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Program Report

Monetary Economics

N. Gregory Mankiw*

Understanding what monetary policy can do to enhance economic performance (and, just as importantly, what it cannot do) is a continuing challenge for economic policymakers around the world. Researchers in the NBER's Monetary Economics Program contribute to this effort with a combination of theoretical and empirical studies on the effects of central bank actions and the design of monetary policy. These studies are circulated as NBER Working Papers, presented and discussed at regular Program meetings, and subsequently published in NBER volumes and academic journals.

Our regular program meetings also aim to facilitate interaction between researchers working in universities and those working in central banks. Much frontier research on monetary economics occurs within research staffs of the Federal Reserve System and other central banks around the world. These central bank researchers often are invited to present their work and to participate in the discussion of other recent studies. We are delighted that Ben S. Bernanke, one of our long-term members and program director for the past two years, was appointed by President George W. Bush in 2002 to become a Governor of the Federal Reserve. When he was confirmed, I returned to the role of Program Director, which I had held previously.

In this report, I summarize a few of the strands of research on monetary economics that have engaged NBER researchers in recent years. None of these issues is fully settled, but significant progress has been made. In the process, I will offer a few of my own judgments about what we know and about where more research is still needed.

The Dynamic Effects of Monetary Policy

According to textbook theory, changes in monetary policy influence employment and production in the short run but, in the long run, affect

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only prices and inflation rates. When a central bank slows the rate of money growth, for instance, the end result will be a lower rate of inflation, but the transition to lower inflation can take some time, and it often entails a period of depressed economic activity, including higher unemployment. This short-run tradeoff between inflation and unemployment is often called the Phillips curve, after the classic study of this topic by A. W. Phillips in the 1950s. Much research in the NBER Monetary Economics Program has been devoted to documenting and explaining these dynamic responses to monetary policy.

One approach to this empirical issue is to study particular episodes of disinflationary policy. A classic study following this approach is that by Christina Romer and David Romer. [2966] Following in the footsteps of NBER researchers Milton Friedman and Anna Schwartz and their renowned *Monetary History of the United States*, the Romers read through the minutes of the meetings of the Federal Open Market Committee to identify episodes in which Fed policy switched toward a tougher stance against inflation. They find that after each of these so-called Romer dates, the economy experienced a substantial decline in production and employment. The Romers interpret their findings as strong evidence for the effect of monetary policy on real economic activity.

In another study, Laurence M. Ball looked at data from OECD countries and found every episode in recent history during which the inflation rate experienced a significant and sustained decline. [4306] In almost every episode that Ball identified, the country also experienced a period with output below trend. This is consistent with a short-run tradeoff between inflation and real economic activity. Ball reports that the output effects are smaller (that is, reducing inflation is less costly) when the disinflation is rapid and when a country has more flexible labor contracts.

More recent studies on the dynamic effects of monetary policy have taken a very different approach to the data, but they have reached broadly similar conclusions. A common methodology is to try to identify "monetary policy shocks" — movements in some measure of monetary policy that cannot be predicted or explained contemporaneously with the economic variables that typically drive monetary policy. These random movements in policy are interpreted as a natural experiment that can be used to determine the policy's effect. Once these shocks are identified, statistical techniques can be used to trace their effects on

employment, production, inflation, and other variables of interest.

Lawrence J. Christiano, Martin Eichenbaum, and Charles Evans summarize these studies as follows: "The literature has not yet converged on a particular set of assumptions for identifying the effects of an exogenous shock to monetary policy. Nevertheless, there is considerable agreement about the qualitative effects of a monetary policy shock in the sense that inference is robust across a large subset of the identification schemes that have been considered in the literature." [6400] This robust conclusion includes the classic textbook result that monetary policy first influences employment and production and only later affects inflation.

The accumulation of many empirical studies following varied strategies has led to a consensus among economists about how monetary policy affects the key measures of macroeconomic performance. The exact timing is open to debate, but a rough rule of thumb is that employment and production respond about six months after a change in monetary policy, whereas it takes a year or more before there is any significant movement in the inflation rate.

The Amazingly Low Inflation and Unemployment of the 1990s

During the late 1990s, the United States experienced an unusual combination of low inflation and low unemployment. In 1999, for instance, the unemployment rate averaged 4.2 percent for the year, while the inflation rate as measured by the consumer price index was a mere 2.2 percent. To some casual observers, these fortuitous events suggested that the short-run tradeoff between inflation and unemployment no longer existed, or perhaps that it never existed at all.

Many NBER researchers have rejected this interpretation of the recent data. Indeed, the Phillips curve as an empirical phenomenon is still very much alive and well. For example, James Stock and Mark Watson have examined the best methods for forecasting inflation. They conclude that, "Inflation forecasts produced by the Phillips curve generally have been more accurate than forecasts based on other macroeconomic variables, including interest rates, money and commodity prices." [7023].

Why, then, did the U.S. economy experience a rare combination of low unemployment and low inflation during the late 1990s? Part of the answer is that the Fed had produced low inflation during the previous decade, which in turn made credible monetary policymakers' claims that they were aiming for low inflation in the future. Lower expectations of inflation shift the short-run tradeoff between inflation and unemployment in a favorable direction because these expectations influence the behavior of wage and price setters.

Yet lower expectations of inflation are not the whole story behind the impressive macroeconomic performance of the 1990s. Part of the answer also lies in the widely noted acceleration in productivity growth that occurred in the second half of the decade. As Robert J. Gordon puts it, "The post-1995 technological acceleration, particularly in information technology and accompanying revival of productivity growth, directly contributed both to faster output growth and to holding down the inflation rate." [8771].

The current state of the inflation-unemployment tradeoff is often summarized in a statistic called the NAIRU, an ugly acronym that stands for the non-accelerating inflation rate of unemployment. The NAIRU is like a speed limit for the economy, for if the economy grows so fast that unemployment falls below the NAIRU, inflation tends to rise. Yet the NAIRU is not constant over time. [5735] In particular, several recent studies have suggested that an acceleration of productivity growth will cause the NAIRU to fall, at least for a while. [8320, 8421, 8614, 8940] The reason for the apparent link between productivity growth and the NAIRU is very much an open question that should lead to future research. One possible explanation is that workers are slow to adjust their wage demands to changes in their productivity. Until workers adapt to the new environment, a shift in productivity growth may alter the economy's normal level of unemployment.

Thus, shifts in productivity growth impinge on the short-run tradeoff between inflation and unemployment and, indirectly, on the choices facing monetary policymakers. When productivity slows down, as it did during the 1970s, monetary policymakers face a deteriorating short-run tradeoff between inflation and unemployment. When productivity speeds up, as it did during the 1990s, monetary policymakers face an improving tradeoff between these two measures of economic performance.

The Puzzle of Sluggish Inflation

Many empirical studies of the inflation process suggest that inflation is sluggish. This sluggishness of inflation appears in various guises. In studies of the Phillips curve, inflation is found to exhibit substantial inertia; that is, inflation is strongly correlated with its own lagged values. [5735] In studies of particular disinflationary episodes, inflation is found to fall only gradually. [4306] In studies that use statistical techniques to identify monetary policy shocks and their effects, these shocks are found to have a gradual and delayed effect on the inflation rate. [5146, 6400] Certainly, these conclusions are consistent with the conventional wisdom of central bankers, who believe they can influence the inflation rate only with a substantial lag. This lag between central bank actions and inflation is one reason why central banks that have chosen to target inflation often look at expected inflation a year or two ahead when judging whether they are on target.

Why does monetary policy influence inflation with such a long lag? The answer is not at all obvious. Standard theories of the real effects of monetary policy emphasize the stickiness of wages or prices. According to these theories, monetary fluctuations have real effects in the short run because wages and prices do not adjust

instantly. [For surveys of this topic, see 2285, 4677.] Even if this line of thought is accepted, however, it fails to explain the sluggishness of inflation — the change in the price level. The stickiness of prices can explain why the price level does not jump to a level ensuring full employment, but the inflation rate is determined by those prices that are changing, and those prices could respond quite quickly to changes in monetary policy. Yet for some reason not found in standard theories of price adjustment, they don't. The failure to explain sluggish inflation shows that the dynamic behavior of prices remains a fundamental puzzle for students of business cycle theory. [7884]

There have, however, been several recent attempts to explain the sluggishness of inflation. These all depart significantly from standard models of price setting. But several of the attempts are similar in their underlying assumptions, and this common structure may well point the way toward a final resolution of the sluggish-inflation puzzle. The common assumption is that price setters are inattentive: prices keep rising after changes in monetary policy because most price setters are not paying close attention to the policy change and, therefore, keep marking up prices as if no change had occurred.

One approach to modeling inattentive price setters, explored by Michael Woodford, is to use the tools of information theory and to assume that humans have a limited channel for absorbing information. [8673] That is, the human brain is assumed to be imperfect in the same way as a computer with a slow internet connection would be. Woodford uses this assumption to build a model of inflation dynamics. His model can explain sluggish inflation, as well as the persistent effects of monetary policy on output. He emphasizes that because not everyone shares the same information, price setting depends on "higher order expectations." That is, price setters care about not only their own expectations of monetary policy, but also their expectations of others' expectations, and their expectations of others' expectations of still others' expectations, and so on.

Ball has proposed another approach to this problem. [7988] He suggests that when forming expectations of any variable, people optimally use all information in the past values of that variable, but fail to incorporate information from other variables. That is, expectations are based on optimal univariate forecasts. He argues that this approach to forecasting is nearly rational, as multivariate forecasts offer only slight improvement over univariate forecasts. Ball shows that this "near rational" approach to expectations can explain why inflation appears so sluggish in recent data, while it was less sluggish in data from early in the twentieth century.

In work I have undertaken with Ricardo Reis, the assumption of imperfect information among price setters is explored from a different angle. [8290, 8614] We assume that each period there is a fixed probability that a price setter updates his information set; otherwise, he continues to set prices based on old plans and outdated information. We show that this model of "sticky information" can explain why inflation is so sluggish, and that it produces dynamic responses to monetary policy similar to those estimated in the empirical literature.

In all three of these models, inflation is sluggish because inflation expectations respond too slowly to changing circumstances. Christopher Carroll has written an intriguing empirical study that gives some support to this prediction. [8695] Carroll uses survey data to compare the inflation expectations of the general public to the inflation expectations of professional forecasters. He reports three notable findings. First, he confirms that professional forecasters are better at forecasting inflation than is the general public. Second, he finds that the public responds to the professionals' expectations with a lag that averages about one year. Third, he reports that when the news media are producing more stories about inflation, the public's expectations adjust more quickly to the professional forecasts. These findings do not prove that the sluggishness of inflation is attributable to the inattentiveness of price setters, but they are certainly consistent with that hypothesis.

Rules for Monetary Policy

The study of monetary policy aims not only to understand the effects of central bank actions but also to produce better monetary policy. Toward this end, a large literature has emerged that studies monetary policy rules. A policy rule is a contingency plan that specifies how the central bank will respond to varying economic conditions.

There are two reasons for interest in monetary policy rules. One reason put forward by some economists is that monetary policy might possibly be better if central banks did not have discretion but were committed to following a monetary rule. Some of these economists have argued that central banks use discretion unwisely and end up being the cause, rather than cure, for the business cycle. Others argue that discretionary monetary policy is inherently inflationary. Monetary policymakers often claim that their aim is price stability, but once expectations are formed, they are tempted to renege on this announcement and take advantage of the short-run tradeoff between inflation and unemployment. The only way to avoid this time-inconsistency, it is argued, is to commit the central bank to a policy rule.

Even if these arguments against discretionary policy are rejected, however, there is another reason for interest in policy rules — as guidelines for policymakers with discretion. Monetary policymaking is a difficult business, and policymakers are always eager to hear objective, reasoned advice on how to respond to economic conditions. A policy rule that performs well by some criterion can be viewed as such advice.

There is a large literature that uses the tools of modern monetary theory to derive optimal policy rules. An excellent introduction to this literature is a paper by Richard Clarida, Jordi Gali, and Mark Gertler, with the alluring title "The Science of Monetary Policy: A New Keynesian Perspective."

[7147] One conclusion from this literature is that optimal policy can often be written as a form of a "Taylor rule," according to which the short-term interest rate set by the central bank responds to inflation and a measure of real economic activity, such as the deviation of output from its potential. [For a recent example, see 9149; for an opposing view, see 9421.]

Another conclusion from this literature is that optimal policy should obey the "Taylor principle," which states that the nominal interest rate should rise more than one-for-one with the inflation rate. In many standard models of the business cycle, this principle ensures that shocks to the economy do not induce inflation to get out of control. There is considerable evidence that the successes of monetary policy over the two decades, compared to the problems in the 1970s, can be explained by reference to the Taylor principle. [6442, 6768, 8471, 8800] That is, the Fed has responded aggressively to changes in inflation when choosing its target interest rate during the recent period, whereas the Fed appears to have responded much less to inflation in the earlier period. This insufficient response to inflation may explain why inflation got out of hand in the United States in the 1970s.

Research Summaries

Explaining Exchange Rate Behavior

Menzie D. Chinn*

In an era characterized by increasingly integrated national economies, the exchange rate is the key relative price in open economies. As such, a great deal of attention has been focused on characterizing its behavior. Unfortunately, it is unclear how much success there has been in predicting this critical relative price. As recently remarked, "There may be more forecasting of exchange rates, with less success, than almost any other economic variable."[1] While this characterization may be quite apt — a point I will return to later — it should not prevent us from attempting to identify the empirical determinants of exchange rates, an enterprise separate from forecasting exchange rates.

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The Impact of Productivity Changes

The first major line of inquiry I've followed links changes in productivity to changes in nominal and real exchange rates. There is a long and venerable literature that links these two variables theoretically, most notably associated with Balassa and Samuelson.[2] In these models, differences in productivity levels between traded and nontraded sectors affect the relative prices of these goods. Further, with traded goods prices equalized in common currency terms, real exchange rates — which incorporate the prices of nontraded good — will be affected.

The post-War yen has been the traditional candidate for explanation by this type of model.[3] In addition, the model typically is applied to economies experiencing rapid growth, since such growth often is associated with rapid productivity change in the tradable (manufacturing) sector. Hence, a natural application of the model is to the East Asian countries. Unfortunately, the data necessary for a direct test of the model do not readily exist. Instead, most analyses rely on observations on relative prices to infer the validity of the approach. In order to conduct a direct test, I compiled sector-specific employment and output data for China, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, Taiwan, and Thailand, and estimated the implied relationships. The time-series evidence did not support the model except in a few cases. Using panel regression techniques adapted to persistent time series,[4] I find that the model applies to the set of countries including Indonesia, Japan, Korea,

Malaysia, and the Philippines.[5] Part of the reason for the limited extent of the finding may be that *measured* traded goods prices do not appear to be equalized, especially when the prices pertain to bundles of goods that are changing rapidly. After all, the composition of exports of Malaysia today bears little resemblance to that of forty years ago.

Interestingly, there is some evidence that the productivity effect applies even for more developed economies. Louis D. Johnston and I examined sector-specific productivity levels for 14 OECD countries. Using panel cointegration methods, we found that productivity levels did matter for dollar-based real exchange rate levels in the long run, although other factors mattered as well. These other factors included government spending and the terms of trade. In a closely related paper, we found that the same conclusions held for trade-weighted OECD real exchange rates.[6]

More recently, Ron Alquist and I have examined the behavior of the euro/dollar exchange rate, drawing inspiration from the large literature that ascribed the strength of the dollar and the weakness of the euro to the differing prospects for accelerated productivity growth rates associated with the diffusion of the New Economy. Using aggregate productivity data from 1985 to 2001, we found that productivity was strongly related to the euro/dollar rate. One of the paradoxes of the results is that according to the estimates, each one percentage point increase in the productivity differential between the United States and the eurozone economies results in a real dollar appreciation of between 2 and 5 percent. While other studies have detected effects of a similar nature, the magnitude is somewhat larger than has been found previously. Furthermore, it is hard — although not impossible — to rationalize the magnitude of the effect theoretically. A combination of demand side effects and an increase in productivity, localized to the technologies used in the United States, is one interpretation.[7]

Overvaluation

Models of purchasing power parity, or the Balassa-Samuelson hypothesis, naturally lend themselves to the exercise of determining whether a currency is "overvalued" or otherwise misaligned. Indeed, one implication of the Balassa-Samuleson hypothesis is that the standard practice of measuring misalignments as deviations from linear trends is likely to provide misleading conclusions. In work I conducted in the wake of the crises of 1997-8, I asked whether the East Asian currencies were overvalued, given the possibility that the standard practice was applied inappropriately.

A long-run relationship between exchange rates and relative prices exists for all currencies, with respect to at least one reference currency (dollar or yen) or price deflator (CPI or PPI). My results indicate that the Malaysian ringgit, Philippine peso, and Thai baht were overvalued a month before the baht devaluation in July 1997. On the other hand, the Indonesian rupiah, Korean won, and Singapore dollar appear to have been undervalued. Of these results, the implied undervaluations of the rupiah and won are the most counter-intuitive, since these two currencies suffered precipitous declines in value. Consequently, the widely held view that currency overvaluation was at the heart of each of the East Asian currency crises lacks credibility (although overvaluation probably did play some role).

Real Exchange Rate Behavior and Market Characteristics

A large body of work has sought to characterize the adjustment of the real exchange rate toward its long-run value. Often, the long-run real exchange rate is thought to be what sets the price of identical baskets of goods to be equal, when expressed in common currency terms; this condition often is termed purchasing power parity. The mystery arises from the stylized fact that the adjustment takes longer than what can be rationalized by sticky prices.[8] Yin-Wong Cheung, Eiji Fujii, and I merge the literature on real exchange rates with that on industrial organization factors suggested by the New Keynesian literature.[9] We calculate real exchange rates sector-by-sector (for example, for chemicals, or for fabricated metal products), and relate the pace at which these real exchange rates revert to their long-run values to the characteristics of those sectors, including the amount of intra-industry trade, size of price-cost margins (a proxy measure for the degree of substitutability of goods) and other factors thought to be important including distance, exchange rate volatility and inflation rates.

The econometric results reveal considerable evidence for the hypothesis that market imperfection is associated with high persistence in deviations from purchasing power parity. In general, the two measures of market imperfection — a price-cost margin and an index of intra-industry trade — are significant across different specifications and have a positive impact on real exchange rate persistence. The robustness of the market structure effects stands in stark contrast with the results pertaining to the macroeconomic variables, which can yield coefficient estimates that vary across model specifications, and occasionally have a sign different from what the theory predicts. Overall, our analysis uncovers positive evidence of market structure effects on real exchange rate persistence.

Interest Rates, Exchange Rates and Expectations

A common method of predicting asset prices uses market-based indicators. For instance, futures prices often are cited as forecasts of commodities. Forward rates — agreements set today for a trade of currencies in the future — would seem to be an ideal indicator for the future exchange rate. Equivalently, according to a no-arbitrage profits condition, when financial capital is free to move, the forward rate equals the current exchange rate adjusted by the interest differential. In reality, forward rates for developed economy currencies typically are biased predictors of future spot rates;

indeed, when interest differentials point to a dollar depreciation, the dollar on average appreciates. This well known fact led Jeffrey Frankel and Kenneth Froot to use survey data to assess whether, for the major currencies, this bias was attributable to the existence of a risk premium or to biased expectations. In two important works, they conclude that the expectations of market participants were biased, and further that there was little evidence that the bias in the forward rate was caused by the presence of an exchange risk premium.[10] Frankel and I examined a larger number of currencies and once again found evidence of biased expectations for 25 currencies over a three-year period.[11] Interestingly, in examining forward rate bias in a larger set of currencies (17), we find somewhat more evidence in favor of an exchange risk premium.[12] To the extent that one believes that such risk premiums arise from the differentiated nature of the bonds issued by separate governments, the result makes sense. For instance, U.S. and German bonds may be more substitutable than U.S. and Swedish bonds.

Guy Meredith and I[13] investigate whether interest rate differentials point in the wrong direction for exchange rate changes for horizons much longer than typically studied: five and ten years, versus the one month or one year used in earlier studies. We find that at these horizons, this perverse correlation largely disappears. While this finding appears robust to a number of variations, its statistical significance has been disputed, given the small number of independent observations in the post-Bretton Woods era (for example, five non-overlapping five-year horizons). Hence, we use panel regressions and confirm the finding.

The interpretation of these results is complicated by the lack of agreement on the origins of the forward rate bias. We propose a model wherein shocks to the interest rate parity relationship (perhaps because of noise traders) spur a central bank reaction function that serves to make exchange changes correlated negatively with interest differentials. Because central banks only can control short-term interest rates, the effect is most pronounced at short horizons. Since long-term interest rates are a weighted average of short-term interest rates, the effect is muted at longer horizons. Further research may illuminate alternative explanations.

What Do Market Participants Think?

The work previously recounted uses empirical methods to discern the determinants of exchange rate movements. Taking a different tack, Cheung and I conduct a survey study of foreign exchange traders in the United States.[14] Our results indicate that: more than half of market respondents believe that large players dominate in the dollar-pound and dollar-Swiss franc markets, and technical trading best characterizes about 30 percent of traders, with this proportion rising from five years ago. The responses also suggest that news about macroeconomic variables is incorporated rapidly into exchange rates, although the relative importance of individual macroeconomic variables shifts over time. Finally, economic fundamentals appear to be more important at longer horizons, while short-run deviations of exchange rates from their fundamentals are attributed to excess speculation and institutional customer/hedge fund manipulation.

Perhaps, unsurprisingly given the mixed findings regarding purchasing power parity, traders do not view the parity condition as a useful concept, even though a significant proportion of them believe that it affects exchange rates at horizons of over six months. Interestingly, these particular findings do not appear to be location-specific. Ian W. Marsh, Cheung, and I conducted a similar survey of U.K.-based foreign exchange dealers in 1998.[15] We confirm that many of these characteristics also pertain to that market. Moreover, we find that there is clear heterogeneity of traders' beliefs, but it is not possible to explain the source of these disagreements in terms of institutional detail, rank, or trading technique (for example, technical analysts versus fundamentalists).

Are Exchange Rates Predictable?

One of the key issues dominating the empirical literature is whether exchange rates can be predicted. Previous assessments of nominal exchange rate determination have focused on a narrow set of models typically of the 1970s vintage. The canonical papers in this literature are by Meese and Rogoff, who examined monetary and portfolio balance models.[16] These papers established the stylized fact that it is extremely difficult to beat a random walk on a consistent basis. Succeeding works by Mark and by Chinn and Meese overturned these results, but only at long (three or four year) horizons.[17]

More recently, several studies have re-evaluated the long-horizon results. Faust, Rogers, and Wright argue that the success of long-horizon regressions is specific to the particular time period examined by Mark and Chinn and Meese.[18] In work co-authored with Cheung and Pascual,[19] I also re-assess exchange rate prediction. Using a wider set of models that have been proposed in the last decade — interest rate parity, productivity based models, and a composite specification incorporating sticky-price, productivity, and portfolio balance models — we compare these models against a benchmark, the Dornbusch-Frankel sticky price monetary model.

We examine the model's performance at various forecast horizons (1 quarter, 4 quarters, 20 quarters) using differing metrics (mean squared error, direction of change), as well as the "consistency" test proposed in Cheung and Chinn.[20] About half of the estimates are based upon specifications that use contemporaneous information (that is, the forecast of December 2000 uses December 2000 data on the right-hand side variables), while half use only lagged information (that is the December 2000 forecast uses data either one quarter, one year, or 5 years prior.) Consequently, half of our specifications are at a great informational disadvantage.

