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Asset Pricing: Liquidity, Trading, and Asset Prices

John H. Cochrane*

Members of the NBER's Asset Pricing Program produce over 100 working papers in a typical year. These papers are spread over an astonishing range of topic areas. Naming the papers written in the four and a half years since the last program report, let alone providing any sort of intelligible summary of their contents, would quickly fill the available space and exhaust the most dedicated reader's patience. Therefore, I'll describe in depth one area that strikes me as particularly interesting and that may be novel to likely readers of this report. I proceed with an apology to all the authors whose papers are thus omitted. In addition, I confine myself to papers in the NBER Working Paper series or presented at Asset Pricing Program Meetings in the last four and a half years. I apologize in advance to non-NBER authors and to authors of older papers whose work should be discussed in a comprehensive literature review.

My focus here goes by a variety of names, including liquidity, trading, volume, market frictions, short-sales constraints, and limits to arbitrage. For a long time, there has been an implicit separation of effort in asset pricing: Researchers operating in the frictionless macroeconomics-based tradition study the broad level of prices, while researchers in the market microstructure tradition — filled with non-Walrasian trading, asymmetric information, and so on — pretty much study small (but interesting) refinements, where prices fall in the bid-ask spread rather than where the spread is in the first place.

Recently, this separation has begun to erode. At one level, this erosion is the beginning of a long-expected understanding of trading and volume. The classic theory of finance has no volume at all: prices adjust until investors are happy to continue doing what they were doing all along, holding the market portfolio. Simple modifications, such as lifecycle and rebalancing motives, don't come near to explaining observed volume. Put bluntly, the classic theory of finance predicts that the NYSE and NASDAQ do not exist. Lifecycle stock trading could be handled at

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a retail level, like (say) life insurance. The markets exist to support high frequency trading. They are at bottom markets of information (or, some might say, opinion), not really markets for stocks and bonds.

Now, perhaps prices are set as if volume is zero, and then volume and the attendant microstructure issues can be studied separately. But perhaps not; perhaps volume, trading, liquidity, and market structure effects spill over to affect the level of prices. This is the issue I focus on. I start with empirical work, and follow with economic modeling that tries to understand the emerging set of facts.

Empirical Work

3Com, Palm and Convenience Yield

Work by Owen A. Lamont and Richard H. Thaler¹ most vividly brought this constellation of ideas to my attention. They start with the case of 3Com and Palm. On March 2, 2000, 3Com sold 5 percent of Palm in an initial public offering. 3Com retained about 95 percent of the shares, and announced that it would distribute those shares to 3Com shareholders by the end of the year at about 1.5 shares per one 3Com share. Thus, one could obtain 150 Palm shares in two ways: buy 150 Palm shares directly or buy 100 3Com shares and end up in six months with 150 Palm as well as 100 3Com.

Surely the latter strategy should cost more. But in fact, the latter strategy was cheaper. Palm prices exploded, 3Com prices fell, and at the end of the first day of trading the “stub value” of 3Com shares (the value of 3Com less the embedded Palm shares) was negative \$63! This violation of the law of one price lasted for quite a while, as shown in Lamont and Thaler's Figure 3. The event was not unique. Lamont and Thaler study six additional cases of persistent negative stub values in a carve-out followed by a spin-off.

Lamont and Thaler carefully document that these events did not present exploitable arbitrage opportunities. Most simply, a trader might want to short Palm and buy 3Com. But the costs of shorting were so high as to make this trade unprofitable or impossible. Rationed out of the short market, a trader might try to buy put options. But this strategy did not work either. The option market became delinked from the stock market; there were wide violations of put-call parity, precisely because arbitraging between stocks and options required shorting stocks.

The absence of an exploitable arbitrage is a little bit comforting, but it does not address the

basic question: why were the prices so out of line in the first place? Lamont and Thaler's view is simply that there were a large number of "irrational" traders, who just did not see the chance to buy Palm embedded in 3Com, and for whom buying Palm rather than 3Com (and similar cases) was therefore "simply a mistake."

Intrigued by this paper, I investigated² the issue a bit further. 3Com and Palm remind me of money and bonds. Just as 3Com and Palm are both claims to Palm shares in six months, so money and a six-month Treasury bill are both claims to a dollar in six months. Yet the bill is cheaper and the dollar is "overpriced."

You might object that nobody holds money for six months. The whole point of money is that you hold it only for a short time, in order to make transactions. But few people held Palm for six months either. Lamont and Thaler document that 19 percent of available Palm shares changed hands every day in the first 20 days after the IPO, and several of their other cases have even larger volume. Furthermore, Palm had a 7 percent standard deviation of daily returns, or a 15 percent standard deviation of 5-day returns — as much as the S&P500 moves in a year. If you can predict any of this movement, then the 2/10 percent per day expected loss due to "overpricing" is trivial; it's less than the commissions and bid-ask spread facing these active traders.

You might object that money is "special" because you need to hold it to make transactions. Palm stock was special too. To bet on information about Palm, you had to hold Palm stock. Even to short Palm, you must first find a lender, borrow Palm shares, and then sell them. Options trading or trading in 3Com stock (3Com still held 95 percent of Palm shares) were poor substitutes, as both markets became delinked from high frequency movements in Palm stock market in this period.

Palm and money behave similarly in many other ways. Money is more overpriced — the interest rate is higher — when velocity is higher. The same is true for 3Com and Palm: the "overpricing" was highly correlated with Palm volume. The monetary over-

pricing (interest rate) is lower when the money supply is larger. The same is true for 3Com and Palm. Palm started with only 5 percent of total shares available, and less than that available for trading, because those receiving IPO allocations are strongly discouraged from flipping (selling) or lending their shares. Short selling provides an extra "supply" of shares, just as checking accounts provide extra money for transactions. Short selling in Palm built up quickly after the IPO. Palm peaked at 146 percent short interest — the average share had been lent out to short more than once — more than doubling the supply. As this supply increased, the overpricing fell. 3Com fell during the Palm IPO, even as the latter was exploding in value and even though 3Com still held 95 percent of Palm shares. With no horrible news about the rest of 3Com, this fall only makes sense if the Palm-information traders all coordinate on trading Palm shares, so that "convenience yield" for trading in Palm prospects suddenly moves to Palm and away from 3Com.

In sum, these observations suggest to me that trading generated a "convenience yield" for Palm shares, just as physical trading generates a convenience yield for money. People wanted to trade on information or opinions about the fortunes of Palm's invention, the PDA. To do this, they had to hold Palm shares, but Palm shares were in short supply. This "convenience yield" nicely links a large number of phenomena: 1) "overpricing" of seemingly identical securities; 2) "overpricing" is higher when volume is higher; 3) "overpricing" is higher when share supply is lower; 4) "overpricing" is higher when there are fewer substitutes for trading (options, correlated stocks); 5) "overpricing" is higher when there is more price volatility (a sign of more information flow); and 6) 3Com stock fell at the Palm IPO.

Most stories for 3Com-Palm are at best silent on points 2-6. In particular, "irrational investors" or "rational bubbles" do not link "overpricing" with volatility and volume, whereas all of the famous "bubbles" have featured tremendous turnover and volatility. If something about the psychology of evaluating risks makes traders irra-

tionally attracted to Palm, why do 20 percent change their minds and resell their Palm shares on any given day?

You might object, "How could convenience yields or liquidity premia be that large?" First, recall that monetary "overpricing" can be quite large as well. In a 100 percent per year hyperinflation, currency trades at twice the value of six-month bills, and probably still with less than 20 percent daily turnover. Second, recall the Gordon growth formula: that the price-dividend ratio is the inverse of expected return less dividend growth, $P/D = 1/(r-g)$. If a stock has a price-dividend ratio of 50, $r-g = 0.02$, so a single percentage point change in expected return can double the price if it's persistent. Liquidity premia of one percent or so are observed in the bond market, so one might not be surprised by substantial liquidity premia in stock prices.

Is this an isolated incident, or is a substantial "convenience yield" for trading one important part of stock valuation in general? Some simple facts in my paper suggest the latter possibility. In particular, "high price" stocks trade frequently, both in the cross section and in the time series. I run regressions across stocks of market value/book value on turnover (share volume/shares outstanding) and find large and significant coefficients; the correlation is between 0.25 and 0.35. The NYSE index and volume are correlated over time, dramatically so through the great crash of 1929. The correlation is impressive. With different labels, a monetary economist might happily point to a stable link between velocity (volume) and interest rates (price of money/price of bonds).

This well-known correlation usually is interpreted that price declines cause volume to dry up (for unknown reasons). For example, John M. Griffin, Federico Nardari, and Rene M. Stulz³ show that volume is bigger after good returns, and markets "dry up" after bad returns. They interpret it this way. But perhaps some of the opposite is true as well: perhaps a decrease in the desire to trade (a decrease in information flow) or in the ability to trade makes shares less valuable.

These patterns are not unique to

Palm-3Com. Eli Ofek and Matthew Richardson⁴ document that many of these features hold for the period of remarkably high price, volatility, and trading volume in the technology sector of the Nasdaq as a whole. One of their most interesting observations is that returns are negative around the expiration of many IPO's lockup period. (For some time after an IPO, insiders are typically forbidden to sell their shares. When the lockup expires, a large number of shares are released for trading or lending to shorts.) Furthermore, the price decline of the overall Nasdaq tech sector in March 2000 coincided with a large release of shares from lockup (see their Figure 2).

Short Sales Constraints

A central part of all “overpricing” stories is that there are limits to the ability of arbitrageurs to establish long-term short positions. If short sales are expensive, and the shorts are the “marginal investor” setting prices, we ought to see that stocks with higher short costs have lower subsequent returns.

Alas, good data on short costs are hard to come by. Owen Lamont and Charles Jones⁵ use data from the 1920s, when rebate rates, one of the prime short costs, were published. They find lower returns for high-short-cost stocks, though not quite one-for-one. Lamont⁶ shows that returns are lower among firms who engage in legal and technical battles that raise the cost of selling short. In both cases, the returns can be as much as 1-2 percent per month lower among firms with the highest short costs. Lamont and Jeremy C. Stein⁷ use data on “short interest,” the fraction of shares sold short. By itself, this is a poor (though often-used) measure of short costs, since it captures people who are able to short. Lamont and Stein use it indirectly to show that short interest declines as markets rise, suggesting that negative opinion is wiped out on the way up. In particular, they show that investors pull money out of open-ended (investors can add or withdraw at any time) short funds even though their string of losses only makes the short position more desirable. These

three papers are summarized in more detail later in this issue.

One nagging question is, “If you can't short stocks, why not buy put options?” Lamont and Thaler document that Palm options and stocks became delinked — there were massive violations of put-call parity. But is this an isolated, extreme case? Eli Ofek, Matthew Richardson, and Robert F. Whitelaw⁸ claim otherwise. In fact, they find frequent violations in put-call parity that are strongly related to the cost of shorting. Their violations forecast subsequent low returns on stocks. (Battilio, Robert, and Paul Schultz⁹ recently have questioned Ofek and Richardson's finding of put-call parity violations, claiming that the use of intraday options data, rather than closing quotes, resolves most of them. They do not address Ofek and Richardson's finding of negative expected returns however.)

Of course, documenting that short sales constraints prevent speculators from effectively lowering a price right away still leaves open the question, “Just why is the stock overpriced in the first place?” This is a job for theorists, and I describe some of their efforts below.

Liquidity Premia

Financial economists have long suspected that less liquid securities might have to offer an expected return higher than what is justified by the covariance of the security's return with the market or other factors. Thus the security might have a lower price level. (See Maureen O'Hara's Presidential Address¹⁰ for a review.) The motivation traditionally has focused more on the price discount that an “illiquid” security might have relative to a frictionless market, rather than on “convenience yield,” or a price premium that a security might enjoy for its special usefulness in allowing information trading. The issues are closely related, though.

Bonds

It's easier to see liquidity premia in bonds than in stocks, since the payoffs are known. Liquidity premia are clear in U.S. treasuries, for example, in the

spread between on-the-run (just issued) and off-the-run issues. Seeing them in other, potentially much more illiquid bonds is harder, since a spread may be attributable to default as well as to liquidity.

Francis A. Longstaff¹¹ separates default from liquidity premia by comparing U.S. Treasury with Refcorp bonds. Most agency bonds (Fannie Mae, Freddie Mac) carry some small default risk, but Refcorp bonds do not: their principal is fully collateralized by Treasury bonds, and the Treasury guarantees full payment of coupons. Thus, they are identical to Treasury bonds in all aspects but liquidity (and, perhaps, obscurity). Longstaff finds that their average premia range from about 10 to 16 basis points of yield (0.10 to 0.16 percent). The premia vary significantly over time. The maximums range from 90 basis points for the three-month premium to about 35 basis points for the seven-year premium. These spreads may seem small, but small yield spreads can imply big price spreads for long-maturity bonds, up to 15 percent in Longstaff's data.

Longstaff, Sanjay Mithal, and Eric Neis¹² use the swap market to obtain market-price-based estimates of the default premium, and hence measure the residual liquidity premium. (One can now buy “default insurance” on particular bonds, and the premium for this insurance can be used to measure the default premium in a bond yield.) Most previous calculations suggested that corporate bond yields were much larger than default alone could account for, but Longstaff, Mithal, and Neis find otherwise: 51 percent of the yield spread of AAA/AA- bonds, 56 percent for A-, 71 percent for BBB, and 83 percent for BB- are explained by default premia measured in the credit-default swap market. However, a substantial residual remains, between 20 to 100 basis points. This component is strongly related to measures of liquidity, such as the size of the bid/ask spread and the principal amount outstanding.

Stocks

Lubos Pastor and Robert F. Stambaugh¹³ find that stocks whose

prices decline when the market gets more illiquid receive compensation in expected returns. Dividing stocks into ten portfolios based on liquidity betas (regression coefficients of stock returns on market liquidity, with other factors as controls), the portfolio of high-beta stocks earned 9 percent more than the portfolio of low beta stocks, after accounting for market, size, and value-growth effects with the Fama-French 3 factor model. Almost all of this premium is accounted for¹⁴ by the spread in liquidity betas and a factor-risk premium estimated across ten portfolios.

Viral V. Acharya and Lasse H. Pedersen¹⁵ perform a similar but more general investigation. They examine all four potential channels for a liquidity premium. First, a security might have to pay a premium simply to compensate for its particular illiquidity or transactions cost, but this is the least interesting (and, as we will see in the theory discussion, least likely) effect. Second, a security might have to pay a premium because it becomes more illiquid in bad times, such as when the market goes down. If you have to sell the security, (and if sellers are the marginal investors) this tendency amounts to a larger beta than would be measured by the midpoint of a bid-ask spread. Third, the security's price (the midpoint) might decline when markets as a whole become less liquid. If "market liquidity" is a state variable, an event that drives up the marginal utility of a marginal investor, then this tendency also will result in a return premium. This is the mechanism that Pastor and Stambaugh investigated. Fourth, the security could become more illiquid when the market becomes more illiquid. Of course these characteristics are correlated in the data, which makes sorting out their relative importance more difficult.

Acharya and Pedersen form 25 portfolios sorted on the basis of previous year's liquidity (the liquidity of the individual stocks, this time, not Pastor and Stambaugh's regression coefficient of return on market liquidity). They find that average returns range from 0.48 percent to 1.10 percent per month as the illiquidity of the portfolios rises. However, their measure of illiquidity is

(intentionally) highly correlated with size, and the size ranges from 12.5 to 0.02 billion dollars in the 25 portfolios. Then, they examine whether the four sources of covariation described above explain the variation in average returns. The illiquidity covariances are significant in some specifications. Interestingly, their most important effect (the largest and most significant premium in a cross-sectional regression of average returns on betas) is the covariance of liquidity with market return — the chance that the stock may get more illiquid if the market goes down.

While both papers find that liquidity betas do correlate with average returns, and both have some success in explaining the expected returns of portfolios sorted on liquidity measures, neither paper claims that "liquidity betas" are a complete description of stock returns. Neither model explains the average returns of portfolios sorted on book-to-market, size, or past-returns-by-liquidity betas alone. This is not a failing; in fact, it is predicted by Acharya and Petersen's model, in which liquidity premia operate above and beyond the usual CAPM. It just means that we will have to understand liquidity as an additional feature, above and beyond the usual picture of returns driven by the macroeconomic state variables familiar from the frictionless view.

Looking a little more deeply into the making of this sausage will show some of the achievement of these papers, and some of the challenges that remain. The biggest challenge is how to measure liquidity (and to some extent, how to define liquidity) both at the individual-stock level and at the market level. Larger bid-ask spreads and transactions costs are indicative of course, but a larger sense of liquidity really matters: how much is for sale at the bid-ask points ("depth"), and most of all how large will the "price impact" of a trade be.

Pastor and Stambaugh's basic idea is that stocks are "illiquid" if there is a large price-impact of orders. A big "buy order" in an illiquid stock should result in large volume and negative return, but this event should forecast a positive return the next day as the price "bounces back." To measure this ten-

dency they run a regression¹⁶ over days in each month of the return at day $d+1$ on a constant, the return at day d to allow for a "normal" serial correlation of returns (though I'm not sure where that comes from) and the product of volume on day d times the sign of the return on day d . The size of the (negative) coefficient on the last variable measures the stock's "liquidity" for the month. Pastor and Stambaugh want innovations in market liquidity. (The paper is about risk as measured by regressions of individual returns on market liquidity, not about individual-stock liquidity.) They measure this quantity by calculating innovations to the changes in the average liquidity of individual stocks, scaled by the growing size of the market.¹⁷

Acharya and Pedersen define the liquidity of a stock in each month as the average absolute return divided by dollar volume in that month.¹⁸ This measure looks only for price changes at date d , whereas Pastor and Stambaugh look for a bounce-back, predictable price changes in the return from d to $d+1$. Acharya and Pedersen thus measure "price discovery," people buying today on the knowledge that the price will rise tomorrow, rather than just "price impact." This raw measure leaves a size effect — as inflation increases dollar volumes, illiquidity defined from returns divided by dollar volume apparently decreases. To remove the size effect over time, they scale the raw illiquidity measure by the market capitalization in each month, and they trim outliers.¹⁹ This measure leaves intact the cross-sectional scaling of "illiquidity" with size: smaller stocks which have smaller dollar volume for the same turnover (fraction of outstanding shares that trade) are automatically more illiquid. While one might argue that small stocks are more illiquid, it does mean the results flow from the well-known (and possibly liquidity-driven) size effect in returns.

Having seen the details, it's clear that these authors are grappling with deep conceptual problems in very sophisticated ways — but that a cleaner definition and measurement of "liquidity," though obviously a difficult objective, will be a valuable one.

Order Flow, Price Impact, and Downward Sloping Demand Curves

One indication of “illiquidity” or “convenience yield” is “price impact” or a “downward sloping demand curve” for stocks. A non-financial economist, quite used to downward-sloping demand curves, might be puzzled why we even worry about this question. After all, if you show up with a truckful of tomatoes in Harvard Square at 2:00 AM determined to sell them in the next half hour, you’re not going to get a very good price. There are arbitrageurs hanging around financial markets, of course, but even they have limited capacity to bear risk.

However, if the sale is announced, or so regular that it becomes expected, then arbitrageurs should know to show up, so the presumption leans much more to a flat “demand” (in quotes because half the time it’s “supply”) curve. For this reason, we should be more surprised to see “price impact” of regular or expected sales or purchases in a frictionless market.

Market microstructure models have an additional story for price-impact: asymmetric information. If you offer to sell a lot of stock unexpectedly, this might mean you know something that the traders don’t, and they will therefore only offer a lower price. Thus, we are more surprised to see price-impact of regular, expected, or otherwise information-free trading.

Martin D. D. Evans and Richard K. Lyons²⁰ show that exchange rate movements are highly correlated with order flow. I reproduce Figure 1 from their paper here. The solid lines are the spot rates of the DM and Yen against the Dollar. The dashed lines are order flow. The correlation is impressive.

A difficulty in most studies of this sort is that you typically do not know if a trade is a “buy” or a “sell,” and in fact we routinely make fun of journalists who report a wave of “buying” since every “buy” must correspond to a “sell.” Evans and Lyons’s dataset does record which side initiated the transaction, so “order flow” can be measured and does make some sense. (Many studies rely on whether the trade takes place above or below the midpoint of the bid-ask spread to identify the sign

of the trade, but direct measurement is obviously much cleaner.)

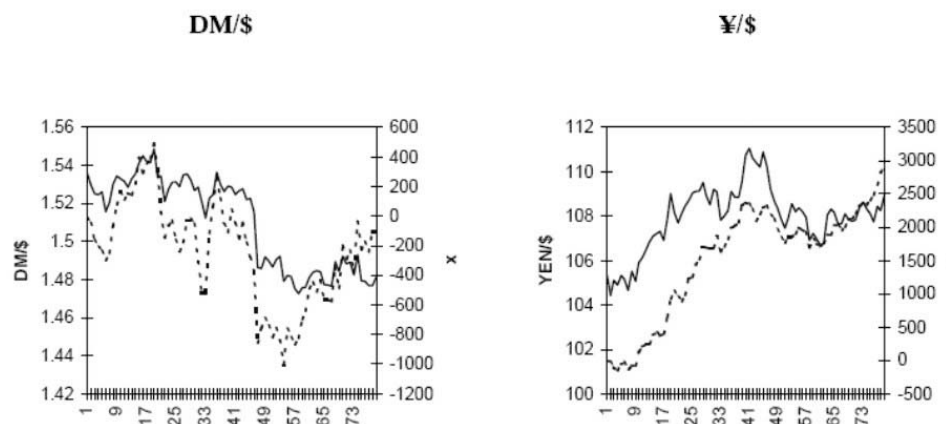
Evans and Lyons interpret the correlation as causal, in other words that order flow causes the exchange rate to move. In this paper and “A New Micro Model of Exchange Rate Dynamics”²¹ they provide rich theoretical models that produce this sort of effect. The latter model combines standard general equilibrium models (productivity shocks, consumption, investment, capital formation) with microstructure in the exchange market, in particular that agents know more about their home shocks than foreigners.

Michael W. Brandt and Kenneth A. Kavajecz²² perform a similar and much more detailed analysis in the market for U.S. Treasury bonds. Brandt and Kavajecz have trade-by-trade data in government bonds from the GovPX system on which the bonds are traded. They also know who initiated the trade

sions in daily data of yields in these classes on lagged yield curve factors (level, slope and curvature, linear combinations of lagged yields) and order flows. In each case, yields on day $d+1$ are significantly related to order flow between day d and day $d+1$, with R^2 nearing 30 percent. For yields of class i , orderflow of that class is the most important forecaster. Interestingly, other orderflows enter as well. Order flow in the 2-5 year maturity is the most important other class in each case. A single common factor (essentially the average of order flows across all maturities) in order flows across all yields also compactly captures the cross-effects.

To examine how orderflow affects the overall shape of the yield curve rather than individual bond yields, they regress factor portfolios (the average of all yields = level, and other linear combinations for slope and curvature)

Figure 1: Four Months of Exchange Rates (solid) and Order Flow (dashed) May 1 - August 31, 1996



— whether is it a “buy” or a “sell.” With all quotes at a given time, they can measure bid-ask spread and depth; how much is for sale at what price.

Brandt and Kavajecz aggregate bonds into maturity bins and on-the-run, just off-the-run, and off-the-run status. (Newly issued bonds are said to be “on the run.” They are most actively traded, since they make their way from the government to long-term holders such as pension funds. Trading in off-the-run bonds can be quite thin as many U.S. treasury investors are passive.) Brandt and Kavajecz run regres-

on order flows of different classes of bonds. They find that the “level” factor, the average of all yields, is most influenced by order flow. Order flows across all maturities forecast changes in the level of interest rates, and a common “level” factor in order flow moves the common “level” factor in yields with nearly the same R^2 as the multiple regression using order flows on all maturities. Other factors are much less related to order flow, let alone factors in order flow. For example, there does not seem to be a “slope” factor in order flow (buy

short, sell long) that induces changes in the slope of the yield curve. Interestingly, the effects are stronger for liquid on-the-run bonds rather than less liquid off-the-run bonds.

Brandt and Kavajecz interpret their findings as evidence for “price discovery” rather than for “illiquidity” or “price impact.” In a market of symmetric information, that information raises prices without any trading. In a market with asymmetrically informed agents, those with the information will trade on that information as prices rise, so that price rises and buy orders will be correlated as we see. “Price discovery” makes sense of the fact that orderflow of other classes helps to forecast yield changes in class i . This would not happen if traders were simply pushing on class-specific demand and supply curves. In addition, “price discovery” makes sense of the fact that order flow in the liquid on-the-run bonds is the important one for forecasting returns.

Kenneth A. Froot and Tarun Ramadorai²³ correlate exchange rates with flows between institutional investors. Again, they exploit a dataset that shows all purchases and sales, so they know the direction of the “flow.” They find that daily flows exhibit a correlation with daily excess returns of about 30 percent.

Froot and Ramadorai undertake a dynamic analysis and uncover “trend-following” by managers: a 1 percent surprise appreciation results in a 0.37 standard deviation inflow over 30 trading days, for the major currencies in the sample. Consistent with this finding, the flow/return correlation rises strongly with horizon, peaking at about 45 percent at horizons of about a month. The flow/return correlation then declines rapidly with horizon. In long horizons, the authors find that fundamentals, not flows, drive exchange rates.

In sum, we have a striking fact: order flow is highly correlated with price changes. We also have three interpretations of this correlation. 1) Perhaps order flow causes the price change, simply running into the illiquidity, “downward sloping demand,” or “limited ability to bear risk” of marketmakers. 2) Perhaps “price discov-

ery” causes the correlation; informed investors come in and bid up prices to where they will go once the information becomes public, and do a bit of trading on the way. 3) Perhaps causality runs backwards: perhaps prices change, and then “trend-following” and “momentum” traders pile volume in that direction. The cross-asset correlations and dynamics suggest the second and third interpretations, though it is possible that a big order into one class causes disruptions in another. I look forward to a detailed cross-sectional and time-series analysis to add evidence that will sort these hypotheses out. At a minimum, the second and third interpretations argue that we need to understand where order flow comes from before concluding that it causes price changes.

Nicholas Barberis, Andrei Shleifer, and Jeffrey Wurgler²⁴ extend a long line of research on S&P500 inclusion effects suggesting “downward sloping demand curves.” They find that stocks start to comove more with the S&P500 index as soon as they are included in that index. In single regressions, daily betas (regression coefficients of stock return on S&P500 index return) increase by 0.15 and weekly betas increase by 0.11 upon inclusion (that is, a typical regression coefficient increases from 1.0 to 1.15). Considerations such as non-trading and lagged betas weaken the magnitudes and statistics a bit, but do not eliminate the effect. In a nice refinement, these authors run regressions of individual stocks on both S&P500 and non-S&P500 stocks. The coefficients on S&P500 rise more, up to 0.3, and those on non-S&P500 decline on inclusion, although the standard errors are somewhat wider because the right-hand variables are highly correlated. Monthly betas do not increase, with the interpretation that short-run demand curves slope down but long-run curves do not. There is a natural source of volume that occurs upon S&P500 inclusion: index arbitrage of individual stocks versus the index and S&P500 options, and demand from S&P500 index funds. But since these are a predictable source of trading, it is surprising that they run into any illiquidity.

Economic Models

So far I have written as if we had good economic models of trading, liquidity, convenience yield, and so on. Of course nothing of the sort is true. Solid economic understanding of all of these issues, and even clear definitions or verbal stories, remain a challenge.

Two fundamental stumbling blocks stand in the way. First, why is there so much trading? It’s no mystery to the layman; people are trading on information and opinion. But economic models of information-based trading quickly stumble on the “no-trade theorem.” Paul Milgrom and Nancy Stokey²⁵ show that rational traders should act like Groucho Marx, who famously didn’t want to belong to any club who would have him. Anyone who wants to sell to you knows something you don’t know. Not everyone can be smarter or better informed than the average.

Second, models of illiquidity premia fundamentally stem from transactions costs. But agents solving typical portfolio problems can avoid transactions costs easily by refusing to trade very often, a point made most famously by George M. Constantinides.²⁶ As a result, large transactions costs typically have small price effects. The two points are related. The classic theory of finance doesn’t give much of a reason to trade, so it naturally does not assign much of a penalty for assets that are hard to trade.

As I review theory papers designed to understand volume and liquidity premia, you will see a variety of unpalatable devices used to avoid these two fundamental barriers. For example, no-trade theorems are often broken by sprinkling in some “noise traders” who buy or sell for unspecified reasons unrelated to information. You will see models with “optimists” and “pessimists” who have different prior beliefs unrelated to any information, or who irrationally overweight their own information. You will see models that crank up lifecycle or hedging motives for trade to unreasonable levels in order to generate some volume. For example, one writes a model with agents that last two months, so each must buy and sell his entire portfolio in two months.

Another posits that investors exogenously withdraw funds from managers after poor returns. Another introduces random preference shifts.

How one interprets these ingredients is a matter of philosophy. Some people see them as proof that finance needs to abandon economics for its behavioral foundations, and thus the assumptions are worth advertising or fussing about, depending on one's views on that question. I tend to see them as sensible shortcuts, quick modeling tricks where starting from "deep microfoundations" would waste too much time and space on the way to the phenomenon we want to capture, and thus they are not worth making much of a fuss about either way. I find it hard to swallow the proposition that there can never be any model built on economics in which the NYSE and NASDAQ exist, but I don't want to wait for its construction to start thinking about the economics of liquidity. In a similar way, macroeconomists write models with cash-in-advance constraints, money in the utility function, sticky prices and so on, not because they believe literally in these specifications but as a convenient shortcut to a money demand curve on the way to studying something else, without waiting for the "microfoundations of money" project to be finished. Buttressing this view that not much essential is at stake, it seems pretty clear in most cases that assumptions could easily be substituted with no effect on the basic results. Most models just need some, any reason for trade. Similarly, the liquidity models just postulate transactions costs rather than derive a bid-ask spread from asymmetric information, and happily go on.

Of course, this state of affairs means that the answers are not fully satisfactory until the microfoundations of trade really are understood. You never know for sure that a shortcut leads to the right road unless you have a full map, and deeper models will be an ongoing project. At any rate, a look at the current crop of models will give the reader a better sense of where these devices fit in, how to interpret them, and what a really satisfactory model of volume, information trading, and liquidity might look like.

Convenience Yield, Short Sales, and Search

Darrell Duffie, Nicolae Garleanu, and Lasse Pedersen²⁷ describe a model that captures many of the 3Com-Palm and short-sales constraint phenomena. This model is of pure shorting. Relatively optimistic agents hold the security only to search for a relatively pessimistic agent who will borrow it, and then sell it to a relatively optimistic agent again.

A security has an unknown value at some random date in the future. Some agents are "optimists" and some are "pessimists." They have different prior views on this value, rather than different information, sidestepping the no-trade theorem. Shares are traded by a Walrasian auctioneer in a centralized market at each moment. To sell short, however, a pessimist must first locate another agent from whom to borrow the shares. The search proceeds by random matching. When a pessimist meets an optimist, they engage in Nash bargaining over the borrowing fee or rebate rate. The model starts, as after an IPO, with no short interest.

At any time, optimists are willing to pay more than even they think the stock is worth, because they can earn fees from lending shares out to shorts. (This is the heart of Jones and Lamont's findings described earlier.) In fact, it is rational for them to buy shares at "too high prices" and then hold them for some time as they search for a short to whom to lend the shares. Thus, in this market everyone thinks shares are overvalued at current prices, but they hold them nonetheless, waiting to find someone to lend them to for short sales. As one might expect, price and volume decrease over time, and short interest increases, exactly the pattern we see in 3Com-Palm.

Lending fees are larger if the difference of opinions is larger, and the price and lending fee are higher if the float is smaller. The overpricing is more drawn out if one has to wait 3 days for settlement before lending out a share again, as well as search for new borrowers. The model does not generate volatility and much volume however; the only volume is the expanding lending, selling short, and lending again.

In "Over-the-Counter Markets,"²⁸ these same authors present a related matching and search model. The focus of this paper is on bid-ask spreads, and the point is to develop a theory of these spreads completely different from the standard one. In the standard theory, dealers hold an inventory of the asset, and manage the bid-ask spread to control this inventory and to control asymmetric information, that is, the chance that an "informed" trader will take advantage of the dealer. This model has no inventory and no asymmetric information.

The setup corresponds to the many assets that are at least partially traded over the counter. Agents randomly switch between low and high discount rates, motivating trade of a single claim to future consumption. (When you get more impatient, you sell to consume now). In addition, there are marketmakers who can instantly unload their positions on the inter-dealer market. Agents meet randomly. The bid-ask spread reflects the dealer's bargaining power versus the investors' other options — how easily he can find another investor to trade with, or another dealer. For example, spreads charged by dealers will be lower the easier it is for investors to find other investors in the over-the-counter market.

Wei Xiong, Harrison Hong, and José Scheinkman²⁹ present another model aimed at the curious features of the late 1990s Nasdaq, and Ofek and Richardson's finding that prices decline at the end of lockup periods in particular. They study a mechanism by which small float and short sales constraints lead to "overpriced" securities, a "bubble" in prices, defined for them as a situation in which agents rationally buying stocks they know to be overpriced on the expectation of further price rises, high turnover, and high volatility. All of these features decline when float increases, even when it is known in advance that float will increase.

There are three periods: 0, 1, and 2. An asset has a random payoff in period 2. Two investors are each endowed with half of the shares and they have identical mean-variance utility functions over terminal wealth. They may trade at period 0 or 1, but are subject

to short sales constraints. At period 1 they each receive a signal about the asset payoff. The signals are public, but each investor is “overconfident” about “his” signal, thinking it more correlated with the true payoff than it really is. As a result, the (ex-post) “optimist” will buy from the “pessimist” in period 1. Since they face short-sales constraints, there will be values of the signals for which one agent holds everything, and the period 1 valuation depends entirely on his signal. Working back, Xiong, Hong, and Scheinkman show that the price at time 0 will be larger than *both* agents’ expectations of fundamental value at time 0. They are both willing to pay for the “resale option” that an “overconfident” agent comes along and bids the price up even further. To the authors, this captures the essence of a “bubble”.

As the share size increases, the overall price in periods 0 and 1 decreases. This is the only asset, so each agent has to bear more risk. It also then becomes less likely that in period 1, after information is revealed, one or the other agent hits his short-sale constraint. If nobody hits the short-sale constraint, the “resale option” disappears. Conversely, with a very small share size, it becomes almost certain that one or the other agent will hit his short-sale constraint and therefore the asset will be “overpriced” in period 1. (Here quadratic utility is important. Were it log utility, nobody would ever want to be short.) Thus, “overpricing” is greater when share supply is lower, as Lamont and Thaler find for 3Com-Palm and as Ofek and Richardson find around lockup expiration in the Nasdaq.

Furthermore, as the share supply gets smaller, it becomes more and more certain that one agent will sell all of his shares to the other. Thus proportional turnover (not dollar turnover) is larger when share supplies are smaller. Similarly, price volatility is higher.

Xiong, Hong, and Scheinkman go on to show that the model continues to work in a multiperiod setting in which the agents know that a lockup expiration will add shares to the market. Thus, a predictable fall in price when shares predictably increase, a “downward sloping demand” of the puzzling sort, emerges.

Liquidity and Quality Premia

Acharya and Pedersen³⁰ present a model along with the empirical work I described earlier, and the model captures the four variants of a liquidity premium: in addition to the standard market beta, expected returns are higher for stocks that are illiquid on average, for stocks whose illiquidity gets worse when the market goes down, for stocks whose price goes down when the market gets more illiquid, and for stocks which become more illiquid when the market gets more illiquid.

The model consists of overlapping generations. Agents live two periods, earn income in the first period, and consume in both periods. Thus they buy securities when young and sell them when old. Agents in a generation also have different risk aversion. “Illiquidity” is simply a random security-specific per-share cost of selling each security — sellers receive the price less the cost per share. “Market illiquidity” is then just the value-weighted average of these costs. Securities are claims to dividend streams, and both dividends and the costs follow AR(1) processes.

The theory then is quite simple: since every agent liquidates his portfolio in the second period of his life, the CAPM holds exactly using returns after transactions costs. Simply expanding the standard expression of the CAPM that expected (return - cost) is proportional to the regression beta of (return - cost) on the (market return - cost), we obtain that expected returns rise with the expected cost of the individual security and the four “betas” listed above. Furthermore, since liquidity (transactions cost) is persistent, the model generates time-varying expected returns predictable on the basis of liquidity variables. (This is an important point. Many of the most popular trading strategies used by hedge funds and similar traders exploit return predictions based on the intersection of past returns and volume data.)

