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Program Report

International Trade and Investment

Robert C. Feenstra*

In the three years since the International Trade and Investment Program (ITI) was last reviewed, the most active area of research has dealt with the decline in the relative wages of unskilled workers in the United States and other industrial countries. The question is whether this decline is explained by increased trade attributable to globalization, or by skilled-biased technological change caused by the increased use of computers. Researchers from several programs at the NBER are participating in this debate, but I review here only the contributions of members of ITI program. Following this, I summarize activities in four other areas of our research: trade and growth; regional trade agreements; the impact of trade policies, including political economy, "strategic" trade policy, and antidumping policy; and a relatively new area dealing with trade, resources, and the environment.

A good deal of the research in this program has become more empirical in its scope, reflecting both the interests of the members and the availability of data. Contributing to this availability, Robert Lipsey, Harry Bowen, and I have released three CD-ROMs: "U.S. Imports, 1972–1994"; "World Trade Flows, 1970–1992"; and "U.S. exports, 1972–1994, With Other Data."[1] The first and third of these include U.S. trade data at the most disaggregate level available, and distinguish over 10,000 commodities per year. The second CD-ROM includes the United Nations world trade data, which have been purchased from Statistics Canada under a license that allows for widespread distribution. Each of these can be ordered for $50 from the Publications Department at the NBER (the CD-ROM dealing with world trade flows is available to academic users only).

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Globalization and Wages

During the 1980s, the wages of unskilled workers in the United States fell for the first time in the post-war years, both in real terms and relative to the wages of more highly-skilled workers. There is little disagreement on the basic facts of this "wage gap," but a good deal of disagreement on both its causes and the appropriate research methods for uncovering them. One way to estimate the impact of trade is to measure the amount of skilled and unskilled labor embodied in U.S. imports and exports, and to add these amounts onto existing labor supplies: this is the "factor content" approach. While trade economists, for example see Edward E. Leamer,[2] have tended to doubt the validity of this approach, Paul R. Krugman recently has argued that it is valid under some circumstances.[3] Robert Z. Lawrence and Carolyn L. Evans have used this approach to calculate that even a fivefold increase in U.S. imports from developing countries would have only a modest impact on wages.[4]

Another popular method is to compare the change in the prices of goods across industries with the factor intensities of skilled and unskilled labor used in production. According to the Stolper-Samuelson theorem, in order for trade to explain the decline in the relative wage of unskilled labor, there should be a fall in the prices of goods using unskilled labor. Leamer argues that this approach can account for the change in relative wages observed during the 1970s (what he calls the "Stolper Samuelson" decade), but not during the 1980s.[5] Similarly, Robert E. Baldwin and Glen G. Cain find that changes in the prices of goods during the 1980s cannot explain much of the change in wages, with the exception of the decline in relative wages among the

least educated workers, for which trade could have been an important contributory factor.[6]

In view of this rather ambiguous link between prices and wages, two schools of thought have emerged on the proximate cause of the decline in relative wages of the unskilled. The first notes that many industries in the United States and abroad have increased their relative demand for skilled workers, despite the fact that their relative wage has increased. This evidence points strongly to an outward shift in the demand for skilled workers within industries, which can be explained by skilled-biased technological change, including the widespread adoption of computers during the 1980s. This view is taken by Lawrence, who cites supporting evidence that United States multinationals have increased their relative demand for skilled (or non-production) workers in much the same manner across their parent plants and foreign affiliates.[7] Krugman also argues that the technological change is global in nature, which explains why it has essentially the same effect on wages as a skill-biased technological change in a closed economy, and he suggests that trade itself is not that important.[8]

The second school of thought holds that the foreign outsourcing of stages of production also will shift demand towards skilled labor in the United States, and therefore, is fully compatible with the demand shifts that have occurred. Gordon Hanson and I take this view and examine the impact of foreign outsourcing on the relative demand for non-production workers in the United States and Mexico.[9] It turns out that outsourcing from the United States can account for about 20 percent of the shift towards nonproduction workers in the 1980s, but it accounts for a much larger portion of the labor shift in Mexico, as Hanson and Ann Harrison also find.[10] In comparison, the increased use of computers in the United States can account for about 30 percent of the shift towards skilled labor, which is above that for outsourcing, but not substantially so.[11]

Outsourcing is measured in these studies by estimating the imported intermediate inputs within each industry, expressed as a share of total materials or costs. Jose Campa and Linda Goldberg have made this calculation over four countries, and find an increase in foreign outsourcing during the 1980s from the United States, Canada, and the United Kingdom, but not for Japan, where the share of imported intermediate inputs was smaller and declined over the 1980s.[12] An alternative view of outsourcing focuses on just the activities of multinational firms, as Matthew Slaughter, and Lael Brainard and David Riker do.[13] They all find that employment in the parent plants of multinationals complements rather than substitutes for employment in the affiliate plants. This seems to contradict the idea that corporations can shift production offshore easily; these results are therefore more supportive of the first school of thought.

Rather than focusing on wages per se, Dani Rodrik takes a broader look at the impacts of globalization.[14] He finds that countries that are more open to trade have a larger share of gross national product devoted to government expenditures. He interprets these expenditures as a "safety net" needed to protect workers from greater external risk through terms of trade variability. However, as globalization also has increased the mobility of capital, the ability of governments to fund these social expenditures is reduced: it becomes necessary to rely more on labor than on capital taxation. If this trend continues for too long, there could be a backlash in terms of increased demands for protection.

This debate also has led to a rethinking of the theoretical foundations among trade, wages, and the location of production. Krugman and Anthony J. Venables have considered a model in which at intermediate levels of transport costs (low enough to promote trade but high enough to prevent factor price equalization), a core-periphery pattern emerges: countries in the core will have manufacturing agglomerated in them, while those in the periphery suffer from low wages.[15] Kiminori Matsuyama demonstrates a similar pattern of agglomeration and uneven incomes across countries.[16] James Markusen and Venables also allow multinational firms to choose their location of production, and they introduce high- and low-skilled labor into each country.[17] They find that multinationals can increase the skilled-unskilled wage gap in the high income country and, under some circumstances, in the low income country as well.

Donald R. Davis has considered the implication of globalization in a model that contrasts the flexible wages of American with the fixed wages of Europe.[18] In this setting, it turns out that the impact of globalization — for example the entry of the newly industrialized countries — is very different than if wages are uniformly flexible. In particular, the brunt of the new supplying countries is borne by European unemployment when those wages are fixed, and does not affect American wages as would occur if both regions had flexible wages. The impact of technological change also depends on the prevailing factor markets institutions in each country, which serves to emphasizes that the impact of globalization cannot be assessed independently of conditions in a country's trading partners.

Trade and Endogenous Growth

Current research in the program has focused on empirically assessing the various theories linking trade with endogenous growth. An essential element of these models is the idea that knowledge will diffuse across borders, making it possible for firms in one country to benefit from R and D activity done abroad. The extent to which these knowledge spillovers actually occur is an open question. David Coe and Elhanan Helpman, with Alexander Hoffmaister and Tamim Bayoumi, have examined the links among total factor productivity in each country, its own R and D expenditures, and those of its trading partners.[19] They find that the trading partners' R and D has a surprisingly large impact on a country's productivity.

Jonathan Eaton and Samuel Kortum introduce greater structure onto the spillovers by using data on patent activity, and in particular, the patents that firms from each country take out in another country.[20] Like Coe and Helpman, they also find a large impact of spillovers. Lee Branstetter also relies on patent data, and focuses on the firm-level productivity performance of American and Japanese corporations.[21] The potential spillovers between these firms are measured by the overlap in the categories where they have each obtained patents, and these are regressed on various measures of firms' performance. He finds that there is a significant spillover of knowledge between the American and Japanese corporations, but this does not occur in the reverse direction.

Another way that trade will induce growth is through its effect on investment, both domestic and foreign. Richard Baldwin, with Elena Seghezza and Rikard Forslid, has investigated the impact of openness on investment using a modified Tobin's-q approach.[22] Their empirical work on a cross-section of countries suggests that openness promotes growth through its impact on investment, and that protection retards growth. This hypothesis finds more limited support from Ann E. Harrison, who examines a broad range of potential determinants of growth.[23] Rodrik focuses on Taiwan and South Korea, and argues that the investment boom in both these countries was critical to their future growth success, but that increased openness was probably a consequence rather than a cause of the investment.[24] At a theoretical level, Joshua Aizenman and Nancy Marion have further examined the impact on a country's investment of uncertainty due to openness.[25]

Turning to foreign investment, Eaton and Akiko Tamura argue that outflows of investment from advanced countries such as the United States and Japan are conduits of knowledge transfer and growth.[26] Firms in these countries need to choose between exporting and foreign investment as alternative means of serving the foreign markets. Eaton and Tamura capture this decision in a modified "gravity model," which relates exports and foreign investment to country size and other characteristics. From the viewpoint of the destination country, the desirability of the investment inflows depends on its impact on local wages. A number of researchers, including Brian Aitken, Hanson, Harrison, and Lipsey, have documented the positive impact of investment inflows on wages for various countries.[27]

The behavior of the government also should be considered as a determinant of growth. Rodrik argues that the presence of a professional bureaucracy is an important component of the East Asia success story.[28] James Rauch develops a model of endogenous government behavior in which internal promotion can be used to influence the actions of bureaucrats, and thereby avoid corruption.[29] Barbara Spencer examines a model where the government allocates quota licenses in a non-uniform fashion to firms that are otherwise identical.[30] Surprisingly, it turns out that this bureaucratic control sometimes can achieve a better outcome than would a uniform allocation of quotas, such as through a market mechanism.

Given that any of the economic explanations for growth can explain only a portion of the cross-country variation, some researchers are looking to less conventional explanations. John Helliwell examines whether measures of "social capital" can help to explain the rapid growth rates of the Asian economies, and also the differences among the regional growth rates across American states and Canadian provinces.[31] Rauch explores how social capital — measured by networks of individuals — can influence trade patterns.[32] He distinguishes between organized exchanges for homogeneous products, where prices are announced, and differentiated products for which prices are not announced, so that information passed through networks becomes important. Andrew Rose and I develop an unconventional measure of openness which measures the time at which countries begin to export various commodities, and we use this measure to establish an ordering of countries or commodities.[33] We show that the ordering of countries established by this criterion is correlated with either their level or growth of GDP per capita.

Regional Trade Agreements

Current research on trade patterns has led to the surprising finding that even when tariffs are close to zero, the movement of goods is still many

times greater within a country than across national borders: this is sometimes referred to as a "home bias" provided by national borders. For example, Shang-Jin Wei[34] has found that an OECD country purchases about two and one-half times as much from itself as from an otherwise identical foreign country; Helliwell[35] finds that Quebec trades even more with the rest of Canada—and less with the United States — than the other Canadian provinces do; while Charles Engel and John Rogers[36] find similar evidence of a break occurring at national borders by looking at the variability of prices. David Richardson and Pamela Smith have further examined the ability of an endowment-based model to explain the trade of U.S states, as has James Harrigan for the OECD countries.[37] Holger Wolf has shown that the tendency for "home bias" extends equally well to subnational units within the United States, suggesting that it is caused more by the clustering of production than by the presence of national borders.[38]

The possibility of eliminating the "invisible" barrier attributable to national borders provides one motivation for regional trade agreements, consisting of free trade between neighboring or politically-aligned countries. Other motivations, assessed by John Whalley,[39] include: the use of regional trade agreements to underpin domestic policy reforms (as with Mexico in NAFTA); the desire to achieve firmer market access with large trading partners (as with Canada in NAFTA); the use of agreements to strengthen collective bargaining power in multilateral negotiations (as with the European Union); and the use of regional negotiations as a threat to driving multilateral negotiations forward.

Kyle Bagwell and Robert W. Staiger analyze the last of these reasons: the link between regional and multilateral agreements.[40] They use a repeated game model to show how multilateral trade agreements can be sustained, where any deviations from this agreement are punished by reversion to the Nash equilibrium tariffs. It turns out that the reciprocity and non-discrimination, which are two pillars of GATT, arise as part of the equilibrium strategies in this repeated game. The question the authors pose is whether regional trade agreements, which allow for preferential treatment of member countries, help or hinder the achievement of multilateral agreements. They find that the free trade areas (which do not require a common external tariff among the member countries) pose a threat to multilateral agreements, but that customs unions (which require a common external tariff) can be consistent with the multilateral agreement.

Kala Krishna and Anne O. Krueger also make the distinction in their work between free trade agreements and customs union.[41] Because the former do not require member countries to have a common external tariff, firms selling into the area would want to enter through the country with the minimum tariff. To avoid this, free trade areas must adopt complicated "rules of origin," that specify the rules under which any particular good can cross the border duty-free within the area. These rules of origin generate a substantial production distortion and deadweight loss within the area. For these and other reasons, Krueger concludes that free trade areas are always inferior to customs unions.[42] Krishna and Jiandong Ju further investigate the effects of a free trade area that does not use rules of origin.[43]

Alessandra Casella also examines regional trade blocs, and argues that the gains from enlarging the bloc are received disproportionately by the small countries.[44] Her empirical work provides mixed evidence on this hypothesis. The proliferation in the numbers of regional trade agreements suggests that the countries involved perceive advantages above and beyond the traditional gains from trade. Raquel Fernandez discusses a number of non-traditional benefits from an agreement, including credibility, signaling, bargaining power, insurance and coordination.[45] Magnus Blomstrom and Ari Kokko consider the impact of regional integration on direct investment flows.[46]

Political Economy of Trade Policy

Gene Grossman and Elhanan Helpman have continued work on their project incorporating political economy considerations into the formation of trade policy.[47] Their models allows politicians to be influenced by campaign contributions in their determination of trade policy; this is designed to maximize the joint welfare of the lobby and the government or politicians. This framework results in a number of empirically testable propositions regarding the cross-sectoral structure of tariffs, as well as differences in average rates of protection across countries.

For example, sectors without an organized lobby have a rate of protection that is related positively to the level of imports (holding fixed the import demand elasticity). But for sectors with an organized lobby, the level of protection is related negatively to the ratio of imports to exports. This reflects the fact that sector-specific owners have more to gain when production (and therefore exports) is higher, while the deadweight loss of a tariff is smaller when consumption (and therefore imports) is lower. Penny Goldberg and Giovanni Maggi find that this hypothesis is supported by the data.[48] In addition, they estimate that the weight given to consumer welfare in the government's

objective function is surprisingly high: 50 to 88 times higher than the weight given to contributions.

Political economy considerations also motivate the recent work of James E. Anderson. He examines a new definition of the effective rate of protection (ERP), as the uniform tariff that is equivalent to the actual differentiated tariff structure in its effect on rents to residual claimants in a sector.[49] The new ERP is equivalent to the old ERP under a special set of circumstances; otherwise, it is an improved method for thinking about the impact of protection on interest groups in an industry. In other work, Anderson has examined the budget constraint faced by the government, in the case where tariff revenue cuts must be offset by distortionary taxation.[50] He argues that in practice this reduces the desirability of tariff cuts, and illustrates this using data from South Korea.

Douglas A. Irwin has analyzed the political economy of several historical tariff episodes. He examines voting patterns from the British general elections of 1923 to distinguish between two hypotheses: that the voting took place according to class or factor lines (that is, labor versus capital), or that the voting took place along industry or occupation lines.[51] Irwin finds greater support for the latter hypothesis, which is consistent with a specific-factors model of production. In joint work with Randall S. Kroszner, Irwin examines voting patterns leading to the passage of the Smoot-Hawley Tariff in the United States in 1930.[52] They find significant evidence of "log-rolling coalitions" among Senators with otherwise unrelated constituencies. Irwin also has estimated the degree to which the Smoot-Hawley Tariff can explain the subsequent fall in United States trade, and more generally, the extent to which the Great Depression influenced the subsequent shifts in U.S. policy.[53]

Imperfect Competition and "Strategic" Trade Policy

The industry that arguably has received the most trade policy attention throughout the 1980s and 1990s is automobiles. The import competition faced by U.S. producers during the 1980s was offset by the application of a "voluntary" export restraint (VER) with Japan. Because this is an industry with a small number of producers, there seems to be some potential that the national benefits of a "strategic" trade policy might apply. Steven Berry, James Levinsohn, and Ariel Pakes investigate this using a model that allows for oligopoly behavior.[54] They find that the VER shifted profits towards U.S. producers quite substantially, but despite this, it failed to be in the U.S. interest because the rents were given away to the Japanese firms.

The VER had the further effect of encouraging foreign investment into the United States, so that by the end of the decade it was redundant. Attention then shifted to the auto parts industry, which had a very low foreign market share in Japan. In an effort to expand this share, the Clinton administration threatened a 100 percent tariff on thirteen Japanese luxury cars, unless the Japanese agreed to expand their purchases of auto parts. Levinsohn examines what the impact of that policy would have been, and finds that the reduction in profits of the Japanese manufacturers would have been very large indeed.[55] Surprisingly, the increase in U.S. profits would have been very modest, since most consumers would have switched to European or other Japanese models. Thus, this policy would have failed the test of a "strategic" trade policy.

However, the threat of this tariff still had an effect, since the Japanese agreed to purchase more automobile parts just 12 hours before the tariff was to be applied. Krishna and John Morgan examine how the effectiveness of a threat depends on having it linked to the market with the desired goal: in this case, the threat was made to the same Japanese firms that could implement the increase in purchases of auto parts.[56] They argue that under these conditions, a market share target can be implemented with fairly weak informational and administrative requirements. Barbara Spencer, Ruth Raubitschek, and Jota Ishikawa also examine the scope for "strategic" policies when firms rely on intermediate inputs.[57] They show that the potential benefits from export subsidies are enhanced if the intermediate inputs are supplied by domestic firms, but not if they are supplied by foreign firms.

Deborah L. Swenson empirically examines the auto parts agreement, focusing on the purchase of American parts by Japanese affiliates in the United States.[58] The question here is whether the Japanese affiliates will ever purchase as great a share of U.S.-made parts as do American firms. Swenson finds that the Japanese firms do respond to exchange rate changes, so that an appreciation of the yen leads to greater purchases of American parts. These firms also have been buying more U.S.-made parts over time, but there is still a significant bias in their demand towards Japanese-made parts.