We find that no model consistently outperforms a random walk, by the

conventionally adopted mean squared error measure. However, along a direction-of-change dimension, certain structural models do outperform a random walk with statistical significance. We also find that interest rates predict quite well, although only at the longest horizon.

These forecasts are tied to the actual values of exchange rates in the long run, although in a large number of cases the elasticity of the forecasts with respect to the actual values is different from unity. Overall, we find that model/specification/currency combinations that work well in one period do not necessarily work well in another period.[21]

While the results are not very positive, they do suggest that along some dimensions, structural models have predictive power. And, it is important to recognize that we have stacked the deck against these models having good predictive power, in that half of our estimates do not rely upon contemporaneous information. So, while useful forecasting models remain elusive, the identification of key empirical factors remains a productive, albeit challenging, enterprise.

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[1] *Alan Greenspan, Testimony of the Federal Reserve Board's semiannual monetary policy report to the Congress, before the Committee on Banking, Housing, and Urban Affairs, U.S. Senate, July 16, 2002.*

[2] *B. A. Balassa, "The Purchasing Power Parity Doctrine: A Reappraisal,"* Journal of Political Economy, *72 (1964), pp. 584-96; and P. A. Samuelson, "Theoretical Notes on Trade Problems,"* Review of Economics and Statistics, *46 (1964), pp. 145-54.*

[3] *See M. D. Chinn, "Whither the Yen? Implications of an Intertemporal Model of the Yen/Dollar Rate,"* Journal of the Japanese and International Economies, *11 (2) (June 1997), pp. 228-46.*

[4] *These are panel regression techniques adapted to data that appear to follow unit root processes. See for instance P. Pedroni, "Purchasing Power Parity in Cointegrated Panels,"* Review of Economics and Statistics, *83 (4) (2001), pp. 727-31.*

[5] *M. D. Chinn, "The Usual Suspects? Productivity and Demand Shocks and Asia-Pacific Real Exchange Rates," NBER Working Paper No. 6108, July 1997, and in* Review of International Economics, *8 (1) (February 2000), pp. 20-43.*

[6] *M. D. Chinn and L. D. Johnston, "Real Exchange Rate Levels, Productivity and Demand Shocks: Evidence from a Panel of 14 Countries," NBER Working Paper No. 5709, August 1996; and M. D. Chinn, "Sectoral Productivity, Government Spending and Real Exchange Rates: Empirical Evidence for OECD Countries," NBER Working Paper No. 5943, February 1997, and in* Equilibrium Exchange Rates, *R. MacDonald and J. L. Stein, eds., Boston: Kluwer Academic Publishers, 1999, pp. 163-90.*

[7] *R. Alquist and M. D. Chinn, "Productivity and the Euro-Dollar Exchange Rate Puzzle," NBER Working Paper No. 8824, March 2002.*

[8] *See K. A. Froot and K. S. Rogoff, "Perspectives on PPP and Long-Run Real Exchange Rates," in G. M. Grossman and K. S. Rogoff, eds.,* Handbook of International Economics, *Vol. III, Amsterdam: North-Holland, 1995.*

[9] *Y. Cheung, M. D. Chinn, and E. Fujii, "Market Structure and the Persistence of Sectoral Real Exchange Rates," NBER Working Paper No. 7408, October 1999; also "Market Structure and the Persistence of Sectoral Deviations from Purchasing Power Parity,"* International Journal of Finance and Economics, *6 (2) (April 2001), pp. 95-114.*

[10] *J. A. Frankel and K. A. Froot, "Using Survey Data to Test Standard Propositions Regarding Exchange Rate Expectations,"* American Economic Review, *77 (1) (March 1987), pp. 133-53; and "Forward Discount Bias: Is It an Exchange Risk Premium?"* Quarterly Journal of Economics, *104 (1) (February 1989), pp. 139-61.*

[11] *M. D. Chinn and J. A. Frankel, "Patterns in Exchange Rate Forecasts for 25 Currencies," NBER Working Paper No. 3807, December 1994, and "Are Exchange Rate Expectations Biased? Tests for a Cross-Section of 25 Currencies,"* Journal of Money, Credit and Banking, *26 (4) (November 1994), pp. 759-70.*

[12] J. A. Frankel and M. D. Chinn, "Ex*change Rate Expectations and the Risk Premium: Tests for a Cross-Section of 17 Currencies," NBER Working Paper No. 3806, August 1991, and* Review of International Economics, *1 (2) (June 1993), pp. 136-44. Some of these results are updated in M. D. Chinn and J. A. Frankel, "Survey Data on Exchange Rate Expectations: More Currencies, More Horizons, More Tests," in W. Allen and D. Dickinson, eds.,* Monetary Policy, Capital Flows and Financial Market Developments in the Era of Financial Globalisation: Essays in Honour of Max Fry, *London: Routledge, 2002, pp. 145-67.*

[13] *G. Meredith and M. D. Chinn, "Long-Horizon Uncovered Interest Rate Parity," NBER Working Paper No. 6797, November 1998.*

[14] *Y. Cheung and M. D. Chinn, "Macroeconomic Implications of the Beliefs and Behavior of Foreign Exchange Traders," NBER Working Paper No. 7417, November 1999; and "Traders, Market Microstructure and Exchange Rate Dynamics," NBER Working Paper No. 7416, November 1999, published as "Traders and Exchange Rate Dynamics: A Survey of the U.S. Market,"* Journal of International Money and Finance, *20 (4) (August 2001), pp. 439-71.*

[15] *Y. Cheung, M. D. Chinn and I. W. Marsh, "How Do UK-Based Foreign Exchange Dealers Think Their Market Operates?" NBER Working Paper No. 7524, February 2000.*

[16] *R. Meese and K. S. Rogoff, "Empirical Exchange Rate Models of the Seventies: Do They Fit Out of Sample?"* Journal of International Economics, *14 (1983), pp. 3-24; and "The Out-of-Sample Failure of Empirical Exchange Rate Models: Sampling Error or Misspecification?" in J. A. Frenkel, ed., Exchange Rates and International Macroeconomics, Chicago: University of Chicago Press, 1983, pp. 67-105.*

[17] *N. C. Mark, "Exchange Rates and Fundamentals: Evidence on Long Horizon Predictability,"* American Economic Review, *85 (1995), pp. 201-18; and M. Chinn and R.Meese, "Banking on Currency Forecasts: How Predictable Is Change in Money?"* Journal of International Economics, *38 (1-2) (1995), pp. 161-78.*

[18] *J. Faust, J. Rogers and J. Wright, "Exchange Rate Forecasting: The Errors We've Really Made," paper presented at conference on "Empirical Exchange Rate Models," University of Wisconsin, September 28-29, 2001. Forthcoming in* Journal of International Economics. *The long horizon finding has been re-established in a panel context; see N. C. Mark*

and D. Sul, "Nominal Exchange Rates and Monetary Fundamentals: Evidence from a Small Post-Bretton Woods Panel," Journal of International Economics, *53 (1) February 2001, pp. 29-52.*

[19] *Y. Cheung, M. D. Chinn and A. G. Pascual, "Empirical Exchange Rate Models of the Nineties: Are Any Fit to Survive?" NBER Working Paper No. 9393, December 2002.*

[20] *Y. Cheung and M. D. Chinn, "Integration, Cointegration, and the Forecast Consistency of Structural Exchange Rate Models,"* Journal of International Money and Finance, *17 (5) (1998), pp. 813-30.*

[21] *These results are confirmed in a related paper which also assesses in-sample fit. See Y. Cheung, M. D. Chinn and A. G. Pascual, "What Do We Know about Recent Exchange Rate Models? In-Sample Fit and Out-of-Sample Performance Evaluated," mimeo (October 2002), forthcoming in P. DeGrauwe, ed.,* Exchange Rate Economics: Where Do We Stand? *Cambridge: MIT Press for CESifo.*

Health, Income, and Inequality

Angus Deaton*

Richer, better-educated people live longer than poorer, less-educated people. According to calculations from the National Longitudinal Mortality Survey which tracks the mortality of people originally interviewed in the CPS and other surveys, people whose family income in 1980 was greater than $50,000, putting them in the top 5 percent of incomes, had a life-expectancy at all ages that was about 25 percent longer than those in the bottom 5 percent, whose family income was less than $5,000. Lower mortality and morbidity is associated with almost any positive indicator of socioeconomic status, a relationship that has come to be known as "the gradient." African-Americans have higher but Hispanic Americans lower mortality rates than whites; the latter is known as the "Hispanic paradox," so strong is the presumption that socioeconomic status is protective of health. Not only are wealth, income, education, and occupational grade protective, but so are several more exotic indicators. One study found that life-spans were longer on larger gravestones, another that winners of Oscars live nearly four years longer than those who were nominated but did not win.

Many economists have attributed these correlations to the effects of education, arguing that more educated people are better able to understand and use health information, and are better placed to benefit from the healthcare system. Economists also have emphasized the negative correlation between socioeconomic status and various risky behaviors, such as smoking, binge drinking, obesity, and lack of exercise. They have also pointed to mechanisms that run from health to earnings, education, and labor force participation, and to the role of potential third factors, such as discount rates, that affect both education and health.

Epidemiologists argue that the economists' explanations at best can explain only a small part of the gradient; they argue that socioeconomic status is a *fundamental cause* of health. They frequently endorse measures to improve health through manipulating socioeconomic status, not only by improving education but also by increasing or redistributing incomes. Fiscal policy is seen as an instrument of *public health*, an argument that is reinforced by ideas, particularly associated with Richard Wilkinson, that income inequality, like air pollution or toxic radiation, is itself a health hazard. Even if economic policy has no direct effect on health, the positive correlation between health and economic status implies that social inequalities in wellbeing are wider than would be recognized by looking at income alone.[1]

Income and Education among Cohorts and Individuals

Christina Paxson and I[2] looked at the relationship between health and economic status among American birth cohorts. We focused on the idea that health is determined by an individual's income relative to other members of a reference group whose membership typically is unobserved by the analyst. Even if income inequality has no direct effect on health, the fact that the reference groups are not observed means that the slope of the relationship between health and income depends on the ratio of the between-to-within group components of income inequality. For example, if doctors' health depends on the income of other doctors, and economists' health on the income of other economists, then the health-to-income relationship in the pooled data will flatten if the average incomes of the two groups pulls apart.[3]

Among birth cohorts there is a strong protective effect of income on mortality; the elasticity of mortality rates with respect to income is approximately –0.5. These estimates are consistent with estimates from the individual data in the National Longitudinal

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Mortality Study (NLMS), and show much the same pattern over the life cycle, with income most highly protective against mortality in middle age, in the mid-40s for women and the mid-50s for men. Although it is difficult to test for reverse causality in the cohort data, we can experiment in the NLMS by looking at the effects of income at the time of interview on the probability of death over an interval some years later, thus eliminating or at least reducing the effects of including in the sample people who are already sick, and whose income is already reduced by the illness that will later kill them. Somewhat surprisingly, there is only a small reduction in the estimated protective effects of income as we move the death interval forward from the date of interview.

Paxson and I also look at the respective roles of education and income in protecting health. In both cohort and individual data, income and education are protective when analyzed separately. Taken together, the picture depends on the level of aggregation. In the *individual* data, the effect of each is robust to allowing for the other, which is consistent with the view that both education and income promote health in different ways. Education makes it easier to use and benefit from new health information and technologies and income makes life easier more generally, reducing stress and wear and tear, for example by having help to look after the children, or the money to buy first class travel. In the *aggregated* cohort data, income and education are more highly correlated than in the individual data, so it is harder to distinguish their effects. Nevertheless, we find that, conditional on education, increases in cohort average income are hazardous to health, a finding that is consistent with other evidence of hazardous effects of income variation over the business cycle.[4,5] Parallel work on British birth cohorts also shows a protective effect of education, although an additional year of schooling is much less protective in Britain than in the United States.[6] Still, cohort income is never estimated to be protective of cohort mortality in Britain, whether analyzed in isolation or in competition with education. Interestingly, analysis of MSA averages shows similar results to the American birth cohorts; cities with higher average education or higher average income have lower mortality, but conditional on average income, the correlation between income and mortality is negative.[7] The contrast between the effects of income in the individual and aggregate data remains an important unresolved puzzle.

Inequality, Race, and Health

Why might income inequality be a health hazard, and what accounts for the fact that people die earlier in American states and cities where income inequality is higher? If income is protective of health, and the relationship is concave, then redistribution from rich to poor will improve aggregate health, although this effect appears to be too small to explain the geographical patterns in the United States. If health depends on *others'* incomes, for example if health is linked to *relative* deprivation, then income will be protective of health for individuals, and income inequality will be hazardous to health in the aggregate.[8] But if the NLMS is used to look at the probability of death as a function of income for white males and females on a state by state basis, there is no evidence of any link between the estimated coefficients and state-level measures of income inequality.

Darren Lubotsky and I[7] have investigated the relationship between income inequality, race, and mortality at both the state and metropolitan statistical area level. In both the state and the city data, mortality is positively and significantly correlated with almost any measure of income inequality. Because whites have higher incomes and lower mortality rates than blacks, places where the population has a large fraction of blacks are also places where both mortality and income inequality are relatively high. However, the relationship is robust to controlling for average income (or poverty rates) and also holds, albeit less strongly, for black and white mortality separately. Nevertheless, it turns out that race is indeed the crucial omitted variable. In states, cities, and counties with a higher fraction of African-Americans, white incomes are higher and black incomes are lower, so that income inequality (through its interracial component) is higher in places with a high fraction black. It is also true that *both* white and black mortality rates are higher in places with a higher fraction black and that, once we control for the fraction black, income inequality has no effect on mortality rates, a result that has been replicated by Victor Fuchs, Mark McClellan, and Jonathan Skinner[9] using the Medicare records data. This result is consistent with the lack of any relationship between income inequality and mortality across Canadian or Australian provinces, where race does not have the same salience. Our finding is robust; it holds for a wide range of inequality measures; it holds for men and women separately; it holds when we control for average education; and it holds once we abandon age-adjusted mortality and look at mortality at specific ages. None of this tells us why the correlation exists, and what it is about cities with substantial black populations that causes both whites and blacks to die sooner.

In a review of the literature on inequality and health, I note that Wilkinson's original evidence, which was (and in many quarters is still) widely accepted showed a negative cross-country relationship between life expectancy and income inequality, not only in levels but also, and more impressively, in changes. But subsequent work has shown that these findings were the result of the use of unreliable and outdated information on income inequality, and that they do not appear if recent, high quality data are used. There are now also a large number of individual level studies exploring the health consequences of ambient income inequality and none of these provide any convincing evidence that inequality is a health hazard. Indeed, the only robust correlations appear to be those among U.S. cities and states (discussed above) which, as we have seen, vanish once we control for racial composition. I suggest that inequality may indeed be important for

health, but that *income* inequality is less important than other dimensions, such as political or gender inequality.[10]

Social versus Medical Determinants of Health

Most of the work on inequality, income, and health looks at cross-sectional or geographic data, with the time-series relatively unexplored. Paxson and I [6] look at income, income inequality, and mortality over time in the United States and the United Kingdom. The postwar period usefully can be broken in two. In the quarter century up to the early 1970s, there was steady productivity growth, with mean and median income growing in parallel, and very little change in income inequality. After 1970, in the United States, productivity growth was much slower; although there was a good deal of income growth at the top of the income distribution, real median family income stagnated or fell. Slow income growth was accompanied by rapid growth in income inequality. The United Kingdom shared the rise in income inequality, which was even more marked than in the United States, but did not experience the same slowdown in the growth of real incomes. If income and income inequality are important determinants of mortality decline, and even allowing for some background trend decline in mortality, then the United States and the United Kingdom should have similar patterns of mortality decline up to the early 1970s, followed by slower decline after 1970, particularly in the United States which had an unfavorable trend in both growth and inequality. But the data show precisely the reverse. Mortality decline accelerated in both countries after 1970, and there is no obvious difference in the patterns in the two countries. Indeed, the most obvious distinction between Britain and the United States is that changes in trends start a few years earlier in the United States. These findings suggest that, as argued by Cutler and Meara, [11] changes in mortality over the last half century in the two countries have been driven, not by changes in income and income inequality, but by changes in risk factors or in medical technology, with the changes being adopted more rapidly in the United States.

The Origins of the Gradient

The two way mechanism between income and health is generally difficult to disentangle, but Anne Case, Lubotsky, and Paxson [12] eliminate the channel that runs from health to income by focusing on children where the correlation between their poor health and low family income cannot be attributed to the lower earnings of the children. Using several large, nationally representative datasets, they find that children's health is positively related to household income, and that the relationship between household income and children's health status becomes more pronounced as children grow older. A large component of the relationship between income and children's health can be explained by the arrival and impact of chronic health conditions in childhood; children have much the same health status at birth, but adverse health shocks are more effectively reversed by children in better-off households. Children's health is closely associated with long-run average household income, and the adverse health effects of lower permanent income accumulate over children's lives, so that the children of poorer parents arrive at the threshold of adulthood with lower health status and educational attainment — the latter, in part, as a consequence of poor health. Case, Lubotsky, and Paxson speculate that poorer health and consequent lower educational attainment may compromise poor children's earnings ability in adulthood, and that the gradient in adults is likely a product of poor health status and low income in childhood.

Health Status and Economic Status in South Africa

In many ways, that income should be an important determinant of health is more plausible in poor countries than in rich ones. When many people do not have enough money to buy food, adults and children often suffer the short and long-term effects of a poor diet, and parents who do not have enough money to feed their children report severe consequences for their own wellbeing. Anne Case has used data from a new integrated survey of health and economic wellbeing in South Africa to examine the impact of the South African old age pension on the health of pensioners, and of the prime aged adults and children who live with them.[13] Her work finds evidence of a large causal effect of income on health status — working at least in part through sanitation and living standards, in part through nutritional status, and in part through the reduction of psychosocial stress. The pension is used to upgrade household facilities, some of which have consequences for health. The household's water source being on-site and the presence of a flush toilet are both significantly more likely, the greater the number of years of pension receipt in the household. In addition, the presence of a pensioner in the household on average reduces the probability of an adult skipping a meal by 20 percent, and the presence of two pensioners reduces the probability by 40 percent. All adults in the survey were asked about depression, which is inextricably linked to stress and health status. For households pooling income, the presence of pensioners significantly reduces reported depression, and the effect is larger the greater the number of pensioners. Governments interested in improving health status may find the provision of cash benefits to be one of the most effective policy tools available to them. And cash provides a yardstick against which other health interventions can be measured.

Case finds that limitations in activities of daily living (ADLs) are associated with worse health status among the elderly and near elderly in South Africa, and that limitations for women are associated with larger erosions in health status than are those for men. Pensioners with limitations in ADLs report better health status than do older adults with the same limitations but who do not receive the pension. In

addition, older adults in larger households report better health status with limitations in ADLs than do other older adults. These results are consistent with a model in which money (in the form of a pension) brings help (purchased or volunteered) when respondents cannot dress or bathe by themselves.

[1] *A. S. Deaton, "Policy Implications of the Gradient of Health and Wealth,"* Health Affairs, *21 (March/April 2002), pp. 13–30.*

[2] *A. S. Deaton and C. Paxson, "Mortality, Education, Income and Inequality among American Cohorts," NBER Working Paper No. 7140, May 1999, and in D. A. Wise,* Themes in the Economics of Aging, *Chicago: University of Chicago Press, 2001, pp. 129-65.*

[3] *A. S. Deaton, "Inequalities in Income and Inequalities in Health," NBER Working Paper No. 7141, May 1999, and in F. Welch,* The Causes and Consequences of Increasing Inequality, *Chicago: University of Chicago Press, 2001, pp. 285–313.*

[4] *C. J. Ruhm, "Are Recessions Good for your Health?" NBER Working Paper No. 5570, May 1996, and in* Quarterly Journal of Economics, *115 (2000), pp. 617-50.*

[5] *U. Gerdtham and C. J. Ruhm, "Deaths Rise in Good Economic Times: Evidence from the OECD," NBER Working Paper No. 9357, December 2002.*

[6] *A. S. Deaton and C. Paxson, "Mortality, Income, and Income Inequality among British and American Cohorts," NBER Working Paper No. 8534, October 2001, and forthcoming in D. A. Wise, ed.,* Perspectives on the Economics of Aging, *Chicago: University of Chicago Press, forthcoming.*

[7] *A. S. Deaton and D. Lubotsky, "Mortality, Inequality and Race in American Cities and States," NBER Working Paper No. 8370, July 2001, and* Social Science and Medicine, *forthcoming.*

[8] *A. S. Deaton, "Relative Deprivation, Inequality, and Mortality," NBER Working Paper No. 8099, January 2001.*

[9] *V. R. Fuchs, M. McClellan, and J. Skinner, "Area Differences in Utilization of Medical Care and Mortality among U.S. Elderly," NBER Working Paper No. 8628, December 2001.*

[10] *A. S. Deaton, "Health, Inequality, and Economic Development," NBER Working Paper No. 8318, June 2001, and in* Journal of Economic Literature, *(41) (March 2003), pp. 113-58.*

[11] *D. M. Cutler and E. Meara, "Changes in the Age Distribution of Mortality over the 20th Century," NBER Working Paper No. 8556, October 2001.*

[12] *A. Case, D. Lubotsky, and C. Paxson, "Economic Status and Health in Childhood: the Origins of the Gradient," NBER Working Paper No. 8344, June 2001, and* American Economic Review, *92 (5) (2002), pp. 1308-34.*

[13] *A. Case, "Does Money Protect Health Status? Evidence from South African Pensions," NBER Working Paper No. 8495, October 2001, and in D. A. Wise, ed.,* Perspectives on the Economics of Aging, *Chicago: University of Chicago Press, forthcoming.*

Patents

Jean O. Lanjouw*

The past twenty years have seen very significant changes in U.S. patent law and policy, strengthening the rights of inventors and significantly expanding those rights across the globe. The United States has broadened areas in which patents can be received, notably software, genetic information, and business methods; has instituted a new unified Court of Appeals for the Federal Circuit to hear appeals on patent cases from all district courts; and has given universities and government laboratories the right to patent and license the output of publicly-funded research. Bilateral negotiations and, more recently, international treaties also have led other countries to revise their patent systems. In particular, NAFTA and the intellectual property component of the treaty establishing the World Trade Organization - WTO - (known as TRIPS) extensively harmonized and extended patent rights internationally. Jaffe discusses these changes and surveys related empirical studies.[1]

The domestic patent reforms have been driven by the emergence of new areas of research and commerce, and by the view that a healthy knowledge-based economy requires strong protection of intellectual property (IP). At the same time, however, serious concerns have arisen. My work on the patent system as an institution has focused on two such areas of concern. The first is the large and growing costs associated with litigating patent rights. The second is the extension of patent rights on pharmaceuticals to countries in the developing world where drug access is already limited by extreme poverty.