Dimitri Vayanos³¹ is motivated by another striking recent event, the “flight to quality” or “flight to liquidity” following the Russian bond default in 1998. This event seems to provide a paradigm of liquidity issues. For exam-

ple, the on-the-run versus off-the-run 30-year U.S. Treasury spread widened from 4 basis points (0.04 percent) to 28 bp. The spread between AA-rated corporate bonds and government bonds increased from 80bp to 150bp. At the same time, prices became much more volatile. For example, the implied volatility of the S&P500 index increased from 23 percent to 43 percent.

Naturally, “spread traders” who were typically short liquid securities (for example, on-the-run 30 year bonds) and long the illiquid ones (for example, off-the-run 29-year bonds) suffered huge losses. Withdrawals by investors as well as margin calls forced liquidations at unfavorable prices. The losses were made worse by seemingly uncorrelated assets becoming more correlated, revealing a common “liquidity factor” in returns. LTCM was the most famous casualty. Certainly these traders would have given up a lot of utility for a dollar delivered in that date and state, motivating a “risk premium” for assets that do not do so.

Vayanos presents a very sophisticated (in the sense that lots of things are endogenous) model that shows how illiquidity is linked to volatility, and that captures the larger betas and correlations of assets in times of high volatility and illiquidity. Investors in this model are all fund managers, and they earn a fixed fraction of assets under management. They face fixed asset-specific transactions costs. They also face the danger of a total withdrawal of funds. The chance of such a withdrawal is a linear function of the probability of achieving a return below a certain threshold, and is thus an increasing function of the fund’s volatility. After withdrawal, the manager gets to start a new fund of the same size as the old one right away. Thus the “withdrawal” simply means that the manager may have to pay the transactions costs (liquidation value - net asset value) and the model is formally equivalent to one with representative consumer-investors who face random liquidation events (more likely with higher volatility) in which they have to pay the transactions costs and then reinvest. The model is completed with the dividend processes of n risky assets that mean-revert, and have stochastic

volatility (square root processes). The dividends are driven by a common shock, a volatility shock and an idiosyncratic shock.

One result is an expected return model with liquidity and volatility effects. The expected return of each asset depends, first, on covariances with the market return (CAPM), but with a time-varying risk premium that is higher in times of volatility. Second, expected returns depend on the covariance of the asset with the volatility of dividend growth, again with a time-varying risk premium. Finally, the expected return of each asset rises if the transactions cost of that asset are higher, but again with a coefficient that is larger when volatility is larger. In each case, higher (exogenous) volatility of dividends, and hence of returns, increases the chance of withdrawals; the fund managers then require higher returns.

The model also predicts that conditional market betas vary through time, and their spread across assets is larger when volatility is higher. It also predicts that the correlation between assets typically increases in times of higher volatility. These properties flow from the assumption that the probability of withdrawals depends linearly on poor performance — the left tail of the return distribution. The chance of a left-tail event is a nonlinear function of volatility. When volatility is low, the chance is low and slowly increasing in volatility. When volatility is high, the chance of poor performance runs into the steeply sloping part of the conditional density, and so has a large effect. The model suggests a theory for a “liquidity pricing factor” such as found by Pastor and Stambaugh. While the transactions costs (bid-ask spread) in the model are constant for each asset, in a time of higher volatility small generalizations of the model suggest higher “price impact,” which forms the basis of Pastor and Stambaugh’s aggregate liquidity factor.

Bryan R. Routledge and Stanley E. Zin³² offer a different and frictionless interpretation. Many “flights to quality” have come after extreme market movements, movements that put to the test sophisticated traders’ hedging models, and found them failing. In

their frictionless view, bid-ask spreads widen when agents become more uncertain about the validity of their models.

Francis Longstaff³³ presents another model of liquidity and flight to quality. The model has two “Lucas Trees.” There also are two agents, one more impatient than the other. They can trade at time zero, but then they cannot trade for T periods. The length of this “blackout” period is the concept of illiquidity in the model. Longstaff solves for the resulting prices of the two trees.

In this model, the portfolio allocations can be quite different under illiquidity, even if that illiquidity is arbitrarily short-lived. The reason is that a log-utility investor can never have a short position in an asset for a finite time interval, as he then faces a probability of negative wealth. The impatient consumer therefore cannot borrow. Rather than hold the market portfolio of the two trees, agents now hold very polarized portfolios. The change in demand also has large effects on the prices of the two assets.

Anthony Lynch and Sinan Tan³⁴ tackle the low-volume problem and the Constantinides puzzle head-on. They consider a standard portfolio problem. They add predictable returns, another reason for individual or heterogeneous investors to trade. They add a stochastic labor income process, calibrated to PSID data, and wealth shocks to give a dynamic hedging motive. Finally, they introduce transactions costs to distinguish liquid and illiquid assets. Some calibrations of the model give liquidity premia in the ballpark found by Pastor and Stambaugh and Acharya and Pedersen. Of course, being partial equilibrium, we’re not sure who is on the other side of all this trading, or why things like predictable returns persist.

Volume and Liquidity

Andrew W. Lo, Harry Mamaysky, and Jiang Wang³⁵ construct a model of volume and liquidity. At heart they study how transactions costs reduce volume and induce a price discount.

As always, we first need some reason for agents to trade in the first

place. (The puzzle is that there is too much volume, not too little.) Lo, Mamaysky, and Wang achieve this by giving agents a nontradeable risky asset — a business, a job, et cetera. The outside income is correlated with the stock market, so the agents want to hedge it. As the outside income increases or declines in value, the optimal hedge changes, giving the agents a reason to trade continuously. Adding transactions costs, the agents trade less frequently, in discontinuous lumps. As a result, the agents bear more risk, and so demand less of the risky asset. Then, the risky asset has a price (“illiquidity”) discount. This discount is approximately proportional to the square root of the transactions cost, so it is large for small costs.

Specifically, Lo, Mamaysky, and Wang model two agents in continuous time. The only assets are a stock — a claim to a random walk dividend — and a riskless bond. The “outside income” is a claim to the same dividend process, but the size of this claim also varies as a random walk. There is one kind of tree in the valley, so all trees bear the same amount of fruit. Some trees live in the orchard, and agents trade claims to those trees. Some trees are constantly uprooted from one agent’s yard and planted in the other’s yard. The lucky guy who got the tree will then want to sell some stock (claims to the orchard) to the unlucky guy who lost the tree. He keeps his increased wealth, but the right risk exposure gets reestablished in this way. The (substantial) technical achievement of the model is to solve for the agents’ trading policies (a band of inaction) and the equilibrium asset price when there is in addition a fixed (per trade, not per share) transactions cost.

The perfect correlation of “outside income” with the stock seems artificial, but components of outside income uncorrelated with stocks generate no hedging demand. Therefore, this is a useful simplification so long as one’s quantitative evaluation of the model recognizes that this is the component of income correlated with stocks and not the whole thing.

Andrew W. Lo and Jiang Wang³⁶ continue an exploration of volume

motivated by dynamic hedging. They write a model with investors who vary in risk aversion, and in sensitivity to a second, non-market state variable. (For example, older investors may care less than younger investors about a decline in short-term interest rates, which lowers prospective returns to investment.) As a result, investors continuously trade both the market portfolio and a hedge portfolio for this state variable. Then Lo and Wang identify the composition of the hedge portfolio by looking for factor structure in volume.

I think the best way to think of these papers is to regard outside income and hedging as useful shortcuts to generate some trading. Then, the point of the paper is how transactions costs reduce trading and induce price discounts. I do not think they are useful models of why there is so much trading in the first place. Each share on the NYSE turns over on average about once per year. Twenty percent of Palm shares changed hands every day. Hedging non-marketed income or hedging state variables seems to me a hopeless starting point for a realistic and quantitatively compelling understanding of such massive turnover.

Perhaps in response to this sort of doubt, Guillermo Llorente, Roni Michaely, Gideon Saar, and Jiang Wang³⁷ examine the dynamic relation between volume and returns to try to separate volume into “hedging” and “speculative” components. They run regressions of daily individual-stock returns on the previous day’s return and on the previous day’s return multiplied by volume. They argue that a positive coefficient on lagged return times volume indicates “speculative trade”: informed investors know that tomorrow’s return (on the left hand side) will be large; they buy on that knowledge sending today’s return up a bit and creating some volume in the process. By contrast, a negative coefficient on return times volume represents “hedging trade.” Agents selling in to a market without information will push the price down temporarily, so a low return today times volume will presage larger returns tomorrow as the price bounces back. This is the same idea as in Pastor and Stambaugh’s liquidity measure. (And as in that case,

lagged returns on the right hand side means we are controlling for “regular” serial correlation in returns, which gives me pause.) The main finding is straightforward. Stocks with higher bid/ask spreads and smaller size — proxies for larger “information asymmetry” — have large positive coefficients on return times volume, suggesting “speculative” trade. Large stocks with small bid/ask spreads have negative coefficients suggesting more “hedging” motives.

Concluding Comments

Exchanges exist to trade stocks and bonds, and most of that trade occurs on information. For a long time, we have presumed that this trading activity has at best a second-order effect on the level of asset prices. Now both empirical work and theory are pointing to the exiting possibility that it is not; that a substantial portion of level and variation of asset prices, both over time and across assets, may reflect how those assets are used in trading.

This study is in its infancy. You can see empiricists struggling with definitions of liquidity and how to see its effects. You can see theorists struggling to formalize the intuition that liquidity and trading should matter, and to overcome the classic theorems that rule out information trading and give small effects of trading costs. But infants grow quickly, and it is a time of great progress on both fronts.

¹ O. A. Lamont and R. H. Thaler, “Can the Market Add and Subtract? Mispricing in Tech Stock Carve-Outs,” NBER Working Paper No. 8302, May 2001, and *Journal of Political Economy*, 111, pp. 227-68.

² J. H. Cochrane, “Stocks as Money: Convenience Yield and the Tech-Stock Bubble,” NBER Working Paper No. 8987, June 2002, and in W. C. Hunter, G. G. Kaufman, and M. Pomerleano, eds., *Asset Price Bubbles*, Cambridge: MIT Press, 2003.

³ J. M. Griffin, F. Nardari, and R. M. Stulz, “Stock Market Trading and Market Conditions” NBER Working Paper No. 10719, September 2004.

⁴ E. Ofek and M. Richardson, “DotCom Mania: The Rise and Fall of Internet Stock

Prices” NBER Working Paper No. 8630, December 2001, and in *Journal of Finance*, 58 (2003), pp. 1113-37.

⁵ C. Jones and O. A. Lamont, “Short Sale Constraints and Stock Returns,” NBER Working Paper No. 8494, October 2001, and in *Journal of Financial Economics*, 66 (3-3) (2002), pp. 207-39.

⁶ O. A. Lamont, “Go Down Fighting: Short Sellers vs. Firms,” NBER Working Paper No. 10659, July 2004.

⁷ O. A. Lamont and J. C. Stein, “Aggregate Short Interest and Market Valuations,” NBER Working Paper No. 10218, January 2004, and in *American Economic Review*, 94 (2) (May 2004), pp. 29-32.

⁸ E. Ofek, M. Richardson, and R. F. Whitelaw, “Limited Arbitrage and Short Sales Restrictions: Evidence from the Options Markets,” NBER Working Paper No. 9423, January 2003, forthcoming in *Journal of Financial Economics*.

⁹ R. Battilio and P. Schultz, “Options and the Bubble,” manuscript, University of Notre Dame, 2004.

¹⁰ M. O’Hara, “Presidential Address: Liquidity and Price Discovery,” in *Journal of Finance*, 58 (2003), pp. 1335-54.

¹¹ F. A. Longstaff, “The Flight-to-Liquidity Premium in U.S. Treasury Bond Prices,” NBER Working Paper No. 9312, November 2002.

¹² F. A. Longstaff, S. Mithal, and E. Neis, “Corporate Yield Spreads: Default Risk or Liquidity? New Evidence From the Credit-Default Swap Market,” NBER Working Paper No. 10418, April 2004.

¹³ L. Pastor and R. F. Stambaugh, “Liquidity Risk and Expected Stock Returns,” NBER Working Paper No. 8462, September 2001, and *Journal of Political Economy*, 111, pp. 642-85.

¹⁴ The canonical asset pricing model states that expected returns should be proportional to the regression coefficients of returns on pricing factors, $E(R^i) = \beta_i \lambda$.

Thus, a spread in average returns $E(R^i)$ across portfolios i is explained if they are linearly related to the betas β_i . For example, researchers often run a regression across assets of $E(R^i)$ on β_i and test whether the slope coefficient λ is significant.

¹⁵ V.V. Acharya and L. H. Pedersen, “Asset Pricing with Liquidity Risk,” NBER Working Paper No. 10814, October 2004.

¹⁶ The regression is

$$r_{i,d+1,t}^e = \theta_{i,t} + \phi_{i,t} r_{i,d,t} + \gamma_{i,t} \text{sign}(r_{i,d,t}^e) \times v_{i,d,t} + \varepsilon_{i,d+1,t}$$

where r = return, r^e = return in excess of market return, and v = dollar volume.

¹⁷ To be specific, they calculate

$$\Delta \hat{\gamma}_t = \frac{m_t}{m_1} \frac{1}{N_t} \sum_{i=1}^N (\hat{\gamma}_{i,t} - \hat{\gamma}_{i,t-1})$$

$$\Delta \hat{\gamma}_t = a + b \Delta \hat{\gamma}_{t-1} + c \left(\frac{m_{t-1}}{m_t} \right) + u_t$$

where m denotes total market value. Their measure of "market liquidity" is $L_t = u_t / 100$.

¹⁸ Their raw measure of the illiquidity of stock i for month t is

$$ILLIQ_t^i = \frac{1}{\# \text{Days}} \sum_{d=1}^{\# \text{Days}} \left| \frac{R_{t,d}^i}{V_{t,d}^i} \right|$$

where R denotes return and V denotes dollar volume.

¹⁹ Their final measure of liquidity of stock i for month t is

$$c_t^i = \min(0.25 + 0.30 \times ILLIQ_t^i \times P_{t-1}^M, 0.30)$$

where P_{t-1}^M is an index of the capitalization of the total market portfolio.

²⁰ M. D. D. Evans and R. K. Lyons, "Order Flow and Exchange Rate Dynamics," NBER Working Paper No. 7317, August 1999, and *Journal of Political Economy*, 110, pp. 170-80.

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²² M. W. Brandt and K. A. Kavajecz, "Price Discovery in the U.S. Treasury Market: The Impact of Orderflow and Liquidity on the Yield Curve," NBER Working Paper No. 9529, March 2003, and forthcoming, *Journal of Finance*, December 2004.

²³ K. A. Froot and T. Ramadorai, "Currency Returns, Institutional Investor Flows, and Exchange Rate Fundamentals," NBER Working Paper No. 9101, August 2002.

²⁴ N. Barberis, A. Shleifer, and J. Wurgler, "Comovement," NBER Working Paper No. 8895, April 2002, forthcoming in the *Journal of Financial Economics*.

²⁵ P. Milgrom and N. Stokey, "Information, Trade and Common Knowledge," *Journal of Economic Theory*, 26 (1982), pp. 17-27.

²⁶ G. M. Constantinides, "Capital Market Equilibrium with Transaction Costs," *Journal of Political Economy*, 94 (1986), pp. 842-62.

²⁷ D. Duffie, N. Garleanu, and L. H. Pedersen "Securities Lending, Shorting, and Pricing," *Journal of Financial Economics*, 66 (2002), pp. 307-39, presented at Spring 2001 Asset Pricing Program Meeting.

²⁸ D. Duffie, N. Garleanu, and L. Heje Pedersen, "Over-the-Counter Markets," NBER Working Paper No. 10816, October 2004, previously "Valuation in Dynamic Bargaining Markets."

²⁹ W. Xiong, H. Hong, and J. Scheinkman,

"Asset Float and Speculative Bubbles," presented at the Fall 2003 AP Program Meeting.

³⁰ V. V. Acharya and L. H. Pedersen, "Asset Pricing with Liquidity Risk."

³¹ D. Vayanos, "Flight to Quality, Flight to Liquidity, and the Pricing of Risk," NBER Working Paper No. 10327, February 2004.

³² B. R. Routledge and S. E. Zin, "Model Uncertainty and Liquidity," NBER Working Paper No. 8683, December 2001.

³³ F. A. Longstaff, "Financial Claustrophobia: Asset Pricing in Illiquid Markets," NBER Working Paper No. 10411, April 2004.

³⁴ A. Lynch and S. Tan, "Explaining the Magnitude of Liquidity Premia: The Roles of Return Predictability, Wealth Shocks and State-Dependent Transaction Costs," presented at Spring 2004 Asset Pricing Program Meeting.

³⁵ A. W. Lo, H. Mamaysky, and J. Wang, "Asset Prices and Trading Volume Under Fixed Transactions Costs," NBER Working Paper No. 8311, May 2001, and *Journal of Political Economy*, 112, 5 (October 2004), pp. 1054-90.

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Infant and Child Health

Ted Joyce*

The U.S. infant mortality rate, defined as the number of deaths before age one per 1000 live births, fell from 12.6 in 1980 to 6.9 in 2000, a decline of 45 percent.¹ Over this same period, the total age-adjusted death rate in the United States fell by only 16.4 percent. We can decompose this decline in infant mortality into two components: changes in the healthiness of newborns and changes in the survival rate of newborns conditional on a given level of health. One widely used measure of newborn health, the rate of low birth weight births, is defined as the percentage of live births of babies who weigh less than 2500 grams or 5.5 pounds. The rate of low birth weight in the United States has actually risen since 1980, from 6.8 to 7.6 percent.² A large portion of the increase is attributable to the rise in multiple births, which have grown from 2 to 3 percent of all live births over the same period. However, even if we adjust for multiple births, the underlying healthiness of newborns in the United States has remained largely unchanged since 1980. In short, the remarkable increase in the survival rate

of infants has resulted almost exclusively from advances in the technology of newborn care.

Why, therefore, has the underlying morbidity of newborns, as proxied by the rate of low birth weight births, remained so immovable? Even more baffling, why has there been so little change in the rate of low birth weight despite increases in the prenatal inputs that many contend should lower its incidence. For instance, the percentage of women who initiate prenatal care in the first trimester increased from 76.3 in 1980 to 83.7 in 2000. The percentage of women who smoke during pregnancy fell from 18.4 in 1990 to 11.4 in 2002, while the number of infants served by the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) has almost doubled since 1988.³

Recent research by my colleagues and me suggests that previous estimates of the efficacy of many inputs designed to improve newborn health is probably inflated by favorable selection. The women who initiate prenatal care early, or who participate in WIC, are likely to be more motivated, less stressed, and more risk averse than the women who start care late or who do not participate in WIC. Too often we lack empirical methods for overcoming the problems caused by selection. In addition, in vetting their results, economists often neglect the clinical literature. Consider studies of the effect of programs to enhance maternal nutrition on infant health. Economic theory is helpful in specifying

the demand for nutrition, but the effect of nutrition on fetal growth is a physiological, not an economic, relationship. For example, the consensus in the literature has been that “WIC works.” In a recent study, economists reported that prenatal WIC participation was associated with a 50 percent decline in very preterm births, infants born before 33 weeks gestation.⁴ These results were consistent with a widely-cited study by economist Barbara Devaney and colleagues in which WIC was associated with a decline of between 2.2 and 6.2 percentage points in rate of preterm birth.⁵ Nationally, 9.7 percent of single births — versus twins, triplets, and other multiple births — were preterm in 1989. These are remarkable improvements, but they are strongly at odds with the clinical literature. In randomized trial after trial, clinical researchers have been unable to find any intervention that prevents preterm birth. In a candid editorial in the *New England Journal of Medicine*, a leading investigator writes:⁶

“Trials measuring the effect of interventions at eliminating a single risk factor are numerous; uterine contractions have been suppressed, cervixes have been sewn shut, microorganisms have been eliminated, and social support, better nutrition, and prenatal care have been provided. When these factors have been studied in isolation, not one has resulted in a decline in preterm birth” (p. 54).

I am not arguing that social scientists have little to contribute to the clinical literature in matters of health.

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However, the “theory” that guides the interpretation of treatment effects is often medicine and not economics. In such analyses, we can increase the credibility of our work if we use clinical findings to understand and perhaps challenge our results.

My colleagues Diane Gibson and Silvie Colman and I make these points in a recent NBER Working Paper.⁷ We use 14 years of birth certificates from New York City to analyze the effect of prenatal WIC participation on measures of fetal growth from 1988 to 2001. Because we have no convincing instruments, we take advantage of our large sample size to stratify the analysis by race, ethnicity, nativity, parity and the timing of prenatal care. The objective is to lessen unobserved heterogeneity by comparing similar women. For instance, we consider only women on WIC or on Medicaid. We further limit the sample to women with no previous live births and who thus have no experience with WIC from a prior pregnancy. We further limit the study to women who initiate prenatal care in the first months of pregnancy. These are likely to be the most motivated women with the longest exposure to WIC during pregnancy. Finally, we analyze two important subgroups separately: U.S.-born Blacks and foreign-born Hispanics. This latter stratification is motivated by our previous research on prenatal exposure to crack cocaine in New York City.⁸ The crack epidemic hit U.S.-born Blacks in New York City much more intensely than other groups. There is also rigorous evidence that cocaine use among pregnant Hispanic women has been minimal.⁹ If exposure to crack is an important omitted variable, then it is more likely to contaminate results among U.S.-born Blacks than foreign-born Hispanics.

Our results suggest that prenatal participation in WIC has had little impact on fetal growth in New York City between 1988 and 2001. However, we do find a strong association between WIC and rates of low birth weight among U.S.-born Blacks between 1988 and 1992 and relatively little association thereafter. We uncover no association between fetal growth and WIC among foreign-born Hispanics in any year. The

results for U.S.-born Blacks, we suspect, are related to differences in prenatal exposure to crack cocaine between WIC and non-WIC participants during the peak years of the epidemic. As the epidemic waned, so did the association between WIC and low birth weight.

One criticism is that our results pertain to a relatively low-risk group of women. Previous researchers have found stronger effects of WIC on birth outcomes among unmarried women, teens, and smokers. We contend that stratification by such endogenous risk factors may exacerbate problems of omitted variables. As an alternative, we use “twinning” as an exogenous risk factor and we compare differences in fetal growth between WIC and non-WIC participants who delivered twins. Over half of twin births are low birth weight and the risk of anemia and inadequate weight gain are substantially greater among twins than single births. If WIC improves fetal growth, then it is more likely to be evident among twins. Again, we find little association between WIC and fetal growth among twins except for U.S.-born Black less than 25 years of age and only for selected years.

Demand for Health Inputs

The estimation of treatment effects is clearly a challenge in studies that use non-randomized research designs. In recent papers, my colleagues and I have focused on the demand for health inputs in which the treatment effects have been well established by clinical trials. For instance, there is widespread agreement among clinicians and epidemiologists that prenatal smoking stunts fetal growth. Our contribution was to analyze the determinants of prenatal smoking. We were not the first. William Evans and Jeanne Ringel used national natality files and demonstrated that cigarette excise taxes lowered smoking during pregnancy and that taxes were positively related to infant birth weight. They also showed, however, that one needed 10,000,000 births before there was sufficient power to detect the reduced form effect of birth weight on taxes.¹⁰ But the screen for smoking on birth cer-

tificates is limited. It only indicates whether the mother smoked at some time during pregnancy. She may have smoked and then quit or never smoked at all. Alternatively, she may have quit so early in pregnancy that she never considered herself a smoker. Finally, it was unclear whether cigarette excise taxes affect pregnant women above and beyond their affect on smoking among women of reproductive age.

To address these issues Greg Colman, Michael Grossman, and I analyzed the effects of cigarette excise taxes on maternal quit rates.¹¹ We used data from the Pregnancy Risk Assessment Monitoring System (PRAMS) because it included information on smoking three months before pregnancy, three months before delivery, and also between two and six months after delivery. We show analytically that if taxes affect quit rates during pregnancy, the elasticity of smoking participation during pregnancy must be more (in absolute value) than the elasticity of smoking participation three months before conception. This is what we found: the elasticity of smoking participation was -0.91 three months before delivery versus -0.30 three months before conception. As a result, we obtained a strong quit elasticity of 1.0 that was robust to a number of specification checks. We conclude that exogenous changes in cigarette prices of 30 cents or more may be as effective as smoking cessation programs at reducing prenatal smoking.

Another input with a direct link to child health is immunizations. Vaccines are arguably the greatest public health achievement of the twentieth century and a highly effective measure of both the quality of pediatric care and the improvement in health associated with vaccine-preventable illnesses. There are now 19 doses of vaccines that an infant should receive within the first 18 months, up from 8 in 1987. Costs of vaccines to fully immunize a child have risen from \$116 in 1987 at private sector prices to \$525 in 2002. However, new vaccines are much more expensive than older ones. The varicella and pneumococcal vaccines cost approximately \$62.00 per dose, making them three times more expensive than either the combined vaccine for diphtheria,

acellular pertussis, and tetanus (DaPt) or the inactivated vaccine for polio (IPV).¹²

The number and costs of vaccines, as well as the complexity of vaccine schedules, suggest that up-to-date immunization rates may be sensitive to whether parents have health insurance that covers childhood vaccines. To test this, Andrew Racine and I used the recently released National Immunization Survey (NIS) to determine whether the State Children's Health Insurance Program (SCHIP) was associated with a relative increase in vaccine coverage rates among poor and near-poor relative to non-poor children.¹³ The NIS is an annual population-based survey of households with at least one child between 19 and 35 months of age. The survey contains information from approximately 34,000 households per year from 1995 to 2002. Until the recent release of NIS, the United States had little consistent information at the state and metropolitan level with which to monitor immunization rates and to assess the effect of initiatives such as SCHIP.

We estimated a reduced-form model of immunization rates on the presence of SCHIP program. Identification came from variation in the timing of SCHIP implementation by states and the generosity of state programs, as measured by income eligibility thresholds above those that existed for infants and children through Medicaid. We found little evidence to suggest that SCHIP has had a major impact on narrowing the gap in immunization rates between poor and non-poor children. The one exception was the varicella vaccine in which differences in coverage rates between poor and non-poor children converged rapidly

between 1997 and 2001. Moreover, convergence was faster among poor children from groups or areas with above average rates of uninsured children. However, in tests of robustness we found that the rise in varicella coverage rates often preceded implementation in SCHIP, which undermined a causal interpretation.

In summary, advances in perinatal care and the development of new pediatric vaccines are probably the two most important changes affecting infant and child health over the past two decades. Research as to which policies most effectively improve access and use of these inputs would be a useful area of work for economists.

¹ See [ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Publications/Health_US/bus03/](http://ftp.cdc.gov/pub/Health_Statistics/NCHS/Publications/Health_US/bus03/)

² See <http://www.cdc.gov/nchs/pressroom/03facts/teenbirth.htm>;
<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5127a1.htm>

³ See http://www.cdc.gov/nchs/data/mvsr/supp/mv46_11s.pdf
<http://www.cdc.gov/nchs/pressroom/03facts/teenbirth.htm>
<http://www.cdc.gov/nchs/pressroom/01news/smokpreg.htm>

U.S. House of Representatives: Committee on Ways and Means, 2000 Green Book, Washington D.C.: U.S. Government Printing Office, 2000.

⁴ M. Bitler and J. Currie, "Does WIC Work? The Effects of WIC on Pregnancy and Birth Outcomes," forthcoming in *Journal of Policy Analysis and Management*.

⁵ B. Devaney, L. Bilheimer, and J. Schore, "Medicaid Costs and Birth Outcomes: The Effects of Prenatal WIC Participation and the Use of Prenatal Care," *Journal of Policy Analysis and Management*, 11 (4) (1992), pp. 573-92.

⁶ J. Iams, "Prevention of Preterm Birth,"

New England Journal of Medicine, 338 (1) (1998), pp. 54-6.

⁷ T. Joyce, D. Gibson, and S. Colman, "The Changing Association between Prenatal Participation in WIC and Birth Outcomes in New York City," NBER Working Paper No. 10796, September 2004.

⁸ T. Joyce, A. Racine, S. McCalla, and H. Webb, "The Impact of Prenatal Exposure to Cocaine on Newborn Costs and Length of Stay," NBER Working Paper No. 4673, March 1994, and *Health Services Research*, 30 (1995), pp. 341-58; T. Joyce, A. Racine, and N. Mocan, "The Consequences and Costs of Maternal Substance Abuse in New York City: A Pooled Time-Series Cross-Section Analysis," NBER Working Paper No. 3987, March 1993, and *Journal of Health Economics*, 11 (1992), pp. 297-314;

and A. Racine, T. Joyce, and R. Anderson, "The Association Between Prenatal Care and Birthweight Among Women Exposed to Cocaine in New York City," *Journal of the American Medical Association*, 270 (1993), pp. 1581-6.

⁹ W. A. Vega, et al, "Prevalence and Magnitude of Perinatal Substance Exposures in California," *New England Journal of Medicine*, 329 (1993), pp. 850-4.

¹⁰ W. N. Evans and J. S. Ringel, "Can Higher Cigarette Taxes Improve Birth Outcomes?" NBER Working Paper No. 5998, April 1997, and *Journal of Public Economics*, 72 (1999), pp. 135-54.

¹¹ G. Colman, M. Grossman, and T. Joyce, "The Effect of Cigarette Excise Taxes on Smoking Before, During and After Pregnancy," *Journal of Health Economics*, 22 (2003), pp. 1053-72.

¹² See http://www.cdc.gov/nip/vfc/cdc_vac_price_list.htm

¹³ T. Joyce and A. Racine, "Chip Shots: Association between The State Children's Health Insurance Programs and Immunization Coverage and Delivery," NBER Working Paper No. 9831, July 2003.

Short Sale Constraints and Overpricing

Owen A. Lamont*

Short sale constraints — including various costs and risks of shorting, as well as legal and institutional restrictions — can allow stocks to be overpriced. If these impediments prevent investors from shorting certain stocks, then these stocks can be overpriced and thus have low future returns until the overpricing is corrected. By identifying stocks with particularly high short sale constraints, one identifies stocks with particularly low future returns.

Consider a stock whose fundamental value is \$100 (that is, \$100 would be the share price in a frictionless world). If it costs \$1 to short the stock, then arbitrageurs cannot prevent the stock from rising to \$101. If the \$1 is a holding cost that must be paid every day that the short position is held, then selling the stock short becomes a gamble that the stock will fall by at least \$1 a day. In such a market, a stock could be very overpriced, yet if there is no way for arbitrageurs to earn excess returns, the market is still in some sense efficient. If frictions are large, “efficient” prices may be far from frictionless prices.

Short Sale Constraints

To be able to sell a stock short, one must borrow it, and because borrowing shares is not done in a centralized market, finding shares sometimes can be difficult or impossible. In order to borrow shares, an investor needs to find an owner willing to lend them. These lenders receive a fee in the form of interest payments generated by the

short-sale proceeds, minus any interest rebate that the lenders return to the borrowers. This rebate acts as a price that equilibrates supply and demand in the securities lending market. In extreme cases, the rebate can be negative, meaning investors who sell short have to make a daily payment to the lender for the right to borrow the stock (instead of receiving a daily payment from the lender as interest payments on the short sale proceeds). This rebate only partially equilibrates supply and demand, because the securities lending market is not a centralized market with a market-clearing price.

Once a short seller has initiated a position by borrowing stock, the borrowed stock may be recalled at any time by the lender. If the short seller is unable to find another lender, he is forced to close his position. This possibility leads to recall risk, one of many risks that short sellers face.

Generally, it is easy and cheap to borrow most large cap stocks, but it can be difficult to borrow stocks that are small, have low institutional ownership, or are in high demand for borrowing. In addition to the problems in the stock lending market, there are a variety of other short sale constraints. U.S. equity markets are not set up to make shorting easy. Regulations and procedures administered by the SEC, the Federal Reserve, the various stock exchanges, underwriters, and individual brokerage firms can mechanically impede short selling. Legal and institutional constraints inhibit or prevent investors from selling short (most mutual funds are long only). We have many institutions set up to encourage individuals to buy stocks, but few institutions set up to encourage them to short. In addition to regulations, short sellers also face hostility from society at large. Policymakers and the general public seem to have an instinctive reaction that short selling is morally wrong.

Short sellers face periodic waves of harassment from governments and society, usually in times of crisis or following major price declines, as short sellers are blamed.

The Overpricing Hypothesis

Short sale constraints can prevent negative information or opinions from being expressed in stock prices, as in Miller (1977).¹ Although constraints are necessary in order for mispricing to occur, they are not sufficient. Constraints can explain why a rational investor fails to short the overpriced security, but not why anyone buys the overpriced security. To explain that, one needs investors who are willing to buy overpriced stocks. Thus two things, trading costs and some investors with downward sloping demand curves, are necessary for substantial mispricing. This willingness to hold overpriced stocks can be interpreted either as reflecting irrational optimism by some investors, or rational speculative behavior reflecting differences of opinion. In the rational model of Harrison and Kreps (1978), differences of opinion, together with short sale constraints, create a “speculative premium” in which stock prices are higher than even the most optimistic investor’s assessment of their value.² Short sale constraints generate a pattern of overpriced stock leading to subsequent low returns.

Short Selling in the 1920s

Charles M. Jones and I study a direct measure of shorting costs, coming from the securities lending market.³ Stocks that are expensive to short should have low subsequent returns. We use a unique dataset that details shorting costs for New York Stock Exchange (NYSE) stocks from 1926

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to 1933. In this period, the cost of shorting certain NYSE stocks was set in a centralized stock loan market on the floor of the NYSE.

From this public record, we collected eight years of data on an average of 90 actively traded stocks per month. New stocks periodically appear in our database when shorting demand cannot be met by normal channels; when stocks begin trading in the centralized borrowing market, they usually have high shorting costs. Thus, appearance in our database conveys important information about shorting demand. In our sample, a few of the stocks were astronomically expensive to borrow, with negative rebates and shorting costs of more than 50 percent per year.

Our results show that stocks that are expensive to short or which enter our database have low subsequent returns, consistent with the hypothesis that they are overpriced. This return predictability shows that shorting costs keep arbitrageurs from forcing down the prices of overvalued stocks. The magnitude of the effect is huge, reflecting the fact that this is a very special sample of extremely overpriced stocks that have extremely low returns. Stocks entering our sample have (in the year following their first appearance) average returns that are 1 percent to 2 percent per month lower than other stocks of similar size. So over the next year they under perform by about 12-24 percent in total.

Go Down Fighting

Yet another form of short sale constraints that I study are those deliberately engineered to hurt the short sellers.⁴ Firms (either management or shareholders) can take a variety of actions to impede short selling of their stock. Firms take legal and regulatory actions to hurt short sellers, including accusing them of illegal activities, suing them, hiring private investigators to probe them, and requesting that the authorities investigate their activities. Firms take technical actions to make shorting the stock difficult, such as splits or distributions specifically designed to disrupt short selling. Management can coordinate with shareholders to withdraw shares from

the stock lending market, thus preventing short selling.

I look at long-term returns for a sample from 1977 to 2002 for 266 firms who threaten, take action against, or accuse short sellers of illegal activity or false statements. The sample uses publicly observable actions from news reports and firm press releases. It turns out that sample firms have very low returns in the year subsequent to taking anti-shorting action. Abnormal returns are approximately -2 percent per month in the subsequent year, and continue to be negative in subsequent years. Thus the evidence is consistent with the idea that short sale constraints allow very substantial overpricing, and that this overpricing gets corrected only slowly over many months.

3com/Palm

A third example of clear overpricing comes from 3Com/Palm, which I studied with Richard H. Thaler.⁵ In this case, the driving force is not fraud but rather overoptimistic investors. Again, having some investors overoptimistic is not a problem, as long as there are more rational investors who can correct their mistakes by short selling. But add overoptimistic investors and short sale constraints together, and the result is overpricing.

On March 2, 2000, 3Com (a profitable company selling computer network systems and services) sold a fraction of its stake in Palm (which makes hand-held computers) to the general public via an initial public offering (IPO) for Palm. In this transaction, called an equity carve-out, 3Com retained ownership of 95 percent of the shares. 3Com announced that, pending an expected IRS approval, it would eventually spin off its remaining shares of Palm to 3Com's shareholders before the end of the year. 3Com shareholders would receive about 1.5 shares of Palm for every share of 3Com that they owned.

This event put in play two ways in which an investor could buy Palm. The investor could buy (say) 150 shares of Palm directly, or he could buy 100 shares of 3Com, thereby acquiring a claim to 150 shares of Palm plus a portion of 3Com's other assets.

Since the price of 3Com's shares can never be less than zero (equity values are never negative), the price of 3Com should have been at least 1.5 times the price of Palm.