Michael Knetter and Penny Goldberg consider the impact of the exchange rate on firms' decisions.[59] This work also is motivated also by issues of imperfect competition, and in particular, uses evidence on the pricing behavior of firms to determine their market conduct. A natural experiment arises when an exporting firm is selling to several different markets, and its exchange rate to these markets changes non-uniformly. Since the level of costs to these markets

can be controlled for, the resulting changes in the prices can be attributed to strategic pricing decisions on the part of the firm. Generally, firms pass through only a portion of exchange rate changes in their export prices. A good example is *The Economist* magazine, studied by Knetter,[60] Atish Ghosh, and Holger Wolf.[61] This magazine sells for considerably different prices across continents, and these are plausibly the result of intentional price discrimination; the time-sensitive nature of the product makes international arbitrage too costly.

Antidumping Policy

Antidumping policies are used more frequently than other trade policies available to firms facing import competition. This is perhaps not surprising in view of the finding that antidumping policies lead to an increase in import prices even in cases where duties are not actually applied. Thomas J. Prusa was the first to measure this effect.[62] He found that when an antidumping action was initiated by a domestic firm, if a positive finding of dumping was made, there would be an opportunity for the domestic firm and the foreign firms to reach a "negotiated" settlement. Needless to say, this has had the effect of increasing prices even when duties are not applied. Price increases also have been found by Staiger and Frank Wolak.[63] They look at the initial phase of an antidumping investigation, when United States government agencies are collecting information on the prices charged by foreigners. During this period, it is possible to find a statistically significant increase in import prices, because the foreign firms are trying to minimize the chances of being found guilty of dumping. Furthermore, Staiger and Wolak find that United States firms facing competition from Canada and Mexico are more likely to file antidumping petitions to obtain this trade-restricting effect, even if a duty is not expected to be ultimately applied.

Another way that antidumping policy leads to price increases is through the distinction between countries named in an antidumping investigation, and other countries selling essentially the same products in the United States, that are not named in the investigation. Prusa finds the investigation itself has the effect of restricting imports and raising the price from the countries named in the investigation; of course, these effects persist and are amplified if duties are applied.[64] Moreover, he finds that there is significant trade diversion towards countries that are not named in the investigation, and on which duties are not applied. Prusa and Wendy Hansen[65] investigate the process of "cumulating" the imports from named countries when assessing whether dumping has occurred. By aggregating over all "like" imports from named countries, it is more likely that the imports will compose a significant share of domestic consumption, and that there will be a positive finding of injury to the domestic industry.

Trade, Resources, and the Environment

A relatively new area of research has dealt with the impact of international trade on resources and the environment. James Brander and Scott Taylor examine the gains from trade when a country has one sector producing from a renewable resource.[66] Producers in that sector make their decisions on the basis of short-run profits, and their yield depends on the stock of the resource available. This creates an intertemporal externality that is not corrected for by the market. In this setting, free trade can lead to a (long-run) fall in the utility of the country that exports the resource-based good, since it is induced to harvest more rapidly. Brander and Taylor further show that this loss in utility applies to a "consumer" country exporting the renewable resource to a "conservationist" country that regulates its harvest.[67]

The possibility of losses for one country also arises in the model of trade and the environment that Brian Copeland and Scott Taylor consider.[68] In this case, one "dirty" industry creates pollution that is a negative externality on the other "clean" industry located in the same country. If the country exporting the "dirty" industry remains diversified in the trade equilibrium, then it can suffer a welfare loss, because of the negative consequences on its "clean" industry. Copeland and Taylor have extended this analysis to the impact of pollution controls and capital mobility on the international location of pollution-intensive industries, and on the resulting levels of worldwide pollution.[69] Markusen also has examined the impact of locational choice on pollution levels.[70] He argues that multinationals do not increase the production-reallocation effect caused by environmental regulations, since these reallocations still occur across firms in different countries in the absence of multinationals. Finally, Whalley broadly discusses the direction of trade and environmental regulations in the WTO following the Singapore meeting of December 1996.[71]

Conferences and Other Activities

The ITI holds two regular program meetings each year: a one- or two-day meeting in the spring, and a four- or five-day meeting in the summer. In addition, the group typically holds one topic-based conference every second year. The most recent of these was held in October 1995, and resulted in the NBER volume *The Impact of U.S. Trade Protection*

and Promotion Policies (Chicago: University of Chicago Press, 1997). A few of these papers have been discussed here, and they are all reviewed in the Fall 1995 NBER *Reporter*. In addition, a number of researchers in the ITI program contributed chapters to the *Handbook of International Economics*, Vol. 3 (Amsterdam: Elsevier Science, 1995), edited by Gene Grossman and Kenneth Rogoff, and these have not been discussed here.

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Research Summaries

Environmental Tax Policy Using a Two-Part Instrument

Don Fullerton*

One important goal of tax policy is economic efficiency. In some cases, this requires raising revenue and avoiding changes in relative prices that may distort taxpayer behavior and create "excess burden." In other cases, however, economic efficiency might require changes in relative prices: for example, taxing the "negative externalities" from alcohol, tobacco, and disposal of household or industrial waste. (Negative externalities include injuries, second hand smoke, and aesthetic costs.)

A second goal of tax policy is administrative efficiency. This is often best achieved by taxes on market transactions, for which the tax base can be measured and verified most easily. Taxes can apply to wages paid by an employer, interest paid by a bank, dividends reported by a broker, and the sale of cigarettes and alcohol as reported by retail establishments.[1]

But what about disposal of household and industrial waste? To achieve economic efficiency, these activities should be taxed, but they are often not market transactions that can be verified by a third party. In such cases, a "two-part instrument" might resolve the conflict.[2] Instead of directly taxing waste, a two-part instrument would raise the relative price of waste indirectly through both a tax and a subsidy on other activities that *are* market transactions. This policy combination can change relative prices in the same way as a tax on waste, but each tax or subsidy can be verified by invoices. Thus, the two-part instrument might better achieve both economic and administrative efficiency.

In the next sections, I clarify the theory behind this idea and provide a few examples. The following sections consider interactions with other taxes and the issue of scarcity rents.

Any Tax Can be Set to Zero

Taxpayers long have known that government can tax them both when they earn and again when they spend; most economists recognize that one such tax is redundant. Generally speaking, a tax that takes half of your gross paycheck is equal to a tax that doubles the price of everything you buy. As a consequence, for any system of tax rates on different commodities, any one tax can be set to zero. Revenue can be raised by a tax on all forms of income. Then all the desired relative prices of the different commodities can be achieved by a set of taxes and subsidies on goods other than the untaxed good.[3] One simple example is a political promise not to tax cigarettes, which can be circumvented by a tax on all income and a subsidy to all goods except cigarettes.

The best actual example of a two-part instrument is a deposit-refund system. A tax is first paid at the store on some item(s), and then returned if

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and when the item (or its container) is recycled. The result is a tax that remains on the good when it is not recycled. But this idea can be applied much more generally. Even the U.S. income tax operates on such a principle, using a withholding tax collected by employers that may exceed the tax due. If so, a refund is paid if and when the taxpayer files properly.

Other Examples

Suppose that a government wants to tax all household waste disposal in order to reduce landfill costs and negative externalities (like truck noise, odor, and groundwater contamination). A tax per bag of garbage might be difficult to implement, administer, and enforce.[4] It also can induce illegal dumping. Under some conditions, however, the jurisdiction can: tax everything bought at the store, through a general sales tax; provide a partial subsidy to all regular garbage, through free curbside collection; and provide a higher subsidy to all recycling.[5] This combination leaves a partial tax on garbage, but it leaves the highest rate of tax on anything *not* put into regular garbage or recycling — that is, anything dumped illegally.[6]

Second, suppose policymakers want to tax some polluting emissions from a factory, and cannot measure those emissions through such devices as the "continuous emissions monitoring" (CEM) equipment used on large power plants. Ease of measurement and enforcement may vary for toxic or nontoxic emissions that are gaseous, liquid, or solid. (The emissions can be viewed as a necessary input to production with its own downward-sloping marginal product schedule, since additional emissions are successively less crucial to production.) The desired substitution in production from this "dirty" input to other "clean" inputs then can be achieved by a subsidy to all clean inputs. This subsidy tends to reduce the equilibrium price of output, which might encourage more purchases of this good. That effect can be avoided by a simple excise tax on the output. The result is a two-part instrument. The tax on output is equivalent to a tax on all inputs at the same rate. This tax is refunded on clean inputs, leaving an implicit tax on the dirty input. Each tax and subsidy applies only to market transactions which have invoices to verify the tax base.

The idea of a two-part instrument is perhaps most important in a case where the emissions are difficult to measure and the tax is difficult to enforce. Therefore, a third example might be emissions from the millions of motor vehicles in this country that are owned by many individuals who might tamper with on-board devices or avoid remote sensing stations designed to measure the tax that each person owes. Even without tampering, measurement might be expensive. Preliminary findings indicate that all the desired incentive effects of an emissions tax can be achieved by the combination of a tax on each fuel and a subsidy at the appropriate rate on each abatement technology including methanol, compressed natural gas, or other alternative fuel vehicles.[7] Thus the measurement of emissions is unnecessary.

A fourth example involves the environment through common-property natural resources, such as water, that tend to be overused if not priced properly. Groundwater is hard to price explicitly, since a landowner can take as much as desired for free. Yet efficiency may require a price that covers the "scarcity rent" or any negative externality from depletion of the aquifer. The scarcity rent is the amount that others would be willing to pay for the water if they had the opportunity. An example of a negative externality is the reduction in springwater necessary for maintaining certain endangered species. If a farmer uses groundwater for irrigation along with other inputs in production, then a two-part instrument could tax the agricultural output, and subsidize all of the inputs other than water.[8]

When Government Needs Revenue

With no revenue constraint, or the availability of lump sum taxes, the "first-best" tax on a polluting input is equal to "marginal environmental damages." The firm is then faced with the full social cost of using that input. The two-part instrument taxes output and subsidizes other inputs, all at rates based on the same concept, marginal environmental damages.[9]

Now, suppose that revenue must be raised using distorting taxes that affect labor supply and saving decisions. Perhaps the two-part instrument could help to raise revenue by imposing a higher tax and paying a lower subsidy. This suggestion is related to the "double dividend hypothesis," that an environmental tax can help both to fix an environmental problem and to raise revenue for use in reducing other distorting taxes.[10] Some have inferred that this second-best pollution tax rate should exceed marginal environmental damages. Recent research finds the reverse, though: the pollution tax raises output prices and reduces the real net wage, so it distorts labor decisions as well as the consumption mix.[11]

What about the two-part instrument? Whatever the desired rate of tax on the dirty input, the same change in relative prices can be achieved by a tax on output that is returned on clean inputs. Thus the subsidy must match the tax. If second-best considerations reduce the desired-but-unenforceable tax on emissions, then they reduce both parts of the two-part instrument. Revenue considerations do not suggest raising the tax and reducing the subsidy.[12]

Scarcity Rents

The point about revenue and the double-dividend hypothesis relates to my recent research with Gib Metcalf.[13] The double dividend literature has suggested that a revenue-raising instrument, for example a pollution tax, can provide higher welfare than a non-revenue-raising instrument, such as quotas, permits, or command-and-control (CAC) restrictions on emissions. All of these policies can provide the same environmental improvement, and all raise the cost of production, but only the tax generates revenue that can be used to reduce distorting taxes on labor.

For example, the Clean Air Act Amendments of 1990 restrict emissions by using permits that are handed out to firms. The requirement to use these valuable permits raises the cost of production, and thus lowers the real net wage, but the scarcity rent goes to permit recipients. We show that the double-dividend debate should focus not on whether an environmental policy raises revenue, but on whether it creates scarcity rents that are left in private hands. Only if government sells all permits (or has a 100 percent profits tax) can it capture the scarcity rent and use that revenue to offset the reduction in the real net wage by cutting the labor tax.

Regulators can impose different kinds of CAC restrictions. If they simply restrict emissions, then they create scarcity rents that must be covered by a higher price of output. In contrast, regulators can require a reduction in emissions *per unit* of output. If it applies equally to all firms, and does not limit entry, then this policy does not create scarcity rents. For small changes, this "technology restriction" has no first-order effect on the cost of production. It does have first-order effects on the environment, however. So this *non*-revenue-raising policy unambiguously improves welfare, just like the revenue-raising emissions tax.

To clarify further that raising revenue is not the crucial distinction, one can compare an environmental tax that raises revenue to an environmental subsidy that *costs* revenue. One might think that an environmental subsidy would provide less welfare, since it must be financed by *raising* other distorting taxes. Yet the environmental subsidy has exactly the *same* effects as the environmental tax! The tax on a dirty input raises the cost of production. This is turn raises the price level, and would reduce the real net wage except for the fact that the revenue can be used to cut the labor tax. Symmetrically, the subsidy to a clean input reduces the cost of production. This reduces the price level, and would raise the real net wage except for the fact that the subsidy needs to be financed by *raising* the labor tax. Either way the real net wage is unaffected, so labor supply distortions are unaffected.[14]

Fully specified, both of these policies are revenue-neutral. The two-part instrument (environmental subsidy financed by a higher labor tax) is equivalent to the emissions tax (with revenue used to lower the labor tax). The crucial distinction is not whether the environmental policy raises revenue, but whether it restricts the quantity of emissions in a way that creates a scarcity rent that is left in private hands, rather than captured by government and used to offset the effect of higher output prices.

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[1] *For a discussion of tax systems that optimize administrative costs as well as tax rates, see J. Slemrod, "Optimal Taxation and Optimal Tax Systems,"* Journal of Economic Perspectives *4, 1 (Winter 1990), pp. 157–78.*

[2] *The terminology of a "two-part instrument" first appears in D. Fullerton, "Environmental Levies and Distortionary Taxation: Comment,"* American Economic Review *87, 1 (March 1997), pp. 245–51.*

[3] *These arguments are formalized in D. Fullerton and A. Wolverton, "The Case for a Two-Part Instrument: Presumptive Tax and Environmental Subsidy," NBER Working Paper No. 5993, April 1997.*

[4] *A particular garbage pricing program is studied for a sample of households in D. Fullerton and T. Kinnaman, "Household Responses to Pricing Garbage by the Bag,"* American Economic Review *86, 4 (September 1996), pp. 971–84.*

[5] *D. Fullerton and T. Kinnaman, "Garbage, Recycling, and Illicit Burning or Dumping," NBER Reprint No. 2024, January 1996, and* Journal of Environmental Economics and Management *29, 1 (July 1995), pp. 78–91.*

[6] *The equivalence is broken if the good is taxed upon purchase in one jurisdiction and recycled in a different jurisdiction without a matching policy. Thus the policy might need to be implemented by a state, rather than local government. Also, the subsidy need not be paid per item. A payment per ton can provide the recycling plant with incentives to obtain more materials from households. Finally, a related set of taxes and subsidies can encourage firms to design their products to use the right amount of packaging and degree of recyclability. See D. Fullerton and W. Wu, "Policies for Green Design," NBER Working Paper No. 5594, May 1996.*

[7] *D. Fullerton and S. West, "Two-Part Instruments for the Control of Vehicle Emissions: Derivation and Numerical Implementation," work in progress.*

[8] *D. Fullerton and M. Mathis, "Achieving Optimal Use of Water," work in progress.*

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[10] *A review of this literature is provided by L. Goulder, "Environmental Taxation and the Double Dividend: A Reader's Guide,"* International Tax and Public Finance *2, 2 (August 1995), pp. 157–83.*

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[12] *D. Fullerton, "Environmental Levies and Distortionary Taxation: Comment,"* American Economic Review *87, 1 (March 1997), pp. 245–51.*

[13] *D. Fullerton and G. Metcalf, "Environmental Controls, Scarcity Rents, and Pre-Existing Distortions," NBER Working Paper No. 6091, July 1997.*

[14] *Ibid.*

Tax Policy and Investment

R. Glenn Hubbard*

Much of my recent research has focused on determinants of business fixed investment and how tax policy affects investment decisions in both the short and the long run. This article briefly reviews my work in three areas of this research. First, I describe challenges in applying the economic intuition of the neoclassical family of models. Second, I summarize my work on complications raised by capital-market imperfections and lumpy investment projects. Finally, I explore the implications of recent empirical work for normative analysis of tax policy.

Modeling Investment: Back to the Future

Policymakers in the United States and other industrial economies evidently believe that business fixed investment responds strongly to tax changes (given the frequency with which governments manipulate tax policy parameters). Hence it is disturbing that models emphasizing the net return to investing — the "neoclassical" family of dynamic models emphasizing the role of the user cost of capital, or Q, or estimating the Euler equation for the choice of the capital stock — are defeated by *ad hoc* models in forecasting "horse races," and that structural variables frequently are found to be economically or statistically insignificant.

The problem is seen easily in aggregate data. Movements of aggregate variables, including investment, over the business cycle are determined simultaneously; disentangling the marginal impact of a single forcing variable is difficult. For example, an exogenous increase in aggregate demand might lead firms to be more optimistic about their sales prospects and to purchase more investment goods; it also might be expected at least in the short run to lead to higher interest rates. If we examine the correlation between investment and the interest rate, we might even find that the sign is the opposite of that predicted by the neoclassical theory. While an instrumental variables procedure might allow us to overcome this simultaneity problem, the estimator is only as good as the instruments, and good instruments are in short supply. Microeconomic data, however, provide a rich additional source of variation; my own work has focused on tests using firm-level data.

Conventional empirical tests of neoclassical models assume convex costs of adjusting the capital stock and attempt to estimate a parameter related to marginal adjustment costs.[1] Jason Cummins, Kevin Hassett, and I note that conventional estimated coefficients on fundamental variables in firm-level panel data for the United States and other countries are very small, implying implausibly large marginal costs of adjustment.[2] Such estimates imply very small effects of permanent investment incentives on investment.

In my research, I have focused on two general explanations of the failure to estimate significant tax effects on investment: measurement error in fundamental variables and misspecification of costs of adjusting the capital stock.