Patent Enforcement

Dealing with patent disputes is part of business life for most firms, but it is

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not a phenomenon well understood by economists. Josh Lerner and I[2] have provided a survey of the small body of empirical research on patent litigation that was available in the mid-1990s[3]. In a set of papers[4] Mark Schankerman and I provide an empirical basis for evaluating what has happened in patent litigation and its implications for R and D incentives and patent policy. We study the determinants of patent suits and settlements during 1978-99 by linking detailed information from the U.S. patent office, the federal courts, and industry sources. In order to characterize litigation risk, we start from a set of almost 10,000 litigated patents and then draw a matching random set from the universe of patents, controlling for technology and year of application. This very comprehensive database reveals that, contrary to popular perception, the incidence of patent suits has *not* been rising once one controls for the rapid increase in patenting itself and a shift toward more litigious technology areas. However, we also show that litigation is concentrated and primarily involves firms and patents with particular characteristics. For example, the risk that a given patent is subject to a suit is much higher if it is owned by an individual or a small firm than if it is owned by a corporation. Patentees with a large portfolio of patents to trade, or other characteristics that facilitate "cooperative" resolution of disputes, are less likely to litigate. At the same time, post-suit outcomes — such as whether a case goes to trial and who wins — do not depend on these characteristics. Thus, small patentees appear to be at a disadvantage in enforcing their patent rights in that their greater litigation risk is not offset by a more rapid resolution of their suits. Both the benefits of patent portfolio and company size in settling disputes, and the heterogeneity in litigation risk, point to the potential value of patent litigation insurance. Currently there are a number of providers of litigation insurance in the United States and Europe. However, demand has been severely limited by high prices while, at the same time, profitability of insuring companies has been undermined by the widespread use of pooled prices. Our empirical analysis could be used to develop insurance pricing schemes that recognize the heterogeneity of litigation risk.

One piece of evidence from our studies[5] suggests that there is a threat value associated with having control over many patents in an area: firms with portfolios that are large *relative* to the disputants they are likely to encounter are significantly less likely to use the courts. In a paper with Josh Lerner, I explore a particular avenue for strategic use of litigation.[6] A plaintiff may request, and be granted by the court, a preliminary injunction preventing an accused infringer from using the patented innovation during the time that a case is being decided. It is claimed that requests for preliminary injunctions requests are used strategically by financially secure plaintiffs to go beyond the avoidance of "irreparable harm" and to extract even greater profit by raising the cost of legal disputes. In an earlier paper[7], Lerner and I develop a model in which differences in financing costs drive the use of preliminary injunctions, and we explore the implications for efficiency and incentives. Detailed data compiled on 250 patent suits and the financial status of the litigants indicates that larger corporate plaintiffs with high levels of cash and equivalents are significantly more likely to request preliminary injunctions.

One of the difficulties faced understanding the effect of enforcement costs on the value of patent protection is that much of the impact of those costs may not be in the form of direct expenditures on litigation. Most obviously, 95 percent of suits settle without a trial, three-quarters before even a pre-trial hearing.[8] Thus even when a suit is filed, legal costs will have most of their effect on returns by altering threat points and thus settlement terms. More subtly, enforcement costs may induce indirect changes in behavior. I develop and estimate a model of patentee decisions to pay annual renewal fees that incorporates the cost of enforcement as part of the decision, in addition to the renewal fees themselves.[9] The basic premise of the model is that patents lose their value when they would not be enforced, irrespective of whether one observes a suit. With the model estimates it is possible to simulate renewal behavior, and thus patent value, with different menus of legal costs and cost allocation rules.[10]

The Global Patent System for Pharmaceuticals

The global system of patent rights also is undergoing an unusually dramatic period of evolution. One of the most important institutional changes has been bringing intellectual property within the system of rules governing the world trading system. While in the past the United States and other rich country governments have used bilateral pressure to influence others' intellectual property (IP) laws and enforcement, now the standards setting and the process for resolving international disputes over IP policies have moved, at least in part, to the WTO.

The inclusion of IP within the Uruguay Round of the GATT negotiations, and the current standards required for membership in the WTO, have been extremely controversial. The main issue has been the treatment of pharmaceutical patents, including the allowed uses of compulsory licensing to deal with public health. Historically, many countries have limited the protection of drug products. Concerned with the prospect of higher prices, the developing countries and their advocates have resisted the expansion of rights over pharmaceutical innovations. On the other side, firms, together with rich country governments, have insisted on the importance of the worldwide availability of patents to support R and D. The controversy over TRIPS began as a rather limited, though bitter, fight among experts at the trade round. With growing awareness of HIV/AIDS and the discovery of expensive new treatments, the question of the appropriate form of global pharmaceutical patents has moved onto the editorial pages and into the public eye.

In this polarized debate, there is an important role for economists in understanding the implications of

global patents (or their restriction) and in using information about pricing and incentives to develop economically well-grounded policies. For some years I have pursued these twin objectives. In an initial period of information gathering, I spent half a year in India interviewing firms, non-governmental organizations, and government officials about their views of the country's commitment to introducing pharmaceutical patents and what it would mean for local industry and consumers. I then outlined the possible costs and benefits of introducing protection for drug products there,[11] and pulled together available statistics and interview data to consider what could be said about their magnitudes. The resulting paper highlights just how little empirical evidence supports *any* position in this debate.

My on-going research attempts to fill in some of the gaps. In a recent paper, Iain Cockburn and I[12] do the groundwork for a future assessment of whether newly-available patent protection in the developing world increases private R and D on diseases concentrated in those countries. These include diseases such as malaria, schistosomiasis, and Chagas disease. This subclass of products is rarely broken out in accounts or statistical sources. We put together tables on disease-specific patenting, bibliometric citations, and NIH funding, and survey Indian pharmaceutical firms to determine their current focus on products specific to developing country markets. The paper gives a baseline picture of private investment in products treating tropical diseases before TRIPS; it will be updated periodically to track changes as new patent laws are implemented. There are, of course, other constraints on investments for poor markets besides weak patent protection, and the paper relates some insights on these problems drawn from interviews with U.S.-based pharmaceutical executives. (An empirical assessment of the response of innovation to policy and price changes in the environmental area is in Lanjouw and Mody, 1996.)[13]

Currently I am examining the relationship between IP protection for pharmaceuticals and related policies on the speed of new product launches in a country. In another current project I am estimating differentiated product demand models for India in order to estimate the effect on local consumer welfare of introducing patent protection.

Part of my recent work has been directed at using a basic understanding of the tradeoffs implicit in the patent system and some basic facts about global drug markets to devise an economically rational global patent system. I discuss various aspects of this in a series of papers.[14] The main factual point is that global drug markets differ enormously by disease. Some diseases are concentrated almost exclusively in poor countries. For these, any market will largely only serve patients there. At the same time, there are many "global" diseases which are just as important in the poor countries but which have worldwide markets. For these, spending is heavily concentrated in rich countries. For example, I estimate that almost half of the world's population — some 3 billion people — live in countries that together represent less than 2 percent of global spending on cardiovascular drugs.

Because the global markets are so very different for these two types of diseases, the tradeoffs between pricing and incentives when adding protection in new countries also differ. The optimal global patent system would reflect this fact. It is not obvious, however, how to differentiate protection in a feasible way. In the work cited, I have developed an unusual mechanism for differentiating protection across diseases. It uses the fact that inventors must request permission to file for a patent overseas (a foreign filing license). This requirement already exists in the U.S. patent code and also in a number of other countries. The mechanism works by requiring inventors to make a particular "Declaration" to obtain permission to file overseas.

The system the mechanism would allow is one in which patent protection in poor countries differed across diseases depending on the importance of those countries' markets as a potential source of research incentives. No one, for example, would argue that African nations are an important source of incentives for doing cancer research. The search for a cure for cancer is driven by demand from the big western markets. However, patent protection in Africa — together with increased funding — might be an important spur to malaria research. Thus, the mechanism would give a system with minimal patent protection in the poorest countries, allowing them to benefit from generic production. As a country developed, protection would broaden gradually to cover more diseases, starting with those, like malaria, of particular importance there. The result would be a patent system tailored to both development levels *and* to the characteristics of different drug markets.

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[1] *A. B. Jaffe, "The U.S. Patent System in Transition: Policy Innovation and the Innovative Process," NBER Working Paper No. 7280, August 1999, and in* Research Policy*, 2000.*

[2] *J. O. Lanjouw and J. Lerner, "The Enforcement of Intellectual Property Rights: A Survey of the Empirical Literature," NBER Working Paper No. 6296, December 1997, and in the* Annales d'Economie et de Statistique, *(49/50) (July 1998), pp. 223-46.*

[3] *More recent work involving NBER researchers includes, for example, Graham et al, 2002, and Hall and Ziedonis, 2001. See S. J. H. Graham, B. H. Hall, D. Harhoff, and D. C. Mowery, "Patent Quality Control: A Comparison of U.S. Patent Re-examinations and European Patent Opposition," NBER Working Paper No. 8807, February 2002; and B. H. Hall and R. H. Ziedonis, "The Patent Paradox Revisited: An Empirical Study of Patenting in the Semiconductor Industry, 1979-1999," NBER Working Paper No. 7062, March 1999, and in* RAND Journal of Economics, *(32) (1) (2001), pp. 101-28.*

[4] *J. O. Lanjouw and M. Schankerman, "An Empirical Analysis of the Enforcement of Patent Rights in the United States," in W. M. Cohen and S. Merrill, eds.,* Patents in the Knowledge-Based Economy, *Washington, D.C.: National Academy Press, 2003; J. O. Lanjouw and M. Schankerman, "Enforcing Intellectual Property," NBER Working Paper No. 8656, December 2001; and J. O. Lanjouw and M. Schankerman, "Characteristics of Patent Litigation: A*

Window on Competition," NBER Working Paper No. 6297, December 1997, and in The Rand Journal of Economics, *(32) (1) (2001), pp. 129-51.*

[5] *See J. O. Lanjouw and M. Schankerman, "An Empirical Analysis of the Enforcement of Patent Rights in the United States."*

[6] *J. O. Lanjouw and J. Lerner, "Tilting the Table? The Predatory Use of Preliminary Injunctions, " NBER Working Paper No. 5689, July 1996, and in* The Journal of Law and Economics, *(XLIV) (2) (2001), pp. 573-603.*

[7] *See J. O. Lanjouw and J. Lerner, "The Enforcement of Intellectual Property Rights: A Survey of the Empirical Literature."*

[8] *See also J. O. Lanjouw and M. Schankerman, "An Empirical Analysis of the Enforcement of Patent Rights in the United States."*

[9] *J. O. Lanjouw, "Patent Protection in the Shadow of Infringement: Simulation Estimations of Patent Value," NBER Working Paper No. 4475, September 1993, and in* The Review of Economic Studies, *(65) (1998), pp. 671-710.*

[10] *J. O. Lanjouw, "Beyond Lawyers' Fees: Economic Consequences of a Changing Litigation Environment," NBER Working Paper No. 4835, August 1994. Revised version available. See also J. O. Lanjouw, A. Pakes, and J. Putnam, "How to Count Patents and Value Intellectual Property: Uses of Patent Renewal and Application Data," NBER Working Paper No. 5741, September 1996, and in* The Journal of Industrial Economics, *(XLVI) (4) (December 1998), pp. 405-33.*

[11] *J. O. Lanjouw, "The Introduction of Product Patents in India: 'Heartless Exploitation of the Poor and Suffering'?" NBER Working Paper No. 6366, January 1998.*

[12] *J. O. Lanjouw and I. Cockburn, "New Pills for Poor People? Empirical Evidence After GATT," NBER Working Paper No. 7495, January 2000, and in* World Development, *(29) (2) (2001), pp. 265-89.*

[13] *J. O. Lanjouw and A. Mody, "Innovation and the International Diffusion of Environmentally Responsive Technology," Research Policy, (25) (1996), pp. 549-71.*

[14] *J. O. Lanjouw, "Beyond TRIPS: A New Global Patent Regime," Policy Brief No. 3, The Center for Global Development, July 2002, at http://www.cgdev.org/fellows/lanjouw.html; J. O. Lanjouw, "A Patent Policy for Global Diseases: U.S. and International Legal Issues,"* Harvard Journal of Law & Technology, *(16) (1) (Fall 2002); J. O. Lanjouw, "A Patent Proposal for Global Diseases," Policy Brief No. 84, The Brookings Institution, June 2001; and J. O. Lanjouw, "Intellectual Property and the Availability of Pharmaceuticals in Poor Countries," Center for Global Development Working Paper No. 5, April 2002, and forthcoming in* Innovation Policy and the Economy, *(3).*

NBER Profile: *Menzie Chinn*

Menzie Chinn is a Research Associate in the NBER's International Finance and Macroeconomics Program and is a National Fellow at the NBER during the 2002-3 academic year. He is also Professor of Economics at the University of California at Santa Cruz. During 2000-1, Chinn served as senior staff economist for international finance on the Council of Economic Advisers during the Clinton and Bush Administrations. His responsibilities included research on Japanese macroeconomic policy issues and assessing the implications of energy market developments. He also has been a visiting scholar at the IMF, the Federal Reserve Board, and Humboldt University, Berlin.

Chinn received his A.B. in economics from Harvard University in 1984 and his M.A. and Ph.D. in Economics from the University of California, Berkeley. He began teaching at UC Santa Cruz in 1991. His research focuses on the macroeconomic interaction between countries, using econometric methods. His earlier work examined the determinants of exchange rate behavior among developed countries, with an emphasis on the role of productivity differentials. His later research examines the empirical factors underlying currency crises. Recently, he has examined the interaction between capital controls, institutional characteristics of economies, and the financial development of credit and equity markets.

Chinn resides in Santa Cruz, California, and is married to Laura Schwendinger, a composer at the University of Illinois, Chicago.

NBER Profile: Angus S. Deaton

Angus S. Deaton is a Research Associate in the NBER's Programs on Economic Fluctuations and Growth and Health Care and is the Dwight D. Eisenhower Professor of International Affairs at Princeton University's Woodrow Wilson School. His current research interests include the determinants of health in rich and poor countries and the measurement of poverty and inequality around the world.

Deaton received his B.A., M.A., and Ph.D. degrees from Cambridge University in England, where he has also taught. A British citizen, he was Professor of Econometrics at the University of Bristol from 1976 to 1983.

Deaton is a Fellow of the British Academy, the American Academy of Arts and Sciences, and the Econometric Society. In 1978 he was the first recipient of the Econometric Society's Frisch Medal.

He lives in Princeton with his wife, the economist Anne Case. When they are not working, they like to cook, and they maintain homes away from home at the Metropolitan Opera in New York, on the Madison River in Ennis, Montana, and in the British Airways Lounge at Heathrow.

NBER Profile: *Jean Olson Lanjouw*

Jean O. Lanjouw is a Faculty Research Fellow in the NBER's Program on Productivity. She is also a Senior Fellow in Economic Studies and Governance Studies at the Brookings Institution, a Senior Fellow at the Center for Global Development, Washington, DC, and an Associate Professor of Economics in the Department of Agricultural and Resource Economics, University of California at Berkeley.

Lanjouw obtained her A.B. in Mathematics and Economics from Miami University and her M.Sc. and Ph.D. in Economics from the London School of Economics, UK. Her current projects focus on domestic and international property rights issues. Her research has been published in a wide variety of academic journals including the *Review of Economic Studies*, *Econometrica*, the *Journal of Development Economics*, and the *Journal of Industrial Economics*. She also has organized several conferences on patent reform and statistics and has consulted for the World Bank, the UNDP, and statistical organizations in South Africa and Brazil.

She and her husband, Peter Lanjouw, currently reside in Washington, D.C. with their two children, Max and Else.

New Development in Empirical International Trade

The 15th annual TRIO conference — one in a series sponsored by the NBER, CEPR, and TCER to bring together economists from the United States, Europe, and Japan — on "New Development in Empirical International Trade" took place in Tokyo on December 10 and 11, 2002. This year the Japanese Research Institute of Economy, Trade, and Industry was also a co-sponsor of the event. Kyoji Fukao, Hitotsubashi University; Takeo Hoshi, University of California, San Diego; Sadao Nagaoka and David Weinstein, NBER and Columbia University, organized this program:

Stephen Redding and **Anthony Venables**, London School of Economics, "Explaining Cross-Country Export Performance: International Linkages and Internal Geography"
Discussants: Peter Debaere, University of Texas, and Shumpei Takemori, Keio University

Donald Davis and **David Weinstein**, NBER and Columbia University, "Why Countries Trade: Insights from Firm-Level Data"
Discussants: Motoshige Itoh, University of Tokyo, and Stephen Redding

Kyoji Fukao; **Hikari Ishido**, Institute of Developing Economies; and **Keiko Ito**, ICSEAD, "Vertical Intra-Industry Trade and Foreign Direct Investment in East Asia"
Discussants: James Harrigan, Federal Reserve Bank of New York, and Shujiro Urata, Waseda University

James Harrigan and **Rohit Vanjani**, Federal Reserve Bank of New York, "Is Japan's Trade (Still) Different?"
Discussants: Eiichi Tomiura, Kobe University, and Ryuhei Wakasugi, Yokohama National University

Keith Head and **John Ries**, University of British Columbia, "Foreign Direct Investment versus Exports: A Test of the Selection Hypothesis"
Discussants: Kyoji Fukao and Jota Ishikawa, Hitotsubashi University

Simon Evenett, World Trade Institute, "Do All Networks Facilitate International Commerce? U.S. Law Firms and the International Market for Corporate Control"
Discussants: Takeo Hoshi and Sadao Nagaoka

Takamune Fujii, Aichi University, and **Fukunari Kimura**, Keio University, "Globalizing Activities and the Rate of Survival: Panel Data Analysis on Japanese Firms"
Discussants: David Weinstein, and Laixun Zhao, Hokkaido University

Redding and **Venables** investigate the role of the international product market in determining export performance. They seek to explain the wide variations in countries' export performance over the last quarter century. For example, East Asian countries have seen real exports increase by more than 800 percent since the early 1970s, while those of Sub-Saharan Africa have increased by just 70 percent. The authors decompose the growth in countries' exports into the contribution from increases in external demand versus those from improved internal supply-side conditions. Building on the result of this decomposition, Redding and Venables analyze the determinants of export performance. They find that poor external geography, poor internal geography, and poor institutional quality contribute in approximately equal parts to explain Sub-Saharan Africa's poor export performance.

Davis and **Weinstein** examine the determinants of exporting by Japanese. They begin by documenting the tremendous concentration in Japanese exporting: four firms account for 20 percent of all Japanese exports, and 12 firms account for 40 percent of exports. Japan is a particularly interesting laboratory for studying export behavior because Japanese data enables researchers to estimate productivity, returns, and capital stocks using more sophisticated techniques than they can with U.S. data. The authors use the Japanese estimates to link firm-level exports to three explanatory variables: relative productivity differences; differences in production techniques; and increasing returns. Their results suggest that standard models of comparative advantage seem to be quite relevant for understanding specialization and export behavior. In particular, there seems to be a very robust relationship between exporting and firm-level total factor productivity. Moreover, firms with the highest growth in capital intensity also have the highest growth in export shares and the propensity to export. Interestingly, the authors find very little support for the monopolistic competition model.

In a related paper, **Head** and **Ries** investigate whether productivity differences explain why some Japanese manufacturers sell only to the domestic market while others serve foreign mar-

kets through exports or foreign direct investment (FDI). They show that firms that export and do FDI are more productive than firms that only export. However, they fail to find that higher productivity is associated with either the export decision or the ratio of FDI to exports.

Fukao, **Ishido**, and **Ito** show that although intra-industry trade (IIT) in East Asia is significantly less than in Europe, this form of trade has grown at a very rapid rate. Moreover, while the share of IIT remained almost constant from 1996 to 2000 for most EU countries, it increased rapidly among East Asian countries. According to the authors' calculations, the share of vertical IIT in total intra-East Asian trade grew from 16.6 percent in 1996 to 23.7 percent in 2000, while the share in total intra-EU trade increased only slightly, from 37.5 percent to 40 percent during the same period. Most interestingly, vertical intra-industry trade (VIIT), that is trade of goods with very different prices within very narrow product categories, has risen even faster. The increase in VIIT in these countries seems to have a strong positive correlation with the extent of the activities by Japanese electrical machinery MNEs.

Harrigan and **Vanjani** explore whether Japanese trade in manufactured goods differs from the rest-of-the world average and from that of the United States. Using a simple industry-level gravity model, they construct a measure of normalized imports by dividing bilateral industry-level imports by the importer's aggregate absorption and the exporter's industry output. They find that Japan imports less than one might expect, but also exports less. Moreover, they find that relative to the United States, Japanese export performance is half as strong today as it was in the mid-1980s, and Japan is more open to imports from the United States than the United States is to imports from Japan.

Evenett estimates the impact of global networks of American law firms on overseas mergers and acquisitions (M&A) by U.S. corporations. Now that many nations can review proposed mergers, U.S. law firms can help clients overcome regulatory hurdles abroad, effectively greasing the market for corporate control. However, they can also oppose transactions that are inimical to their clients' interests. His findings suggest that Baker & McKenzie — the U.S. law firm with the most overseas offices — has facilitated such transactions, whereas the combined effect of five smaller global U.S. law firms has tended to reduce outward U.S. M&A.

Kimura and **Fujii** present evidence on how globalizing activities affect the rate of survival of Japanese firms. They show a positive correlation between survival and the share of foreign sales after controlling for a series of standard variables. They also present evidence that small firms that are members of Japanese corporate groups tend to fail at even higher rates than unaffiliated firms do.

These papers will be published in a special edition of the *Journal of Japanese and International Economies* scheduled for December 2003.

Fourth Annual Conference in India

On January 13-15, 2003 the NBER and India's National Council for Applied Economic Research (NCAER) again brought together a group of NBER economists and about two dozen economists from Indian universities, research institutions, and government departments for their fourth annual conference in India. **Raghuram G. Rajan**, NBER and University of Chicago, and **Martin S. Feldstein**, NBER and Harvard University, organized the conference jointly with **Suman Bery** and **Shashanka Bide** of NCAER.

The U.S. participants were: Isher J. Ahluwalia, University of Maryland; John H. Cochrane, NBER and University of Chicago; David M. Cutler, Mihir A. Desai, Martin S. Feldstein, and Jeffrey A. Frankel, NBER and Harvard University; Anne O. Krueger, on leave from the NBER at the IMF; Michael Grossman and Robert E. Lipsey, NBER and City University of New York; and Michael H. Moskow, NBER Director and President of the Federal Reserve Bank of Chicago.

After introductory remarks about the U.S. and Indian economies by NBER President Feldstein and Suman Bery of NCAER, the participants discussed: trade policy and foreign direct investment; fiscal deficits and how to deal with them; monetary policy and financial sector reforms; economic reforms (including privatization), employment, and poverty; and health issues.

A summary of the conference discussion will be available on the NBER web site at www.nber.org/india.

Inflation Targeting

An NBER Conference on Inflation Targeting, organized by Michael Woodford of NBER and Princeton University, took place on January 23-25. The conference agenda was:

Mervyn A. King, Bank of England, "What has Inflation Targeting Achieved?"