After the first day of trading, Palm closed at \$95.06 a share, implying that the price of 3Com should have been at least \$145 (using the precise ratio of 1.525). Instead, 3Com fell to \$81.81. The "stub value" of 3Com (the implied value of 3Com's non-Palm assets and businesses) was minus \$63. In other words, the stock market was saying that the value of 3Com's non-Palm business was minus 22 billion dollars.

This example is puzzling because there is a clear exit strategy. This spin-off was expected to take place in less than a year, and a favorable IRS ruling was highly likely. Thus, in order to profit from the mispricing, an arbitrageur would need only to buy one share of 3Com, short 1.5 shares of Palm, and wait six months or so. In essence, the arbitrageur would be buying a security worth at worst worth zero for -\$63, and would not need to wait very long to realize the profits. If one had been able to costlessly short Palm and buy 3Com, one could have made very substantial returns. This mispricing was possible because shorting Palm during this period was either difficult and expensive, or (for many investors) just impossible.

Short Sale Constraints More Generally

Each one of these three examples has unique characteristics, and it is conceivable that any one result reflects chance or an unusual sample period. But taken together, the evidence shows that in extreme cases where short sellers want to short a stock but find it difficult to do so, overpricing can be very large.

Can short sale constraints explain the amazing gyrations of stock prices in recent years? Prices seemed absurdly high in the period 1999-2000, especially for technology-related stocks. The Palm example shows that for some specific stocks, short sale constraints relating to mechanical problems in stock lending are surely the answer. More generally though, diffi-

culty in borrowing stock cannot be the whole story. One can always easily short NASDAQ or the S&P using futures or exchange-traded funds.

So if short sale constraints do play a wider role, it is not because of the stock lending difficulties, but because of more generic short sale constraints. Jeremy C. Stein and I look at short selling of NASDAQ stocks during this period, and find that short selling actually decreased as NASDAQ rose.⁶ Thus, for whatever reason, the amount of short selling was not enough to drive prices down to rational valuations.

For most large cap stocks it is not difficult to sell short. Thus one cannot conclude from the evidence that short sale constraints are pervasive phenomena in stock pricing. What we do know

is that for most stocks, very little short selling occurs (relative to other trading activity) and most investors never go short. Thus something is constraining short selling, perhaps lack of knowledge about shorting, institutional constraints, risk, or cultural issues. Generalizing from the narrow (but dramatic) evidence discussed here, one can speculate that these more general short sale constraints also affect stock prices.

¹ E. M. Miller, "Risk, Uncertainty, and Divergence of Opinion," *Journal of Finance*, (September 1977), pp. 1151-68.

² J. M. Harrison and D.M. Kreps, "Speculative Investor Behavior in a Stock Market with Heterogeneous Expectations," *Quarterly Journal of Economics*, (May 1978), pp. 323-36.

³ C. M. Jones and O. A. Lamont, "Short Sale Constraints and Stock Returns," *NBER Working Paper No. 8494*, October 2001, and *Journal of Financial Economics*, (November 2002), pp. 207-39.

⁴ O. A. Lamont, "Go Down Fighting: Short Sellers vs. Firms," *NBER Working Paper No. 10659*, July 2004.

⁵ O. A. Lamont and R. H. Thaler, "Can the Market Add and Subtract? Mispricing in Tech Stock Carve-outs," *NBER Working Paper No. 8302*, May 2001, and *Journal of Political Economy*, (April 2003), pp. 227-68.

⁶ O. A. Lamont and J. C. Stein, "Aggregate Short Interest and Market Valuations" *NBER Working Paper No. 10218*, January 2004, and *American Economic Review*, May 2004.

Historical Perspectives on Racial Economic Differences: A Summary of Recent Research

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Few public policy debates in the United States are as contentious or as long lasting as those arising from racial economic differences. Historical perspective is essential to these debates because history casts a long shadow — what happened in the past, even the distant past, can affect economic behavior today — and because race is central to so much of the political, social, and economic history of the United States. Race, as the Nobel Prize-winning economist Gunnar Myrdal put it, is the "American dilemma."

Much of the research that I have conducted while associated with the

NBER has focused on racial economic differences. For example, my book *Race and Schooling in the South, 1880-1950: An Economic History* is an extended analysis of the economics of segregated schools in the South prior to the Supreme Court's famous decision in *Brown v. Board of Education* whose 50-year anniversary is celebrated this year.¹ In this summary I briefly discuss my recent work on racial differences, most of which has been conducted jointly with NBER Research Associate William J. Collins, my colleague at Vanderbilt University.

Racial Differences in Schooling

In the United States today black children lag behind their white counterparts in most dimensions of schooling. These gaps have been attributed

variously to racial differences in the quality of schooling, family background, neighborhood and other environmental factors, and to cultural biases in testing procedures. Economically, the schooling gaps matter because the American labor market rewards schooling, and these rewards have grown larger over time.

Collins and I² attempt to provide some historical perspective on contemporary racial differences in schooling. Our work draws heavily on recently available public use samples of various federal censuses, as well as on other public documents. We interpret the evidence in an "analytic narrative" that is based conceptually on a simple model of optimal investment in schooling. The narrative has three principal themes. First, in all the dimensions that the data address, the long-term pattern is one of substantial racial convergence. Second, conver-

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gence is not a recent phenomenon; it began long before the Civil Rights Revolution of the 1960s. Third, the South is central to the narrative because, historically, most blacks lived in the South and the educational conditions in the South lagged substantially behind other regions for both races. Our paper considers a variety of schooling indicators in depth, but the data on illiteracy and school attendance serve to illustrate the major themes. In 1870, the first year for which national data by race were reported, the aggregate racial gap in literacy rates was an astounding 68 percentage points. The gap was so high because the vast majority of blacks at the time were former slaves or their offspring, and literacy was extremely difficult to acquire under slavery. Of the many “treatment effects” of the Civil War, the establishment of schools for black children in the South in the aftermath of the War was perhaps one of the most important, for it enabled successive generations of black children to become literate. Although literacy per se did not require much exposure to formal schooling, the returns to literacy, measured in terms of occupational status (a proxy for income) were quite substantial for blacks — even in the South, where racial oppression and segregation were the norm. There is also some evidence of “pure catch-up,” a willingness on the part of black parents to have their children invest in schooling beyond what would have been predicted given the historical circumstances. To be sure, the convergence was not always continuous, especially around the turn of the century when most adult blacks in the South were disenfranchised at the local and state level. However, private philanthropy took up some of the slack as did (later in the century) court action, social activism, and finally, government intervention.

Racial Differences in Housing

Although economic historians and labor economists have long been interested in the historical evolution of racial differences in income and educa-

tion, less attention has been paid to other types of racial differences in economic status, including housing. We study housing because, in the United States, racial gaps in wealth are much larger than racial differences in income. Although racial gaps exist across all types of assets, those related to housing are particularly salient, because housing equity is a major component of household wealth and African-Americans hold a relatively higher proportion of wealth in owner-occupied housing. Housing is also a major component of private consumption, and housing values reflect both the housing services embodied in the housing unit and access to transportation, employment, retail establishments, security, and various public goods.

Collins and I have written several papers about the long-run evolution of racial differences in housing, all of which drew in one way or another on the public use samples of the U.S. census. In one paper,³ we studied secular trends in racial differences in home ownership. African-Americans emerged from slavery with little or no physical wealth but, by 1900, nearly 22 percent of African-American male household heads owned their homes. Considering the initial condition — near zero wealth in 1870 — this is an impressive accomplishment. But the rate of black home ownership fell far below that of white household heads at the time — 46 percent — implying a racial gap of 24 percentage points. Still, if we control for various correlates of home ownership, such as the age of the household head, literacy and occupational status, and location, then the “unexplained” portion of the racial gap declines to 15 percentage points.

Over the next 40 years there was little overall change in either the black or white homeownership rate and, consequently, in the racial gap. For blacks, homeownership rates did rise during the first decade of the twentieth century, but they fell between 1910 and 1920. The relevant correlate here was the “Great Migration” from the rural South to the urban North; blacks (and whites) living in central cities were far less likely to be homeowners than those living elsewhere. Black homeownership continued to slide between

1920 and 1940, largely because of declines during the Great Depression of the 1930s.

In 1940, the eve of World War II, slightly more than 20 percent of black male household heads were homeowners, compared with 42 percent of white male household heads. The ensuing two decades would witness a vast transformation in American housing, one in which homeownership rates rose substantially for both races. But the gains were larger in absolute terms for whites than for blacks. In 1960, the black homeownership rate stood at 39 percent, while that for whites was 66 percent, implying a larger racial gap. However, if we control for the correlates of homeownership, then the unexplained gap is about the same as in 1940 (or in 1900). Again, the culprit was migration north: migrants were less likely to be homeowners, particularly those migrating to central cities.

In the period since 1960, the racial gap in homeownership among male household heads has narrowed. In 1990, the last year examined in this paper, the racial gap was 19.5 percentage points, compared with 27 points in 1960. Because white homeownership rates were rising over this period, all of the narrowing of the gap reflects a faster pace of growth among black household heads. Moreover, when we control for the correlates of homeownership, the unexplained racial gap fell sharply from 1960 to 1990.

In a second paper,⁴ Collins and I supplement our long-run analysis of home ownership with information on the value of owner-occupied housing. In 1940, the first year for which sample information is available, the black-to-white ratio of the value of owner-occupied housing was 0.37. The ratio then increased sharply over the next three decades, to 0.62 in 1970, reflecting a narrowing of the racial gap in housing characteristics that affect value, such as the number of rooms or the presence of indoor plumbing. But from 1970 to 1990 the aggregate national ratio was essentially unchanged, while that for central cities, where most black households resided, declined sharply.

In further analysis of the deterioration in the relative value of black-owned

housing in the 1970s, we examine the correlation between the black-white housing value ratio and the level of residential segregation. Prior to 1970, the black-white ratio was either higher in heavily segregated metropolitan areas or essentially unrelated to the level of segregation. In the 1970s, the correlation become strongly negative; in other words, the deterioration in the relative value of black-owned housing was most severe in cities that were highly segregated.

A variety of economic models suggest that high levels of racial segregation can lead to a “downward spiral” in economic outcomes for blacks in response to a negative shock. The best known among them is that of David Cutler and Edward Glaeser.⁵ Using 1990 census data, they show that increases in residential segregation lead to worse economic outcomes for blacks, a phenomenon known as “bad ghettos.” But their analysis leaves open the question of whether ghettos were always bad. Using similar empirical methods, Collins and I demonstrate that, although bad ghettos certainly existed prior to 1970, the process intensified during the 1970s and 1980s.⁶

Our finding that the black-to-white ratio of property values in central cities fell in the 1970s is consistent in timing with the emergence of “bad ghettos” but raises the obvious question: what caused this emergence? We are not the first to consider this question, and it is unlikely that a single “smoking gun” is responsible, or that all of the causes can be separately identified and measured. But perhaps some can be. In our work, Collins and I have explored the effects of one possible trigger: race-related civil disturbances or “riots.”

Although the United States has experienced many race riots throughout its history, those occurring in the 1960s were unprecedented in frequency and scope. Social scientists, though long interested in the causes of the 1960s riots, have done relatively little work of an econometric nature on their consequences. In two recent papers, Collins and I use census data to examine the impact of the riots on labor and housing market outcomes for blacks in a standard “difference-in-

difference” econometric framework; that is, we compare changes between 1960 to 1970, and 1960 to 1980, in an outcome variable (for example, median black family income) in cities that experienced a severe riot versus cities that did not.⁷ In terms of injuries, deaths, or destruction of property, the severity of riots varied considerably, and it is important to take this into account in the analysis.

One key issue is whether the occurrence of a riot in a particular city might be endogenous to the outcome under study. For example, if riots were more frequent in cities in which black economic prospects in 1960 were especially poor, then the difference-in-difference estimator might produce a biased estimate of the treatment effect. However, the bulk of the work on the causes of the riots suggests that few if any reliable predictors of riot activity can be measured at the city level, other than region (the South had fewer riots) and the absolute size of the black population, both of which we control for. We also consider two-stage least squares estimates in which local government organization (the use of a city manager) and rainfall in the period around the time of the assassination of Martin Luther King (rainfall substantially reduces the likelihood of a riot) serve as instrumental variables. Our empirical work relies on city-level data from the 1950-80 population censuses and individual-level data from the 1970-80 census samples.

We find that the occurrence of a severe riot had economically significant negative effects on blacks’ income and employment prospects, and that these effects appear to have been larger in the long run (1960-80) than in the short run (1960-70). For example, the negative effect on median black family income was on the order of 9 percent in the 1960s. The value of black-owned property was also adversely affected in the 1960s by the occurrence of a riot, with little or no rebound in the 1970s. Individual-level data from the census samples suggest that the racial gap in property values widened in the 1970s in cities that experienced even moderately severe riot activity.

The exact conduit through which

these negative effects emerged is next to impossible to identify with the data at hand, but it is straightforward to speculate about the likely channels. Property (and personal) risk was heightened by riots; qualitative evidence suggests that insurance premiums increased after a riot. Taxes for police and fire protection may have increased, and some riot cities had difficulty placing municipal bonds. Retail establishments that were burned or damaged might not reopen, businesses and households might move away, and so on. Some of the negative effects could have been (and were) offset by outside assistance, but evidently on balance the negative effects predominated. Moreover, because the occurrence of a major riot was national news, it is likely that our empirical strategy underestimates the negative effects. In future work, we plan to examine the effects at the census-tract level, and also explore other possible impacts, notably those on crime and local politics. Crime rates are known to have increased in the 1970s but the relationship between the occurrence of a riot and subsequent crime remains to be explored. A number of American cities elected African-American mayors for the first time in their histories in the 1970s but whether the riots speeded up or hindered the likelihood of electing a black mayor is unclear.

The Civil War and Black Economic Progress

Prior to the Civil War the vast majority of African-Americans were enslaved. With the end of the Civil War came the end of the slavery, and with it, the first prospects for economic advancement among former slaves. But the pace of black economic advance was hindered by the fact that, in the aftermath of the war, most blacks lived in the South, and the South was undeniably poor. At the turn of the twentieth century, for example, per capita income in the South was approximately half the national average.

Economic historians have wondered about the causes of southern poverty, especially the role played by the Civil War. In the two decades prior

to the War per capita incomes in the South grew at about the national average. But in the aftermath of the War, southern per capita incomes fell sharply, both absolutely and relative to the national average, and recovery was slow. A variety of explanations have been proposed to account for the decline and the slow pace of recovery, but there is a lack of consensus on the relative importance of these different explanations.

My approach to this debate has been to disaggregate the effects of the War by focusing on the components of per capita income — namely, factor prices and per capita factor supplies. Focusing on the components, particularly on factor prices, is useful, because additional data can be brought to bear and, more importantly, because different explanations often imply very different changes in factor prices.

In a recent paper,⁸ I examine the impact of the Civil War on wages in the South relative to the North. Many blacks entered the wage labor market after the War, either on a part-time or full-time basis, so data on wage movements are particularly relevant. Compared with pre-war levels, nominal wages in the South fell sharply relative to the North in the immediate aftermath of the War. And, such declines occurred for a broad range of occupations. While there was some recovery in the 1880s, agricultural distress in the 1890s led to further erosion in Southern relative wages. I also show that real wages in the South fell, but that the declines were smaller in magnitude, because the cost of living fell as well. One of the more prominent explanations of the post-bellum decline in Southern per

capita income is an exogenous reduction in per capita labor supply in the South. However, my results suggest that this cannot be the dominant explanation because, if it were, relative wages in the South would have risen, not fallen.

In ongoing work with my Vanderbilt colleague William Hutchinson,⁹ I examine changes in wage-rental ratios in the South relative to the North after the War. Although wages fell in the South, interest rates rose, resulting in sharp declines in the cost of labor compared with the cost of capital. Simple economic theory predicts that capital intensity should have decreased in the South in response to this change in relative factor prices. Using establishment level data from the 1850-80 censuses, Hutchinson and I demonstrate that manufacturing establishments in the South did experience a sharp decline in capital intensity after the War relative to establishments outside the region. Our preliminary results also suggest that manufacturing labor productivity fell in the South relative to the North after the War, and that the decrease in relative labor productivity can be accounted for fully by the reduction in relative capital intensity.

¹ R. A. Margo, *Race and Schooling in the South, 1850-1950: An Economic History*, Chicago: University of Chicago Press, 1990, NBER Long-Term Factors in Economic Development monograph series.

² W. J. Collins and R. A. Margo, "Historical Perspectives on Racial Differences in Schooling in the United States," NBER Working Paper No. 9770, June 2003, forthcoming in E. Hanushek and F. Welch, eds., *Handbook of the Economics of*

Education, New York: Elsevier.

³ W. J. Collins and R. A. Margo, "Race and Home Ownership: A Century-Long View," *Explorations in Economic History*, 37 (2001), pp. 68-92 (revised version of NBER Working Paper No. 7277, August 1999).

⁴ W. J. Collins and R. A. Margo, "Race and the Value of Owner-Occupied Housing, 1940-1990," *Regional Science and Urban Economics*, 33 (2003), pp. 255-86 (revised version of NBER Working Paper No. 7749, June 2000).

⁵ D. M. Cutler and E. Glaeser, "Are Ghettos Good or Bad?" *Quarterly Journal of Economics*, 112 (1997), pp. 827-72.

⁶ W. J. Collins and R. A. Margo, "Residential Segregation and Socioeconomic Outcomes: When did Ghettos Go Bad?" *Economic Letters*, 69 (2000), pp. 239-43.

⁷ W. J. Collins and R. A. Margo, "The Labor Market Effects of the 1960s Riots," in W. Gale and J. Pack, eds. *Brookings-Wharton Papers on Urban Affairs 2004*, pp. 1-24. Washington, DC: The Brookings Institution (revised version of NBER Working Paper No. 10243, January 2004); and "The Economic Aftermath of the 1960s Riots: Evidence from Property Values," NBER Working Paper No. 10493, May 2004.

⁸ R. A. Margo, "The North-South Wage Gap, Before and After the Civil War," in D. Eltis, F. Lewis, and K. Sokoloff, eds. *Slavery in the Development of the Americas*, pp. 324-51, New York: Cambridge University Press, 2004 (revised version of NBER Working Paper No. 8778, February 2002).

⁹ W. Hutchinson and R. A. Margo, "The Impact of the Civil War on Capital Intensity and Labor Productivity in Southern Manufacturing," in progress.

Marijuana Use and Policy: What We Know and Have Yet to Learn

Rosalie Liccardo Pacula*

Marijuana is the most widely used illicit drug, with over 25 million individuals in 2003 estimated to have used marijuana in the past year.¹ Although prevalence rates for the general population have been relatively stable over the past decade, the proportion of current users who meet criteria established by the American Psychiatric Association for dependence or abuse of marijuana has increased at a statistically significant rate, from 30.2 percent to 35.6 percent.² In addition, prevalence rates among youth rose considerably during the mid-1990s before stabilizing, while perceptions of harms declined.³ At the same time the United States has experienced a rise in youth use rates and dependence, there has also been a significant rise in arrests.⁴ There is increasing pressure on many state legislatures to soften their policies toward marijuana as a way of reducing the criminal justice burden, and despite virtually no information available on the economic cost of marijuana use or abuse, there is growing support to do so.

Indeed, during the 1990s several states reduced the penalties or criminal status of first-time marijuana possession offences involving small quantities of marijuana and some other states enacted legislation that gave patients protection from prosecution in state courts if they used or grew marijuana for medicinal purposes.⁵ Whether changes in policies such as these would generate a cost savings for state governments depends on a number of different factors, including changes in enforcement that might have occurred in response to these policy changes, changes in use, and increases in the harmful consequences

associated with use and abuse. Only the latter two associations have been carefully considered in recent empirical analyses in the United States and significant limits exist in drawing conclusions from them. Nonetheless, some important insights have been gained that are relevant for anyone interested in discussing marijuana policy. This research summary provides a review of what we currently know about marijuana use and identifies some gaps that need to be explored before a careful assessment of current marijuana policies can be conducted.

Price Matters

It is well established from national survey data that marijuana initiation generally occurs among youth in their mid-to-late teens and that regular use persists into the early twenties, and then steadily declines through the mid-to-late twenties and into the thirties.⁶ Thus, if one is interested in understanding factors determining the initiation and escalation of marijuana use, it is important to examine youth populations. And, as one recent study points out, it is also important to understand that factors that are important correlates with contemporaneous demand may not be all that important for predicting trends in use rates over time. In a comprehensive assessment of the annual and 30-day prevalence of marijuana among high school seniors, my co-authors and I show that many of the key contemporaneous correlates with marijuana use (race, gender, and religiosity for example) could not explain the trend in use rates observed during the 1980s and 1990s.⁷ Instead, the two most important predictive factors for explaining variation in both contemporaneous use rates and trends over time were attitudes about marijuana (perceived harmfulness) and price. The finding that marijuana use even among adolescents is sensitive to changes in the monetary price of the

drug represents a major discovery for this literature, which had previously concluded that supply factors, including price, were not important determinants of marijuana initiation and consumption. I also show price to be an important determinant of demand among college students.⁸ Estimates of the sensitivity of demand to changes in price (that is, the elasticity of demand) have been shown to be similar to those for smoking.

Marijuana Prevalence Rates are Responsive to Changes in the Legal Risk

Although there has been considerable inconsistency in the literature regarding the sensitivity of marijuana consumption to changes in the legal risk of using marijuana, my comprehensive review included in a recent book provides a reasonable explanation for this: there are subtle but important differences in how the legal penalties for marijuana possession offences are represented in various analyses, making the interpretation of specific penalty variables different across studies.⁹ Another factor contributing to the inconsistency in findings across studies, particularly those evaluating policies in the United States, has been the over-examination of an ill-defined “decriminalization” policy indicator. In a recent NBER Working Paper, I show through a careful legal review of the eleven original U.S. state decriminalization statutes adopted in the mid-1970s that the lowest common denominator across state statutes was a reduction in jail time for first-time marijuana possession offenders.¹⁰ When state statutes from 1999 were examined along the same key dimensions as the original 11 statutes, it was impossible to uniquely identify the so-called decriminalized states. More than half of the non-decriminalized states also had reduced penalties associated

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with possession of small amounts of marijuana, calling into question the interpretation of studies evaluating the effects of decriminalization when a simple dichotomous indicator is employed. The authors re-evaluated the impact of actual statutory penalties on use rates among a nationally representative sample of tenth graders and found that higher fines and longer jail times were consistently associated with reduced cannabis prevalence. These findings are consistent with similar studies that focused more precisely on actual penalties rather than on single dichotomous indicators of decriminalized policies.¹¹

If lower penalties indeed are associated with increased marijuana prevalence, then the next question is whether increases in use are associated with negative consequences and whether the economic value of those consequences is less than or exceeds the cost of maintaining the current policy.

The Relationship Between Marijuana Use and Human Capital Accumulation

Marijuana generally is believed to influence educational attainment through its impact on cognitive functioning. Evidence from the medical literature clearly demonstrates that persistent and/or heavy marijuana use diminishes an individual's cognitive functions, influencing attention, concentration, and short-term memory during periods of intoxication. Marijuana consumption also might influence schooling outcomes by affecting decisions about the allocation of time if, for example, marijuana users choose to spend their time getting high or hanging out with other users instead of studying. The association between marijuana use and poor schooling outcomes in population survey data may, therefore, be real or it may be the artifact of some underlying common factor that is correlated with both marijuana use and schooling outcomes (for example, rates of time preference, tastes for deviance and/or leisure, or general thrill seeking behavior).

Two recent NBER Working Papers examine this issue using alternative

measures of educational performance. In the first study, my co-authors and I try to isolate the impact of marijuana use on cognitive functioning by examining the relationship between marijuana use and performance on standardized tests using data on tenth and twelfth graders from the 1990 and 1992 National Educational Longitudinal Surveys (NELS).¹² We evaluated models that considered the direct impact of marijuana use on performance on a composite, reading and math standardized test as well as the impact of marijuana initiation on the change in standardized test scores over time. Findings from these analyses suggest that marijuana use negatively affects youths' performance on standardized tests by lowering math scores by as much as 15 percent. According to research conducted previously, this reduction in math test scores could translate into a reduction in future wages by as much as 2 percent for those not going on to college.

In a second NBER study, data from the fourth follow-up wave of the same NELs is used to explore the causal relationship between marijuana use during tenth and twelfth grade and the number of years of schooling completed in 2000, when most of the respondents were 26 years old.¹³ The study uses two alternative methods to deal with the probable association between marijuana use and unobserved factors influencing educational attainment; the results from both models suggest that marijuana use in the tenth grade does indeed decrease educational attainment. The author notes that the negative impact of marijuana use in the tenth grade on educational attainment is similar in magnitude to the effect of living in a single parent family or living in a family with an income in the lowest quartile.

Marijuana and Crime

A unique problem exists when we try to consider marijuana's involvement in crime. Objective measures of marijuana use (for example, urinalysis) identify use over an extended period of time, not necessarily use at the time of the offence, and are therefore likely to overstate an association between mari-

juana and crime, while self-reported measures are likely to understate the association because of underreporting. In an NBER Working Paper, I consider the implication of these measurement problems by using several different objective and subjective measures of marijuana use collected from a sample of arrestees drawn from the 1996-9 Arrestee Drug Abuse Monitoring (ADAM) data.¹⁴ Use measures determined by 1) a positive urine test, 2) self-reported use in the past thirty days, 3) self-reported use within 72 hours of the offence, 4) self-reported intoxication from marijuana at the time of the offence, and 5) marijuana price each were associated with the probability of being arrested for a non-drug involved violent, property, and income-producing crime. Results from these analyses demonstrated that statistical associations between marijuana use and specific crimes were extremely sensitive to how marijuana use was measured. More proximal measures of use were generally negatively associated with violent crime but positively associated with property and income-producing crime. Reduced-form models suggested that the negative association between marijuana use and violent crime was spurious while the positive associations between marijuana use and property and income-producing crime could be causal in nature. Future work needs to reconsider these associations with data on crime rates to determine if the findings among arrestees hold more generally.

Health Care Costs

Evaluations of the economic cost of treating marijuana-involved accidents, injuries, dependence, or co-morbidities have yet to be carefully examined, yet it has been argued that the case can be made for researchers to take the public health costs of marijuana use seriously.¹⁵ Even though only a small proportion of marijuana users adopt patterns of use that pose health risks, the growing prevalence of regular marijuana users suggests that the actual number of problem users is on the rise. Evidence showing trends in dependence rates confirm this suspicion. And, the cost of treating the

dependent population is not nearly as low as is frequently presumed. Data from the Agency for Healthcare Research and Quality's National Inpatient Survey show that in 2001 there were an estimated 5,392 discharges from hospitals where marijuana dependence or abuse was the primary diagnosis (see Table 1). Even though the number of marijuana primary diagnoses is significantly lower than those for alcohol, heroin, and cocaine, the mean length of stay for marijuana episodes is three times longer than for alcohol and

heroin discharges and more than two times longer than for cocaine diagnoses. The mean charge per marijuana discharge is nearly twice as large as those for any of the other substances. Work is currently being done to understand why these length of stay and cost differences exist.

Table 1: 2001 National Statistics on Marijuana, Alcohol, Heroin and Cocaine Discharges from the Agency for Healthcare Research and Quality's (AHRQ) National Inpatient Survey *

Substance	Total Number of Discharges	Mean Length of Stay in Days	Mean Charges in Dollars
Marijuana	5,392	16.4	\$12,447
Alcohol	168,472	5.4	\$6,706
Heroin	55,642	4.5	\$5,734
Cocaine	21,134	6.2	\$6,667

* Data downloaded from <http://www.ahrq.gov/data/hcup/>

As can be seen by the brief review above, substantial work evaluating and quantifying the negative effects of marijuana use remains. The lack of information on the cost of marijuana use should not be interpreted as evidence that there are no costs associated with marijuana use, but rather that the data currently available is inadequate to properly measure these relationships and costs. As better data continue to become available, improved estimates of the real consequences and their costs will be constructed. Only then will it be possible to assess the economic benefit (or cost) of a change in marijuana policy.

¹ Substance Abuse and Mental Health Services Administration (SAMHSA), Office of Applied Studies, 2004, *Overview of Findings from the 2003 National Survey on Drug Use and Health (SMA 04-3774)*, SAMHSA, Maryland.

² W. M. Compton, B. F. Grant, J. D. Colliver, M. D. Glantz, and F.S. Stinson, "Prevalence of Marijuana Use Disorders in the United States: 1991-1992 and 2001-2002," *Journal of the American Medical Association*, 291 (17) (2004), pp. 2114-21.

³ R. L. Pacula, M. Grossman, F. J. Chaloupka, P. O'Malley, L. D. Johnston, and M. C. Farrelly, "Marijuana and Youth" NBER Working Paper No. 7703, May 2000, and in J. Gruber, (ed.), *Risky Behavior Among Youths: An Economic Analysis*. Chicago, IL: University of Chicago Press, 2001.

⁴ Federal Bureau of Investigation (FBI) *Annual, Crime in the United States: 2002*, U.S. Department of Justice, Washington, DC.

⁵ R. L. Pacula, J. Chbriqui, and J. King, "Decriminalization in the United States: What Does it Mean?" NBER Working Paper No. 9690, May 2003; and R. L. Pacula, J. F. Chbriqui, D. A. Reichman, and Y. Terry-McElrath, "State Medical Marijuana Laws: Understanding the Laws and their Limitations," *Journal of Public Health Policy*, 23 (4) (2002), pp. 413-39.

⁶ W. Hall and R.L. Pacula, *Cannabis Use and Dependence: Public Health and Public Policy*, Melbourne, Australia: Cambridge University Press, 2003.

⁷ See R. L. Pacula, M. Grossman, F. J. Chaloupka, P. O'Malley, L.D. Johnston, and M.C. Farrelly, "Marijuana and Youth."

⁸ J. Williams, R. L. Pacula, F. J. Chaloupka, and H. Wechsler, "Alcohol and Marijuana Use Among College Students: Economic Complements or Substitutes?" NBER Working Paper No. 8401, July 2001, and in *Health Economics*, 13 (9) (2004), pp. 825-43.

⁹ See W. Hall and R.L. Pacula, *Cannabis Use and Dependence: Public Health and Public Policy*.

¹⁰ See R. L. Pacula; J. Chbriqui, and J King, "Decriminalization in the United States: What Does it Mean?"

¹¹ J. Williams, "The Effects of Price and Policy on Marijuana Use: What Can be Learned from the Australian Experience?" *Health Economics*, 13 (2) (2004), pp. 123-37.

¹² R. L. Pacula, J. Ringel, and K. E. Ross, "The Impact of Marijuana Use on Human Capital Formation" NBER Working Paper No. 9963, September 2003.

¹³ P. Chatterji, "Illicit Drug Use and Educational Attainment," NBER Working Paper No. 10045, October 2003.

¹⁴ R. L. Pacula and B. Kilmer, "Marijuana and Crime: Is there a Connection Beyond Prohibition?" NBER Working Paper No. 10046, October 2003.

¹⁵ W. Hall and T. F. Babor, "Cannabis Use and Public Health: Assessing the Burden," *Addiction*, 95 (4) (2000), pp. 485-90.

NBER Profile: *Ted Joyce*



Ted Joyce is an NBER Research Associate in the Programs on Health Economics and Children and a Professor of Economics at Baruch College and the Graduate Center of the City University of New York. He is also the Academic Director of the Baruch/Mount Sinai MBA Program in Health Care Administration, in which he teaches health economics and statistics. He received his B.A. in bilingual education from the University of Massachusetts in 1976 and his Ph.D. in economics from the City University of New York in 1985.

Professor Joyce's research interests are in infant and reproductive health policy. His published work traverses economic, policy, and clinical journals.

He is best known for his work on abortion policies and their impact on fertility and infant health.

Professor Joyce lives in Brooklyn with his wife, Judy Sackoff, an epidemiologist. They have two daughters, Nina (20) and Maya (14). A formally addicted golfer, a fading jogger, a nascent cyclist, a spin-class enthusiast, and a reluctant ellipticalist, he will do almost any type of exercise that allows his deteriorating systems to stay active. Born in Boston and raised in Massachusetts, his baseball allegiance remains fervent despite 24 years in very hostile territory. "October," he says, "can be a difficult month."

NBER Profile: *Owen A. Lamont*

Owen A. Lamont is a Research Associate in the NBER's Programs in Monetary Economics, Asset Pricing, Corporate Finance, and Economic Fluctuations and Growth. He is also a Professor of Finance at Yale School of Management, where he teaches a course in Behavioral Finance.

Lamont received his B.A. in Economics and Government from Oberlin College in 1988 and his Ph.D. in Economics from MIT in 1994. Before moving to Yale in 2003, he taught at Princeton and the University of Chicago.

Lamont has received numerous prizes and awards, including fellowships

from the National Science Foundation and the Alfred P. Sloan Foundation. His research focuses on asset pricing and corporate finance, and he has published academic papers on short selling, stock returns, bond returns, closed-end funds, and corporate diversification.

Lamont lives in Brookline, Massachusetts, with his wife, Elizabeth Lamont, and two sons. Empirical economics is in Lamont's blood. His grandfather, the late Robinson Newcomb, was also a Ph.D. economist. Both he and his grandson have written papers on economic forecasting and on housing markets.



NBER Profile: *Robert A. Margo*



Robert A. Margo is a Research Associate in the NBER's Programs on the Development of the American Economy and Labor Studies and a Professor of Economics and History at Vanderbilt University in Nashville, Tennessee. He received his B.A. from the University of Michigan and his Ph. D. in Economics from Harvard University.

A specialist in the economic history of the United States, Margo is the author or co-author of three books, and approximately 100 articles, book chapters, and book reviews. Currently, he is the editor of *Explorations in Economic History*. Before joining the Vanderbilt faculty, he taught at the University of

Pennsylvania and Colgate University. He has also been a visiting professor at Harvard and at Bard College.

Margo is married to Lee Breckenridge, a Professor of Law at Northeastern University in Boston. Margo's son, Daniel, is a freshman at Cornell University.

Margo is also an accomplished performer on classical guitar and classical mandolin. He has given solo and duo performances on classical guitar in Boston and in Nashville, and has performed in master classes for noted classical guitarists Sergio and Odair Assad and Manuel Barrueco. When in Boston, he performs regularly on mandolin with the Providence Mandolin Orchestra.

NBER Profile: *Rosalie Liccardo Pacula*

Rosalie Liccardo Pacula is a Faculty Research Fellow in the NBER's Programs on Health Economics and Children and an economist at RAND, working in the Health Program and Drug Policy Research Center. Pacula received her B.S. in economics and political science from Santa Clara University and her M.A. and Ph.D. in economics from Duke University. She was an assistant professor at the University of San Diego for two years before moving to the University of Illinois, Chicago, and then to RAND.

Pacula's research to date has largely focused on evaluating the effectiveness of state and local public policies at diminishing substance use and abuse among youth, and the social costs of such abuses. She has also done significant work in evaluating mental health policies and their impact on health care utilization. Her previous and ongoing

research areas include: analyses of the impact of marijuana policies on youth marijuana use; the social cost of marijuana use; the determination of price in illicit drug markets; the relationship between demands for intoxicating substances; and the cost-benefit of school-based drug prevention programs. She has done in-depth policy analyses of state-level parity legislation, medical marijuana laws, and decriminalization policy in the United States.

Pacula lives in San Diego, CA, with her husband, Joe, and two children, Gabriella (5) and Brian (3). She is an avid runner, but also enjoys hiking, boating, skiing, and various other outdoor activities with family. Right now, Pacula's main hobby is raising her two young children. She works part-time so she can spend more time with them, volunteering regularly in their classrooms and participating in their other activities.