A major problem in using investment models based on Q or the user cost of capital to estimate effects of tax changes on investment is that measurement error in Q or the user cost of capital may bias downward the estimated coefficient. On a statistical level, Cummins, Hassett, and I estimate neoclassical models in firm-level data using first differences and longer differences (as opposed to the usual fixed-effects, within-group estimator) to address measurement error problems. We find lower adjustment costs and a greater response of investment to fundamentals.[3] In other work, I depart from the strategy of using proxies for marginal Q and rely on the firms's Euler equation to model the investment decision. Using Compustat data for the United States, Anil Kashyap, Toni Whited, and I could not reject the frictionless neoclassical model for most firms, and the estimated adjustment cost parameters are more reasonable than those found in estimates of Q models. Very similar results are reported for European manufacturing firms by Cummins, Trevor Harris, and Hassett and for investment in overseas subsidiaries of U.S. multinational corporations by Cummins and myself.[4]

Again, one reason the data may not appear to favor neoclassical models over accelerator models is a simultaneous equations problem. To the extent that data incorporate exogenous changes in both the real interest rate and the intercept of the investment function, aggregate demand shocks may dominate the hypothesized negative relationship between investment and the user cost of capital. In this case, the estimated coefficient on the user cost of capital (or Q) will be "too small," leading to adjustment costs that are "too large." Such simultaneity increases apparent accelerator effects, because positive shifts of the investment function raise both investment

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and output. Conventional instrumental variables have not proved very helpful in addressing the simultaneity problem.

Cummins, Hassett, and I argue that major tax reforms offer periods in which there is exogenous cross-sectional variation in the user cost of capital or tax-adjusted *Q*. We demonstrate that major tax reforms also are associated with significant firm- and asset-level variation in key tax parameters (such as the effective rate of investment tax credit and the present value of depreciation allowances). Hence tax variables are likely to be good instruments for the user cost of *Q* during tax reforms. We estimate significantly greater responses of investment to the user cost of *Q* following U.S. tax reforms in 1962, 1971, 1981, and 1986 than in other periods; we also find significantly greater responsiveness of investment to fundamentals following tax reforms in 14 countries than that detected using firm-level panel data for those countries.[5]

Complications: Capital-Market Imperfections and Lumpy Investment

Not all firms face the frictionless capital markets I described for the neoclassical models. Therefore tests may not be able to ascertain whether the observed sensitivity of investment to financial variables differs across firms and whether these differences in sensitivity explain the weak apparent relationship between the measured user cost (or *Q*) and investment. My research in this area has integrated information and incentive problems in the investment process by moving beyond the assumption of representative firms by examining firm-level panel data in which firms can be grouped into high-net-worth and low-net-worth categories. For the latter category, changes in net worth or internal funds affect investment, holding constant underlying investment opportunities (desired investment). Following my work with Steven Fazzori and Bruce Petersen,[6] many empirical researchers have placed firms into groups as *a priori* financially constrained or financially unconstrained.

Two aspects of the conclusions of this research are noteworthy in the context of measuring incentives to invest. First, numerous empirical studies have found that proxies for internal funds have explanatory power for investment, holding constant *Q*, the user cost, or accelerator variables.[7] This suggests that tax policy may have effects on investment by constrained firms beyond those predicted by neoclassical approaches. (Indeed, returning to the accelerator analogy, Ben Bernanke, Mark Gertler, and Simon Gilchrist argue that this literature describes a "financial accelerator."[8]) In particular, the quantity of internal funds available for investment is affected by the average tax on earnings from existing projects. In this sense, average as well as marginal tax rates faced by a firm can affect its investment decisions.[9]

Second, empirical studies by me and by others generally find that the frictionless neoclassical model is rejected only for the groups of firms that *a priori* are financially constrained.[10] Hence, while the shadow value of internal funds may not be well captured for some firms in standard representations of the neoclassical approach, the neoclassical model with convex adjustment costs yields reasonable estimates for most firms of the response of investment to fundamentals and to tax parameters.

The small estimated sensitivity of investment to fundamentals and tax variables in conventional empirical approaches led some researchers to suggest that adjustment costs may be nonconvex (one example being "irreversible" investment).[11] Hassett and I argue, however, that much of U.S. investment is in the form of capital goods with well-operating secondary markets.[12] Cummins, Hassett, and I also use firm-level data to investigate whether there was evidence of bunching of investment around tax reforms. We estimate transition probabilities among various ranges of investment rates over the year prior to, of, and after the tax reform and find no evidence that firms with large investment were likely to have lower investment in prior or subsequent years. Indeed, only a very tiny fraction of the sample was ever found to transit from high-investment to low-investment states.[13]

In part, the conclusions of such studies may differ because of differences in the level of aggregation. At a sufficiently fine level of disaggregation, all investment looks lumpy. The plant-level evidence suggests that investment appears lumpy, but the firm-level evidence does not corroborate this. However, there may be interesting differences between the investment behavior of plants and firms, as might be the case if, for example, managerial attention is limited and only a fraction of a firm's plants adjust their capital in a given year. Clearly, reconciling the plant-level and firm-level results is an important topic for future research.

Rethinking Tax Policy

My research suggests that tax incentives for investment are important components of the net return to investing and that the short-term and long-term responses of investment to permanent tax incentives are large. The deeper policy question remains: Would permanent investment incentives to increase the stock of business fixed capital raise economic welfare?

A scenario under which investment incentives might have an especially large impact on the quantity of

investment without dissipation in the prices of investment goods is one in which firms' demand for capital is responsive to changes in the user cost of capital and in which capital goods are supplied perfectly elastically. While it is implausible that the supply function for most individual capital goods manufacturers is perfectly elastic, the effective supply of capital goods to a given domestic market might well be highly elastic in the long run if the world market for capital goods is open. Investment incentives would raise prices of capital goods in the short run if the supply of capital goods is highly inelastic.

Using data for the United States and ten other countries, Hassett and I find that local investment tax credits have a negligible effect on prices paid for capital goods — indeed, we find that the capital goods prices for most countries are very highly correlated and that the movements of these over time are consistent with the "law of one price." In addition, using disaggregated data on asset-specific investment good prices and tax variables for the United States, we find that tax parameters have no effect on capital goods prices.[14] Taken together, these tests suggest that the effects of investment tax policy have not been muted in a significant way by upward-sloping supply schedules for capital goods.

While it is instructive to ask how effective investment incentives are at increasing the fixed capital stock, a still more important question remains: What is the social value of the increase in the fixed capital stock?

Hassett and I review comparisons of "golden rule" levels of the capital stock or net investment relative to output to their actual values over the period from 1980 to 1994. For benchmark parameter values, equipment investment and capital stocks are below their "golden rule levels" (assuming 1980–94 is sufficiently long to characterize a steady state), while residential investment and the residential capital stock, which received significant tax subsidies over this time period, are near or above their golden rule levels.[15] Such findings suggest that, by raising the stock of equipment capital, investment incentives have positive social returns.

The finding of substantial short-term and long-term effects of the user cost of capital on business investment has applications for current policy debates. In particular, I have focused on the consequences of a reduction in inflation and a switch from an income tax to a broad-based consumption tax for user cost of capital and investment.

Many economists have argued that, under fairly general assumptions, a reduction in the rate of inflation provides a relatively costless stimulus to business fixed investment by reducing the user cost of capital. Darrel Cohen, Hassett, and I derive the effect of inflation on the user cost and investment under various assumptions about sources of financing and about the openness of capital markets. We estimate that, if the United States were a closed economy, a single-percentage point decline in inflation from its current level lowers the user cost by about 0.5 percentage points. The effect is smaller, but still economically significant, if one assumes that the United States is a price-taker on international debt markets.[16] All else being equal, this "tax cut" would, provide a stimulus to investment.

Under the income tax, the user cost of capital is influenced by the corporate tax rate, investment incentives, and the present value of depreciation allowances. Under a broad-based consumption tax, taxes do not distort business investment decisions. In addition, given current U.S. tax policy, the user cost is lower under a consumption tax than under an income tax. Hassett and I estimate that, all else being equal, a move to a consumption tax would stimulate the demand for equipment investment significantly.[17]

Of course, other aggregate variables are also likely to change if such a large change to the tax code were adopted. For example, nominal interest rates and the supply of savings are likely to change. While it is difficult to say how large the net stimulus to investment would be, the consensus of the recent investment literature suggests that the partial equilibrium impact on investment may be quite large.

New Directions

My current work on investment focuses on two areas: studying how managers choose "hurdle rates" in evaluating investment projects and examining links between plant-level and firm-level investment decisions. The study of "investment" offers a lens through which to learn more about organizational decisionmaking and links between "financial" and "real" decisions.

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[1] *See the review in K.A. Hassett and R. G. Hubbard, "Tax Policy and Investment," NBER Working Paper No. 5683, July 1996.*

[2] *J.G. Cummins, K.A. Hassett, and R.G. Hubbard, "A Reconsideration of Investment Behavior Using Tax Reforms as National Experiments," NBER Reprint No. 1946, February 1995, and* Brookings Papers on Economic Activity *(1994:2), pp. 1–74; and "Tax Reforms and Investment: A Cross-Country Comparison," NBER Reprint No. 2102, December 1996, and* Journal of Public Economics *62 (1996), pp. 237–73.*

[3] *J.G. Cummins, K.A. Hassett, and R.G. Hubbard, "A Reconsideration of Investment Behavior..."*

[4] *R.G. Hubbard, A.K. Kashyap, and T.M. Whited, "Internal Finance and Firm Investment," NBER Reprint No. 2004, September 1995, and* Journal of Money, Credit, and Banking *27 (August 1995),*

pp. 683–701; J.G. Cummins, T.S. Harris, and K.A. Hassett, "Accounting Standards, Information Flows, and Firm Investment Behavior," and J.G. Cummins and R.G. Hubbard, "The Tax Sensitivity of Foreign Direct Investment: Evidence from Firm-Level Panel Data," in* The Effects of Taxation on Multinational Corporations, *M. Feldstein, J.R. Hines, and R.G. Hubbard, eds. Chicago: University of Chicago Press, 1995.*

[5] *J.G. Cummins, K.A. Hassett, and R.G. Hubbard, "A Reconsideration of Investment Behavior..." and "Tax Reforms and Investment..." and "Have Tax Reforms Affected Investment?", in* Tax Policy and the Economy, *Vol. 9, J.M. Poterba, ed. Cambridge: MIT Press, 1995. For an early emphasis on the importance of focusing on tax, rather than nontax, variation in the user cost of capital, see M. Feldstein and J. Flemming, "Tax Policy, Corporate Saving, and Investment Behavior in Britain,"* Review of Economic Studies, *38, October 1971.*

[6] *S.M. Fazzari, R.G. Hubbard, and B.C. Petersen, "Financing Constraints and Corporate Investment,"* Brookings Paper on Economic Activity *(1988:1), pp. 141–95; C.W. Calomiris and R.G. Hubbard, "Internal Finance and Investment: Evidence from the Undistributed Profits Tax of 1937–1938,"* Journal of Business *68 (October 1995), pp. 443–82; M. Gertler and R.G. Hubbard, "Financial Factors in Business Fluctuations," in* Financial Market Volatility: Causes and Consequences, *Federal Reserve Bank of Kansas City, 1988; R.G. Hubbard, "Introduction," in* Asymmetric Information, Corporate Finance, and Investment, *R.G. Hubbard, ed., Chicago: University of Chicago Press, 1990; R.G. Hubbard and A.K. Kashyap, "Internal Net Worth and the Investment Process: An Application to the U.S. Agriculture,"* Journal of Political Economy *100 (June 1992), pp. 506–34; and R.G. Hubbard, A.K. Kashyap, and T.M. Whited,* op. cit.

[7] *See the review of studies in R.G. Hubbard, "Capital-Market Imperfections and Investment," NBER Working Paper No. 5996, April 1997.*

[8] *B.S. Bernanke, M. Gertler, and S. Gilchrist, "The Financial Accelerator and the Flight to Quality,"* Review of Economics and Statistics *78 (February 1996), pp. 1–15.*

[9] *S.M. Fazzari, R.G. Hubbard, and B.C. Petersen, "Investment, Financing Decisions, and Tax Policy,"* American Economic Review *78 (May 1988), pp. 200–5.*

[10] *See the review and examination of studies in R.G. Hubbard, "Capital-Market Imperfections and Investments,"* Journal of Economic Literature, *forthcoming, 1997.*

[11] *I explore this linkage between the literatures in R.G. Hubbard, "Investment Under Uncertainty: Keeping One's Options Open,"* Journal of Economic Literature *32 (December 1994), pp. 1816–31.*

[12] *K.A. Hassett and R.G. Hubbard, "Tax Policy and Investment," in* Fiscal Policy: Lessons from Economic Research, *A.J. Auerbach, ed. Cambridge: MIT Press, 1997.*

[13] *J.G. Cummins, K.A. Hassett, and R.G. Hubbard, "A Reconsideration of Investment Behavior..."*

[14] *K.A. Hassett and R.G. Hubbard, "The World Market for Capital Goods: Does Local Policy Affect Prices?", mimeo, Columbia University, 1996.*

[15] *K.A. Hassett and R.G. Hubbard, "Tax Policy and Investment..."*

[16] *D. Cohen, K.A. Hassett, and R.G. Hubbard, "Inflation and the User Cost of Capital: Does Inflation Still Matter?", mimeo, Columbia University, 1997.*

[17] *J.G. Cummins, K.A. Hassett, and R.G. Hubbard, "A Reconsideration of Investment Behavior..."*

Evaluating Age Discrimination Laws

David Neumark*

The Age Discrimination in Employment Act (ADEA) was enacted by Congress in 1968 to "promote employment of older persons based on their ability rather than age; to prohibit arbitrary age discrimination in employment; to help employers and workers find ways of meeting problems arising from the impact of age on employment." Originally, the ADEA protected workers aged 40–65. Later amendments first prohibited mandatory retirement before the age of 70, and then outlawed it altogether. In recent years, age discrimination has come to represent a significant proportion of the complaints filed with the Equal Employment Opportunity Commission. For example in 1990, just over 10,000 complaints of age discrimination were filed under the ADEA, compared with around 43,000 complaints filed under Title VII of the Civil Rights Act for alleged discrimination based on race or sex.

Arguments For and Against Age Discrimination Laws

The fact that workers file age discrimination complaints under the ADEA does not, in and of itself, indicate that discrimination against older workers exists and should be addressed in the same manner as race and sex discrimination. There are two reasons to be cautious regarding this interpretation. First, there is an absence of prima facie evidence of discrimination against older workers. If anything, older workers tend to fare better than younger workers. One of the most robust empirical facts in labor economics is the "age-earnings profile," which captures the increases in earnings that workers experience over most of their career. In addition, older workers tend to have higher non-labor income and lower unemployment rates than younger workers. This contrasts with evidence regarding race and sex differences in labor markets; while economists and others continue to debate the source of these differences, there is no question that the earnings of women and minorities are lower.

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Second, an influential model of the age-earnings profile seriously calls into question the virtue of age discrimination legislation, especially the prohibition of mandatory retirement. In this model (developed by Edward P. Lazear) employers, in order to elicit effort from workers, initially pay workers less than the value of their productivity in exchange for promises of future wages that will exceed the value of their productivity. Mandatory retirement ages are then necessary to induce high-wage workers to leave the firm eventually. In Lazear's model, these contracts are efficient from society's perspective, and workers find them desirable even though they include mandatory retirement. However, once workers reach the mandatory retirement age, they would prefer to continue working at their current wage, and the ADEA gives them the right to do so. This led Lazear to conclude that the ADEA's ban on mandatory retirement would generate efficiency losses.[1]

Thus, the wisdom of legislation that prohibits age discrimination rests on a few key questions. First, is there firmer evidence of discrimination against older workers, particularly in the period predating the ADEA and the growth in age discrimination complaints? Second, does Lazear's model provide the best explanation of the employment relationship, and of age-earnings profiles in particular? If it does, then legislation prohibiting age discrimination, including mandatory retirement, may do more harm than good. Alternatively, if other models better explain the age-earnings profile, such as the general human capital model in which the age-earnings profile reflects increases in productivity, then such legislation is less likely to have detrimental effects. Finally, even if Lazear's model does provide the best explanation of the age-earnings profile, might age discrimination legislation actually strengthen such contracts, rather than weakening them? Much of my research over the past four years has addressed these questions.

Was There Age Discrimination?

It is difficult to draw inferences regarding the existence of discrimination even for demographic groups that are relatively low paid, let alone for older workers who are not low paid on average. To attempt to assess whether age discrimination in the labor market was a serious problem in the period surrounding the development of the ADEA, Richard Johnson and I examine evidence from the 1960s and 1970s as reported by older workers.[2] We compare labor market outcomes for older workers who claim that they have experienced age discrimination on the job with outcomes for workers who do not report age discrimination. Self-reports of discrimination are clearly problematic, primarily because they may reflect negative outcomes that in fact are unrelated to discrimination. However, we are able to mitigate this problem by using other information to account for differences in these negative outcomes, including measures of job satisfaction. We also contrast the results for white men with those for black men, who may be more likely to attribute negative job outcomes to race discrimination. We find that about 3 percent of our sample of older male workers report age discrimination by their current employer in the form of demotions, layoffs, or failure to be promoted. A similar percentage report other forms of age discrimination in the workplace, such as difficulty getting hired. Moreover, workers who report age discrimination by their current employer are much more likely to leave that employer, thus facing substantial earnings losses. This evidence suggests that age discrimination in the workplace may be (or may have been) a serious problem, at least for some workers, which provides some basis for age discrimination legislation.

Models of the Age-Earnings Profile

I use information from a number of sources to test alternative models of the age-earnings profile. The central question in this research is how earnings and productivity rise over the life cycle. Perhaps the best way to study this question is with actual data on earnings and productivity. However, such data are difficult to come by, prompting other approaches as well. For example, Paul Taubman and I tested theoretical implications of the general human capital model that did not require productivity data.[3] This model predicts that although different workers will choose careers and investments resulting in flatter or steeper age-earnings profiles, in equilibrium (under some conditions) the present value of the profiles for similar workers will be equal. In contrast in the Lazear model, steeper age-earnings profiles are associated with higher productivity, and hence with higher present value of earnings. For a variety of specifications and assumptions, the evidence that we find is most consistent with the general human capital model.

However, in another study Johnson and I test an additional implication of the general human capital model: that at older ages, depreciation of human capital should outweigh new investment, and earnings should start to fall.[4] In contrast, the Lazear model does not necessarily predict this. Well-known estimates of age-earnings profiles from standard cross-sectional datasets yield evidence of declining earnings at older ages, consistent with this prediction. However, a more careful analysis of

longitudinal data, especially taking account of the interaction of workers' earnings and employment with the Social Security system, yields considerably weaker evidence of declining earnings. This may call into question a stylized fact that often is viewed as supporting the general human capital model.