Lars E. O. Svensson and **Michael Woodford**, NBER and Princeton University, "Implementing Optimal Policy through Inflation-Forecast Targeting"
Discussant: Bennett T. McCallum, NBER and Carnegie-Mellon University

Laurence M. Ball, NBER and John Hopkins University, and **Niamh Sheridan**, International Monetary Fund, "Does Inflation Targeting Matter?"
Discussant: Mark Gertler, NBER and New York University

Stephen G. Cecchetti, NBER and Ohio State University, and **Junhan Kim**, Ohio State University, "Inflation Targeting, Price Level Targeting, and Output Variability"
Discussant: N. Gregory Mankiw, NBER and Harvard University

Marc P. Giannoni, Columbia University, and **Michael Woodford**, "Optimal Inflation Targeting Rules"
Discussant: Edward Nelson, Bank of England

Athanasios Orphanides, Federal Reserve Board, and **John C. Williams**, Federal Reserve Bank of San Francisco, "Imperfect Knowledge, Inflation Expectations, and Monetary Policy"
Discussants: George W. Evans, University of Oregon

Christopher A. Sims, NBER and Princeton University, "Fiscal Implications of Inflation Targeting"
Discussant: Stephanie Schmitt-Grohe, NBER and Rutgers University

Marvin Goodfriend, Federal Reserve Bank of Richmond, "Inflation Targeting in the United States"
Discussant: Donald Kohn, Federal Reserve Board

Jiri Jonas, International Monetary Fund, and **Frederic S. Mishkin**, NBER and Columbia University, "Inflation Targeting in Transition Economies"
Discussant: Olivier J. Blanchard, NBER and MIT

Ricardo J. Caballero, NBER and MIT, and **Arvind Krishnamurthy**, Northwestern University, "Inflation Targeting and Sudden Stops"
Discussant: Ben S. Bernanke, Federal Reserve Board

Panel Discussion: "Is Deflation a Threat for the U.S.?"
Martin Feldstein, NBER and Harvard University, **Michael Woodford**, and **Ben S. Bernanke**

King spoke about the experience of inflation targeting in the United Kingdom. Following its exit from the Exchange Rate Mechanism in September 1992, the UK adopted inflation targeting as a means of providing a direct and transparent framework for monetary policy. A key component in the successful implementation of the framework was a willingness to explain how the economy was evolving, particularly in the Bank of England's *Inflation Report*. In May 1997, the framework was sharpened by making the target symmetric, and by setting up an independent committee at the Bank of England to set monetary policy. The Committee structure has proved invaluable in introducing a range of accountable views into the discussion. Many issues still remain to be resolved. For example, what types of central banks benefit from an inflation targeting framework? And, over what horizon should the central banks bring inflation back to target?

Svensson and **Woodford** consider the way in which inflation-forecast targeting should be conducted in order to bring about a socially optimal equilibrium, with an optimal long-run average inflation rate and optimal transitory responses to disturbances. They evaluate variant schemes from the point of view of avoiding stabilization bias, incorporating the kind of history dependence that is needed to cause expectations to respond optimally to shocks, and achieving determinancy of equilibrium. They also evaluate these variants in terms of the transparency of the connection with the ultimate policy goals and the robustness of the policy rule to perturbations of the model. A suitably designed inflation-forecast targeting rule can implement an optimal equilibrium, at the same time have a more transparent connection to policy goals, and be more robust than competing instrument rules, they conclude.

Ball and **Sheridan** examine the effects of inflation targeting on economic performance, as measured by the behavior of inflation, output, and interest rates. They compare seven OECD countries that adopted inflation targeting in the early 1990s to thirteen that did not. During the targeting period, performance improved along many this effect, there is no evidence that inflation targeting is beneficial.

The dramatic improvement in macroeconomic outcomes during the 1990s — stable, low inflation and high, stable growth — can be ascribed at least partly to improved monetary policy. Central banks became more independent and many of them adopted inflation targeting. **Cecchetti** and **Kim** examine the potential for further improvements by refining the concept of inflation targeting. They construct a general model that encompasses a broad array of possible target regimes and apply it to the data. Their results suggest that the vast majority of countries could benefit from moving to

price-path targeting, in which the central bank makes up for periods of above (below) target inflation with later periods of below (above) target inflation.

Giannoni and **Woodford** characterize optimal monetary policy for a range of alternative economic models, applying the general theory developed in an earlier paper (NBER Working Paper No. 9419). The rules they compute have the advantage of being optimal regardless of the assumed character of exogenous additive disturbances, although other aspects of their model specification do affect the form of the optimal rule. In each case that they consider, optimal policy can be implemented through a flexible inflation targeting rule, under which the central bank is committed to adjusting its interest-rate instrument so as to ensure that projections of inflation and other variables satisfy a target criterion. The authors show which additional variables should be taken into account, beyond the inflation projection, and how much weight the variable should get for any given parameterization of the structural equations. They also explain what relative weights should be placed on projections for different horizons in the target criterion, and the manner and degree to which the target criterion should be history-dependent. The authors then assess the likely quantitative significance of the various factors considered in the general discussion by estimating a small, structural model of U.S. monetary transmission with explicit optimizing foundations. They compute an optimal policy rule for the estimated model, and it corresponds to a multi-stage inflation-forecast targeting procedure. Finally, they consider the degree to which actual U.S. policy over the past two decades has conformed to the optimal target criteria.

Orphanides and **Williams** investigate the role of imperfect knowledge about the structure of the economy in the formation of expectations, macroeconomic dynamics, and the efficient formulation of monetary policy. Economic agents rely on an adaptive learning technology to form expectations and continuously update their beliefs about the dynamic structure of the economy based on incoming data. The process of perpetual learning introduces an additional layer of dynamic interactions between monetary policy and economic outcomes. The authors find that policies that would be efficient under rational expectations can perform poorly when knowledge is imperfect. In particular, policies that fail to maintain tight control over inflation are prone to episodes in which the public's expectations of inflation become uncoupled from the policy objective and stagflation results, in a pattern similar to that experienced in the United States during the 1970s. More generally, the authors show that policy should respond more aggressively to inflation under imperfect knowledge than under perfect knowledge.

According to **Sims**, inflation targeting may do more harm than good if there is a substantial chance that the central bank in fact cannot control inflation. A prerequisite for central bank control of inflation is appropriate coordination with, or backup by, fiscal policy; the nature of the required coordination will depend on whether and how central bank independence from the fiscal authority has been implemented. These considerations suggest that in those countries where inflation control has been most difficult in the past, inflation targeting may be least useful. Where inflation control has been successful in the past, the benefits of inflation targeting may have more to do with the associated changes in the policy process and in the central bank's communication with the public than with the inflation target itself.

Goodfriend begins by tracing the origins of the case for inflation targeting in postwar U.S. monetary history. He describes five aspects of inflation targeting practiced implicitly by the Greenspan Fed. He argues that low long-run inflation should be an explicit priority for monetary policy. Further, as a practical matter, it is not desirable for the Fed to vary its short-run inflation target. Strict inflation targeting can be regarded as efficient, constrained, countercyclical stabilization policy. Finally, Goodfriend suggests that the Fed publicly acknowledge its implicit priority for low long-run inflation, that Congress recognize that priority, and that representatives of the Federal Open Market Committee in return consider participating in a monetary policy forum to better inform the public and Congressional oversight committees about current monetary policy.

Jonas and **Mishkin** examine the inflation targeting experience in three transition countries: the Czech Republic, Poland, and Hungary. While these countries have missed inflation targets, often by a large margin, they nevertheless progressed well with disinflation. A key lesson from the experience of the inflation targeting transition countries is that economic performance will improve, and support for the central bank will be higher, if the central banks emphasize not undershooting the inflation target as much as they avoid overshooting. Also, economic performance will be enhanced if inflation targeting central banks in transition countries do not engage in active manipulation of the exchange rate. The relationship between the central bank and the government in these countries has been quite difficult, but this can be alleviated by having direct government involvement in setting the inflation target and with a more active role for the central bank in communicating with the government and the public. In addition, having technocrats rather than politicians appointed to head the central bank may help in depersonalizing the conduct of monetary policy and increasing support for the independence of the central bank. The authors also address the future perspective of monetary policy in the transition economies and conclude that, even after the EU accession, inflation targeting can remain the main pillar of monetary strategy in the three examined accession countries before they join the EMU.

Emerging economies experience sudden stops in capital inflows. During these sudden stops, having access to monetary policy is useful, but mostly for "insurance" rather than aggregate demand reasons. In this environment, a central bank that cannot commit to monetary policy choices will ignore the insurance aspect and

follow a procyclical rather than the optimal countercyclical policy. The inefficiency is exacerbated by the presence of an expansionary bias. In order to solve these problems, **Caballero** and **Krishnamurthy** propose modifying the central bank's objective to include state-contingent inflation targets and to target a measure of inflation that overweights non-tradable inflation.

In the panel discussion, **Feldstein** emphasized that deflation is particularly damaging if the rate of deflation is so great that nominal wages must fall and short-term interest rates are approximately zero. Businesses and households suffer because the value of real assets falls relative to the value of nominal debts. Although the United States is not close to that situation now, a failure to achieve a strong enough recovery might cause the low inflation rate to shift over time to deflation. In addition to a more expansionary monetary policy that includes action with longer-term securities, the United States could reverse deflation by a fiscal stimulus. It is possible to have a fiscal stimulus without increasing the budget deficit by combining a temporary investment tax credit with a temporary increase in the tax on business income.

Bernanke noted that deflation often is associated with bad macroeconomic outcomes (as in the 1930s, or in Japan today) but not always (China today). A key issue is whether the zero bound on nominal interest rates is binding at full employment; in a rapidly growing economy, in which the real interest rate is high, the bound is unlikely to be relevant, but in a slack economy the bound may pose a crucial constraint. Bernanke argued that the chances of protracted deflation in the United States are remote, as the financial system and inflation expectations are both stable, and policymakers are prepared to act aggressively to resist deflationary shocks. Should deflation occur, even if the nominal interest rate reached zero, the Federal Reserve could respond by purchasing assets (including Treasury securities, foreign securities, and securities issued by government-sponsored enterprises), by lending aggressively through the discount window, and by cooperating with fiscal authorities. Bernanke noted that in a monetarist framework, in which money is a substitute for a variety of assets, increasing the money supply has the potential to affect a spectrum of asset yields. He concluded by suggesting that central bank antideflationary policies might be made more precise by targeting asset prices rather than by stipulating quantities of assets to be purchased.

Woodford agreed that the risk of deflation in the United States seems minimal, but argued that the ability of expansion of the monetary base through open-market operations to increase nominal aggregate demand is relatively limited once the zero lower bound on short-term nominal interest rates is reached, as it has been in Japan. Substitution of money for other short-maturity, riskless nominal assets (also with interest yields near zero) in the portfolios of private agents makes very little difference to the situation of those agents and hence their behavior; and the idea that open-market purchases of longer-maturity debt or other assets can substantially change relative prices of alternative financial assets ignores the failure of central-bank attempts to manipulate the term structure of interest rates in the past. Nonetheless, warnings that deflation is like a "black hole" from which an economy may be unable to leave once the state is entered are too pessimistic, because they assume a completely mechanical, backward-looking model of expectations formation. A public commitment to a price-level target should instead create a situation in which deflation will not create expectations of deflation but rather increased expectations of inflation, which will tend to automatically limit the extent of the deflation.

These papers and their discussion will be published by the University of Chicago Press in an NBER Conference Volume, *Inflation Targeting*. Its availability will be announced in a future issue of the NBER *Reporter*. They are also available at "Books in Progress" on the NBER's website.

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Bureau News

Mankiw to Chair CEA

NBER Research Associate N. Gregory Mankiw, Director of the National Bureau's Program of Research on Monetary Economics, has been nominated by President Bush to become Chairman of the Council of Economic Advisers. His appointment requires Senate confirmation. Mankiw replaces NBER Research Associate R. Glenn Hubbard, who will be returning to Columbia University.

Mankiw is the Allie S. Freed Professor of Economics at Harvard University. He received his A.B. from Princeton University and his Ph.D. from MIT. His NBER affiliation began in 1985, and he has twice served as Director of the NBER's Monetary Economics Program. Mankiw also edited the NBER volume *Monetary Policy*, which was published by the University of Chicago Press in 1994.

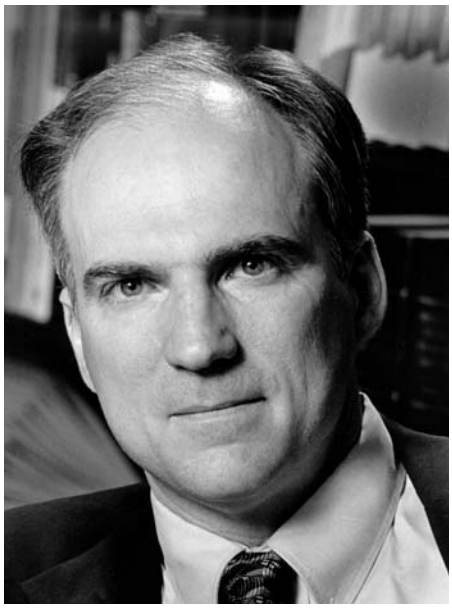
Four of the recent Chairs of the President's Council of Economic Advisers were also NBER Research Associates at the time of their nominations: Martin Feldstein, appointed by Ronald Reagan; Michael Boskin, under President George H.W. Bush; Joseph Stiglitz, President William J. Clinton; and R. Glenn Hubbard, President George W. Bush.

Romers To Direct NBER's Monetary Economics Program

NBER Research Associates Christina D. Romer and David H. Romer will succeed N. Gregory Mankiw as co-directors of the NBER's Program on Monetary Economics.

Christina Romer is currently the Class of 1957 Professor of Economics at the University of California at Berkeley. She is a specialist in monetary economics and economic history, and has studied changes in American business cycles over time and the causes of the Great Depression. David Romer is the Herman Royer Professor in Political Economy at the University of California at Berkeley. He is a specialist in monetary economics and macroeconomic theory. He has conducted research on New Keynesian microeconomic foundations, inflation, and the determinants of cross-country income differences. Together the Romers have conducted a number of studies on the effects and determinants of American monetary policy. They are co-editors of the NBER volume *Reducing Inflation: Motivation and Strategy*.

Christina Romer received her B.A. from the College of William and Mary in 1981 and her Ph.D in Economics from MIT in 1985. She has received the NSF Presidential Young Investigator Award and fellowships from the Sloan Foundation and the Guggenheim Foundation. David Romer received his A.B. from Princeton University in 1980 and his Ph.D. from MIT in 1985. He is the author of the leading graduate textbook in macroeconomics, *Advanced Macroeconomics*. Both taught at Princeton from 1985-8 before joining the Berkeley economics faculty. They are married and have 3 children.



Holtz-Eakin to Head CBO

Douglas J. Holtz-Eakin, who has been affiliated with the NBER since 1985, has been chosen to head the Congressional Budget Office. On leave as a professor of economics at Syracuse University, he most recently had been Chief Economist of the President's Council of Economic Advisers (CEA).

In the past, Holtz-Eakin held academic appointments at Columbia University and Princeton University. He also served as Senior Staff Economist of the CEA in 1989-90.

Holtz-Eakin's long-standing interest is in the economics of public policy. His most recent NBER Working Paper (No. 8261), analyzed the distortion resulting from income versus estate taxation; in Working Paper No. 7980 he discussed personal income taxes and the growth of small firms.

Ruth P. Mack Dies at Age 99

Ruth Prince Mack, a member of the NBER's research staff in New York City from the 1940s through the 1960s, died in early March. She was 99 years old.

Mack was the author of a Technical Paper in 1954 titled *Factors Influencing Consumption: An Experimental Analysis of Shoe Buying*. Her other work at the NBER was the two Studies in Business Cycles that she wrote and which were published in 1956 and 1967, respectively. *Consumption and Business Fluctuations: A Case Study of the Shoe, Leather, Hide Sequence and Information, Expectations,* and *Inventory Fluctuations: A Study of Materials Stock on Hand and on Order*.

Insurance Project

The NBER's Insurance Project, directed by Kenneth A. Froot, NBER and MIT, and Howard Kunreuther, NBER and University of Pennsylvania, met in Cambridge on January 31 and February 1. The following papers were discussed:

J. David Cummins, University of Pennsylvania, and **Christopher M. Lewis**, Fitch Risk Management, "Catastrophic Events, Parameter Uncertainty and the Breakdown of Implicit Long-Term Contracting in the Insurance Market: The Case of Terrorism Insurance"
Discussant: Joan Lamm-Tenant, General Cologne Re Capital Consultants

Gordon Woo, Risk Management Solutions, "Insuring Against Al-Qaeda"
Discussant: John Major, Guy Carpenter & Company, Inc.

Thomas Russell, Santa Clara University, "The Costs and Benefits of the Terrorism Risk Insurance Act: A First Look"
Discussant: Paul Freeman, University of Denver

Darius Lakdawalla, NBER and RAND, and **George Zanjani**, Federal Reserve Bank of New York, "Insurance, Self-Protection, and the Economics of Terrorism"
Discussant: Howard Kunreuther

Alma Cohen, Harvard University, "Asymmetric Information and Learning: Evidence from the Automobile Insurance Market"
Discussant: Gordon Stewart, Insurance Information Institute

Bradley Herring, Emory University, and **Mark Pauly**, University of Pennsylvania, "Incentive-Compatible Guaranteed Renewable Health Insurance Premiums"
Discussant: Thomas McGuire, Harvard University

Thomas Davidoff, University of California, Berkeley; **Jeffrey Brown**, NBER and University of Illinois at Urbana-Champaign; and **Peter Diamond**, NBER and MIT, "Annuities and Individual Welfare"
Discussant: Amy Finkelstein, NBER

Olivier Mahul, INRA, "Efficient Risk Sharing within a Catastrophe Insurance Pool"
Discussant: Kenneth A. Froot

Alex Boulatov and **Dwight Jaffee**, University of California, Berkeley, "The Response of Catastrophe Insurance Markets to Extreme Events: A Real Option Approach"
Discussant: Kent Smetters, NBER and University of Pennsylvania

Neil Doherty and **Paul Kleindorfer**, University of Pennsylvania, "Market, Cotnract Designs, and Mutualization: Insuring Catastrophic Losses"
Discussant: David Durbin, Swiss Re

Geoffrey Heal, Columbia University, and **Howard Kunreuther**, "You Can Only Die Once: Managing Discrete Interdependent Risks"
Discussant: Nathaniel Keohane, Yale University

Cummins and **Lewis** examine the reaction of the stock prices of U.S. property-casualty insurers to the World Trade Center (WTC) terrorist attack of September 11, 2001. Theories of insurance market equilibrium and theories of long-term contracting predict that large loss events that deplete capital and increase uncertainty will affect weakly capitalized insurers more significantly than stronger firms. The results here are

consistent with this prediction. Insurance stock prices generally declined following the WTC attack. However, the stock prices of insurers with strong financial ratings rebounded after the first post-event week, while those of weaker insurers did not, consistent with the flight-to-quality hypothesis.

The broad spectrum of domestic terrorism in the United States traditionally has been underwritten as an insurance risk without the need for elaborate risk management tools. The disparate aims, origins, and domiciles of the various U.S. terrorist groups provide an intrinsic degree of portfolio diversification, and risk accumulations are bounded by the limited damage objectives and capabilities of disaffected U.S. citizens. By comparison with the sizeable database of domestic terrorist acts, the record of foreign attacks is barren: until 9/11, the U.S. mainland had not been attacked since the British burned the White House in 1812. Against a background of al-Qaeda threats to "destroy" America, insurers are obliged by the Terrorism Risk Insurance Act of 2002 to offer insurance coverage against foreign attacks. **Woo** outlines steps by which this coverage may be managed in a risk-informed manner, using knowledge of al-Qaeda modus operandi, expressed in a logical form suitable for decisionmaking on pricing and accumulating terrorism risk.

Russell provides estimates of the costs and benefits of the Terrorism Risk Insurance Act of 2002. He estimates the expected costs to the taxpayer of the federal insurance backstop to be around $6 billion. The chief benefit of the Act is the increase in construction jobs made possible by construction loans now protected against terrorism risk by the resuscitation of the private terrorism insurance market. Russell estimates the number of these jobs at around 65,000, substantially less than the administration claim of 300,000. Other benefits are likely to be small, suggesting that (at the rate of $10,000 per job created) the costs of the Act may substantially exceed the benefits.

Lakdawalla and **Zanjani** investigate the rationale for public intervention in the terrorism insurance market. They argue that government subsidies for terror insurance are aimed, in part, at discouraging self-protection and limiting the negative externalities associated with self-protection. Cautious self-protective behavior by a target can hurt public goods, including national prestige, if it is seen as "giving in" to the terrorists, and may increase the loss probabilities faced by others if it encourages terrorists to substitute toward more vulnerable targets. The authors argue that these externalities distinguish the terrorism insurance market and help to explain why availability problems in this market have engendered much stronger government responses than similar problems in other catastrophe markets.

Cohen tests the predictions of adverse selection models using data from the automobile insurance market. In contrast to what recent research has suggested, she finds that the evidence is consistent with the presence of informational asymmetries in this market: higher insurance coverage is correlated with more accidents. Consistent with the presence of learning by policyholders about their risk type, such a coverage correlation exists only for policyholders who have had three or more years of driving experience prior to joining their insurer. Consistent with the presence of learning by insurers about repeat customers, Cohen finds that, as the experience of the insurer with a group of policyholders increases, the coverage-accidents correlation declines in magnitude and eventually disappears. Finally, consistent with insurers having more information about their repeat customers than would be available to other insurers, she finds that policyholders underreport their past claims when joining the insurer and that policyholders who leave the insurer are disproportionately those with a poor claims history with the insurer.

In practice, an age profile of premiums that decreases with age might result in such high premiums for younger individuals that insurance might be considered unaffordable. **Herring** and **Pauly** use medical expenditure data to estimate an optimal competitive age-based premium schedule for a benchmark renewable health insurance policy. They find that the amount of prepayment by younger individuals necessary to cover future claims is mitigated by three factors: high-risk individuals either will recover or die; low-risk expected expense increases with age; and the likelihood of developing a high-risk condition increases with age. The resulting optimal premium path generally increases with age. In addition, the authors find that actual premium paths exhibited by purchasers of individual insurance with guaranteed renewability are close to an optimal schedule.

Davidoff, **Brown**, and **Diamond** advance the theory of annuity demand in several new directions. First, they derive sufficient conditions under which complete annuitization is optimal, showing that this well-known result holds true in a more general setting than in Yaari (1965). Specifically, when markets are complete, sufficient conditions need not impose exponential discounting, intertemporal separability, or obedience of expected utility axioms on preferences; nor do annuities need be actuarially fair, or longevity risk the only source of consumption uncertainty. All that is required is that consumers have no bequest motive and that annuities pay a rate of return greater than that of otherwise matching conventional assets, net of administrative costs. Second, the authors show that full annuitization may not be optimal when markets are incomplete. Some annuitization is optimal as long as conventional markets are complete. The incompleteness of markets can lead to zero annuitization, but the conditions on both annuity and bond markets are stringent. Third, the authors extend the simulation literature that calculates the utility gains from annuitization by considering consumers whose utility depends both on present consumption and on "standard-of-living" to which they have become accustomed. The value of annuitization hinges critically on the size of the initial standard-of-living relative to wealth.

Mahul examines optimal catastrophic risk sharing arrangements within a pool whose financial

resources may be insufficient to pay all valid claims in full. Under this threat of default on payment, the mutuality principle and the standard allocation of aggregate risk based on individual risk tolerances hold within a sub-pool of agents who decide to stay in the pool after a cataclysmic event. In the context of the insurance market, this constraint precludes obtaining a first-best optimal participating policy with full insurance and a variable premium. The second-best optimal insurance contract provides full (marginal) coverage above an *ex post* variable deductible. This deductible is such that the total claims paid to the policyholders and the financial resources of the pool are equalized. This innovative contract contrasts with current catastrophe insurance schemes based on pro rated indemnification should the insured losses exceed the capital available.

Boulatov and **Jaffee** connect the traditional financial and insurance literatures in the context of real option theory. They use the analogy between insurance and investment under uncertainty in order to study the general equilibrium in an insurance industry with heterogeneous competing firms. They show that even under the assumption of rationality (defined in the traditional sense), insurance companies should be treated as strategic agents when catastrophic events are possible. The authors derive the equilibrium investment (insurance policies) using a generalization of the standard model of partially reversible investment under uncertainty.