Conferences

Japan Conference

The NBER together with the Centre for Economic Policy Research, Center for International Research on the Japanese Economy, and European Institute of Japanese Studies jointly organized a conference on the Japanese economy in Tokyo on September 1-2. The co-chairs of the meeting were: Magnus Blomstrom, NBER and Stockholm School of Economics; Jennifer Corbett, Australian National Union; Fumio Hayashi, NBER and the University of Tokyo; Charles Horioka, Osaka University; Anil K Kashyap, NBER and the Graduate School of Business, University of Chicago; and David Weinstein, NBER and Columbia University. The following papers were discussed:

Daiji Kawaguchi, University of Tsukuba, and **Wenjie Ma**, Osaka University, “The Causal Effect of Graduating from a Top University on Promotion: Evidence from the University of Tokyo’s Admission Freeze in 1969”
Discussant: Edward Miguel, NBER

and University of California, Berkeley

Hiroshi Ono, Stockholm School of Economics, and **Kazuhiko Odaki**, Ministry of Economy, Trade and Industry, “Foreign Ownership and the Structure of Wages in Japan”
Discussant: Marianne Bertrand, NBER and University of Chicago

Kazuo Ogawa, Osaka University, “Debt, R and D Investment, and Technological Progress: A Panel Study of Japanese Manufacturing Firms in the 1990s”
Discussant: Lee G. Branstetter, NBER and Columbia University

Kathryn L. Dewenter and **Alan C. Hess**, University of Washington, and **Yasushi Hamao**, University of Southern California, “Are the Major Japanese Banks Uniform or Unique?”
Discussant: Joe Peek, University of Kentucky

Heather Montgomery, Asian Development Bank Institute, and **Satoshi Shimizutani**, Cabinet

Office, “The Effectiveness of Bank Recapitalization in Japan”
Discussant: Randall S. Kroszner, NBER and University of Chicago

Fumio Hayashi, and **Edward C. Prescott**, Federal Reserve Bank of Minneapolis, “The Depressing Effect of Agriculture Institutions on the Prewar Japanese Economy”
Discussant: John Fernald, Federal Reserve Bank of Chicago

Daniel Leigh, Johns Hopkins University, “Monetary Policy and the Dangers of Deflation: Lessons from Japan”
Discussant: Alan J. Auerbach, NBER and University of California, Berkeley

Wako Watanabe, Osaka University, “Prudential Regulation, the ‘Credit Crunch’ and the Ineffectiveness of Monetary Policy: Evidence from Japan”
Discussant: Takeo Hoshi, NBER and University of California, San Diego

The high correlation between graduating from a selective college and success in the labor market has been observed in many countries. There are two major explanations for this finding: either graduating from selective colleges causes success in the labor market because of better education, a better alumni network, or something attached to selective college graduation, or the correlation is created by a “third” factor, such as selective college graduates’ high innate ability, or better family background. **Kawaguchi** and **Ma** attempt to test the latter hypothesis by using a natural experiment. The most selective university in Japan, the University of Tokyo, did not admit

new students in 1969 because the university could not administer its entrance examination; there was a campus lockout by armed, leftist students, who demanded university reform. Consequently, many of the 3,000 high school graduates who would have been admitted to the university went to other, second-best universities that year. The authors ask whether the 1973 graduation cohort of these secondbest universities performed better than other graduation cohorts of the same universities. Using the 2002 *Who’s Who* for publicly traded companies and the central government, they find little evidence that the 1973 graduating cohort from the sec-

ond-best universities performed better than other cohorts. This finding rejects the hypothesis that the Tokyo graduates’ success is explained solely by their innate high ability.

Ono and **Odaki** examine differences in the wage structure of domestic versus foreign-owned establishments in Japan. Using high-quality wage datasets from the Japanese government, they construct a large employer-employee matched database consisting of 50,000 establishments matched with a sample of approximately one million workers in 1998. Their results confirm that foreign-owned establishments in Japan pay higher wages than domestic establish-

ments, even after they account for human capital and industry composition. A single percentage point increase in the foreign ownership share of equity is associated with a 0.3 percent increase in wages. These results also highlight the distinction in the structure of wages between domestic and foreign-owned establishments. Tenure effects on wages are considerably weaker among foreign-owned establishments, where wages are determined more by general skills as observed by the higher returns to education and work experience. Women in foreign-owned establishments earn more than women in domestic establishments, resulting in a smaller gender wage gap among foreign-owned establishments. Given the high degree of gender segregation and the lack of long-term prospects for women in Japan, foreign-owned establishments may be one source of “brain-drain” for highly-skilled women in the Japanese labor market.

Based on a panel dataset of Japanese manufacturing firms in research-intensive industries, **Ogawa** investigates the extent to which outstanding debt in the 1990s affected firms’ R and D activities. He finds that massive debt had a significantly negative effect on R and D investment in the 1990s. Also, R and D was closely linked to firm-level total factor productivity growth during that period. In fact, a 10 percentage point increase in the debt-to-asset ratio lowered the firm-level total factor productivity growth rate by 0.72 percentage points for 1999-2001.

Dewenter, Hamao, and Hess use banking theory to try to understand the loan loss provisioning and write-off behavior of Japanese banks during Japan’s economic slow growth period that began in 1992. They compare Japanese city and trust banks, and Japanese banks with banks from other countries that have similar banking systems. A major and surprising finding is that Japanese city banks differ from Japanese trust banks, but not from banks in other countries with similar banking systems. The Japanese banks are neither uniform nor unique.

Montgomery and Shimizutani

examine the effectiveness of bank recapitalization policies in Japan. Based on a careful reading of the “business revitalization plan” submitted by banks requesting government funds, they identify four primary goals of the capital injection plan in Japan: 1) to increase the bank capital ratios; 2) to increase lending, in particular to small and medium enterprises, and avoid a “credit crunch”; 3) to increase write-offs of non-performing loans; and 4) to encourage restructuring. Using a panel of individual bank data, the authors estimate the effectiveness of the Japanese government policy of public fund injection in achieving the first two of these stated goals. They find that capital injections are more effective for international banks than for domestic banks. For international banks, receipt of injected capital seems to relax the constraint that capitalization makes on overall loan growth. Further, the receipt of injected capital strengthens the capital position of both international and regional banks. These results are based on ordinary least squares analysis and do not hold up once the authors control for possible endogeneity using an instrumental variables approach.

In sharp contrast to its fabulous postwar growth, the Japanese economy stagnated for a long time before World War II: prewar Japanese real GNP per worker remained at about 40 percent of that of the leader country, the United States, at least after 1885, with no capital deepening. **Hayashi and Prescott** identify as the main cause of the prewar stagnation a barrier that forced the number of persons employed in agriculture to be constant at about 14 million throughout the prewar period. A two-sector growth model shows that the barrier-induced sectoral misallocation of labor explains a virtual lack of capital deepening and the depressed output level. Were it not for the barrier, the model predicts that Japan’s prewar GNP per worker would have been about 50 to 60 percent of the U.S. level, roughly where prewar Western Europe was. This higher output level comes about because an efficient use of labor otherwise locked up in agriculture raises

the economy’s overall production efficiency and sparks a rapid capital deepening.

Leigh investigates how monetary policy can help to avoid the liquidity trap. He first analyzes how the Bank of Japan conducted interest rate policy over the 1990s as the economy entered a deflationary slump. The Bank’s implicit inflation target declined to about 1 percent in the 1990s from about 2.5 percent in the 1980s, he estimates. It seems that the problem arose because of a series of adverse shocks and not because of an extraordinary monetary policy mistake. Next, Leigh investigates whether an alternative monetary policy rule could have avoided the liquidity trap despite these shocks. He finds that targeting a higher rate of inflation of 2-3 percent would not have provided much protection against hitting the zero bound on nominal interest rates. Similarly, a policy of responding more aggressively to the inflation gap while keeping the low inflation target would have provided little improvement in economic performance. The economy still enters the trap under a nonlinear policy rule that commits the central bank to keeping interest rates at zero even after the economy begins to recover. However, Leigh finds that a rule that combined *both* a higher inflation target, of about 3 percent, and a more aggressive response to the inflation gap would have improved the economy’s performance and avoided the zero bound.

The underlying causes of sharp declines in bank lending during recessions in large developed economies, as exemplified by the United States in the early 1990s and Japan in the late 1990s, are still being debated because of a lack of any convincing identification strategy of the supply side capital-lending relationship with lending demand. **Watanabe** attempts to construct a strong instrument for bank capital from empirical observation of the banks’ behavioral changes in the past, and to estimate the impact of capital adequacy on the lending supply. He discusses the implications of prudential regulation and the ineffectiveness of a loose monetary policy based on the micro evidence presented.

Globalization and Poverty

An NBER Conference on “Globalization and Poverty,” organized by Research Associate Ann Harrison, University of California, Berkeley, took place on September 10-12. One of the biggest concerns of globalization’s critics is its impact on the poor. The 15 chapters and comments in the volume that will result from this conference provide an economic perspective on how globalization affects poverty in developing countries. Although there have been many studies devoted to assessing the relationship between trade and inequality, this is the first comprehensive examination of the direct linkages between globalization and poverty.

The volume begins by considering the possible theoretical links between poverty reduction and globalization. This is followed by several cross-country studies that test for macroeconomic linkages using aggregate data. Many of the papers, as well as the discussions by Art Kraay and Xavier Sala-I-Martin, point out that greater global trade could reduce poverty by raising overall growth. The cross-country studies, while consistent with these claims, emphasize the necessity to use disaggregated data.

Each of the remaining papers uses microdata to estimate the impact of globalization on poverty within a particular country. Globalization matters to the poor because it affects the prices of goods that they consume and produce, as well as their wages and employment opportunities. This volume also investigates the indirect impact of globalization on the poor through its effect on risk, inequality, financial market deregulation, and aid flows to the poor. Several themes emerge across the different country studies.

First, the poor are more likely to share in the gains from globalization when there are complementary policies in place. The study on India suggests that globalization is more likely to benefit the poor if trade reforms are implemented in conjunction with labor market deregulation. In Zambia, poor farmers could only benefit from greater access to export markets if they also have access to credit, techni-

cal know-how, and other complementary inputs. The studies also point to the importance of social safety nets. In Mexico, if poor corn farmers did not receive income support from the government, their real incomes would have been halved during the 1990s. In Ethiopia, if food aid is not well targeted, globalization has little impact on the poor.

Second, the evidence suggests that trade reforms in a number of countries have contributed to reducing poverty. In Mexico, the poor in the most globalized regions have weathered the macroeconomic crises best. The study on Zambia suggests that poor consumers gain from falling prices for the goods they buy, while poor producers in exporting sectors benefit from trade reform through higher prices for their goods. In Colombia, the poor located in exporting sectors gained from trade reform. Unskilled workers in Poland have gained from its accession to the European Union, leading to broad income gains.

Third, both the cross-country and individual case studies suggest that financial crises are very costly to the poor. However, the evidence on Indonesia suggests that the poor recover surprisingly quickly. A study of financial deregulation across countries reinforces the need for complementary policies, such as the creation of reliable institutions and macroeconomic stabilization policies (including the use of flexible exchange rate regimes).

Since the evidence suggests that globalization creates winners as well as losers among the poor, the final study by Aisbett seeks to understand globalization’s critics. Aisbett concludes that critiques of globalization arise because of concerns about short-term costs versus the longer-term gains from trade reform, as well as different interpretations regarding the evidence. This final chapter also points to the paucity of knowledge on the possible linkages between globalization and poverty reduction, which this volume seeks to address.

These papers and discussions will be published as *Globalization and Poverty*:

Donald Davis, NBER and Columbia University, “Trade and Poverty: Insights from Theory”
Discussant: Marc Melitz, NBER and Harvard University

Nava Ashraf, Harvard University;
Margaret McMillan, Tufts University; and **Alix Peterson-Zwane**, University of California, Berkeley, “My Policies or Yours: Do OECD Agricultural Policies Affect Poverty in Developing Countries?”
Discussant: Mitali Das, Columbia University

William Easterly, New York University, “Globalization, Poverty, and All That: Factor Endowment versus Productivity Views”
Discussant: Aart Kraay, World Bank

Pinelopi K. Goldberg, NBER and Yale University, and **Nina Pavcnik**, NBER and Dartmouth College, “The Effects of the Colombian Trade Liberalization on Urban Poverty”
Discussant: Chang-Tai Hsieh, NBER and University of California, Berkeley

Gordon H. Hanson, NBER and University of California, San Diego, “Globalization and Labor Income in Mexico”
Discussant: Esther Duflo, NBER and MIT

Ethan Ligon, University of California, Berkeley, “Risk and the Evolution of Inequality in China in an Era of Globalization”
Discussant: Shang-Jin Wei, NBER and IMF

Petia Topalova, MIT, “Trade Liberalization, Poverty, and Inequality: Evidence from Indian Districts”
Discussant: Robin Burgess, NBER and London School of Economics

Jorge F. Balat and **Guido G. Porto**, World Bank, “Globalization and Complementary Policies: Poverty Impacts on Rural Zambia”
Discussant: Matthew Slaughter, NBER and Dartmouth College

James Levinsohn, NBER and University of Michigan, and **Margaret McMillan**, “Does Food Aid Harm the Poor? Household Evidence from Ethiopia”
Discussant: Rohini Pande, Yale University

James Levinsohn, “Globalization and the Returns to Speaking English in South Africa”
Discussant: Raquel Fernandez, NBER and New York University

Duncan Thomas, University of California, Los Angeles, “Globalization, Crises, and Households: Evidence from Indonesia”
Discussant: Donald Cox, Boston College

Chor-Ching Goh and **Beata S. Javorcik**, World Bank, “Trade Protection and Industry Wage Structure in Poland”
Discussant: Irene Brambilla, Yale University

Branko Milanovic and **Lyn Squire**, World Bank, “Do Pro-Openness Policy Reforms Increase Wage Inequality? Some Empirical Evidence”
Discussant: Douglas Irwin, NBER and Dartmouth College

M. Ayhan Kose and **Eswar Prasad**, IMF; **Kenneth Rogoff**, NBER and Harvard University; and **Shang-Jin Wei**, “Financial Globalization, Growth, and Volatility in Developing Countries”
Discussant: Susan Collins, NBER and Georgetown University

Emma Aisbett, University of California, Berkeley, “Why are the Critics so Convinced that Globalization is Bad for the Poor?”
Discussant: Xavier Sala-I-Martin, NBER and Columbia University

Davis provides the framework for the volume by identifying the theoretical channels through which changes in globalization could affect poverty and inequality. Focusing in particular on the impact of international trade, he

reviews the standard implications of the popular factor models and sector specific models and shows that the effect of a trade reform on poverty and inequality is not clear. In particular, he shows that small changes in the assumptions used in these models reverse the standard prediction that labor intensive sectors of poor countries are the most likely to gain from trade reforms. He also explores the implications of economic geography models and models with heterogeneous agents for the relationship between trade, inequality, and poverty.

Developed countries heavily subsidize their agricultural sectors. The magnitude of these subsidies is striking, compared to both the size of the agricultural sector in these countries, and incomes in poor countries. Using a variety of empirical strategies, **Ashraf, McMillan**, and **Peterson-Zwane** seek to understand the impact of these subsidies on the poor in developing countries. They begin by using a cross-country regression framework, analyzing the relationship between per capita income and measures of rich-country subsidies to agriculture. The preliminary evidence suggests that OECD subsidies do affect incomes of the poor and that the sign of this effect depends on whether the country is a net importer or exporter of the agricultural product in question. The authors complement their cross-country analysis with a case study of Mexican corn farmers using data at the micro, individual farmer, and household level. The evidence from Mexico suggests that the income of the poorest corn farmers in Mexico from corn farming dropped substantially between 1991 and 2000. However, the *total income* of these corn farmers remained relatively stable. This is because the poorest corn farmers received substantial transfers. While some of these transfers were in the form of remittances, the majority of them came from the Mexican government through programs like PROGRESA and PROCAMPO.

Easterly notes that the textbook models of trade and factor flows say that globalization has three beneficial channels for unskilled workers in poor countries: 1) it gives them access to inflows of capital, which will raise the

marginal product of labor and thus wages; 2) it gives them the opportunity to migrate to rich countries, where their wages will be higher; and 3) it gives them world market access for their goods, raising the wages of unskilled workers in labor abundant countries. These models assume that differences between rich and poor countries are caused by differences in factor endowments. Models in which productivity differences between countries drive trade and factor flows yield more ambiguous predictions. Unfortunately, productivity differences seem necessary to understand many, though not all, globalization and poverty episodes. The factor endowment predictions show how the North Atlantic economy achieved decreasing inequality between countries in the last five decades. They also help to explain the Great Migration of Europeans from the land-scarce Old World to the land-abundant New World in the late 19th and early 20th century, accompanied by the predicted movements in land rental/wage ratios. The factor endowment view of an earlier movement of Europeans to the colonies of the New World and southern Africa help us understand the origins of different levels of country inequality based on land/labor ratios. However, productivity differences appear to be an important facet of many globalization and poverty episodes. In the Old Globalization era, incomes of rich and poor countries diverged (as they did in other periods in which there was less globalization). In the New Globalization era, productivity differences are important for capturing: the very different performance of poor country regions in recent decades; the flow of all factors of production towards the rich countries; the higher skilled wages in rich than in poor countries; the low returns to physical and human capital in many poor countries; the failure of trade and capital inflows to reduce relative poverty within poor countries; and the persistence of regional “poverty traps,” even within the free factor mobility and trade zone of the internal U.S. economy.

Goldberg and **Pavcnik** use the drastic tariff reductions during the Colombian trade liberalization of 1986 to 1994 to study the effect of trade

openness on urban poverty in Colombia. Between 1986 and 1994-5, the urban poverty rate declined by approximately 10 percent, but then increased; by 1999 it had reached the same level as in the mid-1980s. While the increase in poverty between 1996 and 1999 often is attributed to the recession, the reasons behind its 1986-95 decline are less clear. Despite the chronological coincidence of the poverty reduction with the trade reforms over this period, the authors find no evidence of a link between poverty and tariff reductions operating through the labor income channel. Their results establish that poverty in urban areas is highly correlated with unemployment, employment in the informal sector, and non-compliance with minimum wages. The poverty rates among the employed also differ by industry, suggesting a potential role for industry affiliation in explaining poverty. However, there is no evidence that the trade reforms affected any of these variables in a significant way. Perhaps more surprisingly, most of the reduction in urban poverty between 1986 and 1994 is explained by “within” group changes in poverty, rather than by movements of people out of groups with high poverty rates — such as the “unemployed” or “informal sector workers” — and into groups with low poverty incidence (such as “employed”). However, it remains a possibility that trade liberalization has contributed to the poverty reduction through general equilibrium effects, and in particular through its potential role in lowering the prices of goods consumed primarily by the poor.

Hanson examines the change in the distribution of labor income across regions of Mexico during the country’s decade of globalization in the 1990s. He focuses on men born in states with either high exposure to globalization or in states with little exposure to globalization, as measured by the share of foreign direct investment, imports, or export assembly in state GDP during the 1990s. Hanson finds that the distribution of labor income in high-exposure states shifted to the right relative to the distribution of income in low-exposure states. This change in regional relative incomes was primarily the

result of a shift in mass in the income distribution of low-exposure states, from upper-middle income earners to lower income earners. On average, labor incomes in states with high exposure to globalization increased by 8-9 percent relative to low-exposure states.

Recent increases in urban income inequality in China are mirrored in increases in inequality in consumption expenditures. This connection between changes in the distribution of income and consumption expenditures could be entirely attributable to differences in preferences (in which case households’ intertemporal marginal rates of substitution would all be equated after every history), or could be caused by imperfections in the markets for credit and insurance which ordinarily would serve to equate these intertemporal marginal rates of substitution. **Ligon** presumes that market imperfections drive changes in the distribution of expenditures, and he uses data on expenditures from repeated cross-sections of urban households in China to estimate a Markov transition function for shares of expenditures over the period 1985-2001. He then uses this estimated function to compute the welfare losses attributable to risk over this period, and to predict the future trajectory of inequality from 2001 through 2025.

Although there is a general presumption that trade liberalization results in higher GDP, much less is known about its effects on poverty and inequality. **Topalova** uses the sharp trade liberalization in India in 1991, to a large extent spurred by external factors, to measure the causal impact of trade liberalization on poverty and inequality in districts in India. Variation in pre-liberalization industrial composition across districts in India, and the variation in the degree of liberalization across industries, allow for a difference-in-difference approach. This strategy, which does not measure the first-order impact of trade liberalization common across all regions in India, establishes whether certain areas benefited more from, or bore a disproportionate share of, the burden of liberalization. In rural districts where industries more exposed to liberalization were concentrated, poverty incidence and depth

increased as a result of trade liberalization, a setback of about 15 percent of India’s progress in poverty reduction over the 1990s. The results are robust to pre-reform trends, convergence, and time-varying effects of initial district-specific characteristics. Inequality was unaffected in the sample of all Indian states in both urban and rural areas. The findings are related to the extremely limited mobility of factors across regions and industries in India.

During the 1990s, the Zambian government liberalized trade, improved macroeconomic policies, and implemented agricultural reforms, especially in maize and cotton. In their paper, **Balat** and **Porto** have two main objectives: to investigate some of the links between globalization, complementary policies, and poverty observed in Zambia during the 1990s, and to explore the poverty impacts of non-traditional export growth. They look at consumption and income effects separately. On the consumption side, they study the effects of the elimination of the consumer subsidies implied by the removal of the maize marketing board. They find that higher prices led to welfare losses and that complementary policies matter: the introduction of competition policies at the milling industry cushioned some of the impacts, but the restriction on maize imports by small-scale mills hurt consumers. On the income side, the authors estimate income gains from international trade. The gains are associated with market agriculture activities (such as growing cotton, tobacco, hybrid maize, groundnuts, and vegetables) and rural labor markets and wages. The authors find that by expanding trade opportunities, Zambian households would earn significantly higher income. Securing these higher levels of well-being requires complementary policies, like the provision of infrastructure, credit, and extension services.

It is sometimes claimed that food aid actually harms the poor. The logic behind this claim is that food aid depresses the price of food and the poor are producers of food. **Levinsohn** and **McMillan** investigate this claim using household-level data from Ethiopia — a primarily rural country that receives a tremendous amount of

food aid per-capita. They find that food aid actually helps the poor, and that this is true in both urban and rural areas.

Levinsohn takes a novel approach to trying to disentangle the impact of globalization on wages by focusing on how the return to speaking English, the international language of commerce, changed as South Africa re-integrated with the global economy after 1993. He shows that the return to speaking English increased overall, and that within racial groups the return increased primarily for Whites but not for Blacks.

In recent years, several countries have experienced a massive and largely unanticipated collapse of the exchange rate. These collapses have been linked to the increased globalization of financial markets. The effects of these crises on the well-being of the population are little understood. Using longitudinal household survey data from the Indonesia Family Life Survey (IFLS), **Thomas** examines the immediate and medium-term effects of the East Asian crisis on multiple dimensions of well-being. In IFLS, the same households were interviewed a few months before the onset of the crisis, a year later, and again two years after that. This provides unique opportunities for measuring the magnitude and distribution of the effects of the crisis on the population. Thomas demonstrates that in the first year of the crisis, poverty rose by between 50 and 100 percent, real wages declined by around 40 percent, and household per capita consumption fell by around 15 percent. However, focusing exclusively on changes in real resources is complicated by the fact that measurement of prices in an environment of extremely volatile prices is not straightforward. Moreover, it misses important dimensions of response by households. These include changes in leisure (labor supply), changes in living arrangements (household size and thus per capita household resources), changes in assets, and changes in investments in human capital. These responses are not only quantitatively important but also highlight the resilience of families and households in the face of large unanticipated shocks because they draw on a wide array of mechanisms

to respond to the changes in opportunities they face.

Goh and Javorcik examine the impact of Poland's trade liberalization, 1994-2001, on the industry wage structure. The data suggest that a worker's industry affiliation explains a substantial amount of variation in wages, ranging from 5 to 14 percent depending on the years considered. The results indicate that industry affiliation is an important channel through which trade liberalization affects worker earnings — a decrease in industry tariffs is associated with a higher industry wage premium. This result is robust to including year and industry fixed effects, controlling for exports, imports, real effective exchange rates, industry concentration, FDI stock, and capital accumulation. This finding is consistent with liberalization increasing competitive pressures, forcing firms to restructure and improve their productivity, which in turn translates into higher profits being shared with workers. In addition, the authors find that industries more exposed to import competition also have higher shares of unskilled labor. However, there is no significant effect of tariff reduction on industry-specific skill premium. Thus, the increased productivity from greater import competition appears to be applicable to all workers, regardless of their skill levels. In sum, there is no evidence of an erosion of wages of the unskilled (that is, "race to the bottom") from trade liberalization. Given that the poor in Poland are predominantly the unskilled (that is, those with little education), trade liberalization should be beneficial for the poor.

Prasad, Rogoff, Wei, and Kose provide a comprehensive assessment of empirical evidence on the impact of financial globalization on growth and volatility in developing countries. Their results suggest that it is difficult to establish a robust causal relationship between financial integration and economic growth. Furthermore, there is little evidence that developing countries have been consistently successful in using financial integration to stabilize fluctuations in consumption growth. However, the authors do find that financial globalization can be beneficial under the right circumstances. Empiri-

cally, good institutions and the quality of governance are crucial in helping developing countries to derive the benefits of globalization. Similarly, macroeconomic stability appears to be an important prerequisite for ensuring that financial globalization is beneficial for developing countries. Finally, countries that employ relatively flexible exchange rate regimes and succeed in maintaining fiscal discipline are more likely to enjoy the potential growth and stabilization benefits of financial globalization.

Milanovic and Squire ask: if there are pro-liberalization and pro-openness reforms, what will happen to wage inequality? They consider two types of wage inequality: between occupations (skills premium) and between industries. They use two large databases of wage inequality that have become available recently and a large database of reforms covering the 1975-2000 period. They find that trade reforms increase the skills premium but that the increase is smaller in rich than in poor countries. Trade reforms increase wage inequality between industries in rich countries and reduce it in poor countries.

Aisbett examines the values, beliefs, and facts that lead critics to the view that globalization is bad for the poor. She finds that critics of globalization tend to be concerned about non-monetary as well as monetary dimensions of poverty, and more concerned about the total number of poor than the incidence of poverty. In regard to inequality, critics tend to refer more to changes in absolute inequality, and income polarization, rather than to the inequality measures preferred by economists. It is particularly important to them that no group of poor people is made worse off by globalization. Finally, Aisbett argues that the perceived concentration of political and economic power that accompanies globalization causes many people to presume that globalization is bad for the poor, and the continued ambiguities in the empirical findings mean that this presumption can be supported readily with evidence.

These papers will be appear in an NBER Conference volume published by the University of Chicago Press. They also will be available on the NBER's website at "Books in Progress."

Tax Policy and the Economy

The NBER's Nineteenth Annual Conference on Tax Policy and the Economy, organized by James M. Poterba of NBER and MIT, took place in Washington, DC on October 7. These papers were discussed:

Ann Witte, NBER and Wellesley College, "The Structure of Early Care and Education in the United States: Historical Evolution and

International Comparisons"

Jonathan Gruber, NBER and MIT, "Tax Policy for Health Insurance"

James R. Hines, Jr., NBER and University of Michigan, "Do Tax Havens Flourish?"

Michelle Hanlon, University of Michigan, and **Terry Shevlin**,

University of Washington, "Book-Tax Conformity for Corporate Income: An Introduction to the Issues"

Randall Morck, NBER and University of Alberta, "How to Eliminate Pyramidal Business Groups: The Double Taxation of Inter-corporate Dividends and other Incisive Uses of Tax Policy"

Witte notes that most European governments have universal, consolidated, education-based Early Childhood Education (ECE) programs that are available from early in the morning to late in the evening throughout the year. European ECE programs are uniformly of high quality, generally last at least three years, and are funded to serve all children. The U.S. ECE system is composed of three separate programs (Head Start, Pre-Kindergarten, and the child care voucher program) targeted to low-income children. With a few notable exceptions, U.S. ECE programs are funded to serve less than half of the eligible children. These programs developed quite separately; they have different goals, different funding sources, different administrations and policies, and generally last for an academic year or less. Pre-K and Head Start operate only 3 to 6 hours a day and are open only during the academic year. The average quality of U.S. ECE programs is generally much lower than the average quality of European ECE programs. Further, the quality of U.S. ECE programs varies widely even within local areas. Although the United States has greatly increased expenditures on ECE, U.S. governments pay only 40 percent of the costs of ECE, while European governments pay 70 percent to 90 percent of the costs of ECE. None of the major U.S. ECE programs simultaneously provides work supports for parents, child development opportunities for children, and preparation for school for low-income children. The evidence suggests that the U.S. ECE

system is neither efficient nor equitable. Consolidation of funding and administration of current U.S. ECE programs could lower transaction costs substantially for parents and provide more stable care arrangements for children. Increased funding could improve existing programs, extend hours and months of operation, and make care available to all eligible families. Both the evaluation literature and the European experience suggest that such a consolidated, well-funded system could be successful in preparing poor children for school. Further, the benefits of such a program could well exceed the costs, because low-income children benefit most from stable, high-quality ECE. However, such a targeted program will have neither the positive peer group effects nor the social-integration benefits of universal ECE programs.

Gruber finds that, if the goal is to cover 3-8 million uninsured persons, expanding public insurance is a more efficient option than any tax policy that has been considered to date. Nonetheless, he suggests that it is critical to understand the strengths and weaknesses of alternative tax policy approaches. Several lessons for tax policy are clear from his analysis. First, and probably most important, targeting is key: tightly targeted tax policies dramatically outperform loosely targeted policies in terms of efficiency. This is important because targeting comes with political costs: it is much more politically expedient to allow a larger group of individuals to benefit from a policy than to restrict those

benefits to a smaller low-income group. Yet widening the income range of tax policies comes at great cost in terms of their effectiveness. Second, one cannot straightforwardly compare two policies that cover very different numbers of uninsured, because the efficiency of any tax policy falls as its scope increases. Finally, for the efficiency of tax policy what matters is not only the targeting of benefits, in terms of the share of individuals who are uninsured, but also which individuals are covered. Providing coverage to very young and healthy individuals results in less insurance value per dollar of spending than does providing coverage to higher cost groups.

Hines notes that tax haven countries offer foreign investors low tax rates and other tax features designed to attract investment and thereby stimulate economic activity. Major tax havens have less than one percent of the world's population (outside the United States) and 2.3 percent of world GDP, but host 8.4 percent of foreign property, plant, and equipment; 13.4 percent of foreign sales; and 30 percent of the reported foreign incomes of American firms. Per capita real GDP in tax haven countries grew at an average annual rate of 3.3 percent between 1982 and 1999, which compares favorably to the world average of 1.4 percent. Tax haven governments appear to be adequately funded, with an average 25 percent ratio of government-to-GDP that exceeds the 20 percent ratio for the world as a whole, although the small populations and relative affluence of these countries

normally would be associated with even larger governments. Whether the economic prosperity of tax haven countries comes at the expense of higher tax countries is unclear, but recent research suggests that tax haven activity stimulates investment in nearby high-tax countries.

Hanlon and **Shevlin** discuss the issues surrounding proposals to conform financial accounting income and taxable income. The two incomes diverged in the late 1990s with financial accounting income becoming increasingly greater than taxable income through the year 2000. While the cause of this divergence is not known for certain, many suspect that it is the result of earnings management for financial accounting and/or the tax sheltering of corporate income. The authors outline the potential costs and benefits of one of the proposed “fixes”

to the divergence: the conforming of the two incomes into one measure. They review relevant research that sheds light on the issues surrounding conformity both in the United States and in other countries that have more closely aligned book and taxable incomes. The empirical literature reveals that it is unlikely that conforming the incomes will reduce the amount of tax sheltering by corporations, and that having only one measure of income will result in a loss of information to the capital markets.

Arguments for eliminating the double taxation of dividends apply only to dividends paid by corporations to individuals. The double (and multiple) taxation of dividends paid by one firm to another — inter-corporate dividends — was included explicitly in the 1930s as part of a package of tax and other policies aimed at eliminating U. S. pyram-

idal business groups. These structures remain the predominant form of corporate organization outside the United States. The first Roosevelt administration associated them with corporate governance problems, corporate tax avoidance, market power, and an objectionable concentration of economic power. **Morck** suggests that future tax reforms in the United States should keep in mind the original intent of Congress and the President regarding inter-corporate dividend taxation. Foreign governments may find the American experience a valuable lesson if they desire to eliminate their business groups.

These papers will be published by the MIT Press as *Tax Policy and the Economy, Volume 19*. They are also available at “Books in Progress” on the NBER’s website.

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The Risks of Financial Institutions

The NBER held a Conference on the Risks of Financial Institutions in Vermont on October 22-23. Rene M. Stulz, NBER and Ohio State University, and Mark Carey, Federal Reserve Board of Governors, organized this program:

Franklin Allen, University of Pennsylvania, and **Douglas M. Gale**, New York University, “Systemic Risk and Regulation”
Discussant: Charles Calomiris, NBER and Columbia University

Andrew W. Lo, NBER and MIT; **Mila Getmansky**, University of Massachusetts, Amherst; and **Nicholas Chan** and **Shane M. Haas**, Alpha Simplex Group, “Systemic Risk and Hedge Funds”
Discussant: David Modest, Azimuth Trust Company, LLC

Stephen Schaefer, London Business School, and **Loriana Pelizzon**, University Degli Studi Di Padova, “Pillar 1 vs. Pillar 2 under Risk Management”
Discussant: Marc Saidenberg, Federal Reserve Bank of New York

Philippe Jorion, University of California, Irvine, “Bank Trading Risk and Systemic Risk”
Discussants: Paul Kupiec, FDIC, and Ken Abbott, Bank of America Securities

Jeremy Berkowitz, University of Houston, and **James O’Brien**, Federal Reserve Board of Governors, “Bank Trading Revenues, VaR, and Market Risk”

Discussants: Paul Kupiec and Ken Abbott

Darrell Duffie, NBER and Stanford University, and **Chenyang Wang**, Stanford University, “Leverage Management”
Discussant: Hayne Leland, University of California, Berkeley

Gary B. Gorton and **Nicholas S. Souleles**, NBER and University of Pennsylvania, “Special Purpose Vehicles and Securitization”
Discussant: Peter Tufano, Harvard University

Jan P. Krahn, Johann Wolfgang Goethe University, and **Guenter Franke**, University of Konstanz, “Default Risk Sharing Between Banks and Markets: The Contribution of Collateralized Loan Obligations”
Discussant: Patricia Jackson, Bank of England

Philip E. Strahan, NBER and Boston College; **Evan Gatev**, Boston College; and **Til Schuermann**, Federal Reserve Bank of New York, “How Do Banks Manage Liquidity Risk? Evidence from the Equity and Deposit Markets in the Fall of 1998?”
Discussant: Randall S. Kroszner, NBER and University of Chicago

Thorsten Beck and **Asli Demirguc-Kunt**, World Bank; and **Ross Levine**, NBER and University of Minnesota, “Bank Concentration and Fragility: Impact and Mechanics”

Discussant: Peter M. Garber, Deutsche Bank

Philipp Hartmann, European Central Bank; **Stefan Straetmans**, Maastricht University; and **Casper de Vries**, Erasmus University Rotterdam, “Banking System Stability: A Cross-Atlantic Perspective”
Discussant: Anthony Saunders, New York University

Torben Andersen, NBER and Northwestern University; **Tim Bollerslev**, NBER and Duke University; **Peter Christoffersen**, McGill University; and **Francis X. Diebold**, NBER and University of Pennsylvania, “Practical Volatility and Correlation Modeling for Financial Market Risk Management”
Discussant: Pedro Santa-Clara, NBER and University of California, Los Angeles

M. Hashem Pesaran, University of Cambridge; **Til Schuermann**; and **Björn-Jakob Treutler**, Mercer Oliver Wyman, “The Role of Industry, Geography, and Firm Heterogeneity in Credit Risk Diversification”
Discussant: Richard Cantor, Moody’s Investors Service

Patrick de Fontnouvelle and **Eric S. Rosengren**, Federal Reserve of Boston; and **John S. Jordan**, Fitch Risk, “Implications of Alternative Operational Risk Modeling Techniques”
Discussant: Andrew Kuritzkes, Mercer Oliver Wyman

Historically, much of the banking regulation that was put in place was designed to reduce systemic risk. In many countries, capital regulation in the form of the Basel agreements is currently one of the most important measures to reduce systemic risk. In recent years there has been considerable growth in the transfer of credit risk across and between sectors of the

financial system. In particular, there is evidence that risk has been transferred from the banking sector to the insurance sector. One argument is that this is desirable and simply reflects diversification opportunities. Another is that it represents regulatory arbitrage, and that the concentration of risk that may result from this could increase systemic risk. **Allen** and **Gale** show that

both scenarios are possible depending on whether markets and contracts are complete or incomplete.

Systemic risk is commonly used to describe the possibility of a series of correlated defaults among financial institutions — typically banks — that occur over a short period of time, often caused by a single major event. However, since the collapse of Long

Term Capital Management in 1998, it has become clear that hedge funds also are involved in systemic risk exposures. The hedge-fund industry has a symbiotic relationship with the banking sector, and many banks now operate proprietary trading units that are organized much like hedge funds.

As a result, the risk exposures of the hedge-fund industry may have a material impact on the banking sector, resulting in new sources of systemic risks. **Lo, Getmansky, Chan, and Haas** attempt to quantify the potential impact of hedge funds on systemic risk by developing a number of new risk measures for hedge funds and applying them to individual and aggregate hedge-fund returns data. These measures include: illiquidity risk, non-linear factor models for hedge-fund and banking-sector indexes, and aggregate measures of volatility and distress based on regime-switching models. Their preliminary findings suggest that the hedge-fund industry may be heading into a challenging period of lower expected returns, and that systemic risk is currently on the rise.