An alternative approach to inferring whether earnings rise faster than productivity is to ask whether there appear to be gains to owners of firms from shedding older workers. If older workers are overpaid, and if they can be shed without loss of reputation that damages the ability of employers to enter into Lazear-type contracts in the future, then in fact there may be such gains. Researchers studying corporate takeovers have suggested that one of the motivations for hostile takeovers may be to recapture the higher wages paid to older workers.[5] Such takeovers enable firms to cut employment of older workers. Perhaps because takeover targets often are resold, or because the employment cuts occur under the burden of heavy debt, the effects on reputation may be small. In two studies, I explore the joint hypothesis that hostile takeovers target older workers' wages which exceed their productivity, and that these "extramarginal" wage payments exist.[6] In one of the studies — the one with superior data — I find that older workers are paid more than their marginal product, consistent with Lazear's model, and that hostile takeovers target these excess payments.

The most compelling evidence on the age-earnings profile may come from data that permit us to measure both earnings and productivity over the life cycle. Judith Hellerstein and I carried out one such study using data on Israeli manufacturing plants.[7] We combine standard data used to estimate production functions with information on labor costs and on the age structure of plants' workforces. This enables us to estimate differentials in relative pay and productivity of older versus younger workers. Consistent with the general human capital model, we find, increases in earnings with age mirror increases in productivity. However, a related study with Hellerstein and Kenneth Troske, using data on manufacturing plants in the United States, reaches different conclusions.[8] In these data, using the same production function approach, we find that older workers are paid more than younger workers, but are quite a bit less productive, by perhaps 20 percent.

Unfortunately for those hoping for a definitive answer regarding the best model of the age-earnings profile, the evidence to date does not paint a consistent picture. Some evidence suggests that earnings rise with productivity, while other evidence suggests that workers indeed are underpaid when young and overpaid when old. Things can be even more complicated than this, as there are other explanations of rising age-earnings profiles. In particular, workers may prefer that their earnings rise over time because this serves as a forced-saving mechanisms. Workers can in this way enjoy higher consumption at older ages when they might otherwise have difficulty saving. In fact, I find that people who use forced-saving mechanisms — including overpayment of income taxes and receipt of a refund check, without interest, each spring — also are more likely to have steeper age-earnings profiles.[9]

Thus, the jury is still out. Some evidence supports the general human capital model's explanation of the rising age-earnings profile. If this model is largely correct, then it is difficult to see why age discrimination legislation would be harmful. Employers may sometimes dismiss or otherwise mistreat older workers because of discriminatory tastes, and the legislation might reduce this type of behavior. At the same time, my research and that of others[10] finds some evidence in favor of Lazear's model of long-term incentive contracts, in which age discrimination legislation might be harmful.

The Effects of Age Discrimination Laws

Even if Lazear's model best describes the age-earnings profile and the employment relationship, it is conceivable that by strengthening employment contracts, age discrimination laws increase efficiency. While age discrimination laws (including the prohibition of mandatory retirement) restrict employers from terminating employees involuntarily based on age, firms still may offer financial incentives to induce retirement at specific ages. In addition, mandatory retirement as it existed in the past may not have been a very important determinant of retirement age.[11] Further, by prohibiting age discrimination in layoffs, the ADEA may inhibit firms from opportunistically reneging on long-term implicit contracts with older workers. Thus, by providing a means for workers to enforce Lazear-type contracts, the ADEA may encourage workers to enter into them.

Wendy Stock and I currently are investigating these two competing views of age discrimination laws. We consider the effects of such legislation on the steepness of age-earnings profiles, a proxy for the use of Lazear contracts.[12] We can identify the effects of age discrimination laws from states that passed such legislation before the federal government did. We find that age discrimination laws lead to steeper age-earning profiles in the labor market. This is consistent with age discrimination laws strengthening the bonds between workers and firms, leading to greater use of Lazear contracts in labor markets, and hence possibly increasing

labor market efficiency.

Assessing evidence on labor market discrimination is difficult, because we rarely have information on all of the factors, including productivity, that affect earnings. Even among those who agree that there is discrimination, there are disagreements regarding the appropriate remedy. Because of the absence of prima facie evidence of worse labor market outcomes for older workers, and perhaps also because influential theoretical work in labor economics suggests that age discrimination laws may be detrimental, legislation prohibiting age discrimination may be viewed less sympathetically than laws prohibiting discrimination by race or sex.[13] However, there is evidence suggesting that age discrimination was and may remain a real problem in labor markets. Thus, even if age discrimination laws restrict one means by which employers may enter into efficient employment relationships with workers, the net effect of these laws may be beneficial.

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[2] *R.W. Johnson and D. Neumark, "Self-Reported Age Discrimination, Job Separations, and Employment Status of Older Workers: Evidence from Self-Reports," NBER Working Paper No. 5619, June 1996.*

[3] *D. Neumark and P. Taubman, "Why Do Wage Profiles Slope Upwards? Tests of the General Human Capital Model,"* Journal of Labor Economics, *Vol. 13, October 1995, pp. 736–61.*

[4] *R.W. Johnson and D. Neumark, "Wage Declines Among Older Men,"* Review of Economics and Statistics, *Vol. 78, November 1996, pp. 740–8.*

[5] *A. Shleifer and L. H. Summers, "Breach of Trust in Hostile Takeovers," in* Corporate Takeovers: Causes and Consequences, *A. J. Auerbach, ed., Chicago: University of Chicago Press, (1988) pp. 33–56.*

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[7] *J. K. Hellerstein and D. Neumark, "Are Age-Earnings Profiles Steeper Than Productivity Profiles? Evidence From Israeli Firm-Level Data,"* Journal of Human Resources, *Vol. 30, Fall 1995, pp. 89–112.*

[8] *J. K. Hellerstein, D. Neumark, and K. Troske, "Wages, Productivity, and Worker Characteristics: Evidence from Plant-Level Production Functions and Wage Equations," NBER Working Paper No. 5626, June 1996.*

[9] *D. Neumark, "Are Rising Wage Profiles a Forced-Savings Mechanism?"* Economic Journal, *Vol. 105, January 1995, pp. 95–106.*

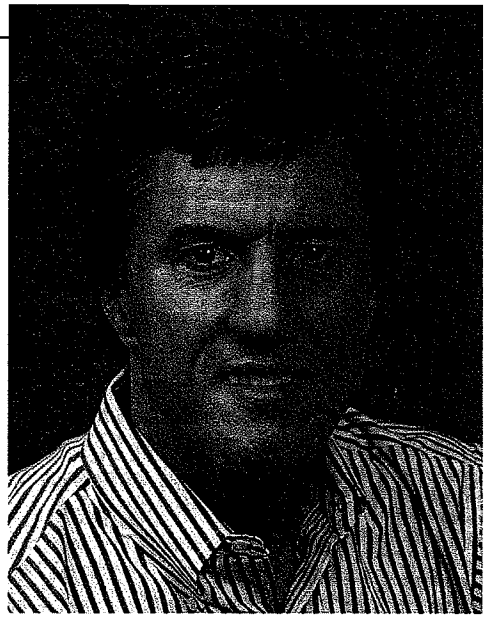
[10] *For example, see L. Kotlikoff and J. Gokhale, "Estimating a Firm's Age-Productivity Profile Using the Present Value of Workers' Earnings,"* Quarterly Journal of Economics, *Vol. 107, 1992, pp. 1215–42.*

[11] *R. V. Burkhauser and J. F. Quinn, "Is Mandatory Retirement Overrated? Evidence from the 1970s,"* Journal of Human Resources, *Vol. 18, 1983, pp. 337–58.*

[12] *D. Neumark and W. A. Stock, "Age Discrimination Laws and Labor Market Efficiency," mimeograph, 1997.*

[13] *See, for example, L. Friedman,* Your Time Will Come, *New York, NY: Russell Sage Foundation, (1984).*

NBER Profile: *Don Fullerton*



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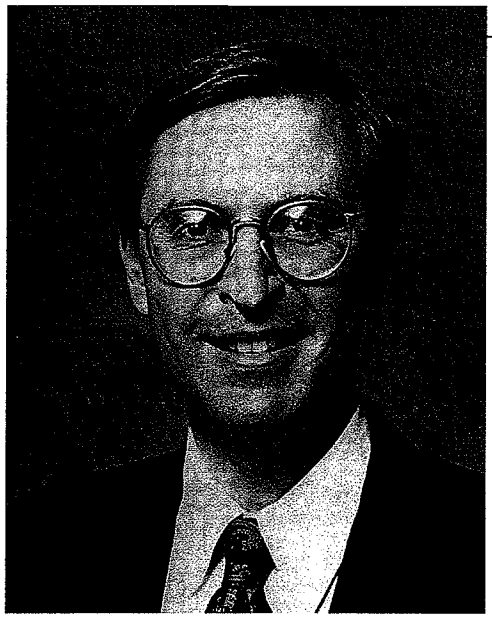
In addition to his teaching, Fullerton was a National Fellow at the Hoover Institution at Stanford University from 1983–4; he was Deputy Assistant Secretary of the Treasury for Tax Analysis from 1985–7, during the debate about the Tax Reform Act of 1986; and, he was an Olin Fellow at the NBER in 1988–9.

Fullerton, who has published numerous articles on taxation and has a particular interest in environmental economics, is one of the editors of the *Journal of Environmental Economics and Management*. He also is the Director of the American Economic Association's Summer Minority Program: in this program, qualified minority undergraduates recommended by their professors receive a stipend and tuition for an 8-week preparatory session prior to enrolling in economics Ph.D. programs.

Fullerton's wife, Jo Worthy, holds a Ph.D. in education from the University of Virginia; has done postdoctoral work at the University of Pittsburgh; and is an assistant professor of education at the University of Texas. They have a son Jared, 15, and a daughter, Jenna, 9. In fact, Fullerton says "I used to have hobbies, but now I have kids..."

NBER Profile: *Glenn Hubbard*

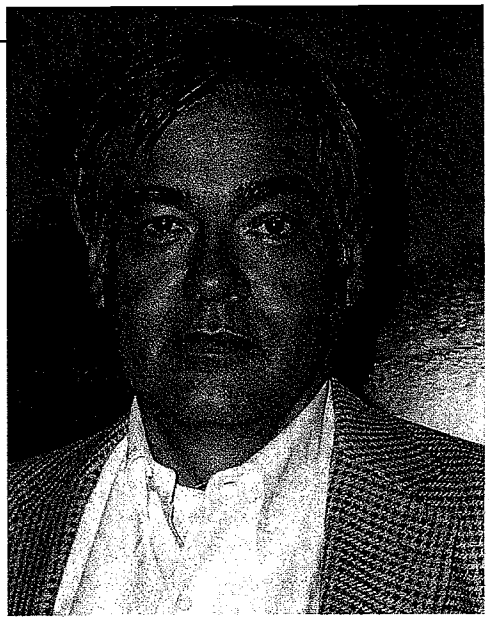


Glenn Hubbard is an NBER Research Associate in the Programs in Public Economics, Corporate Finance, Monetary Economics, and Economic Fluctuations and Growth, and the Russell L. Carson Professor of Economics and Finance at Columbia University. He received his B.A. and B.S. from the University of Central Florida in 1979, and his A.M. in 1981 and Ph.D. in 1983 from Harvard University. Before coming to Columbia University, Hubbard taught at Northwestern University. He also has been a visiting professor at the University of Chicago and Harvard University and a John M. Olin Fellow at the NBER.

Hubbard teaches courses on public economics, corporate finance, and money and financial markets. His current research includes an examination of effects of tax policy on business decisionmaking, an economic analysis of Medicare, a project on how managers choose "hurdle rates," and a study on the saving and portfolio allocation decisions of the wealthy. He is the author of numerous professional publications (and a textbook, *Money, the Financial System, and the Economy*, 2nd ed., Addison, Wesley, 1997) and editor of five NBER volumes in corporate finance or taxation. In addition to his teaching and research, Hubbard has served as Deputy Assistant Secretary of the U.S. Treasury Department and as a policy consultant to the U.S. Department of the Treasury, Department of Energy, and Department of State, the Internal Revenue Service, the Federal Reserve Board, the Federal Reserve Bank of New York, the National Science Foundation, the U.S. House of Representatives' Ways and Means Committee, and the Senate Finance Committee.

When not on an airplane, Hubbard lives in Manhattan with his wife Constance and their son "Raph," 6. Hubbard enjoys restaurant hopping (participating), baseball (watching), trying to keep up with his son on computer skills, and attempting to nudge a major political party to the center.

NBER Profile: *Charles R. Hulten*

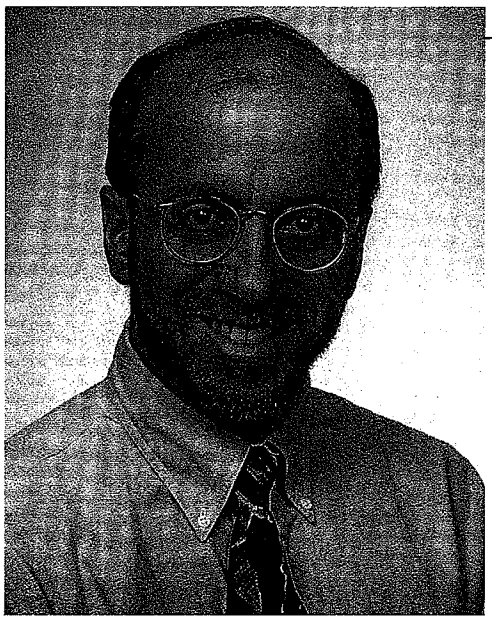


Charles R. Hulten is Professor of Economics at the University of Maryland, where he has taught since 1985, and a research associate in the NBER's Program on Productivity. Both his undergraduate and Ph.D. degrees are from the University of California, Berkeley. Since 1985, Hulten also has been Chairman of the NBER's Conference on Research in Income and Wealth (CRIW).

CRIW was formed in 1936 at the instigation of the University Committee of the NBER, representatives of eight government agencies, and six universities. Its first chair was Simon Kuznets; its first secretary was Milton Friedman. This cooperative venture has produced almost 60 published volumes: the series of *Studies in Income and Wealth*. CRIW now holds a conference every one to two years to discuss issues of economic measurement; the proceedings are published by the NBER.

Before joining the University of Maryland faculty, Hulten was a Senior Research Associate at the Urban Institute (1978–85) and Assistant Professor of Economics at Johns Hopkins University (1971–8). He also has been a Visiting Professor of Economics at the European Institute of Business Administration; a Visiting Scholar at American Enterprise Institute; and a Visiting Research Scholar at the World Bank. He has combined a career of teaching and research in the areas of productivity analysis, economic growth and capital formation, and tax policy and the measurement of economic depreciation.

Hulten is married to Nancy P. Humphrey. His hobbies are "good wine," fine art (viewing, not owning), travel, and watching the Oakland Raiders football team.



NBER Profile: *David Neumark*

David Neumark is an NBER Research Associate in the Programs on Labor Studies and Aging and a professor of economics at Michigan State University. He received his B.A. from the University of Pennsylvania in 1982 and his Ph.D. in economics from Harvard University in 1987.

From 1987 to 1989, Neumark was an economist in the Division of Research and Statistics of the Federal Reserve Board of Governors. In 1989, he became an assistant professor at the University of Pennsylvania; in 1994, he moved to Michigan State University as a full professor. He currently holds a Special Emphasis Research Center Award from the National Institute on Aging.

Neumark was also an NBER Faculty Research Fellow from 1989–94, when he became an NBER Research Associate. His work in labor studies has been published in many professional journals and books.

Neumark and his wife, Donna, who is a nursing researcher at Michigan State about to begin work on her doctorate, have two children, ages 6 and 7. When he is not teaching his kids to "hit line drives, backhands, and the upper corner of the soccer goal," Neumark enjoys reading, camping, playing softball, and lifting weights.

Conferences

The Economic Analysis of Substance Use

The NBER recently sponsored a project on substance use and abuse directed by Research Associates Frank J. Chaloupka, University of Illinois, Chicago, Michael Grossman, CUNY, and Henry Saffer, Kean College, and Warren K. Bickel, University of Vermont. The culmination of this project was a conference held in Cambridge on March 27–8, which integrated the econometric and behavioral research produced by the economists and behavioral psychologists involved. The program for the two-day meeting was:

Donald S. Kenkel, Cornell University, and **Ping Wang**, Pennsylvania State University, "Are Alcoholics in Bad Jobs?"

Kenneth Silverman and **Elias Robles**, Johns Hopkins University, "Employment as a Drug Abuse Treatment Intervention: A Behavioral Economic Analysis"

Discussants: Sharon Hall, University of California, San Francisco, and John Mullahy, NBER and University of Wisconsin, Madison

Robert Kaestner, NBER and Baruch College, "Does Drug Use Cause Poverty?"

Marilyn Carroll, University of Minnesota, "Income Alters the Relative Reinforcing Effects of Drug and Nondrug Reinforcers"

Discussants: Steven Hursh, Science Applications International, and Christopher Ruhm, Council of Economic Advisers

Robert L. Ohsfeldt and **Eli I. Capilouto**, University of Alabama, Birmingham, and **Raymond G. Boyle**, Health Partners Group Health Foundation, "Tobacco Taxes, Smoking Restrictions and Tobacco Use"

Warren K. Bickel and **Gregory J. Madden**, University of Vermont, "The Behavioral Economics of Smoking"

Discussants: Kenneth E. Warner, University of Michigan, and Neil Grunberg, Uniformed Services University

Solomon W. Polachek and **Norman Spear**, SUNY-Binghamton, and **Jerry Sarbaum**, Whitman College, "The Effects of Price Changes on the Consumption of Alcohol in Alcohol-Experienced Rats"

Rudy E. Vuchinich and **Cathy A. Simpson**, Auburn University, "Delayed Reward Discounting in Alcohol Abuse"

Discussants: Michael Hilton, National Institute on Alcohol Abuse and Alcoholism, and Thomas Babor, University of Connecticut

Frank J. Chaloupka, Michael Grossman, and **John A. Tauras**, University of Illinois, Chicago, "The Demand for Cocaine and Marijuana by Youth"

Stephen T. Higgins, University of Vermont, "Some Potential Contributions of Reinforcement and Consumer Demand Theory to Reducing Cocaine Use"

Discussants: Charles R. Schuster, Wayne State University, and Jonathan Caulkins, Carnegie Mellon University

Henry Saffer and **Frank J. Chaloupka**, "Demographic Differentials in the demand for Alcohol and Illicit Drugs"

Nancy M. Petry, University of Connecticut, and **Warren K. Bickel**, "A Behavioral Economic Analysis of Polydrug Abuse in Heroin Addicts"

Discussants: Mark Kleiman, University of California, Los Angeles, and A. Thomas McLellan, University of Pennsylvania

Kenkel and **Wang** show that, if they are employed, male alcoholics are less likely than nonalcoholic men to receive a variety of fringe benefits, and are more likely to be injured on the job, and to work for smaller firms. The value of the lost fringe benefits is about $450 per alcoholic. Alcoholics are also more likely to be in blue-collar occupations, in which they earn an estimated 15 percent less than their nonalcoholic peers.