Doherty and **Kleindorfer** ask whether market insurance can occur naturally under conditions of ambiguity and, if so, what contractual and market structure it should assume. They find that, far from impeding insurance contracting, ambiguity alone can provide a sufficient basis for risk sharing of catastrophic losses. The gains from risk sharing between the parties cover a wide range of parameters and derive from two mechanisms. The first is differences in ambiguity aversion between the primary insurer and the reinsurer. Greater ambiguity aversion on the part of the latter motivates reinsurance. This gain is quite intuitive. If the reinsurer dislikes ambiguity less than the insurers, then a price can be found such that both of them gain from the transfer of risk. The second mechanism comes from the catastrophic nature of the loss. Unless the catastrophic event hits all primary insurers to the same degree, the reinsurance mechanism can be used to diversify risk within the catastrophic lass state.

Heal and **Kunreuther** extend their earlier analysis of interdependent security issues to a general class of problems involving discrete interdependent risks. There is a threat of an event that can only happen once, and the risk depends on actions taken by others. Any agent's incentive to invest in managing the risk depends on the actions of others. Security problems at airlines and in computer networks come into this category, as do problems of risk management at organizations facing the possibility of bankruptcy, and individuals' choices about whether to be vaccinated against an infectious disease. Surprisingly the framework also covers certain aspects of investment in R and D. Here, the authors extend their earlier analysis to cover heterogeneous agents and to characterize the tipping phenomenon.

Entrepreneurship

The NBER's new Working Group on Entrepreneurship met in Cambridge on February 1. Josh Lerner, NBER and Harvard University, organized this program:

Naomi R. Lamoreaux and **Kenneth L. Sokoloff**, NBER and University of California, Los Angeles, "The Decline of the Independent Inventor: A Schumpeterian Story?"
Discussant: Rebecca Henderson, NBER and MIT

Edward Lazear, NBER and Stanford University, "Entrepreneurship"
Discussant: Diane Burton, MIT

Marianne P. Bittler, RAND; **Tobias J. Moskowitz**, NBER and University of Chicago; and **Annette Vissing-Jorgensen**, NBER and Northwestern University, "Why Do Entrepreneurs Hold Large Ownership Shares? Testing Agency Theory Using Entrepreneur Effort and Wealth"
Discussant: Antoinette Schoar, NBER and MIT

Joshua Gans, Melbourne Business School; **David Hsu**, the Wharton School; and **Scott Stern**, NBER and Northwestern University, "Uncertain Intellectual Property Rights and Start-Up Commercialization Strategy: The Strategic Impact of Patent Grants Lags"
Discussant: Manju Puri, NBER and Stanford University

Steven Klepper, Carnegie-Mellon University, "The Geography of Organizational Knowledge"
Discussant: Boyan Jovanovic, NBER and New York University

Joseph Schumpeter argued in *Capitalism, Socialism and Democracy* that the rise of large firms' investments in in-house R and D spelled the doom of the entrepreneur. **Lamoreaux** and **Sokoloff** explore this idea by analyzing the career patterns of three cohorts of inventors from the late nineteenth and early twentieth century. They find that over time highly productive inventors were increasingly likely to form long-term attachments with firms. In the Northeast, these attachments seem to have taken the form of employment positions within large firms, but in the Midwest inventors were more likely to become principals in firms bearing their names. Entrepreneurship, there-

fore, was by no means dead, but the increasing capital requirements — both financial and human — for effective invention, and the need for inventors to establish a reputation before they could attract support, made it more difficult for creative people to pursue careers as inventors. The relative numbers of highly productive inventors in the population correspondingly decreased, as did patenting rates per capita.

The theory **Lazear** proposes is that entrepreneurs are jacks-of-all-trades who may not excel in any one skill, but are competent in many. He presents a model of the choice to become an entrepreneur, the primary implication of which is that individuals with balanced skills are more likely than others to become entrepreneurs. The model has implications for the proportion of entrepreneurs by occupation and by income and yields a number of predictions for the distribution of income by entrepreneurial status. Using a dataset of Stanford alumni, Lazear tests the predictions and finds that they hold. In particular, by far the most important determinant of entrepreneurship is having background in a large number of different roles. Further, income distribution predictions, for example, that there are a disproportionate number of entrepreneurs in the upper tail of the distribution, are borne out.

Bittler, **Moskowitz**, and **Vissing-Jorgensen** augment the standard principal-agent model to accommodate an entrepreneurial setting, in which effort, ownership, and firm size are determined endogenously. They test the model's predictions (some novel) using new data on entrepreneurial effort and wealth. Accounting for unobserved firm heterogeneity using instrumental variables, they find that entrepreneurial ownership shares increase with outside wealth, decrease with firm risk, and decrease with firm size. Effort increases with ownership and size, and both ownership and effort increase firm performance. The magnitude of the effects in the cross-section of firms suggests that agency theory is important for explaining the large average ownership shares of entrepreneurs.

Gans, **Hsu**, and **Stern** consider the impact of the intellectual property (IP) system on the timing of cooperation/licensing by start-up technology entrepreneurs. While productive efficiency considerations argue in favor of early licensing, delays in the granting of patent rights induce an informational asymmetry between the inventor and potential licensees. Employing a dataset combining information about the timing of patent grants and cooperative licensing, the authors establish three key findings: 1) pre-grant licensing is quite common, occurring in more than 50 percent of their sample; 2) the prevalence of pre-grant licensing varies across different economic environments; and 3) the hazard rate for achieving a cooperative licensing agreement nearly doubles with the granting of formal IP rights. Though additional work remains to be done, these findings suggest that uncertainties in the patent system may delay efficient bargaining by serving as a source of informational asymmetry between start-up innovators and other firms crucial to the commercialization process.

Klepper analyzes the evolution of the geographic distribution of producers in the television receiver and automobile industries. Both industries experienced sharp shakeouts and evolved to be oligopolies, suggestive of increasing returns. The television receiver industry initially was concentrated regionally but evolved to be more dispersed over time. In contrast, the automobile industry initially was dispersed but evolved to be heavily concentrated around one city, Detroit, MI, which initially had no producers. Neither pattern conforms to theories that portray agglomerations as being beneficial to the firms that populate them. Klepper develops and tests an alternative theory to explain the geographic evolution of the two industries. Firms are assumed to differ in terms of their initial competence at the time of entry, which shapes their long-term performance. They acquire their competence from firms in related industries and prior entrants into the new industry. He analyzes the location and performance of entrants in both industries and shows how differential importance in the two sources of competence plays a critical role in explaining the contrasting evolution of the geographic structure of the two industries.

Economic Fluctuations and Growth

The NBER's Program on Economic Fluctuations and Growth met in San Francisco on February 7. Fernando Alvarez, NBER and University of Chicago, and Robert King, NBER and Boston University, organized this program:

Andrew Ang, NBER and Columbia University; **Monika Piazzesi**, NBER and University of California, Los Angeles; and **Min Wei**, Columbia University, "What does the Yield Curve Tell us about GDP Growth?"
Discussant: Urban Jermann, NBER and University of Pennsylvania

Susan Athey, NBER and Stanford University; **Andrew Atkeson**, NBER and University of California, Los Angeles; and **Patrick J. Kehoe**, Federal Reserve Bank of Minneapolis, "The Optimal Degree of Discretion in Monetary Policy"
Discussant: Lawrence Christiano, NBER and Northwestern University

Boyan Jovanovic, NBER and New York University, and **Peter L. Rousseau**, NBER and Vanderbilt University, "Mergers as Reallocation" (NBER Working Paper No. 9279)
Discussant: Andrew Atkeson

Marcelo Veracierto, Federal Reserve Bank of Chicago, "On the Cyclical Behavior of Employment, Unemployment and Labor Force Participation"
Discussant: Robert E. Hall, NBER and Stanford University

Yongsung Chang, University of Pennsylvania, and **Sun-Bin Kim**, Concordia University, "From Individual to Aggregate Labor Supply: A Quantitative Analysis Based on a Heterogeneous Agent Macroeconomy"
Discussant: Thomas E. MaCurdy, NBER and Stanford University

Aubhik Khan, Federal Reserve Bank of Philadelphia, and **Julia K. Thomas**, University of Minnesota, "Inventories and the Business Cycle: An Equilibrium Analysis of (S,s) Policies"
Discussant: Valerie A. Ramey, NBER and University of California, San Diego.

Ang, **Piazzesi**, and **Wei** build a dynamic model for GDP growth and yields that completely characterizes expectations of GDP. The model does not permit arbitrage. Contrary to previous studies, this paper concludes that the short rate has more predictive power than any term spread. The authors confirm this finding by forecasting GDP out-of-sample. The model also recommends the use of lagged GDP and the longest maturity yield to measure slope. Greater efficiency enables the yield-curve model to produce superior out-of-sample GDP forecasts than unconstrained ordinary least squares at all horizons.

Athey, **Atkeson**, and **Kehoe** analyze monetary policy design in an economy with an agreed-upon social welfare function that depends on the randomly fluctuating state of the economy. The monetary authority has private information about that state. In the model, well-designed rules trade off society's desire to give the monetary authority flexibility to react to its private information against society's need to guard against the standard time-inconsistency problem arising from the temptation to stimulate the economy with unexpected inflation. The authors find that the optimal degree of monetary policy discretion is decreasing in the severity of the time-inconsistency problem. As this problem becomes sufficiently severe, the optimal degree of discretion is zero. They also find that, despite the apparent complexity of this dynamic mechanism design problem, society can implement the optimal policy simply by legislating an inflation cap that specifies the highest allowable inflation rate.

Jovanovic and **Rousseau** argue that takeovers have played a major role in speeding up the diffusion of new technology. The role of takeovers is similar to that of entry and exit of firms. The authors focus on and compare two periods: 1890-1930, during which electricity and the internal combustion engine spread through the U.S. economy, and 1971-2001, the Information Age.

Veracierto evaluates how well a real business cycle (RBC) model that incorporates search and leisure decisions simultaneously can account for the observed behavior of employment, unemployment, and being out of the labor force. This work contrasts with the previous RBC literature, which analyzed employment or hours fluctuations either by lumping together unemployment and out-of-the-labor-force into a single non-employment state or by assuming fixed labor force participation. Once the three employment states are introduced explicitly, Veracierto finds that the RBC model generates highly counterfactual labor market dynamics.

Chang and **Kim** investigate the mapping from individual to aggregate labor supply using a general equilibrium heterogeneous-agent model with an incomplete market. They calibrate the nature of heterogeneity among workers using wage data from the Panel Survey of Income Dynamics. The gross worker flow between employment and nonemployment, and the cross-sectional earnings and wealth distributions in the model, are comparable to those in the micro data. The authors find that the aggregate labor supply elasticity of such an economy is around one, bigger than micro estimates but smaller than those often assumed in aggregate models.

Khan and **Thomas** develop an equilibrium business cycle model in which final goods' producers pursue generalized inventory policies with respect to intermediate goods, a consequence of nonconvex factor adjustment costs. Calibrating the model to reproduce the average inventory-to-sales ratio in postwar U.S. data, the authors find that it explains half of the cyclical variability of inventory invest-

ment. Moreover, inventory accumulation is strongly procyclical, and production is more volatile than sales, as in the data. The model economy exhibits a business cycle similar to that of a comparable benchmark without inventories, although the authors do observe somewhat higher variability in employment and lower variability in consumption and investment. Thus, equilibrium analysis, which necessarily endogenizes final sales, alters our understanding of the role of inventory accumulation for cyclical movements in GDP. The presence of inventories does not substantially raise the variability of production, because it dampens movements in final sales.

Industrial Organization

The NBER's Program on Industrial Organization met at the Bureau's California Office on February 7 and 8. Dennis W. Carlton and Austan Goolsbee, both of NBER and University of Chicago, organized the program meeting, at which these papers were discussed:

Shane Greenstein, NBER and Northwestern University, and **Michael Mazzeo**, Northwestern University, "Differentiation Strategy and Market Deregulation: Local Telecommunication Entry in the Late 1990s"
Discussant: Glenn Woroch, University of California, Berkeley

Steven Berry, NBER and Yale University, and **Joel Waldfogel**, NBER and University of Pennsylvania, "Product Quality and Market Size"
Discussant: Tim Bresnahan, NBER and Stanford University

Gustavo E. Bamberger and **Lynette R. Neumann**, Lexecon, and **Dennis W. Carlton**, "An Empirical Investigation of the Competitive Effects of Domestic Airline Alliances"
Discussant: Severin Borenstein, NBER and University of California, Berkeley

Amil Petrin, NBER and University of Chicago, and **Kenneth Train**, University of California, Berkeley, "Omitted Product Attributes in Discrete Choice Models"
Discussant: Frank Wolak, NBER and Stanford University

Ali Hortacsu and **Chad Syverson**, University of Chicago, "Search Costs, Product Differentiation, and the Welfare Impact of Entry: A Case Study of S & P 500 Index Funds"
Discussant: Alan Sorenson, NBER and Stanford University

Luis Garicano, University of Chicago, and **Thomas Hubbard**, NBER and University of Chicago, "Specialization, Firms, and Markets: The Division of Labor Within and Between Law Firms"
Discussant: Jonathan Levin, Stanford University

Toshi Iizuka, Vanderbilt University, and **Ginger Z. Jin**, University of Maryland, "The Effects of Direct to Consumer Advertising in the Prescription Drug Market"
Discussant: Scott Stern, NBER and Northwestern University

Greenstein and **Mazzeo** examine the role of differentiation strategies in the development of markets for local telecommunication services in the late 1990s. The prior literature has used models of interaction among homogenous firms, but this paper is motivated by the claim that entrants differ substantially in their product offerings and business strategies. Exploiting a new, detailed dataset of CLEC (Competitive Local Exchange Carriers) entry into over 700 U.S. cities, the authors take advantage of recent developments in the analysis of entry and competition among differentiated firms. They find strong evidence that CLECs take account of both potential market demand and the business strategies of competitors when making their entry decisions. This suggests that firms' incentives to differentiate their services should shape the policy debate for competitive local telecommunications.

When quality is produced with fixed costs, a high-quality firm can undercut its rivals' prices and may find it profitable to invest more in quality as market size grows. As a result, a market can remain concentrated even as it grows large. By contrast, when quality is produced with variable costs, a wide range of product qualities can coexist in the market because they are offered at different prices. Larger markets will fragment and offer products with a wider range of qualities. Using U.S. urban areas as markets, **Perry** and **Waldfogel** examine the relationships between market size and product quality — and between market size and product concentration — for two industries that differ in their quality production process. The authors document that in the restaurant industry, where quality is produced largely with variable costs, the range of qualities increases with market size, with each "product" maintaining a small market share. In daily newspapers, where quality is produced with fixed costs, the average quality of products increases with market size, and the market does not fragment as it grows.

Bamberger, **Carleton**, and **Neumann** empirically investigate the effect of two recent domestic airline alliances. They find that both alliances benefited consumers: average fares fell by about 5 to 7 percent after the creation of the alliances on those city pairs affected by the alliances. They also find that total traffic increased 6 percent after the creation of at least one of the alliances. The average fare and traffic effects arise in part because

the alliance partners' rivals respond to the increased competition from an alliance. Finally, the authors find that the size of the alliance effect on average fares depends on the pre-alliance level of competition on a city pair, with the effect being larger on those city pairs where the level of competition was initially relatively low.

Petrin and **Train** describe two methods for correcting an omitted variables problem in discrete choice models: a fixed effects approach and a control function approach. The control function approach is easier to implement and applicable in situations for which the fixed effects approach is not. The authors apply both methods to a cross-section of disaggregated data on customer's choice among television options including cable, satellite, and antenna. As theory predicts, the estimated price response rises substantially when either correction is applied. All of the estimated parameters and the implied price elasticities are very similar for both methods.

Two salient features of the competitive structure of the U.S. mutual fund industry are the large number of funds and the sizeable dispersion in the fees funds charge investors, even within narrow asset classes. Differences in portfolio financial performance alone do not seem able to fully explain these features. **Hortaçsu** and **Syverson** focus on the retail S&P 500 index funds sector, where they find similar patterns of fund proliferation and price dispersion. This suggests that costly investor search and non-portfolio fund differentiation may play an important role in the mutual fund industry. To quantify the welfare impact of such factors in the market for mutual funds, the authors construct a model of industry equilibrium in which consumers conduct costly search over differentiated products. Using panel data on fund fees and market shares in the retail S&P 500 index fund sector, the authors find that fairly small search costs can explain the considerable price dispersion in the sector. Further, consumers value funds' observable non-portfolio attributes — such as fund age and the number of other funds in the same fund family — in largely plausible ways. Finally, the authors investigate the possibility that there are too many funds in the sector from a social welfare standpoint. They quantify the welfare impact of a counterfactual sector structure where entry is restricted to a single fund; they find that restricting entry would yield nontrivial gains from reduced search costs and productivity gains from scale economies. However, these may be counterbalanced by sizeable losses from monopoly market power and reduced product variety.

What is the role of firms and markets in mediating the division of labor? **Garicano** and **Hubbard** use confidential microdata from the Census of Services to examine law firms' boundaries. First they examine how the specialization of lawyers and firms increases as lawyers' returns to specialization increase. In fields where lawyers increasingly specialize with market size, the relationship between the share of lawyers who work in a field-specialized firm and market size indicates whether firms or markets more efficiently mediate relationships between lawyers in this and other fields. The authors then examine which pairs of specialists tend to work in the same versus different firms; this provides evidence on the scope of firms that are not field-specialized. They find that whether firms or markets mediate the division of labor varies across fields in a way that corresponds to differences in the value of cross-field referrals, consistent with Garicano and Santos's (2001) proposition that firms facilitate specialization by mediating exchanges of economic opportunities more efficiently than markets.

In 1997 there was an important change in direct-to-consumer (DTC) advertising of ethical drugs. For the first time, the Food and Drug Administration (FDA) permitted brand-specific DTC ads on TV without a "brief summary" of comprehensive risk information. This led to a three-fold growth in DTC advertising expenditure over four years, followed by an intensive debate about the effects of DTC advertising on patient and doctor behaviors. **Iizuka** and **Jin** empirically examine the effects of DTC ads on ethical drugs by combining 1996-9 DTC advertising data with the annual National Ambulatory Medical Care Survey (NAMCS). The authors find that DTC advertising leads to a large increase in the number of outpatient drug visits, a moderate increase in the time spent with doctors, but has no effect on doctors' specific choice among prescription drugs within a therapeutic class. Consistent with the proponents' claim, this finding suggests that DTC ads encourage patient visits but do not challenge doctors' authority in the specific choice of prescription drugs. The authors cannot rule out the possibilities, however, that DTC ads may induce doctors to use prescription drugs over alternative treatments, and that doctors may spend extra time clarifying DTC ads if they do not prescribe the most advertised drug(s). The results suggest that the effect of DTC advertising is primarily market-expanding rather than business-stealing, and therefore DTC advertising is a public good for all drugs in the same therapeutic class.

Personnel Economics

A new NBER Working Group on Personnel Economics met in Cambridge on March 6 and 7. Edward P. Lazear, NBER and Stanford University, organized the meeting, at which these papers were discussed:

Edward P. Lazear and **Paul Oyer**, Stanford University, "Ports of Entry"

Audra Bowlus, University of Western Ontario, and **Lars Vilhuber**, Cornell University, "Displaced Workers, Early Leavers, and Re-Employment Wages"

Steffen Huck, University College London; **Dorothea Kübler**, Humboldt University Berlin; and **Jörgen Weibull**, Boston University, "Social Norms and Economic Incentives in Firms"

Illoong Kwon, University of Michigan, and **Eva Meyersson Milgrom**, Stanford University, "Occupation Structure and Boundaries of Internal Labor Markets"

Christian Grund, University of Bonn, "The Wage Policy of Firms: Comparative Evidence for the U.S. and Germany from Personnel Data"

Anders Frederiksen and **Niels Westergaard-Nielsen**, Aarhus School of Business, "Where Did They Go?"

Ann Bartel and **Casey Ichniowski**, NBER and Columbia University; **Richard Freeman**, NBER and Harvard University; and **Morris Kleiner**, NBER and University of Minnesota, "The Effects of Employee Attitudes about their Workplaces on Turnover and Productivity: An Analysis of Retail Commercial Banking"

Paul A. Lengermann, Federal Reserve Board, "Is it Who You Are, Where You Work, or With Whom You Work? Reassessing the Relationship Between Skill Segregation and Wage Inequality"

Tor Eriksson, Aarhus School of Business, and **Jaime Ortega**, Universidad Carlos III de Madrid, "The Adoption of Job Rotation: Testing the Theories"

Amos Golan, American University, and **Julia Lane**, Urban Institute, "The Dynamics of Worker Reallocation: A Markov Approach"

Early statements on internal labor markets view firms as consisting of ports-of-entry jobs and other jobs. Workers are hired into the former and promoted to the latter. In the strictest form, external hiring only takes place at certain job levels and thereafter workers are insulated from the forces of market competition. **Lazear** and **Oyer** use data from the Swedish Employers' Confederation to determine the existence of ports of entry in firms that represent a large part of the Swedish economy. Although there is a great deal of promotion from within, at every level there remains significant hiring from the outside. The data are more consistent with tournament theory, or with theories of firm-specific human capital, than they are with the more rigid institutional views.

Bowlus and **Vilhuber** lay out a search model that explicitly takes into account the information flow prior to a mass layoff. Using universal wage data files that allow them to identify individuals working with healthy and displacing firms, both at the time of displacement and at any other time period, the authors test the predictions of the model about re-employment wage differentials. Workers leaving a "distressed" firm have higher re-employment wages than workers who stay with the distressed firm until displacement. This result is robust to the inclusion of controls for worker quality and unobservable firm characteristics.

Huck, **Kübler** and **Weibull** study the interplay between economic incentives and social norms in firms. They outline a simple model of team production, in which workers' efforts are substitutes, and analyze this situation under different social norms. The main focus is on "efficiency norms," that is, norms that arise from workers' desire for, or peer pressure towards, social efficiency for the team as a whole. The authors examine the possibility of multiple equilibriums and the effect of economic incentives on the set of equilibriums, in particular whether economic incentives that are too strong may knock out efficient equilibriums. Partnerships, complementarity in production, stochastic production, and alternative incentive schemes also are considered.

Kwon and **Milgrom** use data from the private sector in Sweden to look at how institutional settings influence firms' recruitment strategies, and the interaction between occupation boundaries and firm boundaries. The Swedish data encompass entire populations of establishments in the private sector, including characteristics of employees and occupations and information about wages and work hours. The data also cover entire subpopulations of workers in the private sector for a 20-year period. The authors ask: What were the hiring patterns of Swedish private employers in 1978 and 1988? And, how did these patterns affect the individual white-collar worker pay? They find that employers commonly hire from both within and outside the firm to all the different ranks in the firm, contradicting simple theories that higher ranks are filled by promotion from within the firm. Smaller firms tend to hire more from outside, and to higher ranks, than the larger firms. Large firms tend to fill job slots from different occupations but from within the firm. Filling jobs with outside hires (irrespective of within or outside occupation) is most common for the top ranks. White-collar workers' wages increase with occupation tenure and general labor market tenure, possibly reflecting the accumulation of occupation-specific and general human capital, but wages *decrease* with firm tenure.

Generally, hiring appears restricted as much by occupation-specific and general human capital as by the boundaries of the firm.