Under the New Basel Accord, bank capital adequacy rules (Pillar 1) are substantially revised but the introduction of two new dimensions to the regulatory framework is, perhaps, of even greater significance. **Pelizzon and Schaefer** investigate the complementarity between Pillar 1 (risk-based capital requirements) and Pillar 2/PCA and, in particular, the role of closure rules with costly recapitalization when banks are able to manage their portfolios dynamically. Their approach considers the costs and the benefits of capital regulation in a way that accommodates the behavioral response of banks in terms of their portfolio strategy and capital structure, and further the extent to which capital rules are effective, that is, the extent to which banks can “cheat”.

Jorion analyzes the risk of trading revenues of U.S. commercial banks. He collects quarterly data on trading revenues, broken down by business line, as well as the Value at Risk-based market risk charge. The overall picture from these preliminary results is that there is a fair amount of diversification both across and within banks across

business lines. These low correlations do not corroborate concerns about systemic risk. Nor is there evidence that the post-1998 period has witnessed an increase in volatility of trading revenues.

Bank dealers play a central role in market-making in financial markets and are active traders in their own right. Recent literature has argued that trading activity and risk taking by banks and other financial institutions may contribute to market volatility and illiquidity. The literature further suggests that institutions’ wide-spread adoption of Value at Risk (VaR) for risk management is one important source of destabilizing market behavior. **O’Brien and Berkowitz** study the market risks of seven large U.S. trading banks based on the banks’ daily trading revenues and VaRs. Applying a linear factor model to bank trading revenues, with factors representing exchange rate, interest rate, equity, and credit markets, the authors consider the size and direction of risk exposures across markets as evidenced in the trading revenues and commonalities in exposures across the seven banks. They also test for non-linearity and time-variation in market exposures. Further, they consider the relationship between bank VaRs and market factor volatility.

An asset manager trades off the benefits of higher leverage against the costs of adjusting leverage in order to mitigate expected losses caused by insolvency. **Duffie and Wang** explicitly calculate optimal dynamic incentive-compatible leverage policies in simple versions of this problem.

Firms can finance themselves on- or off-balance sheet. Off-balance sheet financing involves transferring assets to “special purpose vehicles” (SPVs), following accounting and regulatory rules that circumscribe relations between the sponsoring firm and the SPVs. SPVs are carefully designed to avoid bankruptcy. If the firm’s bankruptcy costs are high, off-balance sheet financing can be advantageous, especially for sponsoring firms that are risky. In a repeated SPV game, firms can “commit” to subsidize or “bail out” their SPVs when the SPV would otherwise not honor its debt commitments. Investors in SPVs know that, despite legal and accounting restric-

tions to the contrary, SPV sponsors can bail out their SPVs if there is the need. **Gorton and Souleles** find evidence consistent with these prediction using data on credit card securitizations.

Franke and Krahen contribute to the economics of financial institutions’ risk management by exploring how loan securitization affects their default risk, their systematic risk, and their stock prices. In a typical CDO transaction, a bank retains a very high proportion of the expected default losses, and transfers only the extreme losses to other market participants. This enables the bank to expand its loan business, thereby incurring more systematic risk. It also raises its beta. While the authors do not find a significant stock price effect around the announcement of a CDO issue, in line with the irrelevance proposition, they do find some cross-sectional variation related to issue characteristics.

Gatev, Schuermann, and Strahan report evidence from the equity market that unused loan commitments expose banks to systematic liquidity risk, especially during crises such as the one observed in the fall of 1998. They also find, however, that banks with higher levels of transactions deposits had lower risk during the 1998 crisis than other banks did. These banks experienced large inflows of funds just as they were needed — when liquidity demanded by firms taking down funds from commercial paper backup lines of credit peaked. The evidence suggests that combining loan commitments with deposits mitigates liquidity risk, and that this deposit-lending synergy is especially powerful during period of crises as nervous investors move funds into their banks.

Public policy debates and theoretical disputes motivate this paper’s examination of the relationship between bank concentration and banking system fragility and the mechanisms underlying this relationship. **Beck, Demirguc-Kunt, and Levine** find no support for the view that concentration increases the fragility of banks. Rather, banking system concentration is associated with a lower probability that the country suffers a systemic banking crisis. In terms of policies, the authors find that regulations and institutions that facili-

tate competition in banking are associated with less — *not more* — banking system fragility, and including these policy indicators does not change the results on concentration. This suggests that concentration is a proxy for something else besides the competitive environment. Also, the authors do not find that official capital regulations, reserve requirements, or official prudential regulations lower crises probabilities. Finally, they present suggestive evidence that concentrated banking systems tend to have larger, better-diversified banks, which may help to explain the positive link between concentration and stability.

Hartmann, Straetmans, and de Vries derive indicators of the severity and structure of banking system risk from asymptotic interdependencies between banks. They use new tools available from multivariate extreme value theory to estimate individual banks' exposure to each other (contagion risk) and to systematic risk. Moreover, by applying structural break tests to those measures, they study whether capital markets indicate changes in the importance of systemic risk over time. Using data for the United States and the euro area, the author also can compare banking system stability between the two largest economies in the world. Finally, they assess for Europe the relative importance of cross-border contagion risk as compared to domestic contagion risk.

What do academics have to offer market risk management practitioners in financial institutions? Current industry practice largely follows one of two extremely restrictive approaches: historical simulation or RiskMetrics. In contrast,

Andersen, Bollerslev, Christoffersen, and Diebold favor flexible methods based on recent developments in financial econometrics, which are likely to produce more accurate assessments of market risk. Clearly, the demands of real-world risk management in financial institutions — in particular, real-time risk tracking in very high-dimensional situations — impose strict limits on model complexity. Hence, the authors stress parsimonious models that are easily estimated, and discuss a variety of practical approaches for high-dimensional covariance matrix modeling. They thus aim to stimulate dialog between the academic and practitioner communities, hopefully stimulating the development of improved market risk management technologies that draw on the best of both worlds.

In theory, the potential for credit risk diversification for banks could be substantial. Portfolios are large enough that idiosyncratic risk is diversified away leaving exposure to systematic risk. The potential for portfolio diversification is driven broadly by two characteristics: the degree to which systematic risk factors are correlated with each other and the degree of dependence individual firms have to the different types of risk factors. **Pesaran, Schuermann, and Treutler** propose a model for exploring these dimensions of credit risk diversification: across industry sectors and across different countries or regions. They find that full parameter heterogeneity matters a great deal for capturing tail behavior in credit loss distributions, and that this tail behavior is often not captured using standard value-at-risk

(VaR) measures. Instead, the coherent risk measure, expected shortfall, is needed. Symmetric shocks to observable risk factors result in asymmetric loss outcomes, and this asymmetry is especially pronounced when full parameter heterogeneity is allowed for. While neither industry nor regional (geography) fixed effects are sufficient to capture this firm-level heterogeneity, controlling for industry effects seems to generate results which are closer to the fully unrestricted heterogeneous model.

Quantification of operational risk has received increased attention with the inclusion of an explicit capital charge for operational risk under the new Basel proposal. The proposal provides significant flexibility for banks to use internal models to estimate their operational risk, and the associated capital needed for unexpected losses. Most banks have used variants of value at risk models that estimate frequency, severity, and loss distributions. **De Fontnouvelle, Rosengren, and Jordan** examine the empirical regularities in operational loss data. Using data from six large internationally active banking institutions, they find that loss data by event types are quite similar across institutions. Furthermore, their results are consistent with economic capital numbers disclosed by some large banks, and also with the results of studies modeling losses using publicly available “external” loss data.

These papers will be published by the University of Chicago Press in an NBER Conference Volume. They will also be available at “Books in Progress” on the NBER’s website.

International Transmission and Comovement

An NBER-Universities Research Conference on International Transmission and Comovement took place in Cambridge on December 10 and 11. Thirty-eight economists from 15 colleges and universities participated, along with representatives of the Federal Reserve System, the International Monetary Fund, and the European Central Bank. Marianne Baxter, NBER and Boston University, and Paul Bergin, University of California, Davis, organized this program:

M. Ayhan Kose, International Monetary Fund; **Christopher Otrok**, University of Virginia; and **Charles H. Whiteman**, University of Iowa, “Understanding the Evolution of World Business Cycles”
Discussant: Alejandro Justiniano, International Monetary Fund

Mihir A. Desai, NBER and Harvard University, and **C. Fritz Foley**, Harvard University, “The Comovement of Returns and Investment within the Multinational Firm” (NBER Working Paper No. 10785)
Discussant: Marco Del Negro, Federal Reserve Bank of Atlanta

Rebecca Hellerstein, Federal Reserve Bank of New York, “A Decomposition of the Sources of Incomplete Cross-border Transmission: The Case of Beer”
Discussant: Pinelopi Goldberg, NBER and Yale University

Giancarlo Corsetti, European University Institute; **Luca Dedola**, European Central Bank; and **Sylvain Leduc**, Federal Reserve Board, “International Risk-Sharing and the Transmission of Productivity Shocks”
Discussant: Michael Kouparitsas, Federal Reserve Bank of Chicago

Fabio Ghironi, Boston College, and **Marc J. Melitz**, Harvard University, “International Trade and Macroeconomics Dynamics with Heterogeneous Firms” (NBER Working Paper No. 10540)
Discussant: Michael Devereaux, University of British Columbia

Katheryn N. Russ, University of California, Davis, “The Endogeneity of the Exchange Rate as a Determinant of FDI: A Model of Money, Entry, and Multinational Firms”
Discussant: Fabio Ghironi

Martin Boileau, University of Colorado, and **Michel Normandin**, HEC Montreal, “Dynamics of the Current Account and Interest Differentials”
Discussant: Camilo Tovar, Bank for International Settlements

Assaf Razin and **Yona Rubenstein**, Tel Aviv University, “Growth Effects of Exchange-Rate Regime and the Capital-Account Openness in a Crises-Prone World Market: A Nuanced View”
Discussant: Chetan Subramanian, University of Buffalo

Jinill Kim, Federal Reserve Board, and **Sunghyun Henry Kim**, Tufts University, “Welfare Effects of Tax Policy in Open Economies: Stabilization and Cooperation”
Discussant: Margarida Duarte, Federal Reserve Bank of Richmond

Luisa Lambertini, Boston College, “Fiscal Rules in a Monetary Union”
Discussant: Assaf Razin, NBER and Cornell University

Kose, Otrok, and Whiteman study the changes in world business cycles during 1960-2003. They use a Bayesian dynamic latent factor model to estimate common and country-specific components in the main macroeconomic aggregates (output, consumption, and investment) of the G-7 countries. Then they quantify the relative importance of the common and country components in explaining comovement in each observable aggregate over three distinct time periods: the Bretton Woods (BW) period (1960:1-1972:2); the period of common shocks (1972:3-1986:2); and the globalization period (1986:3-2003:4). The authors show how different types of shocks may have affected the nature of business cycle comovement over these three periods. Their results indi-

cate that the common (G-7) factor explains a larger fraction of output, consumption, and investment volatility in the globalization period than it does in the BW period. The G-7 factor also accounts for a larger fraction of investment variation in the period of globalization than it does in the earlier periods. While there is a close association between the fluctuations in the G-7 factor and U.S. output growth for the full period, the G-7 factor becomes more influential in predicting the economic activity in the United States during the globalization period.

Desai and Foley present evidence on the comovement of returns and investment within U.S. multinational firms. These firms constitute significant fractions of economic output and investment in most large economies,

suggesting that they could create significant economic linkages. Aggregate measures of rates of return and the investment rates of U.S. multinational firms located in different countries are highly correlated across countries. Firm-level regressions demonstrate that rates of return and investment rates of affiliates are highly correlated with the rates of return and investment of the affiliate's parent and other affiliates within the same parent system, controlling for country and industry factors. The evidence on these interrelationships, and the importance of multinationals to local economies, suggests that global firms may create an important channel for transmitting economic shocks. This evidence also sheds light on asset pricing puzzles related to the diversification benefits

provided by multinational firms.

Hellerstein quantifies the sources of the incomplete transmission of shocks, such as exchange rate changes (that is, price inertia) using the example of the beer market. She considers two literatures on the sources of local-currency price stability with very different modeling approaches. The empirical trade literature on this topic, which includes Goldberg and Verboven (2001), attributes price inertia to a local-cost component and to firms' markup adjustments, but without modeling the role of each of these factors at each stage along a distribution chain. In the international finance literature, papers such as Burstein, Neves, and Rebelo (2003), Campa and Goldberg (2004), and Corsetti and Dedola (2004) attribute local-currency price stability to the share of local non-traded costs in final-goods prices, but do not allow for a role for markup adjustment by the firms that incur these costs, whether they be manufacturers or retailers. Hellerstein is the first to quantify the relative importance of these two factors for both manufacturers and retailers in the incomplete transmission of shocks to prices. She documents two basic facts about the transmission of shocks across borders. First, there is a nonlinear relationship between integration at the microeconomic level (proxied for by market share) and the transmission of shocks to prices. Second, a local component in manufacturers' costs explains a large part of the incomplete transmission, although markup adjustments by manufacturers and retailers play a nontrivial role.

A central puzzle in international finance is that real exchange rates are volatile and, in stark contrast to efficient risk sharing, negatively correlated with cross-country consumption ratios. **Corsetti, Dedola, and Leduc** show that a standard international business cycle model with incomplete asset markets augmented with distribution services can quantitatively account for these properties of real exchange rates. Distribution services, intensive in local inputs, drive a wedge between producer and consumer prices, thus lowering the impact of terms-of-trade changes on optimal agents' decisions. This reduces the price elasticity of trad-

ables. Two very different patterns of the international transmission of positive technology shocks generate the observed degree of risk sharing: one associated with improving, the other with deteriorating terms of trade and real exchange rate. In both cases, large equilibrium swings in international relative prices magnify consumption risk because of country-specific shock, running counter to risk sharing. Suggestive evidence on the effect of productivity changes in U.S. manufacturing supports the first transmission pattern, questioning the presumption that terms-of-trade movements in response to supply shocks invariably foster international risk-pooling.

Ghironi and Melitz develop a stochastic, general equilibrium, two-country model of trade and macroeconomic dynamics. Productivity differs across individual, monopolistically competitive firms in each country. Firms face a sunk entry cost in the domestic market and both fixed and per-unit export costs. Only the relatively more productive firms export. Exogenous shocks to aggregate productivity, and entry or trade costs, induce firms to enter and exit their domestic and export markets, thus altering the composition of consumption baskets across countries over time. In a world of flexible prices, this model generates endogenously persistent deviations from purchasing power parity that would not exist without this microeconomic structure with heterogeneous firms. The model provides an endogenous, microfounded explanation for a Harrod-Balassa-Samuelson effect in response to aggregate productivity differentials and deregulation. Finally, the model successfully matches several moments of U.S. and international business cycles.

Russ argues that when the exchange rate and projected sales in the host country are jointly determined by underlying macroeconomic variables, standard regressions of FDI flows on both exchange rate levels and volatility are subject to bias. Her results hinge on the interaction of macroeconomic uncertainty, a sunk cost, and heterogeneous productivity across firms. The results indicate that a multinational firm's response to increases in exchange rate volatility will differ

depending on whether the volatility arises from shocks in the firm's native or host country. This is the first study to depart from the representative-firm framework in an analysis of direct investment behavior with money.

Boileau and Normandin study the relationship between the current account and interest rate differentials. To do so, they document the relationship in international data. Then they interpret that relationship from a two-country, dynamic, general equilibrium environment. Finally they confront the relationship predicted by the environment to the one observed in the data. They find that the environment correctly predicts that the current account is countercyclical; that the interest differential is procyclical; and that the current account is negatively correlated with current and future interest differentials, but positively correlated with past interest differentials.

It has been a remarkably difficult empirical task to identify clear-cut real effects of exchange-rate regimes on the open economy. Similarly, no definitive view emerges as to the aggregate effects of capital account liberalizations. **Razin and Rubinstein** hypothesize that a direct and an indirect effect of balance-of-payments policies, geared toward exchange rate regimes and capital account openness, together exert a confounding overall influence on output growth, in the presence of sudden-stop crises. The direct channel works through the trade and financial sectors, akin to the optimal currency area arguments. The indirect channel works through the probability of a sudden-stop crisis. The empirical analysis disentangles these conflicting effects and demonstrates that: the balance-of-payments policies significantly affect the probability of crises, and the crisis probability, in turn, negatively affects output growth; and, controlling for the crisis probability in the growth equation, the direct effect of balance-of-payments policies is large. Domestic price crises (that is, high inflation above a 20 percent threshold) affect growth only indirectly, through their positive effect on the probability of sudden-stop crises.

Kim and Kim study the optimal tax policy design problem using a two-

country dynamic general equilibrium model with incomplete asset markets. They investigate the possibility of welfare-improving active, contingent tax policies (that is, tax rates responding to changes in productivity) on consumption, along with capital and labor income taxes. In contrast to the conventional wisdom on stabilization policies, procyclical factor income tax policy is optimal in the open economy. Procyclical tax policy generates efficiency gains by correcting market incompleteness. Optimal tax policy under cooperative equilibrium is similar to that under the Nash equilibrium and welfare gains from tax policy coordination are quite small.

Lambertini studies optimal fiscal policy rules in a monetary union where monetary policy is decided by an independent central bank. She considers a two-country model with trade in goods and assets, augmented with sticky prices, labor income taxes, and stochastic government consumption. Optimal fiscal policy is a simple, linear function of last-period change in debt and the underlying current shocks to the economy. It is optimal to finance an increase in government spending in part by running deficits and in part by raising income taxes, even though these are distortionary. Real public debt and taxes display random walk behavior. The optimal response of taxes to the

change in debt is larger with the level of public debt, so that fiscal policy is tighter for countries with higher debt-to-GDP ratios. Optimal monetary policy is less aggressive in response to a government spending shock than the policy implied by an interest rate rule; the welfare cost of monetary policy delegation is high, about 0.29 percent of steady state consumption. Optimal fiscal policy delivers lower variability of the income tax rate than a deficit limit like the Stability and Growth Pact (SGP); however, the welfare cost of the SGP is small (between 0.001 and 0.036 percent of steady state consumption) as the SGP is unlikely to bind.

Bureau News

NBER Researcher Shares Nobel Prize in Economics

NBER Research Associate Edward C. Prescott of the University of Arizona will share the 2004 Nobel Prize in Economics with Finn Kydland.

Prescott has been affiliated with the NBER since 1988 and is a member of the Program on Economic Fluctuations and Growth. He and Kydland were awarded the prize for their research on

central banking and on the causes of business cycles.

He now joins a long list of NBER researchers who have received the Prize, including: Robert F. Engle, 2003; George Akerlof, Michael Spence, and Joseph E. Stiglitz in 2001; James J. Heckman and Daniel L. McFadden, 2000; Robert C. Merton and Myron S.

Scholes, 1997; Robert E. Lucas, Jr., 1995; and Robert W. Fogel, 1993. Other NBER researchers who have won the Nobel Prize in Economics are Simon S. Kuznets, Milton Friedman, Theodore W. Schultz, George J. Stigler, and Gary S. Becker.

Indian Economy

The NBER's Working Group on the Indian Economy met in Cambridge on September 17. These papers were discussed:

Tim Besley, V. Rao, and Rohini Pande, Yale University, "Politics as Usual? Local Governance and Public Good Allocation"

Tarun Khanna and Krishna Palepu, Harvard University, "The Evolution of Concentrated Ownership in India: Broad Patterns and a History of the Indian

Software Industry" (NBER Working Paper No. 10613)

Andrew D. Foster, Brown University, and **Mark R. Rosenzweig**, Harvard University, "Agricultural Development, Industrialization, and Rural Inequality"

Dani Rodrik, NBER and Harvard University, and **Arvind Subramanian**, International Monetary Fund, "From Hindu Growth to Productivity Surge: The

Mystery of the India Growth Transition" (NBER Working Paper No. 10376)

Surjit S. Bhalla, Oxus Investments, "The Occam's Razor Model of Growth: India 1950-2004"

Abhijit Banerjee and Petia B. Topalova, MIT, and **Esther Duflo**, NBER and MIT, "Globalization and Internal Labor Markets: Some Evidence from the Indian Software Industry"

Besley, Pande, and Rao use data on the functioning of elected village councils in South India to examine the politics of public resource allocation. They stress two facets of the political process: access to political authority and the use of political power. They find in favor of a model in which public resource allocation, both across and within villages, reflects politicians' self-interest. They also find evidence that the extent and type of political opportunism in resource allocation is responsive to the design of political institutions. Thus, local democracy in India displays all the hallmarks of "politics as usual."

As in many countries (Canada, France, Germany, Japan, Italy, Sweden), concentrated ownership is a ubiquitous feature of the Indian private sector over the past seven decades. Yet, unlike in most countries, the identity of the primary families responsible for the concentrated ownership changes dramatically over time, perhaps even more than it does in the United States during the same time period. It does not appear that concentrated ownership in India is entirely associated with the ills that the literature has recently ascribed to concentrated ownership in emerging markets. If the concentrated owners are not exclusively, or even primarily, engaged in rent-seeking and entry-detering behavior, then concentrated ownership may not be inimical to competition. Indeed, **Khanna** and **Palepu** argue that at least some Indian families — the concentrated owners in question — have consistently tried to

use their business group structures to launch new ventures as a response to competition. In the process, they either have failed — hence the turnover in identity — or reinvented themselves. Thus concentrated ownership is a result, rather than a cause, of inefficiencies in capital markets. Even in the low capital-intensity, relatively unregulated setting of the Indian software industry, the authors find, concentrated ownership persists in a privately successful and socially useful way. Since this setting is the least hospitable to the existence of concentrated ownership, these findings are seen as a lower bound on the persistence of concentrated ownership in the economy at large.

Empirical evidence on the relative efficacy of farm and non-farm growth as sources of reduction in rural poverty and inequality has been inconclusive despite the fact that a large share of the world's poor reside in rural areas. **Foster** and **Rosenzweig** address the limitations of the existing literature by developing and testing a general-equilibrium model of the farm and non-farm sector that distinguishes between different types of non-farm sector activities and income classes. They find, consistent with the model, that although the non-tradable sector is positively influenced by growth in agricultural productivity, factories enter rural areas with relatively low wages; thus factory employment is negatively influenced by growth in agricultural productivity. As a consequence, non-

farm growth tends to reduce inter-village rural inequality induced by agricultural technical change. Also, the growth in factory employment increases the incomes of the unskilled poor relative to better-off landed households.

Most conventional accounts of India's recent economic performance associate the pick-up in economic growth with the liberalization of 1991. **Rodrik** and **Subramanian** demonstrate that the transition to high growth occurred around 1980, a full decade before economic liberalization. The authors investigate a number of hypotheses about the causes of this growth — favorable external environment, fiscal stimulus, trade liberalization, internal liberalization, the green revolution, public investment — and find them wanting. They argue that growth was triggered by an attitudinal shift on the part of the national government towards a pro-business (as opposed to pro-liberalization) approach. They provide some evidence that is consistent with this argument. They also find that registered manufacturing built up in previous decades played an important role in influencing the pattern of growth across the Indian states.

Bhalla looks at the role, and interaction, of three key variables in the Indian development process: growth, inequality, and poverty. With growth having averaged 3.6 percent per capita for the last 25 years, and with no evidence (yet) of any significant worsening in inequality, the Indian experience

conservatively can be described as a miracle, certainly in the same league as the high growth experiences of several countries in the last 50 years. Why this miracle has not been recognized as such may largely be attributable to the political economy of research on poverty, and its reduction. Bhalla discusses two questions in some detail: first, what caused India's growth to *accelerate* in the early 1980s? Second, what *prevented* India's growth from accelerating in the 1990s? The Indian story is about *both* factor accumulation and productivity growth. Bhalla finds that factor accumulation (particularly capital) explains about two-thirds of the higher growth in the 1980s; economic reforms add about 1.3 percentage points of growth in the 1990s. Growth decelerated in the late 1990s because of the policy of administered interest rates. Keeping nominal inter-

est rates fixed led to a sharp increase in the real cost of capital (because of a decline in worldwide and domestic inflation rates). This increase prevented GDP and productivity growth from maintaining the high growth levels of the early to mid-1990s.

The rise of globalization is often met with fear that it will undermine existing long-term relationships in the domestic labor market. By increasing the reward for opportunistic behavior, the net effect of opening up to foreign competition could be a reduction in efficiency. **Banerjee, Duflo, and Topalova** provide evidence on the effect of globalization on worker's opportunism in the Indian customized software industry, focusing on inefficient separations. Using detailed information that they collected on 500 projects carried out by 138 software firms between 2000 and 2002, they

identify shocks to labor demand, such as the seasonal availability of U.S. work visas, the bursting of the "dot com" bubble, and the hiring patterns of the largest Indian software companies, that significantly affect quits. These shocks, combined with varying scheduled completion date of projects, allow the authors to credibly estimate the cost of quits to the project, measured by project delay and cost overrun. The effect of the departure of one person from the team leads to about a 27 percent cost overrun and a 25 percent longer delay. These costs appear too high to be justified by the increase in value for the receiving firm. Moreover, firms seem unable to control separations: good human resources practices (higher salaries and benefits, lower inequality within the firm) are associated with an overall lower level of separations but do not weather the high demand pressures.

The Chinese Economy

The NBER's Working Group on the Chinese Economy, organized by Shang-Jin Wei, NBER and International Monetary Fund, met in Cambridge on October 1. This Working Group provides a forum for discussing recent research related to various aspects of Chinese economic development, including China's macroeconomic policies, trade and financial interactions with the rest of the world, reform strategies, lessons from China for other developing and transition economies, and lessons from other countries for China. The program for this meeting was:

Peter K. Schott, NBER and Yale University, "The Relative Sophistication of Chinese Exports"
Discussant: Wolfgang Keller, NBER and University of Texas

Dwayne Benjamin and **Loren Brandt**, University of Toronto, and

John Giles, Michigan State University, "The Dynamics of Inequality and Growth in Rural China: Does Higher Inequality Impede Growth?"
Discussant: Albert Park, University of Michigan

Wolfgang Keller and **Carol H. Shiue**, University of Texas, "Market Integration and Economic Development: A Long-Run Comparison"
Discussant: Michael D. Bordo, NBER and Rutgers University

Panel Discussion: The Chinese Exchange Rate Regime
Jeffrey A. Frankel, NBER and Harvard University; **Peter Garber**, NBER and Deutsche Bank; and **Yingyi Qian**, University of California, Berkeley

Jianping Mei, New York University, and **Jose A. Scheinkman** and **Wei Xiong**, Princeton University, "Speculative Trading and Stock Prices: An Analysis of Chinese A-B Share Premia"
Discussant: Zhiwu Chen, Yale University

Roger H. Gordon, NBER and University of California, San Diego, and **Wei Li**, University of Virginia, "Tax Structures in Developing Countries: Many Puzzles and a Possible Explanation"
Discussant: Eswar Prasad, IMF

Yasheng Huang, MIT, "Ownership Biases and FDI in China: Evidence from Two Provinces"
Discussant: Gary Jefferson, Brandeis University

Schott exploits product-level U.S. import data to assess the relative sophistication of China's exports along two dimensions. First, he compare China's export bundle to the rela-

tively skilled and capital-abundant members of the OECD and asks how China's OECD overlap compares with those of similarly endowed U.S. trading partners. Then, he examines prices

within product categories to determine whether China's varieties command a premium relative to its peers. Both comparisons indicate that China's exports are more sophisticated than its

relative endowments would predict, and that its “excess” sophistication is increasing with time.

Benjamin, Brandt, and Giles explore the linkages between income inequality and growth in rural China in the post-reform period. Since the early 1980s, China has experienced high rates of growth accompanied by increases in income inequality. As long as living standards rose for everyone, widening income gaps were viewed as the inevitable, temporary consequence of the transition process. However, there is now concern that recent increases in inequality threaten future growth. This paper asks whether there is any evidence from recent experience confirming that inequality can hinder growth. The analysis is based on a large-scale, detailed household survey from over 100 villages, spanning the period 1986 to 1999. The authors create a panel of 100 villages for this time period. Taking the village as the unit of observation, the authors estimate models relating a village’s growth rate to its initial level of inequality, and a set of covariates. Within a dynamic panel-data specification, this study finds no evidence suggesting that inequality reduces growth. However, the authors argue that the potentially long-run relationship between inequality and growth is better detected in a cross-section framework. Within the cross-section framework, they find that levels of inequality in 1986 are negatively related to the growth of village incomes through 1999, suggesting that higher inequality indeed can hurt growth in the long run. Further, they find strong evidence that inequality adversely affects development of the non-agricultural sector, and it is this stunted growth that underlies the broader negative impact of inequality on growth of household incomes.

How much of China’s recent economic performance can be attributed to market-oriented reforms introduced

in the last two decades? **Keller and Shiue** compare the integration of rice markets in China today and 270 years ago. In the eighteenth century, transport technology was non-mechanized, but markets were close to being free. The authors distinguish local harvest and weather from aggregate sources of price variation in a historical sample and in a similarly constructed contemporary sample. They find that the degree of market integration in the 1720s is a very good predictor of per capita income in the 1990s. Moreover, the current pattern of interregional income in China is strongly linked to persistent geographic factors that were already apparent several centuries ago, well before the enactment of modern reform programs.

China’s stock markets, with stringent short-sales constraints, dominance of inexperienced individual investors, a small asset float, and heavy share turnover (500 percent per year despite a high transaction cost), provide a unique opportunity to study non-fundamental components in stock prices. In particular, several dozen Chinese firms offered two classes of shares: class A, which only could be held by domestic investors, and class B, which only could be traded by foreigners. Despite their identical rights, A-share prices were on average 420 percent higher than the corresponding B shares. **Mei, Scheinkman, and Xiong** find that the turnover rate of A shares explains a large portion of the cross-sectional variation in A-B share premiums. Their further analysis of the relationship between asset float and share turnover shows that trading in A-share markets is driven by speculation. These results are robust after controlling for the effects of liquidity, discount rates, and differential risk and demand curves by local and foreign investors.

Developing countries tend to rely heavily on tariffs, inflation, and taxes on capital for their revenue, none of

which should play an important role according to standard models of optimal tax policy. **Gordon** argues that this inconsistency between forecasted and observed behavior may represent a weakness with the standard model rather than with observed policies, raising doubts about the conventional policy advice given by economists. In particular, standard models assume no problem with enforcement of the tax law. If activity is observable, thus taxable, only to the extent that firms make use of the financial sector, then the threat of disintermediation in response to taxes can change dramatically the forecasts for optimal policy, potentially rationalizing not only the tax policies described above but also a range of other puzzling aspects of government policy in poorer countries.

Jiangsu and Zhejiang are of two of China most prosperous and dynamic provinces. **Huang** first presents a factual account of two empirical phenomena: 1) FDI has played a more substantial role in the economic development of Jiangsu than in Zhejiang, and 2) ownership biases against domestic private firms in Jiangsu were more substantial than in Zhejiang. He hypothesizes that there is a connection between these two empirical phenomena. Specifically, ownership biases against domestic private firms increase preferences for FDI because FDI provides a measure of relative property rights security. Thus a biased domestic private firm has an incentive to move its assets and/or future growth opportunities to the foreign sector. Huang uses two private-sector surveys — one conducted in 1993 and the other in 2002 — to provide an empirical test of this hypothesis. His analysis shows that, controlling for a variety of firm-level attributes and industry and regional characteristics, those private firms which perceive ownership biases to be more severe are more likely to form joint ventures with foreign firms.

Entrepreneurship

The NBER's Working Group on Entrepreneurship met in Cambridge on October 15. Josh Lerner, NBER and Harvard Business School, organized this program:

Thomas Hellmann, University of British Columbia, and **Enrico Perotti**, University of Amsterdam, "The Circulation of Ideas: Firms versus Markets"
Discussant: Scott Stern, NBER and Northwestern University

Marie Thursby, NBER and Georgia Institute of Technology; **Jerry Thursby**, Emory University; and **Emmanuel Dechenaux**, Purdue University, "Shirking, Sharing Risk, and Shelving: The Role of University License

Contracts"
Discussant: Fiona Murray, MIT

Rafael di Tella, Harvard University, and **Robert MacCulloch**, Princeton University, "Why Doesn't Capitalism Flow to Poor Countries?"

and **Rafael di Tella**; **Sebastian Galiani**, Universidad de San Andres; and **Ernesto Schargrodsky**, Universidad Torcuato di Tella, "Property Rights and Beliefs: Evidence from the Allocation of Land Titles to Squatters"
Discussant: Nittai Bergman, MIT

John R. Graham, Duke University, and **Krishna Narasimhan**, The Wharton School, "Corporate Survival and Managerial

Experiences During the Great Depression"
Discussant: Yael Hochberg, Cornell University

Lubos Pastor and **Pietro Veronesi**, NBER and University of Chicago, "Was There a Nasdaq Bubble in the late 1990s?"
Discussant: John Y. Campbell, NBER and Harvard University

Panel Discussion: *The Nasdaq Bubble and its Implications: What Don't We Understand?*
Tim Bresnahan, NBER and Stanford University; William Janeway, Warburg Pincus; Luigi Zingales NBER and University of Chicago

Hellmann and **Perotti** describe new ideas as incomplete concepts requiring feedback from agents with complimentary expertise. Once shared, ideas may be stolen. The authors compare how different contractual environments support invention and implementation. Markets, as open exchange systems, are good for circulation and thus elaboration, but may fail to reward idea generation. Firms, as controlled idea exchange systems, can reward idea generation but restrict their circulation. This identifies a basic trade-off between protecting the rights of invention and the best implementation of ideas. An environment that allows ideas to cross firm boundaries enhances the rate of innovation and creates a symbiotic relationship between markets and firms.

University license contracts are more complex than the fixed fees and royalties typically examined by economists. **Thursby**, **Thursby**, and **Dechenaux** show that milestones, annual payments, and consulting are common because moral hazard, risk sharing, and adverse selection all play a role when embryonic inventions are licensed. Milestones address inventor moral hazard without the inefficiency inherent in royalties. Royalties are optimal only when the licensee is risk

averse. The potential for a licensee to shelve inventions is an adverse selection problem that can be addressed by annual fees if shelving is unintentional, but milestones are needed if the firm licenses an invention intending to shelve it. Whether annual fees or milestones prevent shelving depends on the university credibly threatening to take the license back from a shelving firm. When such a threat is not credible an upfront fee is needed. Survey data support the finding that milestone payments help to address inventor moral hazard and to share risk. Royalties are not used to address moral hazard, and the risksharing role of royalties is mitigated by difficulties in defining them for early stage inventions. The authors find that consulting is related to inventor moral hazard. Finally, the data support the use of annual payments for unintentional shelving.

Di Tella and **MacCulloch** find that governments in poor countries have a more left-wing rhetoric than those in OECD countries. One possible explanation is that corruption, which is more widespread in poor countries, reduces the electoral appeal of capitalism more than that of socialism. The empirical pattern of beliefs within countries is consistent with this explanation: people who perceive cor-

ruption to be high in the country are also more likely to lean left ideologically and to declare to support a more intrusive government in economic matters. Finally, the authors show that the corruption-left connection can be explained if corruption is seen as unfair behavior on the part of capitalists (more than of bureaucrats). Voters then react by moving left, even if this is materially costly to them. There is a negative ideological externality since the existence of corrupt entrepreneurs hurts good entrepreneurs by reducing the general appeal of capitalism.

Having property rights may change people's beliefs. **Di Tella**, **Galiani**, and **Schargrodsky** study this hypothesis using a natural experiment from a squatter settlement in the outskirts of Buenos Aires. They find significant differences in the beliefs that squatters with and without property rights declare to hold. Property rights make beliefs closer to those that favor the workings of a free market; examples include materialist and individualist beliefs (such as the belief that money is important for happiness, or the belief that one can be successful without the support of a large group). These effects appear large: the value of a (generated) index of pro market beliefs for squatters without property rights is 78 percent

of that of the general Buenos Aires population; the value for squatters who receive property rights is 98 percent of that of the general population. In other words, giving property rights to squatters causes a change in their beliefs that makes them indistinguishable from those of the general population, in spite of the dramatic differences in the lives they lead. This experiment is less informative as to the precise way property rights change beliefs, although there is suggestive evidence of a behavioral channel.

Graham and **Narasimhan** study corporate performance during and after the Great Depression for all industrial firms on the NYSE. Their first goal is to identify the factors that contribute to business insolvency and valuation during the period 1928 to 1938. To this end, they examine factors such as debt policy, creditworthiness, corporate governance, and investment.

