racial differences in children's school attendance and labor force participation in the American South in 1910. She uses data from the 1910 U.S. census and concludes that family structure was an important determinant of children's activities in 1910. Living apart from one or both parents lowered

the likelihood of school attendance for blacks and increased the likelihood of labor force participation for children of both races. She estimates that the higher number of southern black children than southern white children in single-parent families and foster care accounted for approximately 10 percent of the racial gap in children's school attendance and 30 percent of the racial gap in children's labor force participation. However, it appears that racial differences in adult literacy, occupations, home ownership, and school characteristics were more important than racial differences in family structure in explaining the racial gap in children's experiences in the South in 1910.

Although we now know a great deal about both the population that left Ireland during and after the Great Famine and the population of Irish immigrants in America, an important connection between these data has been lacking: an understanding of how immigrants' circumstances at departure influenced their subsequent economic performance in the United States. **Ferrie** addresses this gap by offering new evidence on the impact of immigrants' place of origin within Ireland on geographic mobility, occupational attainment, and wealth accumulation in the United States. Using immigrants' surnames to determine their place of origin in Ireland, Ferrie finds substantially better performance among the Ulster Irish (particularly the Scots Irish) in the 1850s. This advantage narrowed over the late nineteenth century, though, and was eliminated by 1920. The changes in the places producing the best-performing immigrants appear to reflect changes occurring between 1850 and 1920 in the economic circumstances of those places: relatively better conditions in Ireland produced relatively better-performing immigrants.

World War I dramatically altered the world's financial landscape. Most countries left the gold standard, and New York replaced London as the major lender in world capital markets. **Bordo, Edelstein,** and **Rockoff** discuss how the gold standard was reconstructed in the 1920s. They show that the U.S. capital market viewed returning to the gold standard as a signal of financial rectitude, what they refer to as a "Good Housekeeping Seal of Approval." When countries returned to the gold standard, especially when they did so at the prewar parity, they were rewarded with substantially lower interest rates. Other signals, such as small fiscal deficits, apparently carried little weight with lenders.

By 1860 Britain had become the world's banker. **Davis** focuses on how capital flows from Britain affected the development of the domestic financial infrastructure in four "frontier" countries: Argentina, Australia, Canada, and the United States. Although the four were at different stages of development, the economic future of all of them depended in large part on their ability to bring new lands and resources within the scope of the domestic market. To that end, ultimately, domestic capital had to be accumulated and mobilized. The economic environment and the particular set of financial institutions that evolved in each country were influenced by economic and political considerations, but both the environment and the timing and structure of the developing capital market institutions were influenced by the availability of foreign finance too. Although the relationship between foreign capital flows and the evolution of domestic capital markets is multidimensional, three connections appear particularly important: the role of legal and cultural constraints in establishing the economic domain of the government and the commercial banks; questions of institutional fragility; and the nature of the institutions that emerged to link Britain with the frontier countries and their role in shaping the domestic financial infrastructure that emerged to channel domestic saving into domestic investment. All three were to have a profound effect on long-term growth in the receiving country.

Bureau Books

NBER Macroeconomics Annual 1998

The *NBER Macroeconomics Annual 1998* (Volume 13), edited by Ben S. Bernanke and Julio J. Rotemberg, is now available from the MIT Press. This volume results from a conference designed to present, extend, and apply frontier work in macroeconomics, especially on policy issues. Papers cover such topics as: why the U.S. unemployment rate is so much lower than that in other countries; how labor is supplied over the life cycle; the relationship of exchange rates to job creation and destruction; how investment fundamentals influence finance; and what technology shocks do to the economy.

Bernanke and Rotemberg are both Research Associates in the NBER's Programs on Economic Fluctuations and Growth and Monetary Economics. Bernanke is also the Howard Harrison and Gabrielle Snyder Beck Professor of Economics and Public Affairs at Princeton University. Rotemberg is also the MBA Class of 1942 Professor of Business Administration at the Harvard University Graduate School of Business.

This volume is available for $45.00 (cloth), or $25.00 (paperback). It may be ordered directly from the MIT Press at 5 Cambridge Center, Cambridge, MA 02142; or, by phone to (617) 253-2889; or, by email to mitpress-orders@mit.edu. (The MIT Press also has a Web site: www.mitpress.mit.edu/journals.tcl).

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Generational Accounting Around the World

Generational Accounting Around the World, an NBER Project Report edited by Alan J. Auerbach, Laurence J. Kotlikoff, and Willi Leibfritz, is now available from the University of Chicago Press for $72.00.

Generational accounting, an alternative to traditional government deficit accounting developed in 1991 by Auerbach, Kotlikoff, and Jagadeesh Gokhale, assesses the long-term sustainability of fiscal policy and measures the extent of the fiscal burdens ultimately borne by present and future generations. It is now used by 23 countries worldwide, including the United States.