Silverman and **Robles** seek to identify an effective employment-based treatment intervention for chronically unemployed methadone patients. They find that the utility of employment as a drug abuse treatment intervention depends, in large part, on the extent to which it is used to arrange substantial monetary reinforcement for abstinence from drugs, and on the opportunity cost of drug use (that is, the cost in lost wages or jobs of continuing to use drugs). They conclude that employment could serve a valuable role in the treatment of hard-core drug abuse. They confirm, as has been shown in controlled clinical trials, that it is among the more effective drug abuse treatments currently in use.

Kaestner describes the relation-

ship between drug use and poverty and explores, in a preliminary fashion, the question of whether drug use causes poverty. Using a sample drawn from the National Household Survey of Drug Abuse and another from the National Longitudinal Survey of Youth, he concludes that drug use does cause greater poverty.

Carroll concludes that price and availability of nondrug alternatives are major determinants of drug intake. Changes in income dramatically alter preferences between drugs and alternatives; however, income has less of an effect on drug intake than on consumption of the alternatives. She concludes that the optimal formula for reducing/preventing drug intake would be low income, high drug price, and availability of inexpensive alternative nondrug reinforcers.

Ohsfeldt, Boyle, and **Capilouto** find that individuals living in areas with higher cigarette tax rates tend to be less likely to smoke cigarettes, while those living in areas with higher tax rates on snuff tend to be less likely to use snuff. Smoking restrictions generally are associated with reduced cigarette use, but some types of laws restricting smoking are associated with greater snuff use. Finally, higher cigarette tax rates are associated with greater snuff use, but higher snuff tax rates are not associated with greater cigarette use. This suggests the possibility that increases in cigarette excise tax rates may induce substitution into snuff, at least among some young male cigarette smokers.

Using the results of the behavioral economic studies they have conducted over the last eight years, **Bickel** and **Madden** find that economic principles and concepts are relevant and do pertain to individual smokers. Moreover, the demand curve obtained in their experiments has wide generality. They conclude that these studies can inform policymakers, because their laboratory model demonstrates economic principles and examines the potential consequences of using broad ranges of the independent variable beyond what is typical in the natural economy; and, their results tend to be consistent with overall U.S. demand.

Sarbaum, Polachek, and **Spear** run two experiments on rats that have been exposed to alcohol (ethanol). The first studies rats' responses to a 100 percent versus a 400 percent "increase in the price" of ethanol. In general, the rats respond only moderately to a 100 percent increase, but more dramatically to the 400 percent increase. In the second experiment, the rats respond to increased ethanol "prices" but not to the cue reflecting future price increases. In general, the results from the two experiments show that economic models of consumer choice are a useful tool for studying the consumption of ethanol. In addition, the experiments provide some evidence supporting habit formation, but not "rational addiction."

Vuchinich and **Simpson** find no difference between heavy and light social drinkers in their choices between a highly probable small amount of money and a less probable larger amount of money. Comparing heavy and problem drinkers versus light drinkers, they find a positive relation between temporal discounting and addiction: the heavier drinking is associated with money now, not later.

Chaloupka, Grossman, and **Tauras** find that youth demand for cocaine is sensitive to price. In addition, increased sanctions for the possession of cocaine and marijuana have a negative and statistically significant impact on youth cocaine and marijuana use. However, very large increases in the monetary fines which can be imposed for first offense possession would be necessary to achieve meaningful reductions in use. Finally, sanctions for the sale, manufacture, or distribution of cocaine and marijuana have little impact on youth cocaine and marijuana use.

Higgins underscores the fundamental role of reinforcement in the genesis and maintenance of cocaine use, and illustrates how that knowledge in combination with consumer-demand theory might be translated into effective strategies for reducing cocaine use.

Saffer and **Chaloupka** show that compared to the total population, racial and ethnic minorities consume more cocaine, but less or equal amounts of alcohol, marijuana, and heroin. Also, there is a consistent pattern of negative own-price effects for alcohol and illicit drugs, and a complementarity between alcohol and illicit drugs. The own-price effects do not differ substantially among demographic groups. The pattern of complementarity between alcohol and illicit drugs suggests that alcohol taxes also reduce drug use.

Bickel and **Petry** simulate the purchase of drugs as their price, or individual income, varies. They find that the demand for heroin and cocaine is income elastic, with purchases rising in greater proportion than income. Marijuana, alcohol, and valium purchases do not vary significantly as a function of income. The drug choices in this simulation were correlated with drug use as determined by urinalysis testing. These results point up the utility of a behavioral economics approach for characterizing polydrug abuse.

A project report on substance abuse, including these papers and their discussion, will be published by the University of Chicago Press. The volume's availability will be announced in the NBER *Reporter*.

Twelfth Annual Conference on Macroeconomics

The NBER's Twelfth Annual Conference on Macroeconomics was held in Cambridge on April 4 and 5. The conference organizers, Ben S. Bernanke of Princeton University and Julio J. Rotemberg of MIT, put together this program:

Marvin Goodfriend, Federal Reserve Bank of Richmond, and **Robert King**, NBER and University of Virginia, "The New Neoclassical Synthesis and the Role of Monetary Policy"

Discussants: Ellen McGrattan, Federal Reserve Bank of Minneapolis, and Olivier J. Blanchard, NBER and MIT

Julio J. Rotemberg, and **Michael Woodford**, NBER and Princeton University, "An Optimization-Based Econometric Framework for the Evaluation of Monetary Policy"

Discussants: Jeffrey Fuhrer, Federal Reserve Bank of Boston, and Bennett T. McCallum, NBER and Carnegie Mellon University

Peter Klenow and **Andres Rodriguez**, University of Chicago, "The Neoclassical Revival in Growth Economics: Has It Gone Too Far?"

Discussants: Charles Jones, Stanford University, and N. Gregory Mankiw, NBER and Harvard University

Michael Gavin, Inter-American Development Bank, and **Roberto Perotti**, Columbia University, "Fiscal Policy in Latin America"

Discussants: Torsten Persson and Aaron Tornell, NBER and Harvard University

Martin S. Feldstein, NBER and Harvard University, and **Andrew Samwick**, NBER and Dartmouth College, "The Economics of Prefunding Social Security and Medicare Benefits"

Discussants: Rao Aiyagari, Federal Reserve Bank of Minneapolis, and Laurence J. Kotlikoff, NBER and Boston University

Christopher Carroll, NBER and Johns Hopkins University, and **Wendy Dunn**, Johns Hopkins University, "Unemployment Expectations, Jumping (S,s) Triggers, and Household Balance Sheets"

Discussants: Simon Gilchrist, Boston University, and Angus Deaton, NBER and Princeton University

The Neoclassical Synthesis of the 1960s was based on three sometimes conflicting principles of macroeconomics: that practical policy advice was an essential end; that short-run price stickiness was central to economic fluctuations; and that models should be based on optimization. Macroeconomics now is moving toward a New Neoclassical Synthesis, which **Goodfriend** and **King** describe. They find that the New Neoclassical Synthesis rationalizes an activist monetary policy: a simple system of inflation targets. Under this neutral monetary policy, real quantities evolve as suggested in the literature on real business cycles. The authors use the new synthesis to address several issues that must be resolved in order to make this inflation targeting regime practical, including: the response to oil shocks; the choice of price index; the design of a mandate; and the required structure of variations in short-term nominal interest rates when these are the monetary authority's instrument.

Rotemberg and **Woodford** consider a simple model of output, interest rate, and inflation determination in the United States, and use it to evaluate alternative rules by which the Fed may set interest rates. The model is derived from optimizing behavior under rational expectations, both on the part of the purchasers of goods (who choose quantities to purchase given the expected path of real interest rates) and on the part of the sellers of goods (who set prices on the basis of the expected evolution of demand). The authors find that the monetary policy rule that most reduces the variability of inflation (and is best on this account) requires highly variable interest rates, which in turn is possible only in the case of a high average inflation rate. But even a policy that minimizes the expected losses that are attributable to fluctuations subject to the constraint that interest rates be no more variable than under current policy would cause inflation to be stabilized considerably more and output to be stabilized considerably less than under the authors' estimates of current policy.

Using evidence on the variation in, and the returns to, schooling and experience across countries, **Klenow** and **Rodriguez** find that productivity differences are the dominant source of the large international dispersion in levels and growth rates of output per worker. Thus, although models that focus on physical and human capital accumulation are clearly important, research needs to be refocused toward explaining the causes of productivity differentials.

Gavin and **Perotti** study a dataset they constructed on fiscal policy in Latin America. They show that the movements in fiscal policy in the region differ significantly from those in industrialized countries. In partic-

ular, both government expenditure and taxes are significantly more procyclical — so that they rise together with the level of output — in Latin America. They also study the connection between fiscal policy and exchange rate regimes. They find no evidence that fixed exchange rate regimes impose more fiscal discipline, and some evidence that the reverse is true. Moreover, fiscal expansions in Latin America have been associated with subsequent exchange rate collapses.

Feldstein and **Samwick** study the economics of prefunding Social Security and Medicare benefits by increased savings in individual accounts. Because of the aging population, maintaining the existing relation of benefits to past earnings would require raising the current 12 percent payroll tax to 19 percent by the year 2030 if the current pay-as-you-go (PAYGO) system continues. In contrast, a funded system can deliver the same benefits with mandatory saving of less than 3 percent of payroll. The transition to this fully funded system could begin with a 2-percent-of-payroll rise in the combined value of the PAYGO tax and the mandatory saving that subsequently declines gradually, reaching the existing tax rate in 19 years and then falling sharply to less than 3 percent. The study examines the favorable impact on the capital stock and real disposable wage income, and discusses issues of risk and income distribution.

Carroll and **Dunn** attempt to make sense of the relationship between household balance sheets and consumer purchases. They find that the level of uncertainty about labor income, as measured by consumer's unemployment expectations, is correlated with all measures of consumer spending. Finally, they show that a runup in debt similar to that experienced in the late 1980s can make consumption more sensitive to the uncertainty of labor income. This provides a formal underpinning for the view that the buildup of debt in the 1980s may have played an important role in explaining the weakness of consumption in the last recession.

As in previous years, the papers and discussions presented at this conference will be published in a volume of the same title by the MIT Press. It is typically available in the fall; publication information will appear in a future issue of the NBER *Reporter*.

The Economics of Aging

The NBER's Program on Aging held its biannual conference, organized by Program Director David A. Wise of Harvard University, in late April this year. As in previous years, the papers and discussions referred to in this article will be published by the University of Chicago Press in an NBER conference volume; its availability will be announced in a later issue of the NBER *Reporter*. The program for this conference was:

James M. Poterba, NBER and MIT, **Steven F. Venti**, NBER and Dartmouth College, and **David A. Wise**, "Implications of Rising Personal Retirement Saving"

Ronald Lee, University of California, Berkeley, and **Shripad Tuljapurkar**, Mountain View Research, "Stochastic Forecasts for Social Security"

Discussant for both papers: Sylvester Schieber, Watson Wyatt & Company

John B. Shoven, NBER and Stanford University, and **David A. Wise**, "The Taxation of Pensions: A Shelter Can Become a Trap" (NBER Working Paper No. 5815)

Discussant: Alan J. Auerbach, NBER and University of California, Berkeley

Background Paper: **Poterba, Venti, and Wise**, "Personal Retirement Saving Programs and Asset Accumulation: Reconciling the Evidence" (NBER Working Paper No. 5599)

Discussion of behavioral notions of saving: David Laibson, NBER and Harvard University

Angus S. Deaton and **Christina Paxson**, NBER and Princeton University, "Health, Income, and Inequality over the Life Cycle"

David M. Cutler, NBER and Harvard University, and **Ellen Meara**, Harvard University, "The Medical Cost of the Young and Old: A Forty-Year Perspective"

Discussant for both papers: David Meltzer, NBER and University of Chicago

Alan Garber, Mark B. McClellan, and **Thomas Macurdy**, NBER and Stanford University, "Medicare Expenditures at the End of Life"

Discussant: David M. Cutler

Matthew J. Eichner, MIT, "The Impact of Interfamily Correlations on the Viability of Catastrophic Insurance"

Discussant: Thomas Kane, NBER and Harvard University

(Continued on next page)

Michael D. Hurd, NBER and Rand Corporation; **Daniel L. McFadden**, NBER and University of California, Berkeley; and **Harish Chand, Li Gan, Angela Merrill**, and **Michael Roberts**, all of University of California, Berkeley, "Consumption and Savings Balances of the Elderly: Experimental Evidence on Survey Response Bias"

Discussant: James Smith, Rand Corporation

Kathleen M. McGarry, NBER and University of California, Los Angeles, and **Andrew Davenport**, University of California, Los Angeles, "Pensions and the Distribution of Wealth"

Discussant: Robert Willis, University of Michigan

Mark B. McClellan, "Health Events, Health Insurance, and Labor Supply: Evidence from the Health and Retirement Survey"

Discussant: Michael D. Hurd

Retirement saving accounts, particularly employer-provided 401(k) plans, have expanded rapidly in the last decade. More than 50 percent of workers are currently eligible for these plans, and over 70 percent of eligibles participate in these plans. The substantial and ongoing accumulation of assets in these plans has the potential to significantly alter the financial preparations for retirement by future retirees. **Poterba, Venti,** and **Wise** use data on current age-specific patterns of 401(k) participation, in conjunction with Social Security earnings records that provide detailed information on age-earnings profiles over the lifetime, to project the 401(k) balances of future retirees. The results, which are illustrated by reference to individuals who were 27 and 37 in 1996, demonstrate the growing importance of 401(k) saving. The projected mean 401(k) balance at retirement for a current 37-year old is $91,600 (in 1992 dollars), assuming that the 401(k) plan assets are invested half in stocks and half in bonds. For a current 27-year old, the projected balance is $125,500. These results support the growing importance of personal saving through retirement saving accounts in contributing to financial well-being in old age.

Lee and **Tuljapurkar** develop forecasts of the Social Security reserve fund, payroll tax rates, and other quantities of interest. They also model the real rate of interest on government securities, and a measure of the rate of labor productivity growth, purged of demographic effects. They compare their results to Social Security projections, assess the level and relative importance of various sources of error, present probability distributions for balanced budget payroll tax rates up to the year 2070, and provide distributions of the actuarial balance. (This was a work in progress, and all results were preliminary at the time of the conference.)

Shoven and **Wise** show that pension distributions can face marginal tax rates as high as 61.5 percent; pension assets passing through an estate can face virtually confiscatory marginal tax rates between 92 and 99 percent. This is not limited to the rich; in fact, people of modest incomes who participate in a pension plan over a long career may face such rates.

The background paper by **Poterba, Venti,** and **Wise** summarizes their research on the effect of IRA and 401(k) contributions on net personal saving. They conclude that contributions to both IRA and 401(k) plans largely represent new saving.

Deaton and **Paxson** use the National Health Interview Survey from 1983 to 1994 to examine patterns of inequality over the life cycle for two health-related indicators: self-reported health status (SRHS) and body-mass index (BMI). As with economic measures, these health measures become more widely dispersed with age. The rate of dispersion with age of BMI, but not SRHS, is more rapid for women than for men. BMI and SRHS are more variable among young women than among young men, possibly reflecting pregnancy. Health status rises with income: the correlation is lowest for the young, increases until age 50 to 60, and then diminishes. BMI is not correlated with income for men, but is negatively correlated with income among women; the correlation is highest in middle age. Blacks consistently report lower health status than do whites; some fraction of this difference can be attributed to the lower incomes of blacks. Less of the difference is explained by income among women than among men, an effect that is even more pronounced for BMI.

Why has medical care become so expensive over time, and what has been its value to society? **Cutler** and **Meara** use surveys of individual annual spending on all medical services to begin to address these questions. They show that from 1953 to 1987, medical spending increased disproportionately for infants (those under a year old) and the elderly (those 65 and older). Much of the spending growth for these groups was related to treatment of premature infants and of elderly with circulatory disorders or cancer. Based on aggregate data, the gains in "health outcomes" are greatest where spending growth has been most concentrated, Cutler and Meara find.

Garber and his coauthors analyze claims for a random sample of all

elderly Medicare beneficiaries who died during 1986–90. They find that the "excess" Medicare costs for decedents tend to diminish with advancing age. A very small number of decedents have no Medicare claims in the year before death. For the most part, the conditions diagnosed in Medicare decedents are common and not necessarily fatal.

Major risk insurance, like any other coverage, is supposed to protect against large losses. But if expenditures are correlated within families, then the consequences of having large deductibles might be more serious than an analysis of individuals' expenditures would suggest. **Eichner** evaluates the consequences of such correlations under a major risk insurance scheme. He shows that in the ranges relevant to a consideration of catastrophic health coverage, interfamily correlation in expenditures has relatively minor consequences.

"Anchoring" is a psychological response to information disclosed in the course of a subject's being asked about some quantity. In a wide variety of situations, the information (or "anchor") changes the subjects' responses systematically, shifting them toward the anchor. The magnitude of this effect depends on the amount of uncertainty that respondents have about the topic. **Hurd** and his coauthors study the effects of anchoring on reports of consumption and savings accounts. They find the effects to be about what psychologists would predict: the distributions shift toward the anchor; anchoring is quantitatively important; and the magnitude seems to vary with expectations about respondent uncertainty. The elasticity of the estimated median of the distribution of consumption is about 20 percent, and about 10 percent for savings accounts, with respect to the anchor. The authors conclude that anchoring may be a quantitative estimate of the amount of uncertainty in a population.