Their second goal is to determine whether experiences during the Depression had a lasting effect on corporate decisions in the 1940s. They find that firms with more debt and lower bond ratings in 1928 had a greater probability of becoming financially distressed during the Great Depression. The value loss associated with high leverage for “value” firms is very significant, while the effect for “growth” firms is small. The probability of encountering distress during the Depression is also related to operating profits and firm size in the year prior to the occurrence of distress. Also, companies with large boards, and boards dominated by insiders, are less likely to survive the Depression. Finally, the authors find that the Depression experience appears to have affected the preference to use debt, even after the economic environment improved: firms that were highly lev-

ered during the Depression use relatively little debt in the 1940s. Moreover, this behavior appears to be individual-specific, because the use of debt increases in the 1940s at companies for which the Depression-era company president retires or otherwise leaves the firm.

The fundamental value of a firm increases with uncertainty about average future profitability, and this uncertainty was unusually high in the late 1990s. **Pastor** and **Veronesi** calibrate a stock valuation model that includes this uncertainty, and show that the uncertainty needed to match the observed Nasdaq valuations at their peak is high but plausible. The high uncertainty also might explain the unusually high return volatility of Nasdaq stocks in the late 1990s. Uncertainty has the biggest effect on stock prices when the equity premium is low.

Labor Studies

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

Amitabh Chandra and **Douglas Staiger**, NBER and Dartmouth College, “Geographic Knowledge Spillovers: Evidence from the Treatment of Heart Attacks” (NBER Working Paper No. 10811)

Federico Echenique, California Institute of Technology, and **Roland Fryer**, NBER and Harvard

University, “On the Measurement of Segregation”

Joshua Angrist, NBER and MIT, and **Adrianna D. Kugler**, University of Houston, “Coca, Conflict, and Rural Income: Evidence from Colombia”

Dan Ariely and **Nina Mazar**, MIT; **Uri Gneezy**, University of Chicago; and **George Lowenstein**, Carnegie Mellon University, “Large Stakes and Big Mistakes”

Eli Berman, NBER and University of California, San Diego; **Laurence Iannaccone**, George Mason

University; and **Giuseppe Ragusa**, University of California, San Diego; “Empty Pews, Empty Cradles: Declining Religiosity and Fertility Decline Among European Catholics”

Sandra E. Black, NBER and University of California, Los Angeles; **Paul J. Devereux**, University of California, Los Angeles; and **Kjell G. Salvanes**, Norwegian School of Economics, “The More the Merrier? The Effects of Family Composition on Children's Education”

Productivity spillovers often are cited as a reason for geographic specialization in production. A large literature in medicine documents specialization across areas in the use of surgical treatments, which is unrelated to patient outcomes. **Chandra** and **Staiger** show that a simple Roy model of patient treatment choice with productivity

spillovers can generate these facts. The model predicts that high-use areas will have higher returns to surgery, better outcomes among patients most appropriate for surgery, and worse outcomes among patients least appropriate for surgery. The authors find strong empirical support for these and other predictions of the model, and decisively

reject alternative explanations commonly proposed to explain geographic variation in medical care.

All existing measures of segregation share three undesirable properties. First, they explicitly depend on arbitrary partitions of cities into geographic areas known as census tracts. Second, they are dichotomous measures and

cannot measure the spatial segregation of multiple racial and ethnic groups. Third, they are not equipped to measure segregation at the level of individuals. Constructing three desirable axioms that any segregation measure should satisfy, **Echenique** and **Fryer** prove that one and only one segregation index satisfies the three axioms and the three properties mentioned. Using data from the 2000 census, the authors recalculate the prevalence of segregation across cities and minority groups. The correlation between their new measure of segregation and the commonly used dissimilarity index is .42.

Coca is widely believed to be economically important in Andean nations, although the drug trade also is associated with organized crime and violence, especially by insurgent groups. **Angrist** and **Kugler** study the social consequences of a major shift in coca paste production from Peru and Bolivia to Colombia, where most coca is now harvested. This shift arose in response to the disruption of the “air bridge” that previously ferried coca paste into Colombia. The authors study the consequences of increased coca production for deaths by violence, rural economic conditions, school enrollment, and child labor. They also attempt to distinguish the effects of increased coca production from a secular increase in rural insurgent activity and the Colombian government’s temporary ceding of two departments in coca-growing regions. The results suggest that rural areas in departments that saw accelerated coca production subsequently became much more violent, initially against a backdrop of generally improving public health and a lull in guerrilla activity. On the economic side, there is some evidence of increased income for self-employed workers and increased labor supply by teenage boys. These effects seem unlikely to have generated a substantial increase in rural living standards.

Most upper-management and sales force personnel, as well as workers in many other jobs, are paid based on performance, which is widely perceived as motivating effort and enhancing productivity relative to non-contingent pay schemes. However, psychological research suggests that excessive rewards in some cases can produce supra-optimal motivation and a decline in performance. To test whether very high monetary rewards can decrease performance, **Ariely** and his co-authors conducted a study in rural India. Subjects in their experiment worked on seven different tasks and were randomly assigned to receive performance-contingent payments that were small, moderate, or very large relative to their typical levels of pay. On all tasks but one, the authors observed detrimental effects of the highest reward levels on performance.

The Catholic countries of Europe pose a puzzle for economic demography — their fertility is the lowest in history, despite low female labor force participation rates. **Berman** and his co-authors apply a panel on church attendance and clergy employment from 1960-2000 to the study of fertility decline among European Catholics since the Second Vatican Council (1963-6). Though Catholic theology is fairly uniform across countries, the level of nuns per Catholic person in the population varies considerably both across countries and over time, indicating large differences in Church provision of education, health, welfare, and other social services. **Berman** and co-authors find that the interaction of declines in service provision (reflecting the number of nuns per Catholic) and religiosity (attendance) strongly predict declining fertility. The nuns-per-Catholic effect provides evidence that religion affects fertility not only through preferences but also functionally, through social service provision. Moreover, church attendance is

apparently necessary for Church social service provision to affect fertility. The relative number of nuns outperform the relative number of priests in predicting fertility, suggesting that social service provision may matter more for fertility than does the kind of theological services priests provide. The data are consistent with only a small fertility effect through reduced labor force participation. In the context of a standard fertility model, that small effect implies that religious services primarily affect fertility by lowering the effective cost of raising children.

Among the perceived inputs in the “production” of child quality is family size; there is an extensive theoretical literature that postulates a tradeoff between child quantity and quality within a family. However, there is little causal evidence that speaks to this theory. **Black**, **Devereux**, and **Salvanes** overcome many limitations of the previous literature by using a rich dataset that contains information on the entire population of Norway over an extended period of time and allows them to match adult children to their parents and siblings. In addition, they use exogenous variation in family size induced by the birth of twins to isolate causation. Like most previous studies, this one finds a negative correlation between family size and children’s educational attainment. However, when the authors include indicators for birth order, the effect of family size becomes negligible. This finding is robust to the use of twin births as an instrument for family size. In addition, the authors find that birth order has a significant and large effect on children’s education; children born later in the family obtain less education. These findings suggest the need to revisit economic models of fertility and child “production,” focusing not only on differences across families but differences within families as well.

Behavioral Finance

The NBER's Working Group on Behavioral Finance met in Cambridge on October 16. NBER Research Associates Robert J. Shiller of Yale University and Richard H. Thaler of the University of Chicago organized this program:

Eugene F. Fama, University of Chicago, and **Kenneth R. French**, NBER and Dartmouth College, "Disagreement, Tastes, and Asset Prices"

Discussant: Kent Daniel, NBER and Northwestern University

Gur Huberman and **Wei Jiang**, Columbia University, "Offering versus Choice in 401(k) Plans: Equity

Exposure and Number of Funds" Discussant: Richard H. Thaler

Malcolm Baker, **Joshua Coval**, and **Jeremy C. Stein**, NBER and Harvard University, "Corporate Financing Decisions When Investors Take the Path of Least Resistance"

Discussant: Ulrike Malmendier, Stanford University

Nittai K. Bergman and **Dirk Jenter**, MIT, "Employee Sentiment and Stock Option Compensation" Discussant: Rakesh Khurana, Harvard University

Nicholas Barberis, NBER and

Yale University, and **Ming Huang**, Stanford University, "Stocks as Lotteries: The Implications of Probability Weighting for Security Prices"

Discussant: Alon Brav, Duke University

Brad M. Barber, University of California, Davis; **Yi-Tsung Lee** and **Yu-Jane Liu**, National Chengchi University; and **Terrance Odean**, University of California, Berkeley, "Do Individual Day Traders Make Money? Evidence from Taiwan"

Discussant: Charles Lee, Cornell University

Standard asset pricing models assume that there is complete agreement among investors about probability distributions of future payoffs on assets, and that investors choose asset holdings based solely on anticipated payoffs; that is, that investment assets are not also consumption goods. Both assumptions are probably unrealistic. **Fama** and **French** provide a simple framework for studying how disagreement and tastes for assets as consumption goods can affect asset prices.

Huberman and **Jiang** observe that the records of more than half a million participants in more than six hundred 401(k) pension plans indicate that participants tend to use a small number of funds: the number of participants using a given number of funds peaks at three funds and declines after more than three funds. Participants tend to allocate their contributions evenly across the funds they use, with the tendency weakening with the number of funds used. The median number of funds used is between three and four, and is not sensitive to the number of funds offered by the plans, which ranges from 4 to 59. A participant's propensity to allocate contributions to equity funds is not very sensitive to the fraction of equity funds among those offered by his plan.

Baker, **Coval**, and **Stein** explore the consequences for corporate finan-

cial policy that arise when investors exhibit inertial behavior. One implication of investor inertia is that a firm pursuing a strategy of equity-financed growth will prefer a stock-for-stock merger over greenfield investment financed with a seasoned equity offering (SEO). With a merger, acquirer stock is placed in the hands of investors, who, because of inertia, do not resell it all on the open market. If there is downward-sloping demand for acquirer shares, this leads to less price pressure than an SEO, and cheaper equity financing as a result. The authors develop a simple model to illustrate this idea, and present supporting empirical evidence. Both individual and institutional investors tend to hang on to shares granted them in mergers, with this tendency being much stronger for individuals. Consistent with the model and with this cross-sectional pattern in inertia, acquirer announcement effects are more negative when the target has higher institutional ownership.

The use of broad equity-based compensation for employees in the lower ranks of an organization is a puzzle for standard economic theory: any positive incentive effects should be diminished by free rider problems, and undiversified employees should discount company equity heavily. **Bergman** and **Jenter** point out that employees do not appear to value company stock as the theory

predicts. Employees frequently purchase company stock for their 401(k) plans at market prices, especially after company stock has performed well, implying that their private valuation must at least equal the market price. The authors develop a model of optimal compensation policy for a firm faced with employees with positive sentiment. The goal is to establish the conditions necessary for the firm to compensate its employees with options in equilibrium, while explicitly taking into account that current and potential employees are able to purchase equity in the firm through the stock market. **Bergman** and **Jenter** show that using option compensation under these circumstances is not a puzzle if employees prefer the (non-traded) options offered by the firm to the (traded) equity offered by the market, or if the (traded) equity is overvalued. The evidence confirms that firms use broad-based option compensation when boundedly rational employees are likely to be excessively optimistic about company stock, and when employees are likely to have a strict preference for options over stock. Also, managers grant more options to rank-and-file employees when management believes its stock to be overvalued, again consistent with the model.

Barberis and **Huang** investigate the implications of Tversky and

Kahneman's cumulative prospect theory (CPT) for the pricing of financial securities, paying particular attention to the effects of the weighting function. Under CPT, the Capital Asset Pricing Model can hold when securities are normally distributed; but a positively skewed security can become overpriced and earn very low average returns, even if small and independent of other risks, and even if just one of many skewed securities in the economy. Barberis and Huang apply the last result to the pricing of IPOs and to the valuation of equity stubs. Using data on the skewness of IPO returns, they show that investors with CPT preferences calibrated to experimental

evidence would require an average return on IPOs that is several percentage points below the market return. Under CPT, then, the historical underperformance of IPOs may not be so puzzling.

Barber, Lee, Liu, and Odean analyze the performance of day traders — investors who buy and sell the same stock on the same day — in Taiwan. Day trading by individual investors is prevalent in Taiwan, accounting for over 20 percent of total volume from 1995 through 1999. Individual investors account for over 97 percent of all day trading activity. Day trading is extremely concentrated. About one percent of individual investors account for half of

day trading and one fourth of total trading by individual investors. Heavy day traders earn gross profits, but their profits are not sufficient to cover transaction costs. Moreover, in the typical six-month period, more than eight out of ten day traders lose money. Despite these bleak findings, there is strong evidence of persistent ability for a relatively small group of day traders. Traders with strong past performance continue to earn strong returns. The stocks they buy outperform those they sell by 62 basis points per day. This spread is sufficiently large to cover transaction costs.

Economic Fluctuations and Growth

The NBER's Program on Economic Fluctuations and Growth met in Chicago on October 22. NBER Research Associates John H. Cochrane, University of Chicago, and Janice C. Eberly, Northwestern University, organized this program:

Robert E. Hall, NBER and Stanford University, and **Charles I. Jones**, NBER and University of California, Berkeley, "The Value of Life and the Rise in Health Spending"
Discussant: Tomas Philipson, NBER and University of Chicago

David Altig, Federal Reserve Bank of Cleveland; **Lawrence J. Christiano** and **Martin Eichenbaum**, NBER and

Northwestern University; and **Jesper Linde**, Sveriges Riksbank, "Firm-Specific Capital, Nominal Rigidities and the Business Cycle"
Discussant: Michael Woodford, NBER and Princeton University

Diego Comin, NBER and New York University, and **Bart Hobijn**, Federal Reserve Bank of New York, "Neoclassical Growth and the Adoption of Technologies" (NBER Working Paper No. 10733)
Discussant: Samuel Kortum, NBER and University of Minnesota

Marco Cagetti, University of Virginia, and **Mariacristina De Nardi**, University of Minnesota, "Taxation, Entrepreneurship, and Wealth"

Discussant: Erik Hurst, NBER and University of Chicago

Mark Aguiar, Federal Reserve Bank of Boston, and **Gita Gopinath**, NBER and University of Chicago, "Emerging Market Business Cycles: The Cycle is the Trend"
Discussant: Fabrizio Perri, NBER and New York University

Marco Bassetto, University of Minnesota, and **Thomas J. Sargent**, NBER and New York University, "Politics and Efficiency of Separating Capital and Ordinary Government Budgets"
Discussant: Manuel Amador, Stanford University

Health care extends life. Over the past half century, Americans have spent a rising share of total economic resources on health and have enjoyed substantially longer lives as a result. Debate on health policy often focuses on limiting the growth of health spending. **Hall** and **Jones** investigate an issue central to this debate: can we understand the growth of health spending as the rational response to changing economic conditions, most

notably the growth of income per person? The authors estimate parameters of the technology that relates health spending to improved health, measured as increased longevity, as well as parameters of social preferences about longevity and the consumption of non-health goods and services. The story of rising health spending that emerges is that the diminishing marginal utility of non-health consumption combined with a rising value of

life causes the nation to move up the marginal-cost schedule of life extension. The health share continues to grow as long as income grows. In projections based on Hall and Jones's parameter estimates, the health share reaches 33 percent by the middle of the century.

Altig, Christiano, Eichenbaum, and Linde formulate and estimate a three-shock U.S. business cycle model. The model accounts for roughly 75

percent of the cyclical variation in output and is consistent with the observed inertia in inflation. This is true even though firms in the model only reoptimize their prices once every 1.6 quarters on average. The key feature underlying this result is that capital is firm specific. If the authors instead adopt the standard assumption that capital is homogeneous and traded in economy-wide rental markets, they find that firms reoptimize their prices once every 6 quarters on average. The micro implications of the model strongly favor the firm-specific capital specification.

Comin and Hobijn introduce a growth model of technology diffusion and endogenous Total Factor Productivity (TFP) levels at both the sector and aggregate level. Their goal is for the model to bridge the gap between the theoretical and empirical studies of technology adoption and economic growth. They first use the model to show how one unified theoretical framework is broadly consistent with the observed dynamics of both economic growth and many different measures of technology adoption, such as adoption rates, capital-to-output ratios, and output ratios. Then they estimate the model using a broad range of technological adoption measures, covering 17 technologies and 21 industrialized countries over the past 180 years. This allows them to show how its predicted adoption patterns fit those observed in the data. Finally, they estimate the disparities in sectoral productivity levels and aggregate TFP that can be attributed to the differences in the range of technologies in use across countries. These disparities are almost completely determined by the quality of the worst technology in use, rather than by the quality of the newest technology that has just been adopted or by the number of technologies in use. Further, Comin and Hobijn find that

the TFP component attributable to the range of technologies used is highly correlated with overall sectoral TFP differences across countries, though the variance is smaller.

Entrepreneurship is a key determinant of investment, saving, and wealth inequality. **Cagetti and De Nardi** study the aggregate and distributional effects of several tax reforms in a model that recognizes this key role and matches the large wealth inequality observed in the U.S. data. The aggregate effects of tax reforms can be particularly large when they affect small and medium-sized businesses — which face the most severe financial constraints — rather than big businesses. The consequences of changes in the estate tax depend heavily on the size of its exemption level. The current effective estate tax system insulates smaller businesses from the negative effects of estate taxation, minimizing the aggregate costs of redistribution. Abolishing the current estate tax would generate a modest increase in wealth inequality and reduce aggregate output slightly. Decreasing the progressivity of the income tax generates large increases in output, at the cost of large increases in wealth concentration.

Business cycles in emerging markets are characterized by strongly counter-cyclical current accounts, consumption volatility that exceeds income volatility, and dramatic “sudden stops” in capital inflows. These features contrast with those of developed small open economies and highlight the uniqueness of emerging markets. Yet **Aguiar and Gopinath** show that, both qualitatively and quantitatively, a standard dynamic stochastic small open economy model can account for the behavior of both types of markets. Motivated by the frequent policy regime switches observed in emerging markets, they presume that

these economies are subject to substantial volatility in the trend growth rate relative to developed markets. Consequently, shocks to trend growth, not transitory fluctuations around a stable trend, are the primary source of fluctuations. When the parameters of the income process are structurally estimated for each type of economy, the observed predominance of permanent shocks relative to transitory shocks for emerging market, and the reverse for developed market, explains differences in key features of their business cycles. Finally, the authors find further support for the notion that the “cycle is the trend” for emerging economies.

Bassetto and Sargent analyze the democratic politics of a rule that separates capital and ordinary account budgets and allows the government to issue debt only to finance capital items. Many national governments followed this rule in the eighteenth and nineteenth centuries, and most U.S. states do today. This simple 1800s financing rule sometimes provides excellent incentives for majorities to choose an efficient mix of public goods in an economy with a growing population of overlapping generations of long-lived but mortal agents. In a special limiting case with demographics that make Ricardian equivalence prevail, the 1800s rule does nothing to promote efficiency. But when the demographics imply even a moderate departure from Ricardian equivalence, imposing the rule substantially improves the efficiency of democratically chosen allocations. The authors calibrate some examples to U.S. demographic data. They speculate why, in the twentieth century, most national governments abandoned the 1800s rule while U.S. state governments have retained it.

Health Care

The NBER's Program on Health Care met in Cambridge on October 22. NBER Research Associate Martin Gaynor, Carnegie Mellon University, organized this program:

Leemore Dafny, NBER and Northwestern University, "Estimation and Identification of Merger Effects: An Application to Hospital Mergers"

Mark Duggan, NBER and University of Maryland, and **Fiona Scott-Morton**, NBER and Yale University, "The Distortionary Effects of Government Procurement: Evidence from Medicaid Prescription Drug Purchasing"

Dana Goldman, NBER and RAND, and **Nicole Maestas**, RAND, "Medical Expense Risk and Household Portfolio Allocation"

Katherine Ho, Harvard University, "Provider Networks in the Medical Care Market"

Robert Town, NBER and University of Minnesota; **Lawton R. Burns**, University of Pennsylvania; and **Roger Feldman** and **Doug Wholey**, University of Minnesota, "Did the HMO Revolution Cause Hospital Consolidation?"

Advances in structural demand estimation have improved economists' ability to forecast the impact of mergers substantially. However, these models rely on extensive assumptions about consumer choice and firm objectives; ultimately, observational methods are needed to test their validity. Observational studies, in turn, suffer from selection problems arising from the fact that merging entities differ from non-merging entities in unobserved ways. To obtain an accurate estimate of the ex-post effect of consummated mergers, **Dafny** proposes a combination of rival analysis and instrumental variables. By focusing on the effect of mergers on the behavior of rival firms, and instrumenting for these mergers, she can obtain unbiased estimates of the effect of mergers on market outcomes. Using this methodology, **Dafny** evaluates the impact of all independent hospital mergers between 1989 and 1996 on rivals' prices. She finds sharp increases in rival prices following a merger, with the greatest effect on the closest rivals. The results for this industry are more consistent with predictions from structural models than with prior observational estimates.

The federal-state Medicaid program insures 43 million people for virtually all of the prescription drugs approved by the FDA. To determine the price that it will pay for a drug treatment, the government uses the average price in the private sector for that same drug. Assuming that Medicaid recipients are unresponsive to price because of the program's zero

co-pay, this rule will increase prices for non-Medicaid consumers. Using drug utilization and expenditure data for the top 200 drugs in 1997 and in 2002, **Duggan** and **Scott Morton** investigate the relationship between the Medicaid market share (MMS) and the average price of a prescription. Their findings suggest that the Medicaid rules substantially increase equilibrium prices for non-Medicaid consumers. Specifically, a 10 percentage-point increase in the MMS is associated with a 10 percent increase in the average price of a prescription. This result is robust to the inclusion of controls for a drug's therapeutic class, the existence of generic competition, the number of brand competitors, and the years since the drug entered the market. The authors also demonstrate that the Medicaid rules increase a firm's incentive to introduce new versions of a drug at higher prices. They find empirical evidence in support of this for drugs that do not face generic competition. Taken together, these findings suggest that government procurement can have an important effect on equilibrium prices in the private sector.

As health care costs continue to rise, medical expenses have become an increasingly important contributor to financial risk, especially for the elderly. Economic theory suggests that when background risk rises individuals will reduce their exposure to avoidable risk in other areas. **Goldman** and **Maestas** present a test of this theory by examining the effect of medical expenditure risk on the willingness of older U.S. households to hold risky assets. The

authors focus on individuals who are age 65 or older and who are enrolled in the Medicare program, using data from the Health and Retirement Study. Because supplemental insurance such as Medigap, employer retiree health insurance, and HMOs offer greater protection against catastrophic out-of-pocket medical expenses than traditional Medicare, the authors measure exposure to out-of-pocket medical expenditure risk by whether an individual is covered by Medigap, employer supplemental insurance, or a Medicare HMO. One issue with this approach is that the choice of insurance may be endogenous. The endogeneity can be accounted for by using exogenous variation in county Medigap prices, and with county-level HMO market penetration. **Goldman** and **Maestas** find that having Medigap or an employer policy increases risky asset holding by 6.7 percentage points relative to being enrolled in only Medicare Parts A and B. HMO participation increases risky asset holding by 4.3 percentage points, although this effect is not statistically significant in models that include endogenous wealth and income. Given that just 50 percent of this sample holds risky assets, these are economically sizable effects.

Managed care health insurers in the United States restrict their enrollees' choice of hospitals to specific networks. **Ho** investigates the causes and welfare effects of the observed hospital networks. A simple profit maximization model explains roughly half the observed contracts between insurers and hospitals. A generalization of

the model demonstrates an additional effect: hospitals that do not need to contract with all insurance plans to secure demand (for example, hospitals that are capacity constrained under a limited or selective network) can force insurers to compete for contracts. Some plans may exclude these hospitals in equilibrium. Hospitals can merge to form “systems”, which also may affect bargaining between hospitals and insurance plans. Ho estimates the expected division of profits between insurance plans and different types of hospitals using data on insurers’ choices of network. Hospitals in systems capture around \$179,000 of incremental profits each per month

compared to other providers and impose high penalties on plans that exclude their partners. Providers that are expected to be capacity-constrained capture an additional \$1800 per patient on average. Ho shows that these high markups imply a negative incentive for hospitals to invest to remove capacity constraints, despite a median benefit to consumers of over \$330,000 per new bed per year.

During the 1990s the landscape of U.S. healthcare markets shifted dramatically. Most obviously, managed care rose to become the dominant form of insurance in the private sector. Simultaneously, a wave of hospital consolidation occurred. In 1990, the mean hos-

pital Herfindahl-Hirschman Index (HHI) in a Health Services Area (HSA) was .37. By 2000, the HHI had risen to .42. In this paper, **Town, Wholey, Feldman,** and **Burns** explore whether there is a causal connection between the increase in hospital concentration and the rise in managed care. They use a 10-year difference, instrument variables approach to identify the relationship between managed care and hospital consolidation. Their results indicate that there is no causal relationship between hospital consolidation and increased managed care penetration. This finding is robust to a number of different specifications.

International Finance and Macroeconomics

The NBER’s Program on International Finance and Macroeconomics met in Cambridge on October 22. NBER Research Associates Charles M. Engel, University of Wisconsin, and Linda Tesar, University of Michigan, organized this program:

Martin D. D. Evans, NBER and Georgetown University, and **Richard K. Lyons**, NBER and University of California, Berkeley, “Exchange Rate Fundamentals and Order Flow”
Discussant: Anna Pavlova, MIT

Torben G. Andersen, NBER and Northwestern University; **Tim Bollerslev**, NBER and Duke University; **Francis X. Diebold**, NBER and University of

Pennsylvania; and **Clara Vega**, University of Rochester, “Real-Time Price Discovery in Stock, Bond and Foreign Exchange Markets”
Discussant: Jeffrey A. Frankel, NBER and Harvard University

Assaf Razin, NBER and Cornell University, and **Yona Rubinstein** and **Efraim Sadka**, Tel Aviv University, “Fixed Costs and FDI: The Conflicting Effects of Productivity Shocks”
Discussant: Stephen Yeaple, University of Pennsylvania

Enrique Mendoza, NBER and University of Maryland, “Sudden Stops in an Equilibrium Business Cycle Model with Credit Constraints: A Fisherian Deflation of Tobin’s q ”

Discussant: Martin Uribe, NBER and Duke University

Justin M. Dubas and **Byung-Joo Lee**, University of Notre Dame, and **Nelson C. Mark**, NBER and University of Notre Dame, “Effective Exchange Rate Classifications”
Discussant: Graciela Kaminsky, NBER and George Washington University

Michael W. Klein, NBER and Tufts University, and **Jay C. Shambaugh**, Dartmouth College, “Fixed Exchange Rates and Trade” (NBER Working Paper No. 10696)
Discussant: Eric Van Wincoop, NBER and University of Virginia

Evans and **Lyons** ask whether transaction flows in foreign exchange markets convey information about fundamentals. They begin with a general equilibrium model in which fundamental information is first manifest in the economy at the micro level, that is, in a way that is not observed symmetrically by all agents. With this information structure, induced foreign exchange transactions play a central role in the aggregation process, providing testable

links between transaction flows, exchange rates, and future fundamentals. Using data on all end-user currency trades received by Citibank over 6.5 years, a sample sufficiently long to analyze real-time forecasts at the quarterly horizon, the authors’ predictions are borne out in four empirical findings: 1) transaction flows forecast future macro variables such as output growth, money growth, and inflation; 2) transaction flows forecast these macro vari-

ables significantly better than spot rates do; 3) transaction flows (proprietary) forecast future spot rates; and 4) though proprietary flows convey new information about future fundamentals, much of this information is still not impounded in the spot rate one quarter later. The bottom line is that the significance of transaction flows for exchange rates extends well beyond high frequencies.

Andersen, Bollerslev, Diebold,

and **Vega** characterize the response of U.S., German, and British stock, bond, and foreign exchange markets to real-time U.S. macroeconomic news. Their analysis is based on a unique dataset of high-frequency futures returns for each of the markets. They find that news surprises produce conditional mean jumps; hence high-frequency stock, bond and exchange rate dynamics are linked to fundamentals. Further, the authors show that equity markets react differently to the same news depending on the state of the economy, with bad news having a positive impact during expansions and the traditionally expected negative impact during recessions. They rationalize this by temporal variation in the competing “cash flow” and “discount rate” effects for equity valuation. This finding helps explain the time-varying correlation between stock and bond returns, and the relatively small equity market news effect when averaged across expansions and recessions. Finally, relying on the pronounced heteroskedasticity in the high-frequency data, the authors document important contemporaneous linkages across all markets and countries over-and-above the direct news announcement effects.

Razin, Rubinstein, and Sadka develop a model with lumpy setup costs of new investment which govern the flows of FDI. Foreign investment decisions are two-fold: whether to export FDI and, if so, how much. The first decision is governed by total profitability considerations, whereas the second is governed by marginal profitability considerations. A positive productivity shock in the host country may, on the one hand, increase the volume of the desired FDI flows to the host country but, on the other hand, somewhat counter-intuitively, lower the likelihood of making new FDI flows by the source country at all. Every country is potentially both a source for FDI flows to several host countries and a host for FDI flows from several countries. Thus, the model could gen-

erate two-way FDI flows, but not all source-host FDI flows get realized. The authors use a sample of 24 OECD countries, over the period 1981-98. Many pairs of countries have no FDI flows; these zero reported flows could indicate measurement errors, or true zeroes attributable to fixed costs (in situations where they dominate marginal productivity conditions). By using the Heckman selection procedure, the authors demonstrate how to get unbiased estimates of the fixed-costs effects on FDI flows. Indeed, the evidence suggests that the decisions on whether to export FDI at all, and on how much FDI, cannot be regarded as a single decision on FDI flows, because the exogenous shocks have conflicting effects on the likelihood of FDI flows and the magnitude of the flows.

In a Sudden Stop, a country suffers a loss of access to world capital markets, a sharp current account reversal, and collapses in output, absorption and asset prices. Sudden Stops appear in the data as recessions larger than normal cyclical downturns, suggesting that their cause could be large, unanticipated shocks to credit market access. However, this explanation is at odds with the history of these events and it leaves the credit crunch unexplained. **Mendoza** uses an equilibrium business cycle model in which the underlying shocks driving normal business cycles can trigger credit constraints on foreign debt and working capital financing. When these constraints bind, they cause three “credit channel” effects that magnify the effects of shocks, making recessions larger and more persistent. Two are endogenous external financing premiums on foreign debt and working capital. The third is Fisher’s debt-deflation mechanism. Sudden Stops emerge as the equilibrium response to typical realizations of adverse shocks when the economy is highly leveraged, and these high leverage states are reached with positive probability in the long run.

Dubas, Lee, and Mark propose a new method for classifying exchange rate regimes which is innovative in two ways: First, they include characteristics of the country’s effective exchange rate as a determinant of the exchange rate regime. For this purpose, they construct a new and extensive monthly dataset of effective exchange rates built from bilateral trade weights on goods and services for 180 countries from 1971 to 2002. Second, to obtain their classifications, they model the *de jure* classification as a choice problem conditional on a set of country characteristics. The choice probabilities, given by the multinomial logit specification, are estimated by maximum likelihood. Country-year observations are assigned to the exchange rate regime with the highest predictive probability. Using their “effective” exchange rate regime classifications in growth regressions, they find that increasing exchange rate stability is associated with more rapid GDP growth.

A classic argument for a fixed exchange rate is promotion of trade. However, empirical support for this is mixed. While one branch of research consistently shows a small negative effect of exchange rate volatility on trade, another, more recent, branch presents evidence of a large positive impact of currency unions on trade. **Klein and Shambaugh** help to resolve this disconnect. Their results, using a new data-based classification of fixed exchange rate regimes, show a large, significant effect of a fixed exchange rate on bilateral trade between a base country and a country that pegs to it. Furthermore, the web of fixed exchange rates created when countries link to a common base also promotes trade, but only when these countries are part of a wider system, as during the Bretton Woods period. These results suggest an economically relevant role for exchange rate regimes in trade determination since a significant amount of world trade is conducted between countries with fixed exchange rates.

Public Economics

The NBER's Program on Public Economics met in Cambridge on October 28-29. James M. Poterba, NBER and MIT, organized this program:

Christian A.L. Hilber, London School of Economics, and **Christopher Mayer**, NBER and Columbia University, "Why Do Households without Children Support Local Public Schools? Linking House Price Capitalization to School Spending"
Discussant: Michael Greenstone, NBER and MIT

Nada Eissa, NBER and Georgetown University, and **Henrik Kleven** and **Claus Kreiner**, University of Copenhagen, "Evaluation of Four Tax Reforms in the United States: Labor Supply

and Welfare Effects on Single Mothers"
Discussant: Leora Friedberg, NBER and University of Virginia

Roberton C. Williams, III, NBER and University of Texas, "An Estimate of the Optimal Second-Best Gasoline Tax Considering Both Efficiency and Equity"
Discussant: Gilbert A. Metcalf, NBER and Tufts University

Mihir A. Desai, NBER and Harvard University, and **Dharmika Dharmapala**, University of Connecticut, "Corporate Tax Avoidance and High Powered Incentives"
Discussant: Mark Lang, University of North Carolina

Louis Kaplow, NBER and Harvard University, "On the Undesirability of Commodity Taxation even when Income Taxation is Not Optimal" (NBER Working Paper No. 10407)
Discussant: James R. Hines, Jr., NBER and University of Michigan

Jonathan Gruber, NBER and MIT, and **Gary V. Engelhardt**, Syracuse University, "Social Security and the Evolution of Elderly Poverty" (NBER Working Paper No. 10466)
Discussant: Andrew Samwick, NBER and Dartmouth College

Katherine Baicker and **Douglas Staiger**, NBER and Dartmouth College, "Fiscal Shenanigans, Targeted Federal Health Care Funds, and Patient Mortality"
Discussant: Mark Duggan, NBER and University of Maryland

While residents receive similar benefits from many local government programs, only about one-third of all households have children in public schools. **Hilber** and **Mayer** argue that capitalization of school spending into house prices can encourage residents to support spending on schools, even if the residents themselves will never have children in schools. The authors identify a proxy for the extent of capitalization based on the supply of land available for new development. Using a plausibly exogenous shock to local spending in Massachusetts, they show that house prices change more strongly in response to the demand shock in areas with little undeveloped land than in areas with plenty of undeveloped land, and that communities with little available land also spend more on schools. They then extend these results using national data from school districts, showing that per pupil spending is positively related to the percentage of developed land, and that this positive correlation persists only in locations with high homeownership rates; it is stronger in districts with more elderly residents who do not use school services and have a shorter expected duration in their property. These

results also hold with alternative measures of capitalization. The findings support models in which house price capitalization encourages more efficient provision of public services. They also provide an alternative explanation for why some elderly residents might support local spending on schools.

A large literature on the welfare effects of taxation has examined the role of labor supply elasticity, and has shown that the estimated welfare effects are highly sensitive to its size. This literature focuses exclusively on hours worked and the associated marginal tax rate. An emerging consensus among public finance and labor economists, however, is that labor supply is more responsive along the extensive margin (participation) than along the intensive margin (hours worked). **Eissa**, **Kleven**, and **Kreiner** embed the extensive margin in an explicit welfare theoretic framework. The participation effect on welfare is created by a different tax wedge from the marginal-tax wedge relevant for hours of work. The reason for this is simple and intuitive: features of the tax-transfer schedule, such as the EITC, TANF, and Medicaid, create significant non-

linearities and discontinuities. This in turn leads to substantially different tax rates on participation than on hours worked. Applying the framework to the labor supply and welfare effects for single mothers in the United States following four tax acts passed in 1986, 1990, 1993, and 2001, the authors show that each of the acts reduced the tax burdens on low-income single mothers and created substantial welfare gains. Three features of the welfare effects are notable. First, welfare gains are almost exclusively concentrated along the extensive margin of labor supply. Second, welfare effects along the extensive margin tend to dominate those along the intensive margin, even when the two labor supply elasticities are of similar size. This occurs because the welfare effect on each margin is created by a different tax wedge. Finally, ignoring the composition of the labor supply elasticity may reverse the sign of the welfare effect. In the welfare evaluation of tax reform, the authors conclude that the composition of the total labor supply elasticity is as important as its size.