Grund compares the wage policy of a German and a U.S. firm, focusing on the relationship between wages and hierarchies. Prior studies examined only one particular firm, but in this paper two plants with the same owners and similar production processes in different institutional environments are inspected. Grund finds convex wage profiles over the hierarchy levels of both plants. The U.S. plant shows considerably higher intensity of intra-firm competition in terms of higher intra-level wage inequality and yearly promotion rate. In contrast, wages are more distinctly attached to hierarchy levels in the German firm, as the wage regressions show.

Frederiksen and **Westergaard-Nielsen** study individual job separations and their associated destination states for all individuals in the private sector in Denmark during 1980-95, accounting for their magnitude and cyclical flows. The authors find that individual and workplace characteristics as well as business cycle effects are important in explaining individual behavior. They find that structural and growth policies reduce transitions into unemployment but, in general, have different implications for the economy. Policy interventions targeting displaced workers coming from plant closures are inefficient, the authors argue.

How much do responses to firm opinion surveys vary among workplaces as opposed to among workers? Is there a genuine "workplace effect" in employee opinion surveys? To the extent that systematic differences in attitudes exist across workplaces, do these differences help predict workplace economic outcomes, such as productivity or turnover? **Bartel**, **Freeman**, **Ichniowski**, and **Kleiner** examine these questions across branches of a large commercial bank in the New York metropolitan area. The bank provided files from its 1994 and 1996 employee opinion surveys under the condition that the authors not use its name in the publication of their results. The sample contains data on 2245 employees working in 193 New York area bank branches in 1994, and 1439 employees working in 142 branches in 1996. The smaller sample sizes for 1996 are attributable to closings of 51 branches between 1994 and 1996. The authors supplement the bank data with information from the National Longitudinal Survey of Youth (NLSY) on job satisfaction for the same individual over time. Finally, they combine the employee attitude data with information on the branches' financial performance, characteristics of the branches' local markets, and characteristics of the branch employees, to see whether branch level attitudes help predict employee turnover and productivity in the two cross sections and over time. They conclude that there is a genuine branch, or workplace, effect on how workers view their workplace. Differences in attitudes are highly positively correlated among branches over time; this suggests that workplace effects are strongly persistent. The NLSY data show a higher correlation of attitudes for the same worker at a given workplace than at different workplaces; this also points to the existence of a genuine workplace effect. Further, branches where workers have more favorable attitudes toward the firm have lower turnover and higher productivity.

Lengermann argues that relying on wages as a proxy for skill may be problematic. Using a newly developed longitudinal dataset linking virtually the entire universe of workers in the state of Illinois to their employers, he decomposes wages into components due, not only to person and firm heterogeneity, but also to the characteristics of their co-workers. Such "co-worker effects" capture the impact of a weighted sum of the characteristics of all workers in a firm on each individual employee's wage. Lengermann relies on the person-specific component of wages to proxy for co-worker "skills." Because these person effects are unknown ex ante, he first obtains them from a preliminary regression that excludes any role for co-workers. His estimates imply that a single standard deviation increase in both a firm's average person effect and experience level is associated, on average, with wage increases of 3 percent to 5 percent. Firms that increase the wage premiums they pay workers appear to do so in conjunction with upgrading worker quality. Interestingly, the average effect masks considerable variation in the relative importance of co-workers across industries. After allowing the co-worker parameters to vary across 2 digit industries, he finds that industry average co-worker effects explain 26 percent of observed inter-industry wage differentials. Finally, he decomposes the overall distribution of wages into components due to persons, firms, and co-workers. While co-worker effects indeed serve to exacerbate wage inequality, the tendency for high and low skilled workers to sort non-randomly into firms plays a considerably more prominent role.

Eriksson and **Ortega** test three theories for why firms introduce job rotation schemes: employee learning, employer learning, and employee motivation. The earlier literature used either information about establishment characteristics or data coming from personnel records of a single firm. In order to improve upon this, the authors use a unique dataset constructed by merging information from a fairly detailed survey directed at Danish private sector firms with linked employer-employee panel data. This allows them to include firm and workforce characteristics as well as firms' human resource management practices as explanatory variables, and hence to carry out a more comprehensive analysis.

The dynamism of the U.S. economy is particularly apparent in the reallocation of workers into, out of, and within the labor market. Knowing the order of magnitude of this allocation is important for a variety of empirical exercises — not least of which is the empirical matching function. **Golan** and **Lane** analyze the dynamics of worker allocation for the state of Illinois — both for the entire workforce and for demographic subgroups. They perform their estimation with minimal distributional assumptions. The main results are that even among the more stable groups of workers, there is a great deal of reallocation; and that the reallocation behavior of different groups (gender, low/high wage, age) is significantly different.

Development of the American Economy

The NBER's Program on Development of the American Economy met in Cambridge on March 8. Program Director Claudia Goldin of Harvard University organized the meeting. The following papers were discussed:

Howard Bodenhorn and **Christopher S. Ruebeck**, NBER and Lafayette College, "The Economics of Identity and the Endogeneity of Race"

Dora L. Costa, NBER and MIT, "Race and Pregnancy Outcomes in the Twentieth Century: A Long-Term Comparison"

Chiaki Moriguchi, NBER and Northwestern University, "Did American Welfare Capitalists Breach their Implicit Contracts? Preliminary Findings from Company-Level Data, 1920-1940"

Mark Carlson, Federal Reserve Board, and **Kris J. Mitchener**, NBER and Santa Clara University, "Branch Banking, Bank Competition, and Financial Stability"

Alan L. Olmstead, University of California, Davis, and **Paul W. Rhode**, NBER and University of North Carolina, "An Impossible Undertaking: The Eradication of Bovine Tuberculosis in the United States"

Boyan Jovanovic, NBER and New York University, and **Peter Rousseau**, NBER and Vanderbilt University, "General Purpose Technologies"

Economic and social theorists have modeled race and ethnicity as one form of personal identity produced in response to the costliness of adopting and maintaining a specific identity. **Bodenhorn** and **Ruebeck** look at the free African-American population in the mid-nineteenth century to investigate the costs and benefits of adopting alternative racial identities. During this period light-skinned African-Americans could, and often did, choose to differentiate themselves from dark-skinned African-Americans. The authors model the choice as an extensive-form game, in which whites choose whether to accept a separate mulatto identity and mixed-race individuals then choose whether to adopt a mulatto identity. Adopting a mulatto identity generates pecuniary gains, but imposes psychic costs. The authors quantify "the complexion gap" and find that mulattoes held significantly more wealth than blacks. Finally, they relate the complexion gap to community factors and find that the benefits of adopting a mulatto identity increased with the absolute size of the mulatto community, but decreased as the mulatto percentage of the African-American population increased at the neighborhood and city level. Thus, mulattoes benefited from white preferences when they represented a modest share of the African-American population. Yet if most African-Americans in a city were light-skinned, they became black in the eyes of whites and received no special treatment.

Costa notes that differentials between blacks and whites in both birth weights and prematurity and stillbirth rates have been persistent over the entire twentieth century. Differences in prematurity rates explain a large proportion of the black-white gap in birth weights, she finds, both among babies born under Johns Hopkins physicians in the early twentieth century and babies in the 1988 National Maternal and Infant Health Survey. In the early twentieth century, untreated syphilis was the primary observable explaining differences in black-white prematurity and stillbirth rates. Today the primary observable explaining differences in prematurity rates is the low marriage rate of black women. Maternal birth weight accounts for 5-8 percent of the gap in black-white birth weights in the recent data, suggesting a role for intergenerational factors. The Johns Hopkins data also illustrate the value of breast-feeding in the early twentieth century: black babies fared better than white babies in terms of mortality and weight gain during the first ten days of life spent in the hospital largely because they were more likely to be breast-fed.

Moriguchi studies the dynamic evolution of the human resources management (HRM) practices of American corporations during the 1920s and 1930s. It has been claimed that private welfare capitalism — employers' provision of non-wage benefits, greater employment security, and employee representation to their blue-collar workers — collapsed during the Great Depression and was replaced by the welfare state and industrial unionism under the New Deal regime. However, the recent literature reveals considerable differences among firms. Using data from 14 elite manufacturing firms, Moriguchi tests the implications of implicit contract theory and investigates the effect of the Depression on welfare capitalism and the subsequent development of corporate HRM practices. He identifies positive relationships between the severity of the Depression and the degree of repudiation, but also finds that firms with a higher commitment to workers were less likely to repudiate and more likely to remain unorganized and retain implicit contractual relations.

It is often argued that branching stabilizes banking systems by facilitating diversification of bank portfolios; however, previous empirical research on the Great Depression cannot be reconciled with this view. Analyses using state-level data find that states allowing branch banking had lower failure rates, while those examining individual banks find that branch banks were more likely to fail. **Carlson** and **Mitchener** argue that an alternative hypothesis can reconcile these seemingly disparate findings. Using data on national banks from the 1920s and 1930s, the authors show that branch banking increases competition and forces weak banks to exit the

banking system. This consolidation strengthens the system as a whole without necessarily strengthening the branch banks themselves.

In 1900 bovine tuberculosis represented a growing threat to both animal and human health. In 1917, shortly after a series of scientific breakthroughs allowed the early detection of TB in cattle, the USDA embarked on a national campaign to eradicate the disease. This was a wholly unprecedented and highly controversial effort, with state and federal agents inspecting nearly every cattle farm in the country, testing the animals, and condemning nearly 4 million reactors to slaughter without full compensation. **Olmstead** and **Rhode** analyze how the eradication program functioned, how incentives were aligned to insure widespread participation without excessive moral hazard problems, and why the United States led most European nations in controlling the disease. The U.S. campaign was a spectacular success. For the farm sector alone, the annual benefits ranged between five and twelve times the annual costs. This represented a small part of the story, because the most important benefit was reducing human death and suffering.

Electricity and information technology (IT) are perhaps the two most important general-purpose technologies (GPTs) to date. **Jovanovic** and **Rousseau** analyze how the U.S. economy reacted to them. The Electricity and IT eras are similar, but they also differ in important ways. Electrification was adopted more broadly, whereas IT seems to be technologically more revolutionary. The productivity slowdown is stronger in the IT era, but the ongoing spread of IT and its continuing precipitous price decline are reasons for optimism about growth in the coming decades.

Health Economics

The NBER's Program on Health Economics met in Cambridge on March 14. Program Director Michael Grossman organized the meeting, at which these papers were discussed:

David E. Bloom, NBER and Harvard University, and **David Canning and Jaypee Sevilla**, Harvard University, "Health, Worker Productivity, and Economic Growth"

Jay Bhattacharya, NBER and Stanford University, and **Darius Lakdawalla**, NBER and RAND, "Time-Consistency and Addiction: An Empirical Test"

Avi Dor, NBER and Case Western Reserve University, and **William Encinosa**, Agency for Health Care Research and Quality, "Cost-Sharing and Non-Compliance with Prescription Drugs"

Robert Kaestner, NBER and University of Illinois, Chicago; **Ted Joyce and Sanders Korenman**, NBER and Baruch College; and **Stanley Henshaw**, Alan Guttmacher Institute, "Changes in Births and Abortions Following Welfare Reform"

Nancy E. Reichman, Columbia University; **Hope Corman**, NBER and Rider University; and **Kelly Noonan**, Rider University, "Effects of Child Health on Parents' Relationship Status"

Anthony T. Lo Sasso, Northwestern University, and **Thomas C. Buchmueller**, NBER and University of California, Irvine, "The Effect of the State Children's Health Insurance Program on Health Insurance Coverage" (NBER Working Paper No. 9405)

Microeconomic analyses typically suggest that worker health makes an important contribution to productivity and wages. Weil (2001) uses estimates of the individual-level relationship between health and wages to calibrate an aggregate production function and suggests that differences in health are roughly as important as differences in education in explaining cross-country differences in gross domestic product per worker. **Bloom**, **Canning**, and **Sevilla** directly estimate the effect of health on worker productivity using cross-country macroeconomic data. They find a positive and significant effect. In addition, the estimated effect of health on aggregate output is consistent with the size of the effect found in microeconomic studies.

In the past, many economists have treated smokers and addicts as rational, time-consistent utility-maximizers. In recent years, that view has come under attack by those who argue that smokers and other addicts exhibit time-inconsistency and problems of self-control. This conflict is significant, but intractable, because these two theories have very similar positive implications but wildly different normative ones. However, while the positive implications are qualitatively similar, they differ quantitatively. **Bhattacharya** and **Lakdawalla** use this fact and ask which model better fits the actual lifetime decision making patterns of smokers. Using repeated cross-sectional data from the National Health Interview Surveys, they estimate structural models of rational addiction and time-inconsistency. Their results reveal surprisingly little evidence in favor of time-inconsistency.

Compliance with anti-diabetic medications is crucial to reducing complications such as blindness, amputations, heart disease, and stroke among diabetics. **Dor** and **Encinosa** examine compliance within 90 days after the completion of anti-diabetic drug prescriptions. About a third of the population never complies, a third always complies, and the remaining third partially complies. The authors find that the drug coinsurance rate has the effect of reducing compliance, after they control for chronic conditions, number of previous refills, and demographic characteristics. An increase from 20 percent to 75 percent coinsurance results in the share of those who never comply increasing by

27 percent and reduces the share of fully compliant persons by almost 11 percent. An increase in the copayment from $6 to $10 results in a 13 percent increase in the share of non-compliant persons, and a nearly 11 percent reduction in the share of fully compliant persons. This same increase in copayment would reduce annual drug costs nationally by $177 million, simply by increasing non-compliance. But, this increase in non-compliance also would increase the rate of diabetic complications, resulting in an additional $433.5 million in costs annually.

Joyce, **Kaestner**, **Korenman**, and **Heushaw** analyze the association between state and federal welfare reform and births and abortions. State reform consists of a series of waivers from rules governing the Aid to Families with Dependent Children (AFDC) prior to the Welfare Reform Act (PRWORA). The authors also examine the association between implementation of Temporary Assistance to Needy Families (TANF), the program that replaced AFDC following PRWORA, and births and abortions. They then look more closely at one aspect of reform, the family cap, and its association with reproductive choices. In order to carry out these analyses, they collected and analyzed individual abortion records from 21 states, the largest compilation of such data ever attempted. There is some evidence of an increase in abortion associated with TANF. Among blacks, abortions rise after TANF among older women, but there is no decline in births. There is also a rise in the abortion ratio among black women with two or more live births in states with family caps. Overall, there is at best only a modest change in births and abortions associated with TANF.

Reichman, **Corman**, and **Noonan** use data from the national longitudinal Fragile Families and Child Wellbeing Study of mostly unwed parents to estimate how poor child health affects one potential human resource available to that child: the presence of a father. The authors look at whether parents are living in the same household one year after the child's birth and also, more generally, at how their relationships changed along a continuum (married, cohabiting, romantically involved, friends, or not involved) during the same one-year period. Since it may not be easy to characterize poor child health as a random event, the authors account for the potential endogeneity of child health in their models. They find that having an infant in poor health reduces the likelihood that parents will live together and increases the likelihood that they will become less committed to their relationship.

LoSasso and **Buchmueller** present the first national estimates of the effects of the SCHIP expansions on insurance coverage. Using CPS data on insurance coverage during the years 1996 through 2000, they find that SCHIP had a small, but statistically significant positive effect on insurance coverage. Between 4 percent and 10 percent of children who meet income eligibility standards for the new program gained public insurance. These estimates indicate that states were more successful in enrolling children in SCHIP than they were with prior Medicaid expansions focused on children just above the poverty line. Crowd-out of private health insurance was in line with estimates for the Medicaid expansions of the early 1990s, between 18 percent and 50 percent.

Productivity Program Meeting

The NBER's Program on Productivity met in Cambridge on March 14. Shane Greenstein, NBER and Northwestern University, organized the meeting. These papers were discussed:

Barbara K. Atrostic and **Sang Nguyen**, Center for Economic Studies, "IT and Productivity in IT-Using and IT-Producing Industries: New Micro Data Evidence"
Discussant: Christopher Forman, Carnegie-Mellon University

James Bessen, Research on Innovation, "Technology Adoption Costs and Productivity Growth: The Transition to Information Technology"
Discussant: Shane Greenstein

Dan Elfenbein, Harvard University, and **Josh Lerner**, NBER and Harvard University, "Designing Alliance Contracts: Exclusivity and Contingencies in Internet Portal Alliances"
Discussant: Iain Cockburn, NBER and Boston University

Kenneth Flamm, University of Texas, Austin, "Moore's Law and the Economics of Semiconductor Price Trends"
Discussant: Rebecca Henderson, NBER and MIT

Minjae Song, Harvard University, "Measuring Consumer Welfare in the CPU Market"

Sean M. Dougherty, **Robert H. McGuckin**, and **Bart Van Ark**, The Conference Board, "Internationalization and the Changing Structure of Business R&D: Recent Trends and Measurement Implications"

Atrostic and **Nguyen** use new plant-level data on information technology (IT) collected by the U.S. Census Bureau to provide evidence on the labor productivity impact of IT across U.S. manufacturing plants in IT-producing and IT-using industries (defined under the North American Industrial Classification System). Previous plant-level studies examining the link between productivity and computers or other IT in the United States typically focused on the presence of computers, either using data on the stock of computer capital or on current IT or computer investment as proxies for the computer stock. Studies that have detailed information on IT generally have a relatively small sample, do not include smaller plants, or are limited to specific manufacturing industries. The data for this study, in contrast, are collected from about 30,000 plants across the U.S. manufacturing sector. The authors use a direct measure of IT: information on the presence of computer networks. They find that computer networks have a positive and significant effect on labor productivity after they control for other important factors, such as capital intensity and other plant characteristics, and even after taking account of possible endogeneity of the computer network variable. Also, small plants appear to use computer networks more efficiently than large plants.

Using two panels of U.S. manufacturing industries, **Bessen** estimates capital adjustment costs from 1961 to 1996. He finds that adjustment costs rose sharply from 1974-83: they more than doubled, from about 3 percent of output to around 7 percent. Moreover, this increase is specifically associated with a shift to investment in IT. But such large adoption costs imply that the Solow residual mismeasures productivity growth: adoption costs are resource costs that represent an unmeasured investment. Bessen finds that when this investment is included, productivity grew about 0.5 percent per year faster than official measures during the 1970s and early 1980s, reducing the size of the productivity "slowdown." Indeed, estimated productivity growth rates were roughly the same from 1974-88 as from 1949-73. Thus technology transitions critically affect productivity growth measurement.

Elfenbein and **Lerner** test theoretical propositions from the technology licensing literature and from the literature on information and control in alliances, using a sample of over 100 Internet portal alliance contracts. The technology licensing literature suggests that one of the major factors driving firms' decisions to transact exclusively for an innovation is the magnitude or importance of the innovation. The authors find some support for this hypothesis, but in this setting exclusivity decisions also relate to other factors. The literature on information and control in alliances suggests that the use of verifiable performance measures to allocate state contingent decision rights depends on the level of information asymmetry between the two parties and on the precision of the information. The authors test these propositions by looking at how the timing of agreements (a proxy for environmental uncertainty) and exclusivity restrictions (a proxy for incentive conflict) affect the use of a subset of available performance measures. Consistent with the literature, they find that contracts involve fewer contingencies as industries have matured. Where incentive conflicts are potentially greater, more contingencies are used.

Flamm starts by describing the history of Moore's Law, and explains why it has such potentially wide-ranging consequences. He then shows how a Moore's Law prediction must be coupled with other assumptions in order to produce an economically meaningful link to what is the key economic variable of the information age: the cost or price of electronic functionality, as implemented in a semiconductor integrated circuit. Flamm then relates the historical evolution of semiconductor prices through the mid-1990s

to developments in several key parameters over this historical period. He surveys the evidence on acceleration in the rate of decline in leading edge semiconductor prices in the mid-1990s and suggests that measured increases in historical rates of decline seem unlikely to persist. Finally, he explores the nature of the man-made historical and institutional economic processes that made these technical accomplishments possible, and argues that their consequence has been an unappreciated but radical transformation of the industrial framework in which R and D is undertaken within the global semiconductor industry.

The personal computer Central Processing Unit (CPU) has undergone a dramatic improvement in quality, accompanied by an equally remarkable drop in prices in the 1990s. How have these developments in the CPU market affected consumer welfare? **Song** estimates demand for CPUs and measures consumer welfare. The welfare calculations show that consumer surplus makes up approximately 90 percent of the total social surplus and that a large part of the welfare gains comes from the introduction of new products. Simulation results show how "quality competition" among firms can generate a large gap between the reservation and actual prices.

Dougherty, **Inklaar**, **McGuckin**, and **Van Ark** examine the structure of R and D internationally using information collected in interviews of 25 multinational companies in four high-tech industries from the United States, European Union, and Japan. They look at the composition of R and D activities within the firm, how they are structured internationally, and how they are changing. The focus is on how the production of research and development differ, based on the relative uncertainty of research output as compared to development. The economic distinctions between research and development have broad implications for how companies allocate their resources, and they help to explain recent trends, including research becoming more concentrated in the United States and the development of commercial products more dispersed worldwide. The authors examine changes in international R and D costs using new purchasing power estimates for R and D and compare these to changes in the trends of R and D investments internationally from 1987 to 1997.

International Finance and Macroeconomics

The NBER's Program on International Finance and Macroeconomics met in Cambridge on March 21. Richard Lyons, NBER and University of California, Berkeley, and Andres Velasco, NBER and Harvard University, organized this program:

Andrew Atkeson, University of California, Los Angeles, and **Patrick Kehoe**, NBER and University of Minneapolis, "On the Benefits to Transparency in a Monetary Policy Instrument"
Discussant: Jon Faust, Federal Reserve Board

Aaron Tornell, NBER and University of California, Los Angeles, and **Frank Westermann**, University of Munich, "The Credit Channel in Middle Income Countries"
Discussant: Fernando Broner, University of Maryland

Cedric Tille, Federal Reserve Bank of New York, "How Valuable is Exchange Rate Flexibility? Optimal Monetary Policy under Sectoral Shocks?"
Discussant: Charles Engel, NBER and University of Wisconsin

Kathryn M.E. Dominguez and **Linda L. Tesar**, NBER and University of Michigan; and **Sebastian Auguste** and **Herman Kamil**, University of Michigan, "Cross-Border Trading as a Mechanism for Capital Flight: ADRs, CEDEARS and the Argentine Crisis"
Discussant: Sergio Schmukler, The World Bank

Mark Aguiar and **Gita Gopinath**, University of Chicago, "Fire-Sale FDI and Liquidity Crises"
Discussant: Bernard Dumas, NBER and INSEAD

Helene Rey, NBER and Princeton University; and **Jean Imbs**, **Haroon Mumtaz**, and **Morten Ravn**, London School of Business, "PPP Strikes Back: Aggregation and the Real Exchange Rate" (NBER Working Paper No. 9372)
Discussant: Shang-Jin Wei, NBER and Harvard University

Monetary instruments differ in their transparency — how easy it is for the public to monitor the instrument — and their tightness — how closely linked they are to inflation. Tightness is always desirable in a monetary policy instrument. **Atkeson** and **Kehoe** show that transparency is desirable when there is a credibility problem, in that the government cannot commit to its policy. They illustrate their argument by considering a classic question in international economics: is the exchange rate or the money growth rate the better instrument of monetary policy? Their analysis suggests that the greater transparency of exchange rates means that if both instruments are equally tight, the exchange rate is preferred.