McGarry and **Davenport** focus on one source of financial support for the elderly, pensions. Using data from the Health and Retirement Survey, they analyze the distribution of pension wealth paying particular attention to differences in pension wealth by sex and race. They find that men are approximately 50 percent more likely to have pensions than are women. More surprisingly, even conditional on having a pension, men have twice as much average pension wealth as women: married men have average pension wealth of $140,300 and married women just $72,000. Differences by race are less strong than differences by sex, but still large. Finally, the financial inequality between single men and single women is increased with the addition to net worth (non-Social Security, non-pension wealth) of pension wealth, while the difference between whites and nonwhite is lessened.

McClellan considers the consequences of various illnesses and accidents for labor supply and health insurance coverage of three groups of older Americans: males and females within couples, and single females. He finds that these health problems are more prevalent in individuals with lower education, incomes, and wealth, and in individuals with other prior health conditions. These relationships persist after McClellan adjusts his sample for age. Major "health events" have particularly large effects on retirement decisions, and these effects go well beyond the consequences of the events for functional status. The occurrence of chronic health problems has a milder, although significant, effect on rates of exit of the labor force beyond the association with declining function alone. In contrast, accidents are not associated with additional departures from the labor force. Health events also have substantial effects on health insurance coverage, especially for males. They are associated with small increases in the probability of having health insurance, despite the fact that they tend to lead to reductions in private insurance coverage, particularly for males and for individuals without retiree insurance coverage. These reductions in private insurance coverage are offset by increased coverage through government insurance programs, primarily Medicare, as a result of qualification through the Disability Insurance system.

URC Conference on Innovation and Accumulation

The spring 1997 NBER Universities Research Conference took place on May 2 and 3 and was organized by NBER Faculty Research Fellow Jeffrey R. Campbell of the University of Rochester and NBER Research Associate Paul M. Romer of Stanford University. The conference theme was "Innovation and Accumulation in Firms, Industries, and Nations." The program was:

Andrew Toole, Lathrop R. Christensen Associates, "The Impact of Federally Funded Basic Research on Industrial Innovation: Evidence from the Pharmaceutical Industry"
Discussant: Frank R. Lichtenberg, NBER and Columbia University

Michael Kremer, NBER and MIT, "A Mechanism for Encouraging Innovation"
Discussant: Phil Haile, University of Wisconsin

Suzi Kerr, University of Maryland, College Park, "Timing of Technology Adoption in a Tradable Permit Market: Empirical Evidence from the U.S. Lead Phasedown"
Discussant: Matthew White, Stanford University

Eric A. Hanushek, NBER and University of Rochester, and **Dongwook Kim**, "Schooling, Labor Force Quality, and the Growth of Nations"
Discussant: Julie Berry Cullen, MIT

Shane Greenstein, NBER and University of Illinois, and **Pablo Spiller**, University of California, Berkeley, "Estimating the Welfare Effects of Digital Infrastructure"
Discussant: Mehmet Yorukoglu, University of Chicago

Anita N. Srivastava, Columbia University, "Impact of Trade Liberalization on Domestic Output, Technical Efficiency, and Profitability"
Discussant: Matthew Slaughter, Dartmouth College

Andrew Atkeson and **Patrick Kehoe**, NBER and University of Pennsylvania, "Industry Evolution and Transition: A Neoclassical Benchmark"
Discussant: Richard Epstein, Columbia University

Douglas Gollin, Williams College, "Nobody's Business but my Own: Self-Employment and Small Enterprise in Economic Development"
Discussant: Boyan Jovanovic, NBER and New York University

Marco Da Rin, IGIER, and **Thomas Hellmann**, Stanford University, "Banks as Catalysts for Industrialization"
Discussant: Ross Levine, University of Virginia

Toole explores the direct productivity impact of U.S. government-funded basic biomedical research on the discovery of new chemical entities in the pharmaceutical industry. He finds that public basic research is a significant contributing factor, which influences pharmaceutical innovation roughly 17 years prior to Food and Drug Administration approval and increases the effectiveness of industry expenditure on R and D. His study suggests that a decline in the real growth rate of overall federal funding for basic research may lead to lower productivity in other industries that rely on it, fields traditionally supported by the U.S. government.

Kremer proposes a mechanism under which the private value of patents would be determined in an auction. Governments then would offer to buy out patents at this private value, with a fixed markup that would roughly cover the difference between the private and social values of inventions. Most patents would be placed in the public domain, but in order to provide auction participants with an incentive to honestly reveal their valuations, a few patents would be sold to the highest bidder. The system is well-suited to the pharmaceutical industry, Kremer concludes.

Kerr uses a unique dataset from the United States lead phasedown which began in 1983. She estimates the investment response to the regulation of lead in gasoline by 154 refineries over 11 years. The regulation took the form of a permit market followed by a performance standard. In addition, using a subsample of 78 refineries, she considers the relationship between trading in the permit market and the decision to adopt "isomerization capacity" as a response to the severity of regulation. She also estimates how the adoption decision depends on the characteristics of each refinery. These characteristics affect their costs of adjustment and their valuation of the new technology.

Hanushek and **Kim** analyze the importance of the quality of the labor force, as measured by cognitive skills in mathematics and science. By linking international test scores across countries, they develop a direct measure of quality, and this proves to have a strong influence on growth. One standard deviation in measured cognitive skills translates into a one percent difference in average annual real growth rates — an effect much stronger than changes in average years of schooling, which is the more standard measure of labor force skills. Cognitive skill differences are not, however, the same as differences

in resources devoted to schools. Thus, the importance of quality implies a policy dilemma, because estimates indicate that simple resource approaches to improving cognitive skills appear generally ineffective.

Much economic policy presumes that investment in frontier digital technologies yields high economic returns. **Greenstein** and **Spiller** examine the magnitude of returns associated with investment in fiber optic cable and other digital technology in local telephone companies. Using a model that accounts for differences across the country in regulatory environments and demand conditions, they show that more and better digital technology expands the demand for telephone services. Their estimates imply that investment in better technology is responsible for a substantial fraction of recent growth in consumer use of, and business revenue from, telephone service.

It has long been believed that intensified international competition forces domestic firms to behave more competitively and improve productivity. **Srivastava** examines the impact of trade policy on heterogeneous firms' behavior in imperfectly competitive markets to make inferences about the output adjustment of firms within industries and the consequent changes in technical efficiency and profitability. Her model predicts that large firms are more likely to expand output (and small firms contract), and that small firms undergo greater percentage adjustment in output (as compared to large firms). Using a dataset spanning the course of the dramatic trade reforms undertaken in India in 1991, she finds a shift in market share towards larger, low marginal cost firms, and thus a rationalization in the industry structure. Her results also suggest that increases in import penetration have a significant restraining effect on price-cost margins in the Indian manufacturing industries.

Recently, a large number of countries have undertaken major reforms that have led to a large increase in the number of new enterprises. After these reforms, however, it has taken a number of years before output and productivity have begun to grow. **Atkeson** and **Kehoe** ask what the path of transition looks like in a reforming economy for which the process governing the growth of new enterprises looks like it does in the United States, a well-functioning market economy. They find that it takes 5–7 years until measured output and productivity begin to grow rapidly following reform. This suggests that, even if all other aspects of the economy are perfect, the transition following economy-wide reforms should take a substantial amount of time.

Gollin investigates cross-country patterns of self employment and small enterprise. It appears that relative factor prices account for most of the differences in establishment size and self employment. Moreover, relatively small exogenous changes in productivity can have relatively large effects on aggregate output, since productivity increases are amplified by increasing concentration of entrepreneurial activities among high-skill managers. This suggests that establishment-level models may offer valuable insights into growth as well as into the changing structure of production and employment.

Da Rin and **Hellmann** examine the role of banks as "catalysts" for industrialization. When there are limits to contracting, and complementarities exist among investments of different firms, banks can act as catalysts provided that: they are sufficiently large to mobilize a critical mass of firms; and they possess sufficient market power to make profits from coordination. The costs of coordination depend critically on the contracting instruments available to banks. In particular, allowing banks to hold equity reduces and sometimes eliminates the cost of coordination. Early industrialization in Belgium, Germany, and Italy in the late 19th century occurred quickly because of the active involvement of large and powerful universal banks which engaged in both debt and equity finance.

Frontiers in Health Policy Research

Nearly 100 representatives of foundations, government agencies, the U.S. Congress, and the corporate sector gathered in Washington on June 5 for the NBER's first annual conference on "Frontiers in Health Policy Research." Alan M. Garber, director of the NBER's Health Care Program and a professor at Stanford University, chose the following NBER research studies for discussion:

David M. Cutler, NBER and Harvard University, and **Louise Sheiner**, Council of Economic Advisers, "Managed Care and the Growth of Medical Expenditures"

Alan M. Garber, Mark B. McClellan, and **Thomas E. Macurdy**, NBER and Stanford University, "Medicare Beneficiaries with Persistently High Expenditures: Identification and Policy Implications"

David M. Cutler, and **Richard J. Zeckhauser**, NBER and Harvard University, "Adverse Selection in Health Insurance"

Ernst R. Berndt, NBER and MIT, **Iain M. Cockburn**, NBER and University of British Columbia, **Douglas L. Cocks**, Eli Lilly and Company, **Arnold Epstein, M.D.**, Harvard Medical School, and **Zvi Griliches**, NBER and Harvard University, "Is Drug Price Inflation Different for the Elderly?"

Laurence C. Baker, NBER and Stanford University, and **Sharmila Shankarkumar**, "Managed Care Spillovers in Medicare, 1990–94"

Cutler and **Sheiner** examine the relation between HMO enrollment and medical spending. They find that managed care reduces the growth of hospital costs. While some of this effect is offset by increased spending on physicians, there is generally a significant reduction in total spending as well. Second, preliminary evidence shows that managed care has reduced the diffusion of medical technologies. States with high enrollment in managed care were technology leaders in the early 1980s; by the early 1990s, those states were only average in their acquisition of new technologies. This suggests that managed care may have a significant effect on the long-run growth of medical costs.

Garber and his coauthors present information about the distribution of Medicare expenditures among beneficiaries in specific years, along with new evidence on the extent to which Medicare payments for the care of individual beneficiaries persist over long time periods. Their analysis is based on a longitudinal population of Medicare enrollees from 1987 to 1995. They find that high-cost users accounted for a disproportionate share of the growth of Medicare Part A (hospital) payments during this period, but that changes in Medicare Part B payments were driven largely by increases in the number of beneficiaries using covered services. Few beneficiaries are in the highest-cost categories for multiple years; the high mortality rates of individuals who use medical services heavily, whether the expenditures occur in one year or repeatedly, limits the extent of expenditure persistence. Even among survivors, it is unusual to remain in a high-cost category for multiple years. Nevertheless, individuals with high expenditures in one year are likely to have high expenditures in other years, and expenditures are highly skewed even over a period of nine years.

Individual choice over health insurance policies may result in risk-based sorting across plans. The resulting adverse selection will induce three types of losses: efficiency losses from individuals being allocated to the wrong plans; risk sharing losses; and losses from insurers distorting their policy options to improve their mix of insureds. **Cutler** and **Zeckhauser** discuss the potential for these losses and present empirical evidence on adverse selection in two groups of employees: Harvard University; and the Group Insurance Commission (GIC) of Massachusetts (serving state and local employees). In both groups, adverse selection is severe. At Harvard, the university's decision to contribute an equal amount to all insurance plans led to the disappearance of the most generous policy within 3 years. At the GIC, adverse selection has been contained by managing the most generous policy very tightly. A combination of prospective or retrospective risk adjustment, coupled with reinsurance for high cost cases, seems promising as a way to provide appropriate incentives for enrollees and to reduce losses from adverse selection.

Berndt and his co-authors analyze changes in the price of pharmaceutical products destined for consumption by Americans aged 65 or older: the elderly have quite different patterns of drug consumption from the under-65 population. At the first point in the distribution chain — sales by manufacturers to wholesalers — the authors find essentially no age-specific difference in the rate of inflation between 1990 and 1996. Moving to the next level of the distribution chain — sales from wholesalers to drugstores — they find some small but significant differences in the rates of inflation experienced by elderly

and non-elderly consumers. For antidepressants, the authors' price index for the elderly grows less quickly than that for the non-elderly: 3.37 percent annual average growth rate between 1990 and 1996 as opposed to 4.17 percent for the under 65 age group. They attribute this difference to greater use by the elderly of older and generic drugs, and slower growth in their use of newer (and more expensive) products. By contrast, their price index for antibiotic drugs destined for use by the elderly grows at a faster rate than that for the non-elderly: 2.67 percent versus 2.34 percent between 1990 and 1996, with the biggest differences occurring after 1993; the elderly price index growing at 2.2 percent per year compared to 0.41 percent for the non-elderly. They attribute this to the disproportionate use by the elderly of newer (and patented) antibiotics, for which bacterial resistance has not yet developed, making them more effective for treatment of life-threatening infections, such as pneumonia. They find no difference between elderly and non-elderly inflation rates for a third class of drugs, calcium channel blockers. Preliminary investigation of the final point in the distribution chain — sales from drugstores to customers — suggests that, at least for antidepressants, younger consumers have experienced somewhat slower growth in prices, reflecting the dramatic increase in third party payment for prescriptions and a larger impact of managed care providers on the prices of branded products.

Baker and his coauthor investigate the relationship between HMO market share and Medicare expenditures. They find that increases in Medicare HMO market share are associated with increases in Part A expenditures. This is consistent with the view that Medicare HMO enrollment is subject to substantial selection bias, and with the view that spillover effects are small. However, increases in system-wide HMO market share (which includes both Medicare and non-Medicare enrollment) are associated with declines in expenditures, which suggests that managed care activity generally may have broad effects on health care markets. For Part B, increases in both Medicare and system-wide market share are associated with small declines in expenditures, suggesting that there may be some spillover effects for Part B expenditures associated with Medicare HMO market share. For Medicare policy discussions, these findings imply that previous results that seemed to show the existence of large spillover effects associated with increases in Medicare HMO market share, as opposed to system-wide managed care activity, overstated the magnitude of actual Medicare spillovers.

These papers will be published by the MIT Press in a paperback volume, similar to the NBER's *Tax Policy and the Economy* series. Its availability will be announced in a future issue of the NBER *Reporter*.

Fiscal Institutions And Fiscal Performance

On June 27-29 the NBER and the Zentrum fur Europpische Integrationsforschung (Center for European Integration) at the University of Bonn co-sponsored a conference on "Fiscal Institutions and Fiscal Performance." The program, which was organized by James M. Poterba of NBER (and MIT) and Jurgen von Hagen of the University of Bonn, included thirteen papers addressing a range of questions relating to the economic effects of fiscal institutions. The conference was partly motivated by current debate surrounding the development of the European Monetary Union (EMU). One of the requirements that EMU members must meet is a limitation on the central government's deficit, a key issue is how such an anti-deficit rule would practically affect fiscal policy in EMU member nations.

The conference presentations took three forms: new conceptual insights on the political economy of budget rules; new empirical evidence on the effect of these rules; and case studies on the development of budgetary institutions in various nations. Some researchers presented new theoretical models of the political incentives for government deficits, or of how fiscal institutions might affect fiscal outcomes. Other participants in the meeting reported new empirical findings on the links among budgeting rules, political circumstances, and fiscal outcomes in Europe, North and South America, and Australia. Finally, several research papers presented case studies of the effects of budget rules in particular countries, notably Australia, Canada, and Japan, with emphasis on the link between these rules and fiscal deficits.

The papers presented at the conference and the discussants who commented on these papers were:

Alberto F. Alesina, NBER and Harvard University, and **Roberto Perotti**, Columbia University, "Budget Deficits and Budget Institutions"

Discussant: Robert P. Inman, NBER and University of Pennsylvania

Continued on next page

Oved Yosha, Tel Aviv University, and **Bent Sorensen**, Brown University, "International Risk Sharing and European Monetary Unification"

Discussant: Manfred Neumann, University of Bonn

Roberto Perotti, and **Yianos Kontopoulos**, Merrill Lynch, "Fragmented Fiscal Policy"

Discussant: Gian Maria Milesi-Ferretti, IMF

James M. Poterba, and **Kim Rueben**, Public Policy Institute of California, "State Fiscal Institutions and the U.S. Municipal Bond Market"

Discussant: Anne Case, NBER and Princeton

Andres Velasco, NBER and New York University, "A Model of Endogenous Fiscal Deficits and Delayed Fiscal Reforms"

Discussant: Henning Bohn, University of California, Santa Barbara

Thomas Courchene, Queens University, "Subnational Budgetary and Stabilization Policies in Canada and Australia"

Discussant: Bernhard Spalin, University of Frankfurt

Ernesto Stein, Ernesto Talvi, and **Alejandro Grisanti**, Inter-American Development Bank, "Institutional Arrangements and Fiscal Performance: The Latin American Experience"

Discussant: Andrew Samwick, NBER and Dartmouth

Mariano Tommasi, Universidad de San Andres, **Mark Jones**, Michigan State University, and **Pablo Sanguinetti**, Universidad T. Di Tella, "Politics, Institutions, and Fiscal Performance in the Argentine Provinces"

Discussants: Jorge Braga de Macedo, NBER and Universidade Nova de Lisboa, and Arik Levinson, NBER and University of Wisconsin

Eduardo Campos and **Sanjay Pradhan**, World Bank, "Budgetary Institutions and the Levels of Expenditure Outcomes in Australia and New Zealand"

Discussant: Lars Feld, University of St. Gallen

Gebhard Kirchgassner, University of St. Gallen, and **Lars Feld**, "Public Debt and Budgetary Procedures: Top Down or Bottom Up? Some Evidence from Swiss Municipalities"

Discussant: Mark Crain, George Mason University

Juergen von Hagen, and **Mark Hallerberg**, Georgia Institute of Technology, "Electoral Institutions, Cabinet Negotiations, and Budget Deficits in the European Union"

Discussant: Jorn Rattso, Norwegian University of Science and Technology

Maurice Wright, University of Manchester, "Coping with Fiscal Stress: Illusion and Reality in Central Government Budgeting in Japan, the UK, and Canada, 1974–97"

Discussant: Roland Sturm, University of Erlangen

Jacob de Haan and **Bjorn Volkerink**, University of Groningen, and **Wim Moessen**, Catholic University of Leuven, "Budgetary Procedures: Aspects and Changes, New Evidence for Some European Countries"

Discussant: Kim Rueben

Alesina and **Perotti** survey existing theoretical and empirical literature on the determinants of fiscal policy, and conclude that budget procedures and budget institutions influence budget outcomes; these institutions include both procedural rules and balanced budget laws. They critically assess the theoretical contributions in this area and suggest several open and unresolved issues. They also examine the empirical evidence drawn from studies on samples of OECD countries, Latin America, and U.S. states.