Williams investigates the optimal taxation of gasoline in a setting with pre-existing taxes and heterogeneous

consumers, taking into account both equity and efficiency considerations. He uses data from the Consumer Expenditure Survey to estimate a demand system for leisure, gasoline, and other goods, and then incorporates those estimates into a model of optimal income and commodity taxation to calculate the optimal second-best gas tax rate. All prior work on second-best optimal gas taxes — and the vast majority of the second-best environmental tax literature as a whole — has assumed a representative agent, producing potentially misleading conclusions. Gasoline is a necessity which, in a representative agent model, implies a higher second-best optimal tax. But taxing necessities has harmful distributional effects that cannot be captured by a representative-agent model. Williams allows consumers to differ in ability and preferences. Unlike prior applied work in optimal commodity taxation, his study uses micro data, making it possible to relax assumptions of separability and homotheticity. In addition, rather than assuming a particular social welfare function, he incorporates equity considerations by solving for the optimal tax rate under the constraint that the tax change cannot make any income group worse off. The results suggest that the optimal gasoline tax rate exceeds the marginal damage from gasoline use, though distributional concerns cause this tax rate to be substantially less than a representative-agent model would suggest.

Desai and Dharmapala analyze the links between corporate tax avoidance, the growth of high-powered incentives for managers, and the structure of corporate governance. They develop and test a simple model that highlights the role of positive feedback

effects between tax sheltering and managerial diversion in determining how high-powered incentives influence tax sheltering decisions. The model generates the testable hypothesis that firm governance characteristics determine how incentive compensation changes sheltering decisions. In order to test the model, the authors construct an empirical measure of corporate tax avoidance — the component of the book-tax gap not attributable to accounting accruals — and investigate the link between this measure of tax avoidance and incentive compensation. They find that, for the full sample of firms, increases in incentive compensation tend to reduce the level of tax sheltering, suggesting a complementary relationship between diversion and sheltering. As predicted by the model, the relationship between incentive compensation and tax sheltering is a function of a firm's corporate governance. These results may help to explain the growing cross-sectional variation among firms in their levels of tax avoidance, the “under-sheltering puzzle,” and why large book-tax gaps are associated with substantial negative abnormal returns.

According to Atkinson and Stiglitz (1976), differential commodity taxation is not optimal in the presence of an optimal nonlinear income tax (given weak separability of utility between labor and all consumption goods). **Kaplow** demonstrates that their conclusion holds regardless of whether the income tax is optimal. In particular, given any commodity tax and income tax system, differential commodity taxation can be eliminated in a manner that results in a Pareto improvement. Also, differential commodity taxation can be reduced proportionally so as to generate a Pareto improvement. In

addition, for commodity tax reforms that do not eliminate or proportionally reduce differential taxation, Kaplow offers a simple efficiency condition for determining whether a Pareto improvement is possible.

Engelhardt and Gruber use data from the March 1968-2001 Current Population Surveys to document the evolution of elderly poverty and to assess the causal role of the Social Security program in reducing poverty rates. To estimate the causal effect of Social Security on elderly poverty, they develop an instrumental variable approach that relies on the large increase in benefits for birth cohorts from 1885 through 1916 and the subsequent decline and flattening of real benefits growth caused by the Social Security “notch.” Their findings suggest that for all elderly families the elasticity of poverty-to-benefits is roughly unitary. This suggests that reductions in Social Security benefits would significantly alter the poverty of the elderly.

Baicker and Staiger explore the effectiveness of matching grants when lower levels of government can expropriate some of the funds for other uses. Using data on the Medicaid Disproportionate Share program, they identify states that were most able to expropriate funds. Payments to public hospitals in these states were systematically diverted and had no significant impact on patient mortality. Payments that were not expropriated were associated with significant declines in patient mortality. Overall, subsidies were an effective mechanism for improving outcomes for the poor, but the impact was limited by the ability of state and local governments to divert the targeted funds.

Asset Pricing

The NBER's Program on Asset Pricing met in Cambridge on November 5. Jonathan B. Berk, NBER and University of California, Berkeley, and Jun Pan, MIT, organized this program:

Murray Carlson, Adlai Fisher, and Ron Giammarino, University of British Columbia, "Corporate Investment and Asset Price Dynamics: Implications for SEO Event Studies and Long-Run Performance"
Discussant: Lu Zhang, University of Rochester

Lubos Pastor and Pietro Veronesi, NBER and University of Chicago, "Was There a Nasdaq Bubble in the Late 1990s?"
Discussant: Leonid Kogan, NBER and MIT

Andrew Ang, NBER and Columbia University; and **Jun Liu**, University of California, Los Angeles, "Risk, Return, and Dividends"
Discussant: John Y. Campbell, NBER and Harvard University

Lu Zhang, "Anomalies"
Discussant: John Cochrane, NBER and University of Chicago

Jorgen Haug, Norwegian School of Economics, and **Jacob S. Sagi**, University of California, Berkeley, "Endogenous Regime Changes in the Real Term Structure of Interest Rates"
Discussant: Joao Gomes, University of Pennsylvania

Ravi Jagannathan, NBER and Northwestern University, and **Yong Wang**, Northwestern University, "Consumption Risk and the Cost of Equity Capital"
Discussant: Sydney Ludvigson, NBER and New York University

Carlson, Fisher, and Giammarino present a simple theory of dynamic corporate decisions that explains the price run-up prior to equity issues, short-run announcement effects, and long-run post-issue underperformance, all in the presence of rational optimization and in the absence of cognitive biases. They integrate a theory of dynamic corporate behavior and valuation, similar in spirit to Lucas and McDonald (1990), with recent advances in dynamic asset pricing attributable to Berk, Green, and Naik (1999) and others. The authors characterize the distribution of returns prior to a Seasoned Equity Offering (SEO), show how risk changes through an SEO episode, and relate the risk change to fundamental firm characteristics. They also show the extent to which a size and book-to-market matched control group will fail to capture the dynamics of risk and expected return.

The fundamental value of a firm increases with uncertainty about average future profitability, and this uncertainty was unusually high in the late 1990s. **Pastor and Veronesi** calibrate a stock valuation model that includes this uncertainty, and show that the uncertainty needed to match the observed Nasdaq valuations at their peak is high but plausible. The high uncertainty also might explain the unusually high return volatility of Nasdaq stocks in the late 1990s.

Uncertainty has the biggest effect on stock prices when the equity premium is low.

Ang and Liu characterize the joint dynamics of expected returns, stochastic volatility, and prices. In particular, with a given dividend process, one of the processes of the expected return, the stock volatility, or the price-dividend ratio fully determines the other two. For example, stock volatility determines expected return and the price-dividend ratio. By parameterizing one, or more, of expected returns, volatility, or prices, common empirical specifications place strong, and sometimes inconsistent, restrictions on the dynamics of the other variables. These results are useful for understanding the risk-return tradeoff, as well as for characterizing the predictability of stock returns.

Zhang constructs a neoclassical, Q -theoretical foundation for time-varying expected returns in connection with corporate policies. Under certain conditions, stock return equals investment return, which is directly tied to characteristics. This single equation is shown to be qualitatively consistent with many anomalies, including the relationship of future stock returns to market-to-book, investment and disinvestment rates, seasoned equity offerings, tender offers and stock repurchases, dividend omissions and initiations, expected profitability, profitability, and to a certain extent, earnings announce-

ments. The Q -framework also provides a new test for asset pricing.

Haug and Sagi present a model that captures: the tendency of real rates to switch between regimes of high versus low level and volatility; the general shape of the term structure in either regime; the relative frequency of the regimes; and the time-varying risk premium associated with the yield curve. The authors supplement a pure endowment economy model with a simple constant returns-to-scale technology. The characteristics of the resulting equilibrium then shift between a pure endowment and a production economy. The shift induces endogenous regime switching in the real interest rate. Among the specifications considered, the combination of a linear habit formation endowment economy with risk-free production appears to explain the broadest set of stylized facts.

Using data for 1954-2003, **Jagannathan and Wang** demonstrate that differences in exposure to consumption risk can explain cross-sectional differences in average excess returns (cost of equity capital) across the 25 benchmark equity portfolios constructed by Fama and French (1993). They use yearly returns on stocks to take into account well-documented within-year deterministic seasonal patterns in returns, measurement errors in the consumption data, and

the possibly slow adjustment of consumption to changes in wealth because of habit and prior commitments. Consumption during the fourth quarter is likely to have a larger discretionary component. Further, given the availability of more leisure time during

the holiday season, and the end of the tax year in December, investors are more likely to review their asset holdings and to make trading decisions during the fourth quarter. Therefore the authors match the growth rate in fourth quarter consumption from one

year to the next with the corresponding calendar year return when computing the latter's exposure to consumption risk. They find strong support in the data for their consumption-risk model specification.

Monetary Economics

The NBER's Program on Monetary Economics met in Cambridge on November 5. Anil K Kashyap and Monika Piazzesi, NBER and University of Chicago, organized the meeting. These papers were discussed:

Tom Krebs, Brown University, "Job Displacement Risk and the Cost of Business Cycles"
Discussant: Lawrence F. Katz, NBER and Harvard University

Daniel Levy, Bar-Ilan University; **Haipeng (Allan) Chen**, University of Miami; **Sourav Ray**, McMaster University; and **Mark Bergen**,

University of Minnesota, "Asymmetric Price Adjustment in the Small: An Implication of Rational Inattention"
Discussant: Stephen G. Cecchetti, NBER and Brandeis University

Andrew T. Levin, **Fabio N. Natalucci**, and **Egon Zakrajsek**, Federal Reserve Board of Governors, "The Magnitude and Cyclical Behavior of Financial Market Frictions"
Discussant: Janice C. Eberly, NBER and Northwestern University

Francis X. Diebold, NBER and University of Pennsylvania; **Glenn**

D. Rudebusch, Federal Reserve Bank of San Francisco; and **S. Boragan Aruoba**, University of Maryland, "The Macroeconomy and the Yield Curve: A Dynamic Latent Factor Approach"
Discussant: Mark W. Watson, NBER and Princeton University

N. Gregory Mankiw, NBER and Harvard University, and **Matt Weinzierl**, Harvard University, "Dynamic Scoring: A Back-of-the-Envelope Guide"
Discussant: J. Bradford DeLong, NBER and University of California, Berkeley

Krebs analyzes the welfare costs of business cycles when workers face uninsurable job displacement risk with a cyclical component. Using a simple dynamic general equilibrium model with incomplete markets, Krebs shows that: for a sufficiently high degree of risk aversion (at least one), the introduction of cyclical variations in the permanent earnings losses of displaced workers can generate arbitrarily large costs of business cycles, even if there is no employment risk (displaced workers are immediately re-employed), and the second moments of the distribution of individual income shocks are (almost) constant over the cycle. In other words, the previous literature, which either has focused on cyclical fluctuations in employment risk or assumed that income changes of workers are (log)-normally distributed, might have severely underestimated the cost of business cycles. In addition to his theoretical analysis, Krebs conducts a quantitative study of the cost of business cycles using empirical evi-

dence about the permanent earnings losses of displaced U.S. workers. The quantitative analysis suggests that cyclical variations in job displacement risk generate sizable costs of business cycles.

Analyzing scanner data from a large Midwestern supermarket chain covering 29 product categories over an eight-year period, **Levy**, **Chen**, **Ray**, and **Bergen** uncover a surprising regularity: small price increases occur more frequently than small price decreases. The authors find that this asymmetry holds for price changes of up to about 15 to 30 cents (in absolute terms) and 3 to 10 percent (in relative terms). The asymmetry disappears for larger price changes. They document this finding for the entire dataset, as well as for individual product categories. Moreover, they find that the asymmetry holds even when they exclude the observations pertaining to inflationary periods. To explain these findings, they extend the implications of the literature on rational inattention to individ-

ual price dynamics. Specifically, they argue that processing and reacting to price change information is costly. With rational inattention, consumers may rationally choose to ignore and thus not respond to small price changes, creating a "range of inattention" along the demand curve. This range of consumer inattention, the authors argue, gives the retailers an incentive for asymmetric price adjustment "in the small." However, these incentives disappear for large price changes, because they are processed by consumers and therefore trigger a response. Thus, no asymmetry is observed "in the large."

Levin, **Natalucci**, and **Zakrajsek** quantify the cross-sectional and time-series behavior of the wedge between the cost of external and internal finance by estimating the structural parameters of a canonical debt-contracting model with informational frictions. For this purpose, they construct a new dataset that includes balance sheet information, measures of expect-

ed default risk, and credit spreads on publicly-traded debt for about 900 U.S. firms over the period 1997Q1 to 2003Q3. Using nonlinear least squares, they obtain precise time-specific estimates of the bankruptcy cost parameter and consistently reject the null hypothesis of frictionless financial markets. For most of the firms in the sample, the estimated premium on external finance was very low during the expansionary period 1997-9 but rose sharply in 2000 — especially for firms with higher ratios of debt to equity — and remained elevated until early 2003.

Diebold, Rudebusch, and Aruoba

estimate a model that summarizes the yield curve using latent factors (specifically level, slope, and curvature) and also includes observable macroeconomic variables (specifically real activity, inflation, and the monetary policy instrument). Their goal is to provide a characterization of the dynamic interactions between the macroeconomy and the yield curve. They find strong evidence of the effects of macro variables on future movements in the yield curve and evidence for a reverse influence as well. They also relate their results to the expectations hypothesis.

Mankiw and Weinzierl use the neoclassical growth model to examine

the extent to which a tax cut pays for itself through higher economic growth. The model yields simple expressions for the steady-state feedback effect of a tax cut. The feedback is surprisingly large: for standard parameter values, half of a capital tax cut is self-financing. The authors consider various generalizations of the basic model, including elastic labor supply, departures from infinite horizons, and non-neoclassical production settings. They also examine how the steady-state results change when one considers the transition path to the steady state.

Organizational Economics

The NBER's Working Group on Organizational Economics, directed by NBER Research Associate Robert S. Gibbons of MIT, held its third annual meeting on November 5-6. The papers presented covered many of the working group's major themes, illustrating the broad range of topics within the emerging field of organizational economics. All of these themes and topics share a common focus on "governed transactions" (that is, transactions that do not occur in frictionless markets). Naturally, the group's main focus is on transactions within firms. As a result, many of the group's members are drawn from the relevant margins of other NBER Programs and Working Groups that study resource allocation and other processes within firms, such as Corporate Finance, Personnel Economics, and Productivity. The papers delivered by Scharfstein, Benabou, Schmidt, Shaw, Oyer, Klein, Gibbons, and Winter addressed these kinds of issues.

The group is also pursuing a significant interest in governed transactions between firms, such as contracts, "hybrid" governance structures (that is, alliances, joint ventures, and networks), and activities that change firms' boundaries (that is, start-ups, spin-offs, and mergers). As a result, some of the group's members are drawn from the relevant margins of NBER Programs and Working Groups

such as Entrepreneurship, Industrial Organization, and International Trade and Organization. The papers delivered by Hart, Perotti, Bidwell, Azoulay, and Garicano addressed these kinds of issues.

Finally, many of the principles that apply to governed transactions within and between firms also apply to other kinds of organizations and institutions, so the group is also pursuing a subsidiary interest in organizations such as schools, hospitals, government agencies, and beyond. The papers delivered by Khwaja and Tadelis addressed these kinds of issues.

The meeting program was:

David S. Scharfstein, NBER and Harvard University, and **Ilan Guedj**, MIT, "Organizational Scope and Investment: Evidence from the Drug Development Strategies of Biopharmaceutical Firms"

Asim Khwaja, Harvard University, and **Atif Mian**, University of Chicago, "Do Lenders Favor Politically Connected Firms? Rent-seeking in an Emerging Financial Market"

Discussant: Antoinette Schoar, NBER and MIT

Roland Benabou, NBER and Princeton University, and **Jean Tirole**, University of Toulouse, "Incentives and Prosocial Behavior"

Alexander Klein and **Klaus Schmidt**, University of Munich, and **Ernst Fehr**, University of Zurich, "Contracts, Fairness, and Incentives" Discussant: W. Bentley Macleod, University of Southern California

Ben Klein, University of California, Los Angeles, "When Does a Contractual Adjustment Involve a Holdup? The Dynamics of Fisher-Body-General Motors"

Robert Gibbons, "A Rent-seeking Theory of the Firm?" Discussant: Scott Masten, University of Michigan

Kathryn L. Shaw, NBER and Stanford University, and **Ann P. Bartel** and **Casey Ichniowski**, NBER and Columbia University, "The Strategic Investment in Information Technologies and New Human Resource Practices and Their Effects on Productivity: An Insider Econometric Analysis" **Paul Oyer**, NBER and Stanford University, "Salary or Benefits?" Discussant: George Baker, NBER and Harvard University

Oliver D. Hart, NBER and Harvard University, and **John Moore**, London School of Economics, "Agreeing Now to Agree Later: Contracts that Rule Out but do not Rule In" **Enrico Perroti**, University of

Amsterdam, and **Thomas Hellmann**, University of British Columbia, “The Circulation of Ideas: Firms versus Markets”
Discussant: Daron Acemoglu, NBER and MIT

Matthew Bidwell, INSEAD Singapore, “What Do Firms Do Differently? Comparing the Governance of Internal and Outsourced IT Projects”
Pierre Azoulay, NBER and Columbia University, “Agents of Embeddedness”
Discussant: Francine LaFontaine, University of Michigan

Sidney Winter, University of Pennsylvania, “Towards an Evolutionary Theory of Production”
Discussant: Bengt R. Holmstrom, NBER and MIT

Steven Tadelis and **Jonathan Levin**, Stanford University, “Employment versus Contracting in Procurement: Theory and Evidence from U.S. Cities”
Luis Garicano, University of Chicago; **Pol Antras**, NBER and Harvard University; and **Esteban Rossi-Hansberg**, Stanford University, “Outsourcing in a Knowledge Economy”
Discussant: Michael Waldman, Cornell University

Guedj and **Scharfstein** compare the clinical trial strategies and performance of large, established (“mature”) biopharmaceutical firms to those of smaller (“early stage”) firms that have not yet successfully developed a drug. The authors study a sample of 235 cancer drug candidates that entered clinical trials during 1990-2002 and were sponsored by public firms. Early-stage firms are more likely than mature firms to advance from Phase I to Phase II clinical trials. However, early-stage firms have much less promising clinical results in their Phase II trials, and their Phase II drug candidates also are less likely to advance to Phase III and to receive Food and Drug Administration approval. This pattern is more pronounced for early-stage firms with large cash reserves. The evidence points to an agency problem

between shareholders and managers of single-product early-stage firms who are reluctant to abandon development of their only viable drug candidates. By contrast, the managers of mature firms with multiple products in development are more willing to drop unpromising drug candidates. These findings appear to be consistent with the benefits of internal capital markets identified by Stein (1997).

Rent-seeking by the politically connected often is blamed for economic ills, particularly in less developed economies. Using a loan-level dataset of more than 90,000 firms that represents the universe of corporate lending in Pakistan between 1996 and 2002, **Khwaja** and **Mian** investigate rents to politically connected firms in banking. Classifying a firm as “political” if its director participates in an election, the authors examine the extent, nature, and economic costs of political rent seeking. They find that political firms borrow 40 percent more and have 50 percent higher default rates. Such preferential treatment occurs exclusively in government banks; private banks provide no political favors. Using only within-firm variation, the authors show that government banks not only select bad political firms, but conditional on selection, lend larger amounts to them. Moreover, the extent of political rent-seeking increases with the strength of the firm’s politician and whether he is in power, and falls with the degree of electoral participation in his constituency. **Khwaja** and **Mian** provide direct evidence that rules out alternative explanations, such as socially motivated lending by government banks. The economy-wide costs of the rent-seeking are estimated to be 0.3 percent to 1.9 percent of GDP every year.

Benabou and **Tirole** build a theory of prosocial behavior that combines heterogeneity in individual altruism and greed with concerns for social reputation or self-respect. The presence of rewards or punishments creates doubt as to the true motive for which good deeds are performed, and this “overjustification effect” can result in a net crowding out of prosocial behavior by extrinsic incentives. The model also allows the authors to identify settings that are conducive to multiple

social norms of behavior, and those in which disclosing one’s generosity may backfire. Finally, **Benabou** and **Tirole** analyze the equilibrium contracts offered by sponsors, including the level and confidentiality, or publicity, of incentives. Sponsor competition may cause rewards to bid down rather than up, and can even reduce social welfare by requiring agents to engage in inefficient sacrifices.

Fehr, **Klein**, and **Schmidt** show experimentally that fairness concerns may have a decisive impact on both the actual and the optimal choice of contracts in a moral hazard context. Explicit incentive contracts that are optimal according to self-interest theory become inferior when some agents value fairness. Conversely, implicit bonus contracts that are doomed to fail among purely selfish actors provide powerful incentives and become superior when there are some fair-minded players. The principals understand this and predominantly choose the bonus contracts, even preferring a pure bonus contract over a contract that combines the enforcement power of explicit and implicit incentives. This contract preference is associated with the fact that explicit incentives weaken the enforcement power of implicit bonus incentives significantly. These results are largely consistent with recently developed theories of fairness, which also offer interesting new insights into the interaction of contract choices, fairness, and incentives.

Klein’s paper continues his quarter century of work on the relationship between specific investments and vertical integration. This paper provides a more complete analysis of the Fisher Body-General Motors movement to vertical integration, because a copy of the actual 1919 contract between these parties (previously unavailable from any public source) is now available. In particular, the paper focuses on the dynamics of the movement to vertical integration — from well-functioning contract, to contractual failure, to integration. After a detailed study of these dynamics, it becomes clear that there can be little disagreement about what occurred, even if there still can be disagreement about the interpretation of what occurred. In particular, **Klein** notes that there is no accepted, rigor-

ous definition of what hold-up is, so clarifying this basic concept is a primary goal of this paper.

Gibbons defines and compares elemental versions of four theories of the firm. These elemental theories are distilled from important contributions by Hart, Holmstrom, Klein, Williamson, and others. Although these contributions have been widely cited and much discussed, Gibbons finds it difficult to understand the commonalities, distinctions, and potential combinations of these seemingly familiar contributions. In his essay, therefore, he attempts to clarify these issues, in three steps: beginning with informal summaries of the theories, then turning to simple but formal statements of each elemental theory, and finally nesting the four elemental theories in an integrative framework.

Many analysts point to the widespread adoption of new computer aided information technologies (IT) as an important cause of the rapid rates of productivity growth experienced by the United States in the last decade, as well as many other trends over this period that have dramatically reshaped the U.S. economy, including widespread changes in the organization of work and an increasing demand for new kinds of employee skills. Several recent studies find that the effects of new IT investments on productivity are concentrated in businesses that adopt new team-based work practices. Yet, much of the existing research is based on aggregate data that examine the timing of IT investments and the timing of productivity changes for the economy, or for broad industry groupings. Firm-level research is less common, and analysis is often based on cross-industry surveys, forcing analysts to examine general measures of IT that may have very different effects in different industrial settings. **Bartel**, **Ichniowski** and **Shaw** fill this gap in the literature by conducting an in-depth study of the determinants of productivity in a specific manufacturing production process: valve making. Using personally collected longitudinal data on specific IT investments, productivity measures, work practices, and worker skills for plants in this industry, they present a series of very straightforward empirical estimates that exam-

ine how investments in IT and new human resource management practices affect the production process in this industry.

Employer-provided benefits are a large and growing share of compensation costs. It is often efficient for employers to provide benefits because firms have a comparative advantage (for example, because of scale purchasing or tax treatment) in purchasing relative to employees. **Oyer** models two factors that can affect the value created by employer-sponsored benefits: costly search for employees whose preferences match the benefits a firm offers; and, the fact that some benefits can reduce the marginal cost to an employee of extra working time. He uses employee benefits data from the National Longitudinal Survey of Youth to investigate how these factors contribute to the salary/benefit mix. Oyer shows that firms use benefits to ease the costs of working long hours, to create value in long-tenure relationships, and to exploit the cost advantages they have in procurement.

Hart and **Moore** view a contract as a list of outcomes. Ex ante, the parties commit to not consider outcomes that are not on the list; that is, these outcomes are “ruled out.” Ex post, they freely bargain over outcomes on the list; that is, the contract specifies no mechanism to structure their choice. In this sense, outcomes on the list are not “ruled in.” A “loose” contract (long list) maximizes flexibility but may interfere with ex ante investment incentives. When these incentives are important enough, the parties may write a “tight” contract (short list), even though this leads to ex post inefficiency.

Hellmann and **Perotti** describe new ideas as incomplete concepts requiring feedback from agents with complementary expertise. Once shared, ideas may be stolen. The authors compare how different contractual environments support invention and implementation. As open exchange systems, markets are good for circulation and thus elaboration, but may fail to reward idea generation. As controlled idea exchange systems, firms can reward idea generation but restrict their circulation. This identifies a basic trade-off between protecting the

rights of invention and the best implementation of ideas. An environment that allows ideas to cross firm boundaries enhances the rate of innovation and creates a symbiotic relationship between markets and firms.

Bidwell examines the impact of firm boundaries on transaction governance, by comparing the governance of internal and outsourced Information Technology projects at a large financial services institution. Contrary to the some of the literature’s predictions on firm boundaries, he finds that the clients often exercise extensive authority over outsourced projects. However, there are differences in the way that payments are made for internal and external projects: outsourced projects often are governed by incentive provisions, but the organization’s structure prevents managers from using incentives on internal projects. These findings suggest that we should pay more attention to how income rights and decision rights interact in shaping firm boundaries. They also demonstrate how restrictions on employees’ interactions inside the firm create differences between internal and external governance.

A rich literature argues that interorganizational networks foster learning and coordinated adaptation among their constituents, but embedded ties between organizations are not ubiquitous. What explains this heterogeneity? Acknowledging the influence of internal organizational dynamics can help to refine the scope of embeddedness arguments. **Azoulay** explores this idea in an in-depth qualitative examination of supply relationships in drug development. Drawing on field work conducted at six pharmaceutical and biotechnology firms, he explains why outsourcing deals sometimes take the form of embedded relationships, and other times take the form of seemingly inefficient spot contracts. The evidence suggests that the structure of constituent firms’ internal labor markets powerfully shapes and constrains the scope of interorganizational networks.

Winter reviews the historical development of production theory, concluding that this history has led to a paradoxical situation: while production sets are fundamentally conceived as summarizing knowledge about how

to produce things, the received theory has negligible grounding in any consideration of what such knowledge is like. In the latter part of the paper, he begins a reconstruction effort. This effort focuses on issues that figure prominently in the account of firms in evolutionary economics: how firms store knowledge; and, under what circumstances knowledge travels reliably in time and space. This discussion treats as problematic some propositions that are literally axiomatic in the received theory, particularly additivity.

Local governments can choose to provide services with internally employed labor or through contracts with external providers. **Levin** and **Tadelis** develop a general procurement model that highlights the trade-off between productive efficiency and the costs of administering perform-

ance contracts. They construct a dataset of service provision choices by U.S. cities and document the relationship between service characteristics and contracting choices. Their analysis suggests that economic efficiency concerns, as well as politics, matter for contracting decisions. They discuss implications of this approach for the theory of the firm.

How does the formation of cross-country teams affect the organization of work and the structure of wages? **Antras**, **Garicano**, and **Rossi-Hansberg** answer this question through a model of the assignment of heterogeneous agents into hierarchical teams, where less skilled agents specialize in production and more skilled agents specialize in problem solving. The authors first study the properties of the competitive equilibrium of the

model in a closed economy, and show that the model has a unique and efficient solution. Then they study the equilibrium of a two-country model in which agents drawn from the two countries' ability distributions can join together in teams. The authors describe how globalization changes the allocation of individuals to tasks and the matching between managers and workers. They also show that globalization leads to the destruction of certain firms and the creation of new ones, and affects the size of the surviving firms. Finally, the authors analyze how these changes in organization translate into changes in the levels and structure of earnings of individuals, which in turn determine the patterns of consumption and international trade in the global economy.

Macroeconomics and Individual Decisionmaking

The NBER's Working Group on Macroeconomics and Individual Decisionmaking met in Cambridge on November 6. NBER Director George Akerlof of University of California, Berkeley, and Robert J. Shiller of NBER and Yale University organized this program:

Roland Benabou, NBER and Princeton University, and **Jean Tirole**, University of Toulouse, "Incentives and Prosocial Behavior" (also presented at the "Conference on Organizational Economics" described earlier in this issue)
Discussant: Roland G. Fryer, NBER and Harvard University

Paola Giuliano, IMF, "On the Determinants of Living Arrangements in Western Europe: Does Cultural Origin Matter?"
Discussant: Alberto F. Alesina, NBER and Harvard University

Miles S. Kimball and **Matthew D. Shapiro**, NBER and University of Michigan, "Labor Supply: Are the Income and Substitution Effects Both Large or Both Small?"
Discussant: Joseph G. Altonji, NBER and Yale University

Jeffrey B. Liebman and **Richard J. Zeckhauser**, NBER and Harvard University, "Schmeduling"
Discussant: Robert E. Hall, NBER and Stanford University

Luigi Guiso, University of Sassari; **Paola Sapienza**, Northwestern University; and **Luigi Zingales**, NBER and University of Chicago, "Cultural Biases in Economic Exchange"
Discussant: Marianne Baxter, NBER and Boston University

Paul Heidhues, WZB, Berlin, and **Botond Koszegi**, University of California, Berkeley, "The Impact of Consumer Loss Aversion on Pricing"
Discussant: Wolfgang Pesendorfer, Princeton University

Conventional economic analyses have not been successful in explaining differences in living arrangements, and particularly the dramatic increase in the fraction of young adults living with their parents, in Mediterranean Europe. **Giuliano** offers an explanation for this phenomenon and shows a number of surprising facts that strongly support his explanation. He proposes an interpretation based on the interaction of a

cultural identity, reflected in different family types, with an exogenous shock: the sexual revolution. This explanation can easily explain both the shift in living arrangements over time and the observed North-South differentials. Data on the living arrangements of second-generation immigrants in the United States support it. In both 1970 and 2000, the U.S. living arrangements of second-generation immigrants by

country of origin mimic those in Europe across countries; similarly, the changes in the United States across time by country of origin mimic the European changes. This duplication of the European pattern in a neutral environment — with the same unemployment benefits, the same welfare code, and the same macroeconomic conditions — suggests a major role in determining living arrangements for what is

common between the immigrants and their mother-country counterpart, that is, a shock that affected immigrants and their European counterparts similarly.

Labor supply is unresponsive to permanent changes in the wage rate. Hence, income and substitution effects cancel. But are they both close to zero, or are they both large? **Kimball** and **Shapiro** develop a theory of labor supply that imposes the restriction that income and substitution effects cancel. The theory takes into account optimization over time, fixed costs of going to work, and interaction of labor supply decisions within the household. The authors then apply this theory to experimental survey evidence on the response of labor supply to a large wealth shock. The evidence implies that the constant marginal utility of wealth (Frisch) elasticity of labor supply is about one.

Complicated pricing schedules can make it very difficult for consumers to know what price they are paying. Such schedules are widely used in important economic domains such as taxation, assistance to the poor, and utility pricing. When people have limited understanding of the actual schedules they face, they are likely to perceive them in a crude fashion. **Liebman** and **Zeckhauser** define the term “schmedule” to be an inaccurately perceived schedule. They call the act of behaving as if one were facing a schmedule, rather than the true schedule, “schmeduling.” They focus on two forms of schmeduling: ironing and spotlighting. Ironing arises when an individual facing a multipart schedule perceives and

responds to the average price at the point where he consumes. Spotlighting occurs when consumers identify and respond to immediate or local prices, and ignore the full schedule, even though future prices will be affected by current consumption. The authors analyze the welfare implications of ironing in three settings: a profit-maximizing monopolist; a Ramsey-pricing utility regulator; and a social-welfare maximizing tax authority. They show that with convex schedules, outcomes that are Pareto superior to the rational responders’ outcome are available in all three contexts, although a sophisticated schedule setter will not necessarily choose such outcomes. They also solve the Mirrlees optimal income tax problem under ironing and show, using micro data, that the welfare implications of the ironing variant of schmeduling are potentially very large for the personal income tax. They then identify the deadweight loss that arises from spotlighting. Finally, **Liebman** and **Zeckhauser** provide empirical tests of ironing using the 1998 introduction of the child tax credit and of spotlighting using data from a food stamp cash out experiment. In both cases, the data, though not conclusive, are consistent with a significant amount of scheduling.

How much do cultural biases affect economic exchange? **Guiso**, **Sapienza**, and **Zingales** try to answer this question by using the relative trust that European citizens have for citizens of other countries. First, the authors document that this trust is affected not only by objective characteristics of the

country being trusted, but also by cultural aspects, such as religion, a history of conflicts, and genetic similarities. Lower relative levels of trust toward citizens of a country lead to less trade with that country, less portfolio investment, and less direct investment in that country. This effect persists after the authors control for the objective characteristics of that country, and it doubles or triples when trust is instrumented with its cultural determinants. The authors conclude that perceptions rooted in culture are important (and generally omitted) determinants of economic exchange.

Heidhues and **Koszegi** develop a model in which a profit-maximizing monopolist with uncertain production costs sells to loss-averse, yet rational, consumers. The authors first introduce (portable) techniques for analyzing the demand of such consumers, and then investigate the monopolist’s pricing strategy. They provide conditions under which a firm with continuously distributed marginal costs chooses a discrete price distribution; that is, prices are “sticky”. Price stickiness is more likely to obtain when the cost distribution has high density, the price responsiveness of demand is low, or consumers are likely to purchase. Whether or not the monopolist’s prices are sticky, markups follow a countercyclical pattern. Despite the tendency toward price stability, there are also circumstances in which a firm with unchanging cost offers random “sales” to attract more demand at higher prices.

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Higher Education

The NBER's Working Group on Higher Education met in Cambridge on November 11. The group's director, Charles T. Clotfelter, of NBER and Duke University, organized this program:

Jennifer Ma, TIAA-CREF, and **Paula E. Stephan**, Georgia State University, "The Growing Postdoctorate Population at U.S. Research Universities"
Discussant: Michael Rothschild, NBER and Princeton University

John Bound, NBER and University of Michigan; **Sarah Turner**, NBER and University of Virginia; and **Patrick Walsh**, University of Michigan, "Internationalization of U.S. Doctorate Education"
Discussant: Abigail Payne, McMaster University

Jeffrey Groen, **Scott Condie**, and **George Jakobson**, Cornell University; and **Ronald G. Ehrenberg**, NBER and Cornell University, "Preliminary Estimates of the Impact of the Andrew W. Mellon Foundation's Graduate

Education Initiative on Attrition Rates and Times to Degree in Humanities and Related Social Science Doctoral Programs"
Discussant: John Siegfried, Vanderbilt University

Peter Arcidiacono, Duke University; **Gigi Foster**, University of South Australia; and **Natalie Goodpaster** and **Josh Kinsler**, Duke University, "Estimating Spillovers in the Classroom with Panel Data"
Discussant: Bruce Sacerdote, NBER and Dartmouth College

U.S. research universities increasingly are populated by postdoctoral fellows. Two dimensions of postdoctoral training have caused this increase. One is the increasing number of new PhDs taking their first postdoc position, and the other is a lengthening of the individual's postdoc experience. **Ma** and **Stephan** examine factors that contribute to both of these trends. They find that the increased propensity to take a postdoctoral position can be attributed to the increased proportion of PhDs being awarded in the life sciences and to the increased proportion of temporary residents in the graduate population. It is also related to adverse job market conditions experienced by PhDs during the period. Increased duration for postdocs can be explained in part by the increasing proportion of PhDs awarded to temporary residents and by the increased number of degrees being awarded in the life sciences. Adverse job market conditions also appear to play a role. Finally, the duration of the postdoc experience appears to be positively related to the provision of fringe benefits.

The large number of students born outside the United States represented among the ranks of doctorate recipients from U.S. universities is one of the most significant transformations in U.S. graduate education, and the international market for highly-trained workers in science and engineering, in the last quarter century. Students born outside the United States accounted for 30

percent of PhDs awarded in the United States in 2002, up from 15 percent in 1972. In the physical sciences, engineering, and economics, the representation of foreign-born students is more striking: among doctorate recipients in 2002, foreign-born students — those with temporary and permanent visas — accounted for 42.7 percent of degrees in the physical sciences, 57.4 percent of degrees in engineering, and 56.2 percent of degrees in economics. **Bound**, **Turner**, and **Walsh** highlight the important role of changes in demand among the foreign born in explaining the growth and distribution of doctorates awarded in science and engineering. Expansion in the receipt of undergraduate degrees in many countries directly effects the demand for advanced training in the United States. Changes in the supply side of the U.S. graduate education market also may differentially affect the representation of foreign students in U.S. universities. Supply shocks, such as increases in federal support for the sciences, will have relatively large effects on the representation in the United States of doctorate students from countries where demand is relatively elastic. Understanding the determinants — and consequences — of changes over time in the representation of foreign born students among doctorate recipients from U.S. universities informs the design of policies affecting the science and engineering workforce.