With inflation under control in many middle income countries (MICs), swings in credit, investment, and asset prices now have the most effect on these

countries. **Tornell** and **Westermann** present a framework for analyzing how credit market shocks are propagated and amplified in MICs. In their model the strength of the credit channel derives from two key characteristics of MICs: a sharp asymmetry across the tradables (T) sector and the more bank-dependent nontradables (N) sector; and a significant degree of currency mismatch in the N-sector. This makes movements in the real exchange rate the driving element in the amplification of shocks. Using quarterly data for a group of MICs, the authors find evidence for a strong credit channel, for a balance sheet effect, and for asymmetric sectorial responses. Their findings indicate that inflation targeting is not sufficient to guarantee economic stability, because such a policy might overlook the development of lending booms and associated sectorial asymmetries.

Tille explores the optimal monetary policy reaction to productivity shocks in an open economy. Earlier studies assumed that countries specialize in producing particular goods, but he enriches the analysis by allowing for incomplete specialization. He confirms the finding of Obstfeld and Rogoff (2000) — who build on Friedman (1953) — that a flexible exchange rate is highly valuable in delivering the optimal response to country-specific shocks. However, its value is much smaller when shocks are sector-specific, because exchange rate fluctuations then lead to misallocations between different firms within a sector. The limitation on the value of flexibility is sizable even when specialization is high.

Auguste, **Dominguez**, **Kamil**, and **Tesar** examine the surprising performance of the Argentine stock market in the midst of the country's most recent financial crisis as well as the role of cross-listed stocks in Argentine capital flight. Although Argentine investors were subject to capital controls, they were able to purchase cross-listed stocks for pesos in Argentina, convert them into dollar-denominated shares, re-sell them in New York, and deposit the dollar proceeds in U.S. bank accounts. The authors show that: 1) ADR discounts went as high as 45 percent (indicating that Argentine investors were willing to pay significant amounts in order to legally move their funds abroad); 2) the implicit peso-dollar exchange rate on the eve of the devaluation anticipated a 42 percent fall in the value of the peso relative to the dollar; 3) local market factors in Argentina became more important in pricing peso denominated stocks with associated ADRs, while the same stocks in New York were mainly priced based on global factors; and 4) capital outflow using the ADR and CEDEAR markets was substantial (their estimate for ADRs is between $835 million and $3.4 billion).

Aguiar and **Gopinath** use a firm-level dataset to show that foreign acquisitions *increased* by 91 percent in East Asia between 1996 and 1998, while intra-national merger activity declined. Firm liquidity plays a significant and sizeable role in explaining both the increase in foreign acquisitions and the decline in the price of acquisitions during the crisis. This contrasts with the role of liquidity in non-crisis years and in non-crisis economies in the region. This effect is also most prominent in the tradable sector. Quantitatively, the observed decline in liquidity can explain 25 percent of the increase in foreign acquisition activity in the tradable sectors. The nature of M and A activity supports liquidity-based explanations of the East Asian crisis and provides an explanation for the puzzling stability of FDI inflows during the crises.

Imbs, **Mumtaz**, **Ravn**, and **Rey** show the importance of a dynamic aggregation bias in accounting for the Purchasing Power Parity (PPP) puzzle. They prove that established time series and panel methods substantially exaggerate the persistence of real exchange rates because of heterogeneity in the dynamics of disaggregated relative prices. When heterogeneity is properly taken into account, estimates of the real exchange rate half-life fall dramatically, to little more than one year, or significantly below Rogoff's "consensus view" of three to five years. The authors show that corrected estimates are consistent with plausible nominal rigidities, thus, arguably, solving the PPP puzzle.

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International Trade and Investment

The NBER's Program on International Trade and Investment met in Cambridge on March 28 and 29. Program Director Robert C. Feenstra, NBER and University of California, Davis, organized this program:

Andrew K. Rose, NBER and University of California, Berkeley, "Do We Really Know that the WTO Increases Trade?"

Bruce A. Blonigen, NBER and University of Oregon, "Evolving Discretionary Practices of U.S. Antidumping Activity"

Andrew B. Bernard, NBER and Dartmouth College; **J. Brandford Jensen**, Institute for International Economics; and **Peter K. Schott**, NBER and Yale University, "Falling Trade Costs, Heterogeneous Firms, and Industry Dynamics"

Wolfgang Keller, NBER and University of Texas, Austin, and **Stephen R. Yeaple**, University of Pennsylvania, "Multinational Enterprises, International Trade, and Productivity Growth: Firm-Level Evidence from the United States" (NBER Working Paper No. 9504)

Joshua Aizenman, NBER and University of California, Santa Cruz, and **Mark M. Spiegel**, Federal Reserve Bank of San Francisco, "Institutional Efficiency, Monitoring Costs, and the Investment Share of FDI"

Donald R. Davis and **David Weinstein**, NBER and Columbia University, "A Search for Multiple Equilibria in Urban Industrial Structure"

Pinelopi K. Goldberg, NBER and Yale University, and **Nina Pavcnik**, NBER and Dartmouth College, "The Responses of the Informal Sector to Trade Liberalization" (NBER Working Paper No. 9443)

Rose estimates the effect on international trade of multilateral trade agreements: the World Trade Organization (WTO); its predecessor, the Generalized Agreement on Tariffs and Trade (GATT); and the Generalized System of Preferences (GSP) extended from rich countries to developing countries. He uses a standard "gravity"model of bilateral merchandise trade and a large panel data set covering over 50 years and 175 countries. An extensive search reveals little evidence that countries joining or belonging to the GATT/WTO have different trade patterns from outsiders. The GSP does seem to have a strong effect, and is associated with an approximate doubling of trade.

Previous literature has discussed the procedural biases that exist in U.S. Department of Commerce (USDOC) calculations of dumping margins. **Blonigen** examines the evolution of discretionary practices and their role in the rapid increase in average USDOC dumping margins since 1980. He finds that USDOC discretionary practices, including use of "facts available" and cost of production tests, have played a major role in rising dumping margins, with little evidence that changes in U.S. antidumping law or composition of investigated products and countries have had much effect. Importantly, the evolving effect of discretionary practices is attributable not only to increasing use of these practices over time, but also to apparent changes in implementation of these practices which signal a higher increase in the dumping margin whenever they are applied.

Bernard, **Jensen**, and **Schott** examine the response of industries and firms to changes in trade costs. They test the predictions of recent equilibrium models of international trade with heterogeneous firms. Using disaggregated U.S. import data, the authors create a new measure of trade costs over time and industries. As the models predict, productivity growth is faster in industries with falling trade costs. The authors also find evidence supporting the major hypotheses of the heterogeneous firm models. Firms in industries with falling (relative) trade costs are more likely to die or become exporters. Existing exporters increase their shipments abroad. The results are strongest for industries most likely to be producing horizontally differentiated tradeable goods.

Keller and **Yeaple** estimate international technology spillovers to U.S. manufacturing firms via imports and foreign direct investment (FDI) between 1987 and 1996. In contrast to earlier work, their results suggest that FDI leads to significant productivity gains for domestic firms. The size of FDI spillovers is economically important, accounting for about 14 percent of productivity growth in U.S. firms between 1987 and 1996. In addition, there is some evidence of imports-related spillovers, but it is weaker than for FDI. The authors also give a detailed account of why their study leads to different results from those found in previous work. Their analysis indicates that their results are likely to generalize to other countries and periods.

Aizenman and **Spiegel** study the implications of institutional efficiency on the pattern of foreign direct investment (FDI). They posit that domestic agents have a comparative advantage over foreign agents in overcoming some of the obstacles associated with corruption and weak institutions. They model these circumstances in a principal-agent framework with costly ex-post monitoring and enforcement of an ex-ante labor contract. Ex-post monitoring and enforcement costs are assumed to be lower for domestic entrepreneurs than for foreign ones, but foreign producers enjoy a countervailing productivity advantage. Under these asymmetries, multinationals pay higher wages than domestic producers, in line with the insight of efficiency wages and with the evidence about the "multinationals wage premium." FDI

also is more sensitive to increases in enforcement costs. The authors compare institutional efficiency levels for a large cross section of countries in 1989 to subsequent FDI flows from 1990 to 1999. They find that institutional efficiency is associated positively with the ratio of subsequent FDI flows to gross fixed capital formation and to private investment. This is true for both simple cross-sections and for cross-sections weighted by country size.

In the context of the Allied bombing of Japanese cities and industries in WWII, **Davis** and **Weinstein** develop a new empirical test for multiple equilibriums and then apply it to data for 114 Japanese cities in eight manufacturing industries. The data reject the existence of multiple equilibriums. In the aftermath of even gargantuan shocks, a city typically recovers not only its population and its share of aggregate manufacturing, but even the specific industries it had before.

Goldberg and **Pavcnik** study the relationship between trade liberalization and informality. It is often claimed that increased foreign competition in developing countries leads to an expansion of the informal sector, defined as the sector that does not comply with labor market legislation. Using data from two countries that experienced large trade barrier reductions in the 1980s and 1990s, Brazil and Colombia, the authors examine the response of the informal sector to liberalization. They find no evidence of a relationship between trade policy and informality in Brazil. In Colombia, though, there is evidence of such a relationship, but only for the period preceding a major labor market reform which increased the flexibility of the labor market. These results point to the significance of labor market institutions in assessing the effects of trade policy on the labor market.

Program on Children

The NBER's Program on Children, directed by Jonathan Gruber of MIT, met in Cambridge on April 3. Members and guests discussed these papers:

Anna Aizer, Princeton University, "Got Health? Advertising, Medicaid, and Child Health"

Karen Norberg, NBER, "Dads and Cads: Parental Cohabitation and the Human Sex Ratio at Birth"

Douglas Almond, NBER, and **Kenneth Chay**, NBER and University of California, Berkeley, "The Long-Run and Intergenerational Impact of Poor Infant Health: Evidence from Cohorts Born During the Civil Rights Era"

David Figlio, NBER and University of Florida, "Testing, Crime, and Punishment"

Thomas S. Dee, NBER and Swarthmore College, "Are There Civic Returns to Education?"

Abhijit Banerjee, **Shawn Cole**, and **Leigh Linden**, MIT; and **Esther Duflo**, NBER and MIT, "Improving the Quality of Education in India: Evidence from Three Randomized Experiments"

Of the ten million uninsured children in 1996, nearly half were eligible for the public health insurance program, Medicaid, but not enrolled. Little is known about the reasons low-income families fail to use public programs or the consequences of failing to use them. Using detailed information on Medicaid outreach, enrollment, and hospitalization rates in California, **Aizer** finds that information and administrative costs are significant deterrents to program take-up. Controlling for selection into Medicaid, enrolling children early in Medicaid leads to a more efficient allocation of health care resources by promoting primary ambulatory care over more expensive hospital-based care resulting in fewer avoidable hospitalizations, she finds.

Modern theory on sex allocation predicts that parents may be able to vary the sex of their offspring according to the prospects for two-parent care. Using data pooled from four publicly available longitudinal studies, **Norberg** finds that parents who were living with an opposite-sex spouse or partner before the child's conception or birth were significantly more likely to have a male child than parents who were living apart. This effect is observable even when the comparisons are made between siblings, and even when those comparisons are made before the children's conceptions. This "partnership status effect" may be the result of modern reproductive exposures, but a paternal investment effect would fit closely with the predictions of adaptive sex allocation theory.

Almond and **Chay** use the substantial improvements in health among the cohorts of black infants born during the 1960s to estimate the long-run effects of early life health conditions. The microdata contained in the annual Natality Detail files provides information on the demographic and socioeconomic characteristics and health risk factors of mothers giving birth, as well as the health outcomes of the infant. These data can be linked to the infant health conditions that prevailed in the state and year in which the mother was born. The evidence suggests a strong link between infant health and both adult health and infant health of the subsequent generation. For example, the dramatic improvements in health among black infants born in Mississippi during the 1960s are mirrored by improved health among black women born in Mississippi during the 1960s who gave birth during the 1980s

and 1990s. A black adult female born after 1964 has lower rates of diabetes and other risk factors and is less likely to give birth to a low birth weight infant than a black woman born before 1964. This pattern does not hold for white, Mississippi-born women, who experienced much smaller infant health improvements during the Civil Rights Era. The authors find similar associations in other states that were affected by the social programs of the 1960s.

Figlio shows that schools respond to high-stakes testing by selectively disciplining their students. Schools have an incentive to keep high-performing students in school and low-performing students out of school during the testing window in order to maximize aggregate test scores. The evidence supports this hypothesis — these patterns are precisely what are observed in the data, **but only for students in grades that are tested with high stakes for the school**. Since students suspended during the testing window are significantly more likely to miss the examination, this result suggests that schools may be deliberately attempting to reshape the testing pool in response to high-stakes testing. On the other hand, schools have an incentive to keep marginal students in school during the pre-testing preparation period, and have less of an incentive to keep very high or very low-performing students in school during this so-called "cram" period. Again, this pattern is observed in the data. Taken together, these results indicate that schools may be using student discipline as a tool to manipulate aggregate test scores.

The hypothesized effects of educational attainment on adult civic engagement and attitudes provide some of the most important justifications for government intervention in the market for education. In this study, **Dee** presents evidence on whether these externalities exist. He assesses and implements two strategies for identifying the effects of educational attainment. One is based on the availability of junior and community colleges; the other on changes in teen exposure to child labor laws. The results suggest that educational attainment has large and statistically significant effects on subsequent voter participation and support for free speech. Dee also finds that additional schooling appears to increase the quality of civic knowledge as measured by the frequency of newspaper readership.

Banerjee, **Cole**, **Duflo,** and **Linden** present the results of a two-year randomized evaluation of a large-scale remedial education program, conducted in Mumbai and Vadodara, India, along with the preliminary results of a randomized evaluation of a computer-assisted learning program in Vadodara. The remedial education program hires young women from the community to teach basic literacy and numeracy to children who reach "standard three or four" without having mastered these competencies. The program, implemented by a non-governmental organization in collaboration with the government, is extremely cheap (it cost 5 dollars per child per year) and is easily replicable: it is now implemented in 20 Indian cities, and reaches tens of thousands of children. The authors find the program to be very effective: on average, it increased learning by 0.15 standard deviations in the first year, and 0.39 in the second year. The gains are the largest for children at the bottom of the distribution: children in the bottom third gain 0.18 standard deviations in the first year, and 0.59 in the second year. The results are very similar in the two standards, and in the two cities. At the margin, extending this program would be 4.5 to 6 times more cost effective than hiring new teachers. The preliminary results of the computer assisted learning program, which is planned to be widely implemented in India, are less impressive: on average, the program increases test scores by an insignificant 0.10 standard deviations. The effect is higher (and significant) in schools where the remedial education program is also present. On the basis of these estimates, extending the computer assisted learning program would appear less cost effective than hiring new teachers.

Public Economics

The NBER's Program on Public Economics met in Cambridge on April 10 and 11. Program Director James M. Poterba, NBER and MIT, organized the meeting. These papers were discussed:

Brian G. Knight, NBER and Brown University, "Parochial Interests and the Centralized Provision of Local Public Goods: Evidence from Congressional Voting on Transportation Projects"
Discussants: Robert P. Inman, NBER and University of Pennsylvania

Stephen Coate, NBER and Cornell University, "Pareto Improving Campaign Finance Policy"
Discussant: Marco Battaglini, Princeton University

Jeffrey R. Brown, NBER and University of Illinois, and **Amy Finkelstein**, NBER and Harvard University, "Why is the Market for Private Long-Term Care Insurance So Small? The Roll of Pricing and Medicaid Crowd-Out"
Discussant: David M. Cutler, NBER and Harvard University

Julie Berry Cullen, NBER and University of Michigan, and **Roger H. Gordon**, NBER and University of California, San Diego, "Taxes and Entrepreneurial Activity: Theory and Evidence for the U.S." (NBER Working Paper No. 9015)
Discussant: Austan Goolsbee, NBER and University of Chicago

Jagadeesh Gokhale, Federal Reserve Bank of Cleveland; **Laurence J. Kotlikoff**, NBER and Boston University; and **Alexi Sluchynsky**, ESPlanner, "Does it Pay to Work?"
Discussant: Robert A. Moffitt, NBER and Johns Hopkins University

Jonathan Gruber, NBER and MIT, "Pay or Pray: The Impact of Charitable Subsidies on Religious Participation"
Discussant: Laurence Iannaccone, George Mason University

Local public goods financed from a national tax base provide concentrated benefits to recipient jurisdictions but dispersed costs, creating incentives for legislators to increase own-district spending but to restrain aggregate spending because of the associated tax costs. Theoretically, therefore, one would predict inefficiencies in the allocation of public goods, but there is little direct evidence that individual legislators respond to these incentives. **Knight** analyzes 1998 Congressional votes on transportation project funding. He shows that legislators respond to common pool incentives: the probability of supporting the projects increases with own-district spending and decreases with the tax burden associated with aggregate spending. Having found that legislators do respond to such incentives, Knight calculates the efficient level of public goods. The results suggest over-spending in the aggregate, especially in politically powerful districts, and a large associated deadweight loss.

Coate argues that campaign finance policy, in the form of contribution limits and matching public financing, can be Pareto-improving even under the most optimistic assumptions concerning the role of campaign advertising and the rationality of voters. The argument assumes that candidates use campaign contributions to convey truthful information to voters about their qualifications for office and that voters update their beliefs rationally on the basis of the information they have seen. It also assumes that campaign contributions are provided by interest groups and that candidates can offer to provide policy favors for their interest groups to attract higher contributions.

Long-term care represents one of the largest uninsured financial risks facing the elderly in the United States, and yet we have virtually no evidence to help explain the extremely limited nature of the private market for long-term care insurance. **Brown** and **Finkelstein** develop two complementary analytical tools to begin filling this void: a framework for assessing the "money's worth" of private long-term care insurance policies and a model of the insurance value of a long-term care insurance contract for a risk averse, life-cycle consumer. Using state-of-the-art actuarial data on long-term care utilization probabilities and comprehensive market data on insurance policy characteristics and premiums, they find that private long-term care insurance contracts are priced lower than is actuarially fair for women and higher for men. For a policy that covers all types of paid care, a 65-year old male can expect to receive 57 to 73 cents in present discounted value of benefits for every dollar paid in expected present value of premiums; by contrast, a 65-year old woman can expect to receive about $1.12 to $1.42 in benefits for every dollar paid in premiums. These results suggest that, given existing market prices and the presence of Medicaid as a payer-of-last-resort, private long-term care insurance is not valued by individuals throughout substantial portions of the wealth distribution. The very presence of Medicaid crowds out the purchase of private insurance for well over half of households, and significantly reduces the value of private insurance for the rest. In addition, marginal decreases in the "quality" of Medicaid-financed relative to privately-financed care substantially increase the value of private long-term care insurance. By contrast, even substantial reductions in premiums — such as those that might be achieved by the new federal tax subsidies for long-term care insurance — would be insufficient to make long-term care insurance attractive to the median individual.

Entrepreneurial activity is presumed to generate important spillovers, potentially justifying tax subsidies.

How does the tax law affect individual incentives? How much of an impact has it had in practice? **Cullen** and **Gordon** first show theoretically that taxes can affect the incentives to be an entrepreneur simply because of differences in tax rates on business versus wage and salary income; differences in the tax treatment of losses versus profits through a progressive rate structure and through the option to incorporate; and risk-sharing with the government. They then provide empirical evidence — using U.S. individual tax return data — that these aspects of the tax law have had large effects on actual behavior.

Gokhale, **Kotlikoff**, and **Sluchynsky** use *ESPlanner*, a financial planning software program, to study the net work tax levied on workers with different earnings capacities. The authors focus on lifetime average and marginal net work tax rates, which are measured by comparing the present values of lifetime spending from working through retirement, both in the presence and in the absence of all tax-transfer programs. They report eight findings: 1) The fiscal system is highly progressive; couples working full time and earning the minimum wage receive 32 cents in benefits, net of taxes, for every dollar they earn. In contrast, households with million dollar salaries pay 51 cents in taxes, net of benefits, per dollar earned. 2) Net subsidies are provided only at the very bottom end of the income distribution. Average net work tax rates of couples earning 1.5 times the minimum wage ($32,100 per year) are 14 percent. For working couples earning 5 times the minimum wage ($107,000), the net tax rate is 38 percent. 3) While the poor face negative average taxes, like the middle class and the rich, they face positive marginal net taxes on working that exceed 50 percent. Moreover, certain low- and moderate-income households face substantially higher marginal net work tax rates than those faced by the rich. 4) Low-wage workers face confiscatory tax rates on switching from part-time to full-time work. 5) The same is true of secondary earning spouses in low-wage households. 6) The marginal net tax on working is particularly high for young households with low incomes. 7) Average and marginal net work tax rates are relatively insensitive to the assumed rate of real wage growth and the discount rate. 8) Major tax reforms, such as switching from income to consumption taxation, can have a significant effect on the fiscal system's overall progressivity.

The economic argument for subsidizing charitable giving relies on the positive externalities of charitable activities, particularly from the religious institutions that are the largest recipients of giving. But the net external effects of subsidies to religious giving will depend also on their potentially important indirect effect on religious participation. Religious participation can be a complement to, or a substitute for, the level of charitable giving. Understanding these spillover effects of charitable giving may be quite important, given the existing observational literature suggesting that religiosity is a major determinant of well-being among Americans. In his paper, **Gruber** investigates the impact of charitable subsidies on religious participation by using data over three decades from the General Social Survey; he also confirms the impact of such subsidies on religious giving using the Consumer Expenditure Survey. He finds strong evidence that religious giving and religious participation are substitutes: larger subsidies to charitable giving lead to more religious giving, but less religious attendance, with an implied elasticity of attendance with respect to religious giving of –0.92. These results have important implications for the debate over charitable subsidies. They also serve to validate economic models of religious participation.

Asset Pricing

The NBER's Program on Asset Pricing met in Chicago on April 11. Program Director John H. Cochrane and Lubos Pastor, both of NBER and University of Chicago, organized the meeting. These papers were discussed:

Antonios Sangvinatsos, New York University, and **Jessica Wachter**, NBER and New York University, "Does the Failure of the Expectations Hypothesis Matter for Long-Term Investors?"
Discussant: Kenneth J. Singleton, NBER and Stanford University

Jun Pan, MIT, and **Allen M. Poteshman**, University of Illinois, "The Information in Option Volume for Stock Prices"
Discussant: Michael W. Brandt, NBER and University of Pennsylvania

Robert F. Stambaugh, NBER and University of Pennsylvania, "Inference About Survivors"
Discussant: Christopher Jones, University of Southern California

Maria Vassalou and **Yuhang Xing**, Columbia University, "Default Risk in Equity Returns"
Discussant: Ravi Jagannathan, NBER and Northwestern University

Robert F. Dittmar and **Christian T. Lundblad**, Indiana University, and **Ravi Bansal**, Duke University, "Interpreting Risk Premia Across Size, Value and Industry Portfolios"
Discussant: Lars P. Hansen, NBER and University of Chicago

Owen A. Lamont, NBER and University of Chicago, "Go Down Fighting: Short Sellers vs. Firms"
Discussant: William N. Goetzmann, NBER and Yale University

Sangvinatsos and **Wachter** consider the consumption and portfolio choice problem of a long-run investor who has access to nominal bonds and a stock portfolio. In the presence of unhedgeable inflation risk, there are multiple pricing kernels that produce the same bond prices, but a unique pricing kernel that equals the marginal utility of the investor. The authors extend their model to account for time-varying expected inflation and estimate it with data on inflation and term structure. The estimates imply that the bond portfolio for the long-run investor looks very different from the portfolio of a mean-variance optimizer. In particular, the desire to hedge changes in term premiums generates large hedging demands for long-term bonds.