The papers in this volume combine the latest and most extensive country-by-country generational analyses with a comprehensive review of generational accounting's innovative methodology. It will be a consummate resource on this subject for economists, political scientists, and policymakers.

Auerbach is a Research Associate in the NBER's Programs on Public Economics, Economic Fluctuations and Growth, and Corporate Finance, and a professor of economics at the University of California, Berkeley. Kotlikoff is a Research Associate in the NBER's Programs on Public Economics and Aging and a professor of economics at Boston University. Leibfritz is head of the department for Macroeconomic Analysis and Public Finance of the ifo Institute for Economic Research in Munich.

The Costs and Benefits of Price Stability

The Costs and Benefits of Price Stability, edited by Martin S. Feldstein, is now available from the University of Chicago Press for $52.00.

There is widespread agreement among economists and policy officials that monetary policy should not permit the high inflation that prevailed in the 1970s in the United States and many other industrial countries. However, there is less agreement about a specific long-term goal for monetary policy, about the concessions that a nation must make to achieve that goal, and about the short-term actions that could be taken in pursuit of that goal.

This volume explores the costs and benefits of going from the existing low rate of inflation to full price stability, focusing particularly on the interaction between taxes and the economic cost of inflation. Feldstein and the NBER enlisted staff members of the central banks of three countries — Germany, the United Kingdom, and Spain — to participate in this project by doing comparable studies of the costs of inflation in their countries that paralleled Feldstein's study for the United States.

Their results, along with specific analyses by other scholars, were presented at an NBER conference hosted by the Federal Reserve Bank of New York in February 1997. The conference brought together macroeconomists and specialists in public finance to explore the complex issues of macroeconomics, taxation, and welfare economics that affect and are affected by a move to full price stability.

Feldstein is President of the NBER and the George F. Baker Professor of Economics at Harvard University.

The Financing of Catastrophe Risk

The Financing of Catastrophe Risk, edited by Kenneth A. Froot, is now available from the University of Chicago Press for $68.00.

While it remains unlikely that a single event might entirely bankrupt the U.S. insurance and re-insurance industries, a big catastrophe could place firms under severe financial stress, jeopardizing both policyholders and investors and causing profound ripple effects throughout the U.S. economy. For this volume, Froot directed a substantial NBER research project and then assembled an impressive roster of experts from academia and the insurance industry to explore the disturbing yet realistic possibility that a large catastrophic event, with aggregate losses exceeding $25 billion, will occur in the United States. The essays assess the level of fiscal preparedness of the insurance and re-insurance industries and estimate the potential effect of such a catastrophe on the U.S. economy.

Froot is a Research Associate in several NBER Programs and the Industrial Bank of Japan Professor of Finance at the Harvard University Graduate School of Business.

Fiscal Institutions and Fiscal Performance

Fiscal Institutions and Fiscal Performance, an NBER Conference Report edited by James M. Poterba and Jürgen von Hagen, is now available from the University of Chicago Press for $53.00.

The rise and persistence of sustained budget deficits in many developed and developing countries during the past three decades have caused great concern. Their emergence in otherwise diverse nations defies explanations aimed at internal economic developments within a specific country. This volume shifts emphasis away from narrow economic factors to more broadly defined political and institutional factors that affect government policy and national debt. It brings together new theoretical models, empirical evidence, and a series of in-depth case studies to analyze the effect of political institutions, fiscal regulations, and policy decisions on accumulating deficits. It provides a fascinating overview of the political and economic issues involved and highlights the role of budgetary institutions in the formation of budget deficits.

Poterba is Director of the NBER's Program on Public Economics and a professor of economics at MIT. Von Hagen is a professor of economics at the University of Bonn.

Changes in Exchange Rates in Rapidly Developing Countries

Changes in Exchange Rates in Rapidly Developing Countries, edited by Takatoshi Ito and Anne O. Krueger, is now available from the University of Chicago Press for $67.00. This will be volume 7 in the NBER-East Asia Seminar on Economics series.

Historically, most developing nations have employed strict exchange rate controls and heavy protection of domestic industry — policies now thought to be at odds with sustainable and desirable rates of economic growth. By contrast, many East Asian nations maintained exchange rate regimes designed to achieve an attractive climate for exports and an "outer-oriented" development strategy. The result has been rapid and consistent economic growth over the past few decades. This volume explores the impact of such diverse exchange control regimes in both historical and regional contexts, focusing particular attention on East Asia.

Ito is a Research Associate in the NBER's Program on International Finance and Macroeconomics and a professor at the Institution of Economic Research at Hitotsubashi University. Krueger is a Research Associate in the NBER's Programs on International Trade and Investment and International Finance and Macroeconomics and a professor of economics at Stanford University.

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6903	Eduardo M.R.A. Engel James R. Hines, Jr.	Understanding Tax Evasion Dynamics
6904	Richard E. Baldwin Philippe Martin	Two Waves of Globalisation: Superficial Similarities, Fundamental Differences
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