Sorenson and **Yosha** explore risksharing patterns in European Community countries, OECD nations, and U.S. states. They find that for OECD countries as well as for EC countries, about 40 percent of shocks to GDP are smoothed at the one-year frequency, with about half of that smoothing achieved through national government budget deficits and half by corporate saving. At the three year differencing frequency, only about one quarter of the shocks to GDP are smoothed, with all of that smoothing achieved via government lending and borrowing. These findings have implications for the design of fiscal unions, and the degree to which risk-sharing is feasible in such unions.

Perotti explores the effects of political factors, procedural factors (such as the budget process), and ideology in shaping the fiscal outcomes for OECD countries throughout the 1960–95 period. His paper begins with a theoretical model of how fragmentation, the degree to which individual participants in the fiscal policy process internalize the costs of any dollar of aggregate expenditures, affects the budget process. Fragmentation can arise either when there are many actors in the budget process, or when the process in which these actors interact diffuses power. The empirical analysis suggests that fragmentation, particularly when measured by cabinet size (the number of participants in the deliberations that ultimately determine the budget), has an important effect on fiscal policy outcomes. It also indicates that ideology, as measured by the position of the ruling party on a liberal/conservative spectrum, is a

substantively important determinant of fiscal policy.

Poterba and **Rueben** present new evidence on the effect of state fiscal institutions, particularly balanced budget rules and restrictions on state debt issuance, on the yields on state general obligation bonds in the United States. They examine a longer sample period, and a broader range of fiscal institutions, than previous studies of how fiscal rules affect the bond market. The results suggest that states with tighter anti-deficit rules, and states with more restrictive provisions on the authority of state governments to issue debt, face lower borrowing costs. The interest rate differential between a state with a very strict anti-deficit constitution and one with a lax constitution is between 10 and 15 basis points. States with binding revenue limitation measures tend to face higher borrowing rates by approximately the same amount. These results provide evidence that bond market participants consider fiscal institutions in assessing the risk characteristics of tax-exempt bonds, and further support the view that fiscal institutions have real effects on fiscal outcomes.

Velasco develops a political-economic model of fiscal policy in which government resources are a "common property" out of which interest groups can finance expenditures on their preferred items. This set-up has striking macroeconomic implications. First, fiscal deficits and debt accumulation occur even when there are no reasons for intertemporal smoothing. Second, those deficits can be eliminated through a fiscal reform, but such a reform may only take place after a delay during which government debt is built up.

Courchene focuses on the relationship between institutional structures and subnational fiscal/budgetary processes in Canada and Australia. He describes the institutional arrangements that have led the Australian government to be more centralized and egalitarian than its Canadian counterpart. These arrangements have also made the Canadian provinces more fiscally autonomous than the Australian states. He then focuses on the implications of government structure for the magnitude and structure of intergovernmental grants, for the degree of subnational fiscal stabilization policy, for subnational borrowing autonomy, and for the extent of economic and budgetary coordination between the national and subnational governments. He also considers the recent shift toward "hard budget constraints" in the Canadian provinces, and presents some information on the credit ratings of Australian states and Canadian provinces.

Stein, Talvi, and **Grisanti** explore the links between electoral systems, budget institutions, and fiscal performance in Latin America. They consider four measures of fiscal performance, namely, the level of government expenditures, the size of the deficit and public debt, and the response of fiscal policy to business cycle fluctuations. They find that electoral systems characterized by a high degree of proportionality (that is, proportional representation) tend to have larger governments, larger deficits, and a more procyclical response to the business cycle. They also find that more transparent and centralized budgetary procedures lead to lower deficits and debt. Furthermore, strengthening budget procedures for the central government can weaken the effect of proportional representation on fiscal policy outcomes.

Tommasi and his coauthors study the behavior of provincial public finances since Argentina's return to democracy in 1983. They use a "common pool" model of budget deficits to analyze fiscal policies in different provinces. They find that the tax-sharing mechanism, "coparticipocion fiscal," by which the national government devolves taxes to the provinces, is an important determinant of provincial fiscal behavior. Budget procedures and other institutions are also crucial for fiscal performance. Party affiliation of the provincial governors in relation to most of the national executive is a key factor in ameliorating or exacerbating the incentive for provinces to "free ride" on the common pool.

Campos and **Pradhan** extend previous research suggesting that key budgetary institutions are important in controlling aggregate spending. They look beyond the issue of fiscal discipline, and argue that aggregate fiscal discipline is necessarily linked to the issues of allocative and technical efficiency. Hence, in identifying the impact of budgetary institutions, they suggest taking a broader and more systemic perspective. Based on the reform experiences of New Zealand and Australia, they argue that these linkages embody transactions costs that could lead one country to adopt one set of institutions, and another a different (though overlapping) set. Specifically, they show that New Zealand sought to control aggregate spending by focusing on improving technical efficiency, while Australia sought to do so by introducing mechanisms to facilitate strategic prioritization and enhance allocative efficiency.

Feld and **Kirchgassner** investigate the impact of referendum approval of budget deficits, a form of direct democracy, on the level of public debt in a cross section of the 131 largest Swiss municipalities. They develop a new database on fiscal institutions and fiscal outcomes in Swiss municipalities, and use it to explore an important question in the link between institutional structure and fiscal outcomes. Their results

suggest that municipalities with direct democracy provisions for the approval of new debt issues exhibit lower levels of debt per capita than those municipalities without such provisions.

Hallerberg and **von Hagen** argue that electoral institutions have an important effect in restricting the type of budgetary institutions at the government's disposal. In states where one-party governments are the norm, spending ministers can delegate agenda-setting powers. These states usually have plurality electoral systems. In contrast, in multi-party governments that are common in proportional representation systems, the institutional solution to the "common pool" problem is a commitment to negotiated targets. The empirical section of this paper presents evidence from the European Union states for 1980–94.

Wright focuses on how the Japanese government has coped with conditions of almost continuous fiscal stress, including budget deficits, accumulated debt, and increasing costs of debt servicing, during the last two and one half decades. He makes brief comparisons with Canada and the United Kingdom during this period. He argues that policy choices were largely unsuccessful in achieving their fiscal objectives. An illusion of discipline and control was created through manipulation of the budgetary system and the exploitation of the rules of the game on the part of budget makers. In reality, the central government was either unable or unwilling to control the growth of government spending over this period.

de Haan and his coauthors address two potential problems in the empirical literature on the link between procedures that lead to the formulation, approval, and implementation of the budget, and fiscal policy outcomes. First, they consider which features of budget institutions are most important in influencing fiscal policy outcomes, using data from nations in the European Union. The position of the finance minister in the budget process, and the presence or absence of binding constraints, appear most important in determining the level of budget deficits. In addition, they consider the evolution of budget rules in some countries, to explore the causes of procedural changes. In one case, Sweden, changes in the budgetary process were precipitated by an acute financial crisis. In several other nations that are the subjects of case studies, it is more difficult to identify the motivation for reform.

These papers and discussions will be published in an NBER conference volume by the University of Chicago Press. Its availability will be announced in a future issue of the NBER *Reporter*.

This article was prepared in large part by conference organizer James M. Poterba.

New Market Microstructure Group Meets

On July 17th, the NBER's newly launched Market Microstructure Research Group, organized by Andrew Lo of MIT and NBER, held its first meeting in Cambridge. The seeds of this new research group were planted three years ago at the NBER's Conference on the Industrial Organization and Regulation of the Securities Industry which engaged economists, legal scholars, regulators, and professionals from the securities industry in lively debate and discussion. This conference confirmed a strong and growing interest in economic, legal, and policy issues surrounding the securities industry, and Lo formed the group to pursue this interest.

The meeting included six papers and a luncheon speaker, Commissioner Steven Wallman of the U.S. Securities and Exchange Commission (SEC). Commissioner Wallman described some of the inner workings of the SEC, including some of the recent SEC rule changes that affect stock market price increments, and he exhorted economists to take a more active role in shaping the SEC's rulemaking activities. In particular, he encouraged economists to respond to the SEC's "concept releases" and assured audience members that such responses would be heard at the SEC.

The following papers also were discussed:

Robert Battalio, University of Notre Dame; **Jason Greene**, Georgia State University; and **Robert Jennings**, Indiana University, "Order Flow, Trade Quality, and Liquidity Costs: Merrill Lynch's Decision to Cease Making Markets on the Regional Stock Exchanges." Discussant: James J. Angel, Georgetown University.

Bruno Biais, University of Toulouse; **Thierry Foucalt**, Pompeu Fabra University, Barcelona; and **Francoise Salanie**, INRA, Toulouse, "Implicit Collusion on Wide Spreads." Discussant: Larry Glosten, Columbia University.

Stephen Foerster and **G. Andrew Karolyi**, University of Western Ontario, "The Effects of Market Segmentation and Illiquidity on

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Asset Prices: Evidence from Foreign Stocks Listing in the U.S."

Discussant: Ananth Madhavan, University of Southern California

Takatoshi Ito, NBER and Hitotsubashi University; **Richard K. Lyons**, NBER and University of California, Berkeley; and **Michael T. Melvin**, Arizona State University, "Is There Private Information in the FX Market? The Tokyo Experiment," NBER Working Paper No. 5936

See "Japan Working Group Meets" in the Bureau News section of this issue for a description of this paper.

Discussant: Martin Evans, Georgetown University

Dimitri Vayanos, Stanford University, "Strategic Trading in a Dynamic Noisy Market"

Discussant: Matthew Spiegel, University of California at Berkeley

Erik R. Sirri, Lois E. Lightfoot, Peter G. Martin, and **Mark A. Peterson**, all of the U.S. Securities and Exchange Commission, "Preferencing and Market Quality on U.S. Exchanges"

Discussant: Robert A. Wood, University of Memphis

Battalio et al. identify a natural experiment to test whether order flow across trading venues affects the cost of providing liquidity by affecting the costs of marketmaking. In October 1995, Merrill Lynch announced that it would cease routinely routing small retail orders for NYSE-listed securities to affiliated specialists on regional stock exchanges. Their action is associated with substantial changes in market share across trading venues: the NYSE gains share at the expense of the affected regionals. The authors find that the average quoted spread does not decrease after order flow is redirected, though. However, execution costs in the affected securities decrease, supporting the claim that Merrill captures better prices for its customers in New York.

Biais et al. ask whether price competition among risk-averse marketmakers leaves room for implicit collusive behavior. They compare the spread and risk-sharing efficiency that arise in several market structures which differ in terms of the priority rule followed in the case of ties and the type of schedules that marketmakers may use (that is, general schedules, linear schedules, or limit orders). In general, competitive pricing does not arise in equilibrium, and there is a conflict between risksharing efficiency and the tightness of the spread. This conflict can be mitigated by an appropriate design for market structure. The limit order market is the only structure in which the competitive equilibrium is the unique equilibrium.

Foerster and **Karolyi** document the effect on share value of non-U.S. firms listing on U.S. exchanges. Their sample consists of over 150 firms from 11 countries that listed their shares for the first time in the United States as ordinary listings or as American Depositary Receipts (ADRS) from 1976 to 1992. These stocks earned a significant average excess return of 0.38 percent per week during the year before listing, an additional 1.20 percent during the listing week, but incurred a significant average loss of 0.27 percent per week during the year following listing. Also, local market risk exposure of these stocks decreases with the listing while global market risk exposure does not change. The pattern in abnormal returns and global risk exposure is significantly related to an increase in the shareholder base and to the exchange on which the shares are listed.

Vayanos models a financial market with a large trader who in each period receives a privately observed stock endowment, and trades with competitive marketmakers in order to share dividend risk. When the time between trades diminishes to zero, the trading process consists of two phases. During the first very short phase, the large trader sells a fraction of his endowment and is identified by the marketmakers. Then during the second longer phase, he completes his trades.

Sirri and his coauthors analyze the quality of retail order executions on the primary and the regional U.S. equity exchanges. Brokers have an obligation to provide "best execution" for customers' orders and must route orders received to venues that satisfy this obligation. Differing market structures and pricing practices among venues create an incentive for brokers to include other factors in addition to "best execution" in their routing decision. The authors use a matched sample of retail market and limit orders on the New York, Boston, Chicago, Cincinnati, Philadelphia, and the Pacific Stock Exchanges to assess the variation of execution quality and examine to what extent orders routed to various exchanges are consistent with brokers' fiduciary duties.

Bureau News

Kremer Wins MacArthur Grant

Michael Kremer, an NBER Faculty Research Fellow in the Economic Fluctuations and Growth Program, won a MacArthur Fellowship of $215,000 in June. These awards, sometimes called "genius grants," come with "no strings attached." Kremer, also an associate professor of economics at MIT, expects to spend his award on research, possibly on health care and education in developing countries.

Kremer received his BA and Ph.D. in economics from Harvard University. He has been affiliated with the NBER since 1993.

International Trade and Investment

The NBER's Program on International Trade and Investment, directed by Robert C. Feenstra of NBER and University of California, Davis, held its spring meeting in Cambridge on April 4–5. The discussion centered on the following papers and topics:

Jonathan Eaton and **Samuel Kortum**, NBER and Boston University, "Technology and Bilateral Trade"

Robert C. Feenstra and **Gordon H. Hanson**, NBER and University of Texas, "Productivity Measurement and the Impact of Trade and Technology on Wages: Estimates for the United States, 1972–90"

James Harrigan, Federal Reserve Bank of New York, and **Rita A. Balaban**, University of Pittsburgh, "U.S. Wages in General Equilibrium: Estimating the Effects of Trade, Technology, and Factor Supplies, 1964–91"

Alessandra Casella, NBER and Columbia University, and **James E. Rauch**, NBER and University of California, San Diego, "Anonymous Market and Group Ties in International Trade"

Donald R. Davis, NBER and Harvard University, "The Home Market and Economic Geography With Globalization Be Industrialize Small Countries"

Research Plans Focusing on the United States: **J. David Richardson**, NBER and Syracuse University; **Matthew J. Slaughter**, NBER and Dartmouth College; **Linda S. Goldberg** and **Joseph Tracy**, Federal Reserve Bank of New York; **Lori Kletzer**, University of California, Santa Cruz; **Andrew Bernard**, MIT, and **Bradford Jensen**, Carnegie Mellon University; Research Plans Focusing on Global Impacts: **Robert C. Feenstra**, **Gordon H. Hanson**, and **James Harrigan**; **Robert Z. Lawrence**, NBER and Harvard University; **Paul R. Krugman**, NBER and MIT; **Edward E. Leamer**, NBER and University of California, Los Angeles, and **Daniel Trefler**, NBER and University of Toronto.

Innovative activity is concentrated in a small number of countries, but the benefits of innovation are experienced broadly. **Eaton** and **Kortum** develop a model of technology and trade to explore the role of trade in spreading the benefits of innovation. Their estimates imply an underlying elasticity of substitution among labor from different countries of around 3.5.

Feenstra and **Hanson** find that both foreign outsourcing and expenditures on high-technology equipment can explain a substantial amount of the relative increase in nonproduction wages that occurred during the 1980s. Comparatively, foreign outsourcing has a greater impact on the relative nonproduction wage than high-technology capital, but this result is somewhat sensitive to the specification that is used. Surprisingly, expenditures on high-technology capital other than computers are most important. Taken together, foreign outsourcing and expenditures on high-technology capital explain more than the observed increase in the relative nonproduction wage, which suggests that in their absence the relative wages of skilled workers could have fallen.

Wage inequality in the United States has increased in the past two decades, and most researchers believe that the main causes are changes in technology, international competition, and factor supplies. In this paper, **Harrigan** and **Balaban** view wages as arising out of a competitive general equilibrium where goods prices, technology, and factor supplies jointly determine outputs and factor prices. Treating final goods prices as being partially determined

in international markets, and using data on trends in the international economy as instruments for U.S. prices, they find that changes in relative factor supply are more important than changes in relative price in explaining the growing return to skill. In particular, capital accumulation accounts for much of the increase in the skill differential.

Casella and **Rauch** model trade between two economies in which output is generated through bilateral matching of agents spanning a spectrum of types. Domestic matching is perfect — every trader knows the type of all others and can approach whomever he chooses — but international matching is random — every trader lacks the information to choose his partner's type. However, coethnic ties allow perfect matching abroad to those members of an ethnic minority who choose to use them.

In recent decades, because of changes in both policy and technology, there has been growing international economic integration. With declining barriers to trade, some analysis has suggested that countries with small markets may lose a distinctive component of their manufacturing base: goods produced under increasing returns to scale when the producers have some monopoly power. With lower barriers, producers of these goods may be tempted to locate in large markets and to serve the smaller markets by export. The small countries would be left to produce more homogeneous and competitive goods. However that analysis was premised on an assumption of convenience — transport costs only for the goods produced with scale economies — that indeed matters. **Davis** shows that in a focal case with equal transport costs for both classes of goods, small countries need not fear loss of this distinctive component of manufactures. He also discusses the available evidence, which indicates that total trade costs for these two classes of goods do not differ significantly.

Public Economics Program Meeting

Members of the NBER's Program on Public Economics, directed by James M. Poterba of MIT, met in Cambridge on April 10 and 11. They discussed the following papers:

Rosanne Altshuler, NBER and Rutgers University, and **Jason G. Cummins**, New York University, "Tax Policy and the Dynamic Demand for Domestic and Foreign Capital by Multinational Corporations"
Discussant: Douglas Shackelford, University of North Carolina

Kenneth L. Judd, NBER and Stanford University, "Optimal Taxation and Spending in General Competitive Growth Models"
Discussant: Rodolfo Manuelli, NBER and University of Wisconsin

Steven D. Levitt, NBER and Harvard University, and **Ian Ayres**, Yale University, "Measuring Positive Externalities from Unobservable Victim Precaution: an Empirical Analysis of Lojack" (NBER Working Paper No. 5928)
Discussant: Edward Glaeser, NBER and Harvard University

Olivia S. Mitchell, NBER and University of Pennsylvania, **James M. Poterba**, and **Mark J. Warshawsky**, TIAA-CREF, "New Evidence on the Money's Worth of Individual Annuities" (NBER Working Paper No. 6002)
Discussant: Benjamin Friedman, NBER and Harvard University

John B. Shoven, NBER and Stanford University, and **David A. Wise**, NBER and Harvard University, "The Taxation of Pensions: A Shelter Can Become a Trap" (NBER Working Paper No. 5811)
Discussant: Daniel Halperin, Harvard University

David F. Bradford, NBER and Princeton University, "Fixing Realization Accounting: Symmetry, Consistency, and Correctness in the Taxation of Financial Instruments" (NBER Working Paper No. 5754)
Discussant: William M. Gentry, NBER and Columbia University

Joel B. Slemrod, NBER and University of Michigan, "Tax Compliance: New Evidence from Minnesota"
Discussant: Ann D. Witte, NBER and Florida International University

Altshuler and **Cummins** use firm-level panel data on Canadian multinational corporations that invest solely in the United States and find that domestic and foreign capital are greater-than-unit-elastic substitutes in the production process, and that there is a statistically significant coordination cost to domestic and foreign investment. They also simulate the effect of various tax policies on the dynamics of investment and on the steady-state values of the Canadian and U.S. capital stock. Their simulations show the importance of interrelated production and adjustment costs in the analysis of tax policy towards multinational corporations.