The Andrew W. Mellon Foundation

launched the Graduate Education Initiative (GEI) in 1991 to improve the structure and organization of PhD programs in the humanities and related social sciences. Over a 10-year period, the Foundation spent a total of over \$80 million on the GEI and allocated the funds to 51 departments (or programs) at ten major research universities. **Groen**, **Condie**, **Jakubson**, and **Ehrenberg** estimate the impact of the GEI on attrition rates and time-to-degree. Their analysis is based on systematic data on student progress collected annually from the departments that participated in the GEI. The data allow the authors to track the progress of each student who entered participating departments over a 20-year period spanning the introduction of the GEI. To account for external forces (such as the job market for humanities PhDs) that affect all PhD programs, the Foundation also identified a set of roughly comparable departments to serve as a control group. The control departments provided similar data on student progress but did not receive any funding from the Foundation under the GEI. The authors estimate that, on average, the GEI had modest impacts on student outcomes in the expected directions: reducing the probability of attrition; reducing time-to-degree; and increasing graduation probabilities. Their estimates suggest that the GEI had differential effects across fields and had larger effects in smaller departments. The overall im-

pacts of the GEI appear to have been driven in part by reductions in cohort size, increases in student quality, and increases in financial aid. The authors also find that more generous financial aid has a larger impact on reducing attrition than on encouraging graduations.

Arcidiacono, Foster, Goodpaster, and **Kinsler** develop a new strategy for estimating peer effects when there are multiple observations per person and the peer group varies across observa-

tions. This technique allows them to explicitly account for student fixed effects and to use these student fixed effects to formulate the ability level of the peer group. Monte Carlo evidence shows that the algorithm performs well, even with a short panel. While it is generally thought that peer effect estimates are biased upward, the authors find strong evidence to the contrary for both their technique and the standard selection on observables

approach. The bias attributable to measurement error in peer ability is downward and stronger than the upward bias associated with selection into the peer group. The authors demonstrate the technique using transcript data from University of Maryland undergraduates. They find statistically significant peer effects, particularly in courses of a collaborative nature.

Education

The NBER's Program on Education met in Cambridge on November 12. The following papers were presented and discussed:

Hoyt Bleakley, University of California, San Diego, and **Aimee Chin**, University of Houston, "What Holds Back the Second Generation? The Intergenerational Transmission of Language Human Capital among Immigrants"

Eric D. Gould and **Victor Lavy**, NBER and Hebrew University, and **M. Daniele Paserman**, Hebrew University, "Does Immigration Affect the Long-Term Educational Outcomes of Natives? Quasi-Experimental Evidence"

Janet Currie, NBER and University of California, Los Angeles, and **Mark Stabile**, NBER and University of Toronto, "Child Mental Health and Human Capital Accumulation: The Case of ADHD" (NBER Working Paper No. 10435)

Patrick Bayer, NBER and Yale University; **Hamming Fang**, Yale University; and **Robert McMillan**, University of Toronto, "Racial Inequality and Segregation: Theory and Evidence"

Abhijit Banerjee and **Esther Duflo**, NBER and MIT, and **Shawn Cole** and **Leigh Linden**, MIT, "Remedying Education: Evidence from Two Randomized Experiments in India"

Donald Deere, Texas A&M University, and **Wayne Strayer**, Welch Consulting, "Competitive Incentives: School Accountability and Student Outcomes in Texas"

Lisa Sanbonmatsu, NBER; **Jeffrey R. Kling**, NBER and Princeton University; **Greg J. Duncan**, Northwestern University; and **Jeanne Brooks-Gunn**, Columbia University, "Neighborhoods and Academic Achievement: Results from the Moving to Opportunity Experiment"

Caroline M. Hoxby, NBER and Harvard University, and **Jonah E. Rockoff**, Columbia University, "The Impact of Charter Schools on Student Achievement"

Bleakley and **Chin** exploit the phenomenon that younger children learn languages more easily than older children to construct an instrumental variable for "language human capital." Among U.S.-born children with immigrant parents who came to the United States as children, those whose parents arrived as younger children tend to have more exposure to English at home. The authors find a significant positive effect of parent's English-speaking proficiency on children's English-speaking proficiency while the children are young. Eventually, though, all children attain the highest level of English-speaking proficiency, as measured by the Census. There is also evi-

dence that children of parents with lower English-speaking proficiency are more likely to drop out of high school, be below their age-appropriate grade, and not attend preschool. Strikingly, parental English-language skills can account for 60 percent of the difference in dropout rate between non-Hispanic whites and U.S.-born Hispanic children of immigrants.

Gould, **Lavy**, and **Paserman** use the mass migration wave to Israel in the 1990s to examine the impact of immigrant concentration in elementary school on the long-term academic outcomes of native students in high school. To identify the causal effect of immigrant children on their peers, the

authors exploit random variation in the number of immigrants across grades within the same school. The results suggest that the overall presence of immigrants had essentially no effect on the quality of the high school attended by native Israelis and on dropout rates, and only a mild negative effect on high school matriculation rates. However, when the sample is divided by parents' education and by ethnic origin, the authors find that disadvantaged children were more likely to have been adversely affected by a higher immigrant concentration in elementary school.

Focusing on the impact of Ethiopian immigrants who are from a

much lower socio-economic background, there is stronger evidence of adverse effects, especially for disadvantaged students and in classes where immigrant concentration was particularly high.

Currie and Stabile examine U.S. and Canadian children with symptoms of Attention Deficit Hyperactivity Disorder (ADHD), the most common child mental health problem. ADHD increases the probability of delinquency and grade repetition, reduces future reading and mathematics scores, and increases the probability of special education. The estimated effects are remarkably similar in the two countries, and are robust to many specification changes. Moreover, even moderate symptoms have large negative effects relative to the effects of poor physical health. The probability of treatment increases with income in the United States, but not in Canada. However, in models of outcomes, interactions between income and ADHD scores are statistically insignificant in the United States (except for delinquency), while these interactions in Canada indicate that higher income is protective. The U.S. results are consistent with a growing psychological literature suggesting that conventional treatments for ADHD improve behavior, but have inconsistent effects on cognitive performance.

In 1994 the state of Texas implemented a school accountability system that emphasizes student performance on state-mandated tests and provides a low cost, easily interpreted measure of a school's performance. Test scores have increased substantially since 1994 and the pattern of increases has little to do with the typical measures of education resources. However, several aspects of the test scores changes are noticeably related to the incentives implicit in the accountability system. According to **Deere and Strayer**, if parents value the accountability rating information and make residence choices based on the ratings, then school enrollment will be affected by accountability ratings. It appears that better-rated schools have experienced higher enrollment growth. In light of the accountability system incentives, a comparison of the pattern of gains on the state-mandated tests with gains in

NAEP scores for Texas students relative to the national average suggests that the observed improvements on the state tests do extend to the national assessments. Thus, the incentive system and the resulting competition appear to have improved education outcomes in Texas.

Standard intuition suggests that as income and education differences across race decline, racial segregation in the United States will fall. **Bayer, Fang, and McMillan** argue that the very opposite should be expected. First, they identify a powerful mechanism underlying the persistence and even increase in segregation as racial differences in sociodemographics are eliminated. In essence, given the existing structure of many U.S. cities, middle-class black neighborhoods are in short supply, forcing wealthy blacks either to live in white neighborhoods with high levels of neighborhood amenities or in more black neighborhoods with lower amenity levels. Increases in the proportion of highly educated blacks then permit the formation of new middle-class black neighborhoods, relieving the prior neighborhood supply constraint and leading to segregation increases. The authors present cross-metro area evidence from the 2000 Census indicating that this mechanism does in fact operate: as the proportion of highly educated blacks in a metropolitan area increases, so the segregation of educated blacks and blacks more generally goes up. According to the leading alternative hypotheses as to the causes of segregation, the effect on segregation would be expected to go the other way. The research has implications for the shape of U.S. cities of the future.

Banerjee, Cole, Duflo, and Linden present the results of two overlapping two-year randomized evaluations conducted in Mumbai and Vadodara, India, designed to evaluate ways to improve the quality of education in urban slums. A remedial education program hires young women from the community to teach basic literacy and numeracy skills to children lagging behind in government schools. Children are removed from the regular classroom for half a day. The authors find the program to be very effective: it increased average test scores of all

children in treatment schools by 0.14 standard deviations in the first year, and 0.28 in the second year. A computer-assisted learning program provided each child in the fourth standard with two hours of shared computer time per week; students played educational games that reinforced mathematics skills. The program was also very effective, increasing math scores by 0.36 standard deviation the first year and 0.54 the second year. Two instrumental variable strategies suggest that the effect of the remedial education program benefited only children who participated. This suggests that reducing class size without changing pedagogy many not be beneficial.

Families originally living in public housing were assigned housing vouchers by lottery, encouraging moves to neighborhoods with lower poverty rates. Although **Sanbonmatsu, Kling, Duncan, and Gunn** had hypothesized that reading and math test scores would be higher among children in families offered vouchers (with larger effects among younger children), their results show no significant effects on test scores for any age group: their sample was over 5000 children ages 6 to 20 in 2002 who were assessed four to seven years after randomization. The program impacts on school environments were considerably smaller than the impacts on neighborhoods, suggesting that achievement-related benefits from improved neighborhood environments are small.

Charter schools are public schools that are funded by a per-person fee for each student they attract. They are freed from some regulations on school management but obey safety regulations, follow non-discrimination rules, participate in state testing, and choose students by lottery when they are oversubscribed. **Hoxby and Rockoff** investigate the impact of a group of schools that enroll most of Chicago's and many of Illinois' charter school students. The schools have more applicants than places and the authors use the "lotteried-out" students as a control group for the "lotteried-in" students: randomization makes the groups similar on unobservable characteristics, such as motivation, as well as on observable traits, such as race and prior achievement. Hoxby and Rockoff estimate

both the effect of attending charter schools (the treatment-on-the-treated effect) and the effect of being offered the chance to attend a charter school (the intention-to-treat effect). They show that, compared to their lotteried-out fellow applicants, charter school students score about six national percentile rank points higher in both math

and reading. These effects are for students who have spent an average of two years in charter school. The authors describe methods of dealing efficiently with the lottery, pre-lottery information, re-application, attrition, grade-of-application effects, years-in-charter-school effects, and age-of-charter-school effects. For the relative-

ly rare students who apply to the charter schools in higher grades, the authors find effects that are inconsistent across specifications, suggesting that — for those students — they cannot separately identify the effects of the factors listed above.

Corporate Finance

The NBER's Program on Corporate Finance met in Cambridge on November 19. NBER Research Associate Randall S. Kroszner, University of Chicago, organized the meeting. The following papers were discussed:

Dean Karlan, Princeton University, and **Jonathan Zinman**, Federal Reserve Bank of New York, "Observing Unobservables: Identifying Information Asymmetries with a Consumer Credit Field Experiment"
Discussant: Esther Duflo, NBER and MIT

Alexander W. Butler, University of South Florida, and **James P. Weston** and **Gustavo Grullon**, Rice University, "Can Managers Successfully Time the Maturity Structure of their Debt Issues?"
Discussant: Jeffrey Wurgler, NBER and New York University

Michael C. Jensen, NBER and Harvard University, "Agency Costs of Overvalued Equity"
Discussant: Bengt R. Holmstrom, NBER and MIT

Philippe Aghion and **Jeremy C. Stein**, NBER and Harvard University, "Growth vs. Margins: Business-Cycle Implications of Giving the Stock Market What it Wants"
Discussant: Arvind Krishnamurthy, Northwestern University

Lucian Bebchuk, NBER and Harvard University, and **Alma Cohen** and **Allen Ferrell**, Harvard University, "What Matters in Corporate Governance?"
Discussant: Kenneth Lehn, University of Pittsburgh

A. Burak Guner, Stanford University; **Ulrike Malmendier**, NBER and Stanford University; and

Geoffrey Tate, University of Pennsylvania, "The Impact of Boards with Financial Expertise on Corporate Policies"
Discussant: Philip Strahan, NBER and Boston College

Matias Braun, University of California, Los Angeles, and **Claudio Raddatz**, MIT, "Trade Liberalization and the Politics of Financial Development"
Discussant: Luigi Zingales, NBER and University of Chicago

Asim Ijaz Khwaja, Harvard University, and **Atif Mian**, University of Chicago, "Do Lenders Favor Politically Connected Firms? Renting-Seeking in an Emerging Financial Market"
Discussant: Daron Acemoglu, NBER and MIT

Using a field experiment methodology derived from theoretical models, **Karlan** and **Zinman** estimate the prevalence of asymmetric information in a consumer credit market. They randomize 58,000 direct mail offers issued by a major South African lender along three dimensions: 1) the initial "offer interest rate" appearing on the direct mail solicitations; 2) a weakly lower "contract interest rate" revealed to the over 4,000 borrowers who responded to the solicitation and agreed to the initial offer rate; and 3) a dynamic repayment incentive that extends preferential pricing to borrowers who remain in good standing on their first

loan taken at the contract rate. These three randomizations, combined with the large sample and complete knowledge of the lender's information set, permit identification of specific types of private information. Specifically, this setup distinguishes adverse selection from moral hazard effects on repayment, and thereby generates unique empirical evidence on the sources and magnitude of asymmetric information. The authors find evidence of both adverse selection and moral hazard. These effects are large, both economically and statistically, and help to explain the prevalence of rationing, even in a market that spe-

cializes in financing high-risk borrowers at very high rates.

Butler, **Grullon**, and **Weston** show that, contrary to previous evidence, corporate managers cannot successfully time the maturity of their debt issues to reduce their cost of capital. Instead, the negative correlation between future excess long-term bond returns and the ratio of long-term debt issues to total debt issues is driven by "aggregate pseudo market timing." A structural shift in U.S. monetary and fiscal policy during the early 1980s induces a pseudo-market-timing effect in the in-sample tests of bond-return predictability, the researchers

show. After accounting for this structural shift, they find no evidence that corporate managers are able to predict future variations in excess long-term bond returns or to strategically choose the maturity of their debt.

The recent dramatic increase in corporate scandals and value destruction are attributable to what **Jensen** calls the agency costs of overvalued equity. He believes that these costs have amounted to hundreds of billions of dollars in recent years. When a firm's equity becomes substantially overvalued, it sets in motion organizational forces that are extremely difficult to manage, forces that almost inevitably lead to destruction of part or all of the core value of the firm. The first step in managing these forces lies in understanding the incongruous proposition that managers should not let their stock price get too high. Once a firm's stock price becomes substantially overvalued, managers who wish to eliminate it are faced with disappointing the capital markets. This value resetting is not value destruction, because the overvaluation would disappear anyway. The resulting stock price decline will generate substantial pain for shareholders, board members, managers, and employees. The prospect of this pain makes it difficult for managers and boards to short circuit the forces leading to destruction of part or all of the core value of the firm. And, in many cases, managers choosing to defend the overvaluation instead end up destroying part or all of the core value of the firm. While it is puzzling that short selling was unable to resolve the problem, the evidence seems to be consistent with the Shleifer and Vishny (1997) arguments for the limits of arbitrage. The solution to these problems appears to lie in the board of directors and the governance system, yet there is substantial evidence that weak governance systems have widely failed. It also appears that boards and audit committees would be well served by communicating with and carefully evaluating the information that could be provided by short sellers of the firm's securities.

Aghion and Stein develop a multi-tasking model in which a firm can devote its efforts either to increasing sales growth, or to improving per-unit

profit margins, for example by cutting costs. If the firm's manager is concerned with the current stock price, she will tend to favor the growth strategy when the stock market is paying more attention to performance on the growth dimension. Conversely, it can be rational for the stock market to weight observed growth measures more heavily when it is known that the firm is following a growth strategy. This two-way feedback between firms' business strategies and the market's pricing rule can lead to purely intrinsic fluctuations in sales and output, creating excess volatility in these real variables even in the absence of any external source of shocks.

Bebchuk, Cohen, and Ferrell investigate which among a set of 24 governance provisions followed by the Investor Responsibility Research Center (IRRC) are correlated with firm value and stockholder returns. Based on their analysis, they put forward an entrenchment index based on six provisions — four “constitutional” provisions that prevent a majority of shareholders from having their way (staggered boards, limits to shareholder by-law amendments, supermajority requirements for mergers, and supermajority requirements for charter amendments) and two “takeover readiness” provisions that boards put in place to be ready for a hostile takeover (poison pills and golden parachutes). The authors find that increases in the level of this index are monotonically associated with economically significant reductions in firm valuation, as measured by Tobin's Q . Also, firms with higher levels of the entrenchment index were associated with large negative abnormal returns during the 1990-2003 period. Furthermore, the provisions in their entrenchment index fully drive the correlation, identified by prior work, between the IRRC provisions in the aggregate and reduced firm value and lower stock returns during the 1990s. There is no evidence that the other 18 IRRC provisions are negatively correlated with either firm value or stock returns during the 1990-2003 period.

Guner, Malmendier, and Tate analyze whether and how board members with financial expertise affect corporate finance and investment decisions. Using a novel dataset of Forbes

500 companies with detailed demographic information on the individual directors of corporate boards from 1988 to 2001, the researchers first investigate whether bankers on the board help firms to overcome financial constraints. The presence of commercial bankers on corporate boards does increase the size of loans to the corporation and decreases investment-to-cash-flow sensitivity, the authors find, particularly when the director's bank has a lending relationship with the firm. However, the increased access to finance mostly affects firms with good credit, few financial constraints, and relatively poor investment opportunities; this suggests that banker-directors do not act in the interest of shareholders but rather in the interest of creditors. Next the authors analyze the impact of having investment bankers on the board on a range of activities, such as securities issues and mergers. The presence of investment bankers on the board is associated with more frequent outside financing, larger public debt issues, and poorer stock and earnings performance after acquisitions, they find. The impact of board composition on firm policies is significant even after accounting for firm fixed effects and instrumenting for bankers by the number of senior board members. These findings suggest that financial experts on corporate boards do not necessarily improve shareholder value.

A well-developed financial system enhances competition in the industrial sector by allowing easier entry. The impact varies across industries, though. For some, small changes in financial development quickly induce entry and dissipate incumbents' rents, generating strong incentives to oppose improvement of the financial system. In other sectors, incumbents may even benefit from increased availability of external funds. The relative strength of promoters and opponents determines the political equilibrium level of financial system development. This may be perturbed by the effect of trade liberalization in the strength of each group. Using a sample of 41 trade liberalizers, **Braun and Raddatz** conduct an event study and show that the change in the strength of promoters vis-à-vis opponents is a very good predictor of sub-

sequent financial development. The result is not driven by changes in demand for external funds, or by the success of the trade policy. The relationship is mediated by policy reforms, the kind that induces competition in the financial sector, in particular. Real effects follow, not so much from capital deepening but mainly through improved allocation. The effect is stronger in countries with high levels of governance, suggesting that incumbents resort to this costly but subtler way of restricting entry when it is difficult to obtain more blatant forms of anti-competitive measures from politicians.

Rent seeking by the politically con-

nected often is blamed for economic ills, particularly in less-developed economies. Using a loan-level dataset of more than 90,000 firms that represents the universe of corporate lending in Pakistan between 1996 and 2002, **Khwaja** and **Mian** investigate rents to politically connected firms in banking. Classifying a firm as “political” if its director participates in an election, the authors examine the extent, nature, and economic costs of political rent seeking. They find that political firms borrow 40 percent more and have 50 percent higher default rates. Such preferential treatment occurs exclusively in government banks; private banks provide

no political favors. Using only within-firm variation, the authors show that government banks not only *select* bad political firms but also, conditional on selection, lend larger amounts to them. Moreover, the extent of political rent seeking increases with the strength of the firm’s politician and whether he is in power, and falls with the degree of electoral participation in his constituency. The authors provide direct evidence that rules out alternative explanations, such as socially motivated lending by government banks. The economy wide costs of the rent seeking identified are estimated to be 0.3 percent to 1.9 percent of GDP every year.

Market Microstructure

The NBER’s Working Group on Market Microstructure, directed by Research Associate Bruce Lehmann of University of California, San Diego, met on December 3 in Cambridge. The meeting was organized by Lehmann; Matthew Spiegel, Yale School of Management; and Avaniidhar Subrahmanyam, University of California, Los Angeles. The following papers were discussed:

Amber Anand, Syracuse University, “Information and the Intermediary: Are Market Intermediaries Informed Traders in Electronic Markets?”
Discussant: Lei Yu, University of Notre Dame

Kerry Back, Texas A & M University, and **Shmuel Baruch**,

University of Utah, “Limit-Order Markets and Floor Exchanges: An Irrelevance Proposition”
Discussant: Christine Parlour, Carnegie Mellon University

John Y. Campbell, NBER and Harvard University; **Tarun Ramadorai**, University of Oxford; and **Tuomo O. Vuolteenaho**, Harvard University, “Caught on Tape: Predicting Institutional Ownership with Order Flow”
Discussant: Gideon Saar, New York University

Xavier Gabaix, NBER and MIT; and **Parameswaran Gopikrishnan**, **Vasiliki Plerou**, and **H. Eugene Stanley**, Boston University, “A Theory of Large Fluctuations in Stock Market Activity”

Discussant: Soeren Hvidkjaer, University of Maryland

Jonathan Macey, Yale University; and **Maureen O’Hara** and **David Pompilio**, Cornell University, “Down and Out in the Stock Market: The Law and Finance of the Delisting Process”
Discussant: Oliver Hansch, Pennsylvania State University

Martin D. D. Evans, NBER and Georgetown University, and **Richard K. Lyons**, NBER and University of California, Berkeley, “Exchange Rate Fundamentals and Order Flow”
Discussant: Bruno Biais, University of Toulouse

Anand asks whether market intermediaries are informed traders, and whether they trade ahead of their clients in order to buttress their profits. Using confidential trades-and-orders data from the Toronto Stock Exchange, she finds that intermediaries account for a majority of price discovery, in spite of initiating fewer trades and less volume than their clients. Her estimates of price discovery attributable to market intermediaries range between 55 percent and 62

percent, although these trades are responsible for only 37 percent of all trades, representing 40 percent of total volume. She also analyzes whether the results are driven by inappropriate handling of customer orders and explicitly tests for front-running and stepping ahead by intermediaries. She finds no evidence of such behavior.

Back and **Baruch** compare limit-order markets and floor exchanges. Floor exchanges are modelled as markets in which liquidity providers com-

pete to fill a buy or sell order after observing the size. The order is assumed to be transacted at a single price; thus floor exchanges are modelled as uniform-price markets. The authors allow for different order sizes and endogenize the flow of market orders, assuming risk-neutral competitive liquidity providers. Optimization by informed and uninformed market-order traders implies that the two markets are equivalent.

Campbell, **Ramadorai**, and

Vuolteenaho infer institutional trading behavior from the “tape,” that is the Transactions and Quotes database of the New York Stock Exchange, by regressing quarterly changes in reported institutional ownership on quarterly buy and sell volume in different trade size categories. Their method is better at predicting institutional ownership than the simple cutoff rules used in previous research. The authors also find that total buy (sell) volume predicts increasing (decreasing) institutional ownership, consistent with institutions demanding liquidity in aggregate. Furthermore, institutions tend to trade in large or very small sizes: buy (sell) volume at these sizes predicts increasing (decreasing) institutional ownership, while the pattern reverses at intermediate trade sizes that appear favored by individuals. Finally, the authors explore changes in institutional trading strategies. Institutions appear to prefer medium-size trades on high-volume days and large trades on high-volatility days.

Gabaix, Gopikrishnan, Plerou, and **Stanley** propose a theory of large movements in stock market activity. Their theory is motivated by growing empirical evidence on the power-law tailed nature of distributions that characterize large movements of distinct variables describing stock market activity such as returns, volumes, number of trades, and order flow. Remarkably, the exponents that characterize these power laws are similar for different countries, for different

types and sizes of markets, and for different market trends, suggesting that a generic theoretical basis may underlie these regularities. The theory in this paper provides a unified way to understand the power-law tailed distributions of these variables, their apparently universal nature, and the precise values of exponents. It links large movements in market activity to the power-law distribution of the size of large financial institutions. The trades made by large financial institutions create large fluctuations in volume and returns. The authors show that optimal trading by such large institutions generates power-law tailed distributions for market variables with exponents that agree with the empirical data.

Since 1995, more than 7300 firms have delisted from U.S. stock markets, with almost half of these being involuntary. **Macey, O’Hara,** and **Pompilio** examine the law and finance of the delisting process. They examine economic rationales for delisting, the legal rules that define it, and the causes of delisting. Using a sample of NYSE firms delisted in 2002, they examine the effects of their delisting and subsequent trading on the Pink Sheets. They find huge costs to delisting, with percentage spreads tripling, volatility doubling, but volume remarkably high. They also show that delisting is applied inconsistently, with some firms trading for months after failing the listing requirements. The authors argue that the current delisting process is flawed, and they provide some alternatives.

Evans and **Lyons** ask whether

transaction flows in foreign exchange markets convey information about fundamentals. They begin with a general equilibrium model in the spirit of Hayek (1945) in which fundamental information is first manifest in the economy at the micro level, that is, in a way that is not observed symmetrically by all agents. With this information structure, induced foreign exchange transactions play a central role in the aggregation process, providing testable links between transaction flows, exchange rates, and future fundamentals. The authors test these links using data on all end-user currency trades received by Citibank over 6.5 years, a sample sufficiently long to analyze real-time forecasts at the quarterly horizon. Four empirical findings define this paper’s main contribution: 1) transaction flows forecast future macro variables such as output growth, money growth, and inflation; 2) transaction flows forecast these macro variables significantly better than spot rates do; 3) transaction flows (proprietary) forecast future spot rates; and 4) though proprietary flows convey new information about future fundamentals, much of this information is still not impounded in the spot rate one quarter later. The bottom line is that the significance of transaction flows for exchange rates extends well beyond high frequencies.

The papers presented at the meeting are available on the NBER website at: <http://www.nber.org/~confer/2004/mmf04/mmf04prg.html>.

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International Trade and Investment

The NBER's Program on International Trade and Investment met at the Bureau's California office on December 3 and 4. Program Director Robert C. Feenstra, of University of California, Davis, chose these papers for discussion:

Pol Antras, NBER and Harvard University; **Luis Garicano**, University of Chicago; and **Esteban Rossi-Hansberg**, Stanford University, "Outsourcing in a Knowledge Economy"

Volker Nocke, University of Pennsylvania, and **Stephen Yeaple**, NBER and University of Pennsylvania, "An Assignment Theory of Foreign Direct Investment"

Chiara Criscuolo, University College London; **Jonathan Haskel**, University of London; and **Matthew J. Slaughter**, NBER and Dartmouth College, "Why Are Some Firms More Innovative? Knowledge Inputs, Knowledge Flows, and the Role of Global Engagement"

Deborah L. Swenson, NBER and University of California, Davis, "The Effects of Competition and Market Characteristics on the Pricing of Production Sharing Imports"

Bruce A. Blonigen, NBER and University of Oregon; and **Ronald Davies**, **Helen Naughton**, and **Glen R. Waddell**, University of Oregon, "FDI in Space: Spatial Autoregressive Relationships in

Foreign Direct Investment"

James E. Rauch, NBER and University of California, San Diego, and **Vitor Trindade**, Syracuse University, "Neckties in the Tropics: A Model of International Trade and Cultural Diversity"

Tatyana Chesnokova, Pennsylvania State University, and **Kala Krishna**, NBER and Pennsylvania State University, "Skill Acquisition, Credit Constraints, and Trade"

James E. Anderson, NBER and Boston College, and **J. Peter Neary**, University College Dublin, "Welfare versus Market Access: The Implications of Tariff Structure for Tariff Reform"

How does the formation of cross-country teams affect the organization of work and the structure of wages? **Antras**, **Garicano**, and **Rossi-Hansberg** answer this question through a model of the assignment of heterogeneous agents into hierarchical teams, in which less skilled agents specialize in production and more skilled agents specialize in problem solving. The authors first study the properties of the competitive equilibrium of the model in a closed economy, and show that the model has a unique and efficient solution. Then they study the equilibrium of a two-country model, in which agents drawn from the two countries' ability distributions can join together in teams. The authors describe how globalization changes the allocation of individuals to tasks and the matching of managers and workers. They also show that globalization leads to less dispersion in the size distribution of firms. Finally, they analyze how these changes in organization translate into changes in the levels and structure of earnings of individuals, which in turn determine the patterns of consumption and international trade in the global economy.

Nocke and **Yeaple** develop an assignment theory of foreign direct

investment (FDI) in which firms conduct FDI by engaging either in greenfield investment or in cross-border acquisitions. Cross-border acquisitions involve firms trading heterogeneous corporate assets to exploit complementarities, while greenfield FDI involves building a new plant in the foreign market. In equilibrium, greenfield FDI and cross-border acquisitions co-exist, but the composition of FDI between these modes varies with firm and country characteristics. Firms engaging in greenfield investment are systematically more efficient than those engaging in crossborder acquisitions. Furthermore, most FDI takes the form of cross-border acquisitions when factor price differences between countries are small, while greenfield investment plays a more important role for FDI from high-wage into low-wage countries.

Why do some firms create more knowledge than others? This question is typically answered by referring to a production-function model in which new ideas spring from the interaction of researchers and the existing stock of knowledge. But there is very little empirical evidence on production functions for new ideas. **Criscuolo**, **Haskel**, and **Slaughter** estimate knowledge pro-

duction functions for several thousand U.K. firms, covering their operations from 1994 through 2000. They focus in particular on the hypothesis from the trade literature that globally engaged firms — either multinationals or exporters — are more innovative. They find that globally engaged firms do generate more ideas than their purely domestic counterparts. This is not just because they use more researchers. Importantly, it is also because they draw on a larger stock of ideas through sources such as suppliers and customers and, for multinationals, their intra-firm worldwide pool of information.

Internationally fragmented production accounts for a growing share of international trade flows. However, while many theories of outsourcing emphasize the importance of cross-country cost differences in guiding outsourcing decisions, little is known about the nature of competition in outsourcing relationships. To study this question, **Swenson** tests how production costs and competitor prices affect the prices of products imported through the U.S. 9802 overseas assembly program. The empirical results show that while production costs generally are incompletely passed-through,

when assembly is located in more highly educated countries, production cost changes are passed-through to a much higher degree. The prices of 9802 imports also respond to prices chosen by other countries, with the largest responsiveness for products in capital-intensive industries.

Theoretical models of foreign direct investment (FDI) only recently have begun to model the role of third countries, and the empirical FDI literature has almost exclusively examined bilateral FDI data without recognizing the potential interdependence between FDI decisions to alternative host countries. **Blonigen, Davies, Waddell,** and **Naughton** use spatial econometric techniques to examine the spatial correlation between FDI and alternative (neighboring) regions. The sign of such correlations can provide evidence for or against alternative theories for FDI motivations. Using data on OECD countries from 1980-2000, the authors find evidence consistent with export platform FDI in Europe.

Some cultural goods, like clothes and films, are consumed socially and thus are characterized by the same consumption network externalities as languages. At the same time, producers of new cultural goods in any one country draw on the stock of ideas generated by previous cultural produc-

tion in all countries. For such goods, costless trade and communication tend to lead to the dominance of one cultural style, increasing utility in the short run but reducing quality and generating cultural stagnation in the long run. Increasing trade costs while keeping communication costs low may reduce welfare by stimulating production of cultural goods that are “compatible” with the dominant style, thereby capturing consumption network externalities, but that add little to the stock of usable ideas. **Rauch** and **Trindade** perform a two-country analysis which suggests a reform of cultural policy whereby import restrictions in the smaller country are replaced by subsidies to the fixed costs of production of “authentic” new cultural goods, funded by contributions from the larger country.

Chesnokova and **Krishna** look at the effect of credit constraints on skill acquisition when agents have heterogeneous abilities and wealth. They use a general equilibrium model and assume that credit markets are absent and explore two payment systems for training. Under the first, payment is made up front; as a result, credit constraints are severe. Under the second, a form of work-study is allowed, and this helps to mitigate credit constraints. The authors consider the system’s behavior both in

and out of steady state and argue that there can be multiple equilibria as supply need not always be monotonic. Moreover, stricter credit constraints do not have to shift supply inward. Also, opening the economy to trade could reduce welfare in the steady state. An increase in the relative price of the skill-intensive good raises the cost of education. As education becomes more expensive, credit constraints become more binding, and the stock of skilled labor falls, as does the supply of the skill-intensive good; this permits welfare to fall.

Anderson and **Neary** show that the effects of tariff changes on welfare and import volume can be fully characterized by their effects on the generalized mean and variance of the tariff distribution. Using these tools, the authors derive new results for welfare- and market-access-improving tariff changes, which imply two “cones of liberalization” in price space. Because welfare is negatively but import volume positively related to the generalized variance, the cones do not intersect, which poses a dilemma for trade policy reform. Finally, the authors show that generalized and trade-weighted moments are mutually proportional when the trade expenditure function is CES.

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Bureau Books

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The Inflation-Targeting Debate

The Inflation-Targeting Debate, edited by Ben S. Bernanke and Michael Woodford, is available from the University of Chicago Press for \$85.00.

Over the past fifteen years, a significant number of industrialized and middle-income countries have adopted inflation targeting as a framework for monetary policymaking. As the name suggests, in such regimes the central bank is responsible for achieving a publicly announced target for the inflation rate. While the objective of controlling inflation enjoys wide support among both academic experts and policymakers, and while the countries that

have followed this model generally have experienced good macroeconomic outcomes, many important questions about inflation targeting remain.

For this volume, the result of an NBER conference, a distinguished group of contributors explore the many under-examined dimensions of inflation targeting — its potential, its successes, and its limitations — from both a theoretical and an empirical standpoint, and for both developed and emerging economies. The volume opens with a discussion of the optimal formulation of inflation-targeting policy and continues with a debate about

the desirability of such a model for the United States. The concluding chapters discuss the special problems of inflation targeting in several countries, including the Czech Republic, Poland, and Hungary.

Bernanke, the Howard Harrison and Gabrielle Snyder Beck Professor of Economics and Public Affairs at Princeton University, is currently on leave from the NBER as a member of the Federal Reserve Board of Governors. Woodford is a research associate in the NBER's Program on Monetary Economics and a professor of economics at Columbia University.

Emerging Labor Market Institutions for the Twenty-First Century

Emerging Labor Market Institutions for the Twenty-First Century, edited by Richard B. Freeman, Joni Hersch, and Lawrence Mishel, is available from the University of Chicago Press for \$65.00

Private-sector unionism, which historically has represented and advocated on behalf of workers in capitalist economies, is in decline in the United States. As a result, labor advocates, community groups, nongovernmental organizations, and individuals concerned with the well-being of workers have sought to develop alternative ways to represent workers' interests. And, unions have undertaken new campaigns and initiatives to arrest the

decline in their organizations and to strengthen their ability to help workers. This NBER Conference Volume provides the first in-depth assessment of how effectively labor market institutions are responding to this drastically altered landscape.

The contributors to this volume provide case studies of new labor market institutions and new directions for existing institutions. The evidence suggests that while non-union institutions are unlikely to fill the gap left by the decline of unions, emerging groups and unions together might improve some dimensions of worker well-being. Ultimately, this volume tells a

story of workers and institutions in flux, searching for ways to represent labor in the new century and its attendant new economies.

Freeman directs the NBER's Program of Research on Labor Studies and is the Herbert Ascherman Professor of Economics at Harvard University. He is also a senior research fellow at the Centre for Economic Performance of the London School of Economics. Hersch is an adjunct professor and codirector of the Program on Empirical Legal Studies at Harvard Law School. Mishel is president of the Economic Policy Institute.

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Innovation Policy and the Economy, Volume 5

Innovation Policy and the Economy, Volume 5, edited by Adam B. Jaffe, Josh Lerner, and Scott Stern, available from the MIT Press. The paperback volume price is \$30.00, the clothbound volume is \$60.00.

This volume is the latest in an annual NBER conference series. It covers such topics as the implications of software outsourcing for American technology leadership; the complementary roles of large corporations and entrepreneurs in developing inno-

vative technology; city-level policy and planning that establishes a “jurisdictional advantage” in the value of local resources; the effect of taxes on entrepreneurship; and how to incorporate innovation into the analysis of business mergers. These papers highlight the role of economic theory and empirical analysis in evaluating policies and programs regarding research, innovation, and the commercialization of new technologies.

Jaffe is the Fred C. Hecht Professor

of Economics and Dean of Arts and Sciences at Brandeis University. Lerner is the Jacob H. Schiff Professor of Investment Banking at Harvard Business School, with a joint appointment in the Finance and Entrepreneurial Units. Stern is an Associate Professor of Management and Strategy at the Kellogg School of Management at Northwestern University. All three are also Research Associates in the NBER's Program on Productivity.

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