Pan and **Poteshman** find strong evidence of information transmission from the options market to underlying stock prices. Taking advantage of a unique dataset from the Chicago Board of Options Exchange, the authors construct put-to-call volume ratios for underlying stocks, using only volume initiated by buyers to open new option positions. Performing daily cross-sectional analyses from 1990 to 2001, they find that buying stocks with low put/call ratios and selling stocks with high put/call ratios generates an expected return of 40 basis points per day and 1 percent per week. This result occurs during each year of the sample period, and is not affected by the exclusion of earnings announcement windows. Moreover, the result is stronger for smaller stocks, indicating that the options market may be a more important avenue for information transmission for stocks with less efficient information flow. This analysis also sheds light on the type of investors behind the informed option trading. Specifically, option trading from customers of full service brokers provides the strongest predictability. The authors further show that while public customers on average trade in the options market as contrarians — buying fresh new puts on stocks that have done well and calls on stocks that have done poorly — firm proprietary traders exhibit the opposite behavior. Finally, in contrast to the equity options market, there is no evidence in the index options market of informed trading.

Stambaugh explores the problem of making inferences about an asset that has passed a survival test failed by other assets with lower realized returns. The more commonality there is across assets in one's prior uncertainty about unknown parameters, the greater is the extent to which inferences about an asset's expected return (or its alpha) are affected by its having survived. In the absence of commonality, a sample average can possess substantial survival bias but can still equal the appropriate inference about an asset's expected return. Various forms of commonality in returns across assets also play key roles. Conditioning on survival usually lowers, but sometimes can raise, a surviving asset's inferred alpha. Survival bias, as typically computed, generally gives too severe an adjustment for survival unless one assumes that expected returns on all assets, dead and alive, are equal to a common value that is completely unknown.

Vassalou and **Xing** use Merton's (1974) option pricing model to compute default measures for individual firms and to assess the effect of default risk on equity returns. The size effect is a default effect, and this is also largely true for the book-to-market (BM) effect. Both exist only in segments of the market with high default risk. Default risk is systematic risk. The Fama-French (FF) factors contain some default-related information, but this is not the main reason that the FF model can explain the cross-section of equity returns.

Bansal, **Dittmar**, and **Lundblad** model dividend and consumption growth rates as a vector-autoregression (VAR), from which they measure the long-run response of dividend growth rates to consumption shocks. They find that this long-run cash flow beta can justify well over 50 percent of the difference in risk premiums across size, book-to-market, and industry sorted portfolios. Interestingly, the long-run

cash flow betas explain about half of the dispersion in the standard Capital Asset Pricing Mode- based portfolio betas for these assets. The authors' model highlights the reasons for the failure of the market beta to justify the cross-section of risk premiums. The market beta itself is a weighted combination of cash flow betas and additional priced sources of risk. Each risk source's beta may be significant; however, a weighted combination of the betas may not be significant in explaining the cross-section of risk premiums, as each source of risk carries a distinct price. The results indicate that the size, book-to-market, and industry spreads are not puzzling from the perspective of economic models.

Lamont studies battles between short sellers and firms. Firms use a variety of means to impede short selling, including explicit or implicit legal threats, investigations, lawsuits, and various technical actions intended to create a short squeeze. Firms that take these actions create short-sale constraints. Consistent with the hypothesis that short-sale constraints allow stocks to be overpriced, firms taking anti-shorting actions in the next year have very low abnormal returns of about negative 2 percent per month.

Corporate Finance

The NBER's Program on Corporate Finance met in Chicago on April 11. Program Director Raghuram Rajan and Per Strömberg, both of NBER and University of Chicago, organized this program:

Ulf Axelson, University of Chicago, "Security Design with Investor Private Information"
Discussant: Philip Bond, Northwestern University

Evan Gatev and **Philip E. Strahan**, Boston College, "Banks' Advantage in Hedging Liquidity Risk: Theory and Evidence from the Commercial Paper Market"
Discussant: Jeremy C. Stein, NBER and Harvard University

Steven N. Kaplan, NBER and University of Chicago, and Antoinette Schoar, NBER and MIT, "Private Equity Returns: Persistence and Capital Flows"
Discussant: Alexander Ljunqvist, New York University

Atif Mian, University of Chicago, "Incentives, Supervision, and Organizational Hierarchy: A Loan-Level Investigation of Banking"
Discussant: Paola Sapienza, Northwestern University

Rafael La Porta and **Andrei Shleifer**, NBER and Harvard University, and **Florencio Lopez-de-Silanes**, NBER and Yale University, "What Works in Securities Laws?"
Discussant: Doug Baird, University of Chicago

Roman Inderst, London School of Economics, and **Holger M. Müller**, New York University, "The Effect of Capital Market Characteristics on the Value of Start-Up Firms"
Discussant: Stewart C. Myers, NBER and MIT

Marianne P. Bitler, RAND Corporation; **Tobias J. Moskowitz**, NBER and University of Chicago; and **Annette Vissing-Jorgensen**, NBER and Northwestern University, "Why Do Entrepreneurs Hold Large Ownership Shares? Testing Agency Theory Using Entrepreneur Effort and Wealth"
Discussant: Dirk Jenter, MIT

Axelson argues that an important friction in the issuance of financial securities is the fact that potential investors may be privately informed about the value of the underlying assets. He shows how security design can help to overcome this friction. In the single asset case, debt is often an optimal security when the number of potential investors is small, but equity becomes optimal as the degree of competition increases. In the multiple asset case, debt backed by a pool of assets is optimal if the number of assets is large relative to the degree of competition, but equity backed by individual assets is optimal when the number of assets is small relative to the degree of competition. Axelson uses the theory to interpret security design choices in financial markets.

Gatev and **Strahan** argue that banks have a unique ability to hedge against market-wide liquidity shocks. Deposit inflows provide a hedge for loan demand shocks that follow declines in market liquidity. Consequently, one dimension of bank "specialness" is that banks can insure firms against systematic declines in market liquidity at lower cost than other financial institutions. The authors provide supporting evidence from the commercial paper (CP) market. When market liquidity dries up and CP spreads increase, banks experience funding inflows. These inflows allow banks to meet increased loan demand from borrowers drawing funds from pre-existing CP backup lines, *without* running down their holdings of liquid assets. Moreover, the supply of cheap funds is large enough that pricing on new lines of credit actually *falls* as market spreads widen.

Kaplan and **Schoar** investigate individual fund returns in the private equity industry using a unique dataset collected by Venture Economics. They find a large degree of heterogeneity among fund returns. Those returns persist strongly across funds by private equity firms. The returns also improve with firm experience. Better performing funds are more likely to raise follow-on funds and raise larger funds than more poorly performing firms. This relationship is concave, so that top performing funds grow more slowly than the market average. Finally,

the authors find that funds that are raised in boom times (and firms that are started in boom times) are less likely to raise a follow-on fund, suggesting that these funds perform worse. Several of these results differ substantially from those for mutual funds.

Mian uses a unique dataset that contains detailed information on every corporate loan outstanding in the banking sector of Pakistan during 2001-2 (52,000 loans). Using a simple empirical methodology that allows him to measure separately ex-ante monitoring, ex-post monitoring, "softness", renegotiation, recovery, and litigation of loans, Mian presents a number of new findings. First, concerns about weak external supervision can be overcome by market-discipline coupled with private incentives for banks. Second, government involvement is the key to poor banking. Third, even with private markets, the organizational hierarchy of banks can seriously limit their ability to lend to "soft information" firms — firms in greatest need of intermediation.

La Porta, **Lopez-de-Silanes**, and **Shleifer** examine the effect of securities laws on market development in 49 countries. They find that public enforcement of laws benefits securities markets, especially in countries with efficient government bureaucracies. They also find that organization of private enforcement through disclosure and liability rules benefits securities markets in countries with both efficient and inefficient government bureaucracies.

Inderst and **Müller** show how the value, valuation, and success probability of start-ups depend on characteristics of the capital market. Market characteristics, including the return on investments, entry costs, and capital market transparency, affect the relative supply and demand for capital, and thus the relative bargaining power of entrepreneurs and venture capitalists. Relative bargaining power, in turn, determines ownership shares and incentives in start-up firms. In characterizing the short- and long-run dynamics of the venture capital market, the authors' model sheds light on the Internet boom and bust periods.

Bitler, **Moskowitz**, and **Vissing-Jörgensen** augment the standard principal-agent model to accommodate an entrepreneurial setting, where effort, ownership, and firm size are determined endogenously. They test the model's predictions (some novel) using new data on entrepreneurial effort and wealth. They find that entrepreneurial ownership shares increase with outside wealth, decrease with firm risk, and decrease with firm size; effort increases with ownership and size; and both ownership and effort increase firm performance. The magnitude of the effects in the cross-section of firms suggests that agency theory is important for explaining the large average ownership shares of entrepreneurs.

Behavioral Finance

The NBER's Working Group on Behavioral Finance met in Chicago on April 12. Nicholas Barberis and Richard H. Thaler, both of NBER and University of Chicago, organized the meeting. These papers were discussed:

Alan B. Krueger, NBER and Princeton University, and **Kenneth N. Fortson**, Princeton University, "Do Markets Respond More to More Reliable Labor Market Data?"
Discussant: Anil K Kashyap, NBER and University of Chicago

Ming Dong, York University; **David Hirshleifer** and **Siew Hong Teoh**, Ohio State University; and **Scott Richardson**, University of Pennsylvania, "Does Investor Misvaluation Drive the Takeover Market?"

Matthew Rhodes-Kropf and **David T. Robinson**, Columbia University, and **S. Viswanathan**, Duke University, "Valuation Waves and Merger Activity: The Empirical Evidence"
Discussant: Steven N. Kaplan, NBER and University of Chicago

Markus K. Brunnermeier, Princeton University, and **Jonathan A. Parker**, NBER and Princeton University, "Optimal Expectations"
Discussant: Sendhil Mullainathan, NBER and MIT

Louis K.C. Chan, University of Illinois; **Jason Karceski**, University of Florida; and **Josef Lakonishok**, NBER and University of Illinois, "Analysts' Conflict of Interest and Biases in Earnings Forecasts"
Discussant: Russell Fuller, Fuller and Thaler Asset Management

Asim Ijaz Khwaja, Harvard University, and **Atif Mian**, University of Chicago, "Price Manipulation and Phantom Markets: An In-depth Exploration of a Stock Market"
Discussant: Pete Kyle, Duke University

Krueger and **Fortson** note that since 1979, the Bureau of Labor Statistics (BLS) has nearly quadrupled the size of the sample used to estimate monthly employment changes. Although first-reported employment estimates are still noisy, the magnitude of sampling variability has declined in proportion to the increase in the sample size. Still, a regression analysis of changes in interest rates on the day the employment data are released finds no evidence that the bond market's reaction to employment news intensified in the late 1980s or 1990s; indeed, in the late 1990s and early 2000s the bond markets hardly reacted to unexpected employment news. For the time period as a whole, an unexpected increase of 200,000 jobs is associated with about a 6 basis point increase in the interest rate on 30-year Treasury bonds, and an 8 basis point increase in the interest rate on 3-month bills, all else equal.

Additionally, unexpected changes in the unemployment rate and revisions to past months' employment estimates have statistically insignificant effects on long-term interest rates.

Dong, **Hirshleifer**, **Richardson**, and **Hong Teoh** show that irrational market misvaluation, at both the transaction and aggregate levels, affects the volume and character of takeover activity. The authors examine pre-takeover book/price ratios and pre-takeover ratios of residual-income-model-valuation-to-price for bidders, targets, and the aggregate stock market as proxies for market misvaluation. They find that misvaluation of bidders, targets, and the aggregate stock market influences the aggregate volume of takeovers, the means of payment chosen, the premiums paid, target hostility to the offer, the likelihood of offer success, bidder and target announcement period stock returns, post-takeover long-run returns, and the returns from diversifying transactions.

Merger intensity spikes in times of high market valuations (that is, when average market-to-book, M/B, ratios are at their highest). To explore whether this is the result of correlated valuation errors or behavioral mispricing, **Rhodes-Kropf**, **Robinson**, and **Viswanathan** decompose M/B into three components: firm-specific deviation from short-run industry valuations; short-run industry deviations from long-run values, and long-run value to book. The fact that high M/B buys lower M/B is driven mostly by firm-specific deviations from short-run industry average pricing. However, both targets and "acquires" are priced above their long-run industry average. When the authors find differences between bidders and targets in long-run value-to-book, they find that *low* buys *high*. They also find that the industry-specific component of M/B is highly positively correlated with merger intensity, and with the use of stock. However, long-run value-to-book is not correlated with cash merger intensity and is negatively correlated with stock merger intensity, leading to little overall correlation between long-run value-to-book and merger activity.

Brunnermeier and **Parker** introduce a tractable, structural model of subjective beliefs. Since agents who plan for the future care about expected future utility flows, current felicity can be increased by believing that better outcomes are more likely. On the other hand, expectations that are biased towards optimism worsen decision-making, leading to poorer realized outcomes on average. Optimal expectations balance these forces by maximizing the total well-being of an agent over time. The authors apply their framework of optimal expectations to three different economic settings. In a portfolio choice problem, agents overestimate the return of their investment and underdiversify. In general equilibrium, agents' prior beliefs are endogenously heterogeneous, leading to gambling. Second, in a consumption-saving problem with stochastic income, agents are both overconfident and overoptimistic, and consume more than implied by rational beliefs early in life. Third, in choosing when to undertake a single task with an uncertain cost, agents exhibit several features of procrastination, including regret, intertemporal preference reversal, and a greater readiness to accept commitment.

Analysts' earnings forecasts are influenced by their desire to win investment banking clients. **Chan**, **Karceski**, and **Lakonishok** hypothesize that the equity bull market of the 1990s, along with the boom in investment banking business, exacerbated analysts' conflict of interest and their incentives to strategically adjust forecasts in order to avoid earnings disappointments. The authors document shifts in: the distribution of earnings surprises; the market's response to surprises and forecast revisions; and in the predictability of non-negative surprises. Further confirmation is based on samples with conflicts of interest that are higher (including growth stocks and stocks with consecutive non-negative surprises) or lower (such as foreign markets).

Khwaja and **Mian** analyze a unique dataset containing *all* daily firm-level trades of *every* broker trading on the stock exchange in Pakistan over a 32-month period. Examining broker behavior reveals that many brokers choose stocks in which they *only* trade for themselves rather than acting as intermediaries for outside investors. The authors find that when brokers trade on their own behalf in a stock — act as "principals" — they earn 4 percent to 8 percent higher annual rates of return. While broker "ability" does not explain this effect, anecdotes suggest it is caused by direct price manipulation by brokers. The authors find strong evidence for such manipulation: when prices are low, colluding brokers trade amongst themselves to artificially raise prices and attract naïve positive-feedback traders. Once prices have risen, the former exit, leaving the latter to suffer the ensuing price fall. Such manipulation of stock prices occurs in *all* types of stocks. However, the effect is larger in stocks of *smaller* firms, and for firms with *less* concentrated ownership. Finally, while the higher profitability of principals is not attributable to inherent broker attributes, the authors do find that *more* "able" brokers earn *higher* returns when they trade as a principal in a stock.

Environmental Economics

The NBER's Working Group on Environmental Economics met in Cambridge on April 12. Don Fullerton, NBER and University of Texas, Austin, organized the meeting. These papers were discussed:

David F. Bradford, NBER and Princeton University, "Improving on Kyoto: Greenhouse Gas Control as the Purchase of a Global Public Good"
Discussant: Peter Wilcoxen, Syracuse University

Scott Barrett, Johns Hopkins University, "Global Disease Eradication"
Discussant: Joshua Graff Zivin, Columbia University

Brian R. Copeland, University of British Columbia, and **M. Scott Taylor**, NBER and University of Wisconsin, "Trade, Tragedy, and the Commons"
Discussant: Istvan Konya, Boston College

Mustafa H. Babiker and **John Reilly**, MIT; and **Gilbert E. Metcalf**, NBER and Tufts University, "Tax Distortions and Global Climate Policy" (NBER Working Paper No. 9136)
Discussant: Lawrence H. Goulder, NBER and Stanford University

W. Michael Hanemann, University of California, Berkeley; **Sheila M. Olmstead**, Yale University; and **Robert N. Stavins**, Harvard University; "Does Price Structure Matter? Household Water Demand Under Increasing-Block and Uniform Prices"
Discussant: Li Gan, University of Texas at Austin

John A. List, University of Maryland; **Michael Margolis**, Resources for the Future; and **Daniel E. Osgood**, University of Arizona, "Measuring the Preemption of Regulatory Takings in the U.S. Endangered Species Act: Evidence from a Natural Experiment"
Discussant: Steve Polasky, University of Minnesota

One way to obtain a global public good is to set up an institution to buy it, with the nations of the world contributing to the cost according to whatever sharing arrangements make political sense. **Bradford** suggests a way to exploit this approach in order to limit the accumulations of greenhouse gases in the atmosphere. The "service" that produces the control is the reduction in the levels of emissions over time from what the nations otherwise would choose, also known as the "business as usual" emissions path. In the scheme as envisioned, which could be used in a successor agreement to the Kyoto Protocol, the fact that all nations are sellers of reductions ameliorates the enforcement problems typical of commitments to particular emission paths. Another difference from the Kyoto-style system: in the scheme sketched here, the distribution of burdens is explicit, rather than implicit, in the allowable emission amounts. An infectious disease only can be eradicated globally if it is eliminated in every country. But does this simply require international coordination, or does it also require cooperation? Using a model that blends epidemiology, economics, and game theory, **Barrett** shows that coordination will not always suffice, even when the global benefits of eradication exceed the costs. In general, eradication will require strong international institutions.

Copeland and **Taylor** develop a theory of resource management whereby the degree to which countries escape "the tragedy of the commons" is determined endogenously and linked explicitly to changes in world prices and other possible effects of market integration. The authors show how changes in world prices can move some countries from de facto open access situations to ones in which management replicates an unconstrained social planner. Not all countries can follow this path of institutional reform and the authors identify key country characteristics (mortality rates, resource growth rates, technology) that divide the world's set of resource rich countries into three categories. Category I countries will never be able to effectively manage their renewable resources. Category II countries exhibit *de facto* open access for low resource prices, but can maintain a limited form of resource management at higher prices. Category III countries can fully implement efficient management and can obtain the unconstrained first best outcome for some range of resource prices. For Category III countries, *de facto* open access and limited management are but transitory phases.

Babiker, **Metcalf**, and **Reilly** consider the efficiency implications of policies to reduce global carbon emissions in a world with pre-existing tax distortions. They first note that the weak double dividend — the proposition that the welfare improvement from a tax reform in which environmental taxes are used to lower distorting taxes must be greater than the welfare improvement from a reform in which the environmental taxes are returned in a lump sum fashion — need not hold in a world with multiple distortions. They then present a large-scale computable general equilibrium model of the world economy with distortionary taxation. They use this model to evaluate a number of policies to reduce carbon emissions. They find that the weak double dividend is not obtained in a number of European countries. Their results also demonstrate that the interplay between carbon policies and pre-existing taxes can differ markedly across countries. Thus, one must be cautious in extrapolating the results from a country specific analysis to other countries.

Olmstead, **Hanemann**, and **Stavins** analyze the influence of the price of water and the structure of water prices on residential water demand. They adapt a model from the labor economics literature — the Hausman model of labor supply under

progressive income taxation — to estimate water demand under increasing-block prices. They apply this structural model to the most price-diverse, detailed, household-level water demand data now available to estimate the price elasticity of residential water demand. Their results indicate that the sensitivity of residential water demand to price is quite low, in contrast with results of previous studies using similar models to account for the piecewise-linear budget constraint of block prices. They also find, however, that price elasticity is higher and demand is lower among households facing block prices than among households facing uniform marginal prices. The impact of the price structure on demand appears to be greater than the impact of marginal price itself.

Does the endangered species act endanger species? **Margolis**, **Osgood**, and **List** derive two empirical measures to estimate the extent of preemptive habitat destruction. They illustrate the use of such measures by examining development decisions on more than 70,000 plots of land that are potentially Pygmy Owl-critical habit areas in Pima County, Arizona. Their models provide direct measures of the scale of preemptive habitat destruction in units that can indicate whether it is significant as an obstacle to conservation, or how much it adds to the social cost of achieving conservation goals. The preliminary findings suggest that preemption is occurring at rates that are statistically significant.

Bureau Books

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Globalization in Historical Perspective

Globalization in Historical Perspective, edited by Michael D. Bordo, Alan M. Taylor, and Jeffrey G. Williamson, will be available from the University of Chicago Press this spring for $95. This volume collects eleven papers and comments and a panel discussion, and presents a comprehensive view of globalization. The volume is divided into three parts: the first explores how the progress of globalization should be measured in terms of the integration of various markets; the second places this knowledge in a wider context, examining why divergence rather than convergence has been the more predominant outcome of globalization efforts, with special attention paid to the effects of technology and geography; the third studies the role of the financial sector, including exchange rate regimes, financial development, financial crises, and the architecture of the international financial system. Overall, the contributors show how an earlier global system was established during the 19th century, and how a new system has evolved following the disruptions of World War I, the Great Depression, and World War II.

Bordo, Taylor, and Williamson are all NBER Research Associates. Bordo is also a professor of economics at Rutgers University. Taylor is associate professor of economics at the University of California, Davis. Williamson is the Laird Bell Professor of Economics at Harvard University.

Health and Labor Force Participation over the Life Cycle: Evidence from the Past

Health and Labor Force Participation over the Life Cycle: Evidence from the Past, edited by Dora L. Costa, is available from the University of Chicago Press this spring for $75.

The rise in life expectancy and retirement rates in the twentieth century has had dramatic effects. Forecasting future trends in health and retirement rates, as we must now do, requires that we investigate underlying long-term trends and their causes. To that end, this volume draws on new data — an extensive survey of Union Army veterans who were born between 1820 and 1850 — to examine the factors that affected health and labor force participation in the United States in the nineteenth century. The contributors consider the impact of a variety of conditions — social class, wealth, occupation, family, and community — on the morbidity and mortality of the group, and also address several more specialized topics.

Costa is an NBER Research Associate and the Ford Career Development Associate Professor of Economics at MIT. She is also the author of *The Evolution of Retirement: An American Economic History, 1880-1990.*

The Economics of School Choice

The Economics of School Choice, edited by Caroline M. Hoxby, is available now from the University of Chicago Press for $75. Since the U.S. Supreme Court

has declared school voucher programs constitutional, the many unanswered questions about the potential effects of school choice will become especially pressing. Contributors to this volume investigate the ways in which school choice affects a wide range of issues, presenting evidence on the impact of school choice on student achievement, school productivity, teachers, and special education. They also tackle such difficult questions as whether school choice affects where people decide to live, and how choice can be integrated into a system of school financing that gives children from different backgrounds equal access to resources. There is a discussion of the latest findings on Florida's school choice program, as well as on voucher programs and charter schools in several other states.

The resulting volume not only reveals the promise of school choice, but examines its pitfalls as well, showing how programs can be designed that exploit the idea's potential but avoid its worst effects. With school choice programs gradually becoming both more possible and more popular, this book stands out as an essential exploration of the effects such programs will have, and a necessary resource for anyone interested in the idea of school choice.

Hoxby directs the Economics of Education Program at the National Bureau of Economic Research and is a professor of economics at Harvard University.

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