Judd examines the optimal taxation of capital and the provision of public goods. He points out that

many "consumption" tax proposals, such as the Flat Tax and the VAT, are not consumption taxes. He instead proposes a tax system biased against human capital and in favor of physical capital investment.

Levitt and **Ayres** find that the presence of Lojack is associated with a sharp fall in auto theft in central cities and a more modest decline in the remainder of the state. Rates of other crimes do not change appreciably. Their estimates suggest that, at least historically, the marginal social benefit of an additional unit of Lojack has been as much as 15 times greater than the marginal social cost in high crime areas. Those who install Lojack in their cars, however, obtain less than 10 percent of the total social benefits of Lojack, causing Lojack to be undersupplied by the free market. Current insurance subsidies for the installation of Lojack appear to be well below the socially optimal level.

Mitchell, Poterba, and **Warshawsky** present new information on the expected present discounted value of payouts on individual life annuities. They examine the single premium immediate life annuity, an insurance product that pays out a nominal level sum as long as the covered person lives, in exchange for an initial lump-sum premium. This annuity offers protection against the risk of someone outliving his saving, given uncertainty about longevity. They calculate that individual annuities currently are priced so that retirees without bequest motives should find them of substantial value in configuring their portfolios to smooth retirement consumption. They also find that the expected present discounted value of payouts, relative to the initial cost of the annuity, has increased over the last decade.

Shoven and **Wise** show that, at least for large pension accumulations, pension distributions can face marginal tax rates as high as 61.5 percent; pension assets passing through an estate can face marginal tax rates between 92 and 99 percent. This paper shows the circumstances under which these extraordinarily high marginal tax rates will be encountered. They are not limited to the rich. In fact, people of modest incomes who participate in a pension plan over a long career may face such rates.

Bradford sets forth the requirements for income measurement rules based on realization that are "linear," in the sense that doubling a person's transactions will double the taxable income and adding one set of transactions to another will result in the sum of the associated income. Under present realization conventions, the tax law cannot be linear because then there would be no limit on tax arbitrage profit via variations on borrowing with deductible interest and lending tax exempt. To focus on the principles, Bradford assumes that transactions are costless. In that case, dealing with the intertemporal aspect of the problem requires virtually universal imputation of taxable interest income to basis (the taypayer's cost of an asset). To deal with the risk aspect of the problem (lock-in and cherry picking) requires simply that the effective rate of tax on gains and losses be the same (not necessarily equal to the rate on intertemporal returns).

In 1995 the Minnesota Department of Revenue conducted a series of randomized, controlled income tax compliance experiments to test alternative strategies for improving compliance. Among them was sending taxpayers a letter informing them that their return would be examined. Under certain assumptions, the response of reported income to this experiment will be a measure of the extent of tax noncompliance. **Slemrod** finds that, compared to a control group of taxpayers, the average increase (over the previous year) in taxes paid for low- and middle-income members of the treatment group was 3 percent of tax liability, and much higher for those taxpayers who have greater opportunities for evasion. However, no significant positive effect was observed for high-income taxpayers; this may reflect the reduced incentive for the treated taxpayers to reduce the probability of an audit by reporting more than otherwise, combined with the perception that in practice an audit is a negotiation process for which an initial "low bid" may be optimal.

The Well-Being of Children

The NBER's Program on the Well-being of Children met in Cambridge on April 12. Program Director Jonathan Gruber, also of MIT, organized the meeting, at which these papers were discussed:

Kevin Lang, Boston University, and **Jay L. Zagorsky**, Ohio State University, "Does Growing Up with a Parent Absent Really Hurt?"

Stephen Cameron, Columbia University, and **James Heckman**, NBER and University of Chicago, "Dynamics of Educational Attainment for Blacks, Hispanics and Whites"

Thomas J. Kane, NBER and Harvard University, "Racial and Ethnic Preference in College Admissions"

Janet Currie, NBER and University of California, Los Angeles, and **Jonathan Gruber**, "The Technology of Birth: Health Insurance, Medical Intervention, and Infant Health," NBER Working Paper No. 5985

Sherry A. Glied, NBER and Columbia University, and **A. Bowen Garrett**, University of California, Berkeley, "The Effect of U.S. Supreme Court Ruling Sullivan v. Zebley on Child SSI and AFDC Enrollment: A Natural Experiment"

Gary Solon, University of Michigan, **Marianne Page**, University of California, Davis, and **Greg J. Duncan**, Northwestern University, "Correlation Between Neighboring Children in their Socioeconomic Status as Adults"

Children who grow up without one of their biological parents in the home do worse, on average, than other children. However, having a single parent is highly correlated with lots of other socioeconomic disadvantages. In their analysis, **Lang** and **Zagorsky** find little evidence that absence of a parent affects income or wealth. For men, father's presence has a notable impact on whether one marries. For women, mother's presence is most important for cognitive ability.

Cameron and **Heckman** present a careful accounting of the role of family background, family income, labor market opportunities, and college tuition in explaining educational differences among black, white, and Hispanic males. Three main conclusions emerge from their research: 1) family income and family background influence schooling choices beginning at early stages of schooling; 2) tuition levels explain nothing of the difference among black, white, and Hispanic college enrollment patterns; 3) family income and family background operate on schooling choices primarily through long-term influences and not through short-run restrictions in the credit market.

Kane uses data from the High School and Beyond survey of the class of 1982 to study the extent of racial preference at different types of four-year colleges, by comparing the likelihood of admission for black, Hispanic, and white students with similar SAT scores and high school grades applying to the same colleges. Despite large differences in mean SAT scores by race in most four-year colleges, he finds little evidence of racial or ethnic preference in admissions outside of the top quintile of colleges. Kane also evaluates the likely effectiveness of "class-based" admission policies in producing similar racial balance on elite campuses. Given that black and Hispanic youth are a minority of the population and a very small minority of high-scoring youth, they represent a small minority of most subsets of low-income disadvantaged youth. Thus colleges likely would have to impose very large penalties on those from middle income families or those with college-educated parents in order to replicate the current racial balance on campus without using race explicitly. Simple demographics imply that preferences for low-income students would be a very blunt instrument for maintaining racial balance on elite college campuses.

Using Vital Statistics data on every birth in the United States from 1987–92, and information on the tremendous variation in eligibility for public insurance coverage under the Medicaid program during that period, **Currie** and **Gruber** find that among teen mothers and high school dropouts, who were largely uninsured before being made eligible for Medicaid, there were significant increases in the use of a variety of obstetric procedures. On average, this more intensive treatment only resulted in marginal changes in the health of infants, as measured by neonatal mortality. The effect of eligibility on neonatal mortality is sizeable among children born to mothers whose closest hospital had a Neonatal Intensive Care Unit, though. This suggests that insurance-induced increases in the use of "high tech" treatments can have real effects on outcomes. Among women with more education who moved from more generous to less generous insurance coverage of pregnancy and neonatal care, the movement was accompanied by reductions in the use of high-tech procedures without any discernable change in neonatal mortality.

In 1990, in *Sullivan v. Zebley*, the U.S. Supreme Court substantially

relaxed the criteria whereby children became eligible for Supplemental Security Income (SSI). **Glied** and **Garrett** examine the extent of spillovers between the SSI and the AFDC (Aid to Families with Dependent Children) programs. They show that growth in child SSI participation over the period affected by the *Zebley* decision is likely to be highest in states with low AFDC payments and high state SSI supplemental payments. They then estimate that about 57 percent of new SSI child participants would not have qualified otherwise for cash payments or Medicaid benefits, while the remaining 43 percent are children who were already eligible for cash and Medicaid benefits under AFDC. In five states with the lowest AFDC payments, at least 53 percent of new SSI cases are children who were already eligible for AFDC. These results suggest that increased government expenditures on SSI have been offset partially by reduced expenditure on AFDC.

Solon, Page, and **Duncan** investigate the socioeconomic impact of community origins by studying children in the same neighborhood and their later socioeconomic status as adults. Based on data from the Panel Study of Income Dynamics, they find that the correlation among neighboring children in educational attainment is far smaller than among siblings. Given that neighborhoods reflect the influence of similar family background as well as of shared community backgrounds, these results suggest that neighborhood characteristics explain only a modest portion of the population-wide inequality in educational attainment.

Program Meeting on Labor Studies

Members of the NBER's Program on Labor Studies met in Cambridge on April 18 to discuss recent research. Organizers Richard B. Freeman and Lawrence F. Katz, both of the NBER and Harvard University, selected the following papers for discussion:

Steven D. Levitt, NBER and Harvard University, "Juvenile Crime and Punishment"

George Baker, NBER and Harvard Business School; **Robert Gibbons,** NBER and Cornell University; and **Kevin J. Murphy,** University of Southern California, "Implicit Contracts and the Theory of the Firm"

William T. Dickens, The Brookings Institution, "Neighborhoods and Networks"

Michael Kremer, NBER and MIT, "Should Taxes be Independent of Age?"

Alan B. Krueger, NBER and Princeton University, "Experimental Estimates of Education Production Functions"

Over the last two decades the punitiveness of the juvenile justice system has declined substantially relative to that of the adult courts. During that same time period, juvenile violent crime rates have grown almost twice as quickly as adult crime rates. **Levitt** finds that juvenile offenders are at least as responsive to criminal sanctions as adults are. Moreover, sharp changes in criminal involvement with the transition from the juvenile to the adult court suggest that deterrence plays an important role. Changes in relative punishment account for 60 percent of the differential growth rates in juvenile and adult violent crime between 1978 and 1993. There does not appear to be a strong relationship between the punitiveness of the juvenile justice system and the extent of criminal involvement later in life.

Baker, Gibbons, and **Murphy** analyze the role of "implicit contracts" (that is, informal agreements supported by reputation rather than law) both within firms, for example in employment relationships, and between them, for example as hand-in-glove supplier relationships. They find that the optimal organizational form is determined largely by what implicit contracts it facilitates. Among other things, they also show that vertical integration is an efficient response to widely varying supply prices. Finally, their model suggests why "management" (that is, the development and implementation of unwritten rules and codes of conduct) is essential in organizations.

Dickens presents a model of a labor market in which workers come from either a high rent or a low rent neighborhood. Employed people prefer to live in the high rent neighborhood, and can help unemployed people in their "network" (neighborhood) to find jobs. He shows that complete segregation of workers by employment status lowers the level of employment: beyond some point, making it easier for employed people to leave the low rent neighborhood begins to reduce employment. The level of mobility at which this change takes place is higher for populations with lower unemployment rates. Thus decreased racial housing segregation that has allowed affluent blacks to leave depressed inner city neighborhoods may have hurt black

employment levels overall. And, because increasing mobility is detrimental at lower levels for populations that have more of a tendency to be unemployed, the same level of mobility that is helpful to whites could be harmful to blacks who face discrimination in finding a job and who on average are not as well prepared for work as whites.

Raising marginal tax rates at a given level of income reduces work incentives for people with that amount of income and increases tax revenues collected from people with higher incomes. **Kremer** finds that the number of people for whom work incentives are distorted per dollar of revenue raised in this way is typically more than five times greater for 17-to-21 year-olds than for 31-to-64 year-olds, and typically more than twice as large for 22-to-26 year-olds as for 31-to-64 year-olds. Reductions in marginal tax rates for youth, coupled with revenue-neutral increases in marginal tax rates for prime-age workers, will equalize the distribution of lifetime income, Kremer concludes, since income when one is young is almost uncorrelated with lifetime income.

Krueger analyzes data from Project STAR, an experiment in which 11,600 Tennessee kindergarten students and teachers were assigned randomly to one of three types of classes beginning in the 1985–6 school year: small (13–17 students); regular-size (22–25 students); and regular-size with a teacher's aide. Students in regular-size classes were re-assigned randomly at the end of kindergarten, and about 10 percent of students moved between class types in second and third grade. Attrition was also common. Krueger finds that: 1) on average, performance on standardized tests increases by about 4 percentile points the first year that students are assigned to a small class, irrespective of the grade in which the student first attends a small class; 2) after initial assignment to a small class, student performance increases by about one percentile per year relative to those in regular-size classes; 3) teacher aides have little effect on student achievement; 4) class size has a larger effect on test scores for minority students and those who receive free lunches.

Japan Working Group Meets

The NBER's Japan Working Group, directed by Anil K Kashyap, University of Chicago, met in Cambridge on April 19. Members discussed the following papers:

Brian J. Hall and **David E. Weinstein**, Harvard University, "Do Banking Relationships Reduce Corporate Myopia? Evidence from Japan"

Discussant: David Scharfstein, NBER and MIT

Albert Ando, NBER and University of Pennsylvania, **John Hancock**, University of Pennsylvania, and **Gary Sawchuk**, Industry Canada, "Cost of Capital for the United States, Japan, and Canada: An Attempt at Measurement Based on Individual Company Records and Aggregate National Accounts Data" (NBER Working Paper No. 5884)

Discussant: Dale Jorgenson, Harvard University

Lee G. Branstetter, NBER and Dartmouth College, and **Mariko Sakakibara**, University of California, Los Angeles, "Japanese Research Consortia: A Microeconomic Analysis of Industrial Policy" (See "Program Meeting on Productivity" earlier in this issue for a description of this paper.)

Discussant: Sara Ellison, MIT

Takatoshi Ito, NBER and Hitotsubashi University, **Richard K. Lyons**, NBER and University of California, Berkeley, and **Michael T. Melvin**, Arizona State University, "Is there Private Information in the FX Market? The Tokyo Experiment" (NBER Working Paper No. 5936)

Discussant: Silverio Foresi, New York University

Kenn Ariga, Kyoto University, **Yasushi Ohkusa**, Osaka City University, and **Giorgio Brunello**, Udine University, "Fast Track: Is it in the Genes? The Promotion Policy of a Large Japanese Firm"

Discussant: Canice Prendergast, NBER and University of Chicago

Hall and **Weinstein** compare Japanese firms with and without strong relationships to banks to determine whether strong banking relationships enable firms to behave less myopically. They conjecture that if banking relationships do reduce corporate myopia, this benefit will be most pronounced during episodes of financial distress, when concerns about the current bottom line are most pronounced. Using R and D as a proxy for long-term investment, they find no evidence that unaffiliated Japanese firms cut back on R and D more than firms with strong banking relationships during periods of financial distress. Nor do firms with strong banking relationships receive more loan assistance during periods of financial distress. This

casts doubt on the main mechanism through which bank relationships are thought to reduce financial-friction induced myopia.

Ando, Hancock, and **Sawchuk** lay out a conceptual basis for measuring the cost of capital for corporations from data typically available in such countries as the United States, Canada, and Japan. They attempt to carry out the measurement based both on the accounting records of individual companies and on the aggregate National Accounts data, supplemented by market information on the price of equity shares. For the United States, they find a consistent pattern from both sets of data: the real cost of capital after depreciation and before taxes fluctuates around a point between 10 and 11 percent, without a persistent trend. For Canada, the individual company data cover too few companies for too short a period, and it does not seem possible to obtain any reliable estimate from this set of data. The aggregate National Accounts data for Canada Supplemented by some unpublished data supplied by Statistics Canada, suggest that the cost of capital in Canada is equal to or somewhat lower than that in the United States. For Japan, the National Accounts data has critical defects for the purpose of estimating the cost of capital, and there are problems in the individual company accounts data as well, the authors believe. They do not estimate the cost of capital using the National Accounts data; their estimate is in the range of roughly 5 to 6 percent using the company accounts. This very low estimate is largely due to an extremely high depreciation rate reported in these accounts. Ando and his coauthors believe, nevertheless, that the cost of capital there may have been lower than in the United States during the period they study.

Ito, Lyons, and **Melvin** provide evidence against the view that private information in the foreign exchange market does not exist. The evidence comes from the introduction of trading in Tokyo over the lunch hour. Lunch return variance doubles with the introduction of trading, which cannot be attributable to public information, since its flow did not change with the trading rules. Having eliminated public information as the cause, the authors exploit recent results from the market microstructure literature to discriminate between two alternatives, private information and pricing errors. Three key results support the predictions of private-information models, specifically their predictions about how the pattern of return volatility should change with the lunch opening. (This pattern tends to be "U-shaped" within a trading period: high at the beginning and end relative to the middle.) First the volatility U-shape flattens: greater revelation over lunch leaves a smaller share for the morning and afternoon. Second, the U-shape tilts upward, an implication of information whose private value is transitory. Finally, the morning exhibits a clear U-shape when Tokyo closes over lunch, and it disappears when trading is introduced, exactly as the private information models predict.

Ariga, Ohkusa, and **Brunello** study the promotion policy of a large high-tech Japanese firm. They find that: there is little evidence in support of the common view of Japanese career development that promotions based on merit are unduly delayed; there are multiple ports of entry and a substantial number of hires have significant previous job experience; and, there are significant fast track effects across ranks and different cohorts.

Asset Pricing Program

The NBER's Asset Pricing Program met in Cambridge on April 25. Stanley E. Zin, NBER and Carnegie-Mellon University, organized the session and chose the following papers for discussion:

David Backus, NBER and New York University, **Silverio Foresi**, **Abon Mozumdar**, and **Liuren Wu**, New York University, "Predictable Changes in Yields and Forward Rates"

Discussant: Lars Lutmer, Northwestern University

William T. Roberds, Federal Reserve Bank of Atlanta, and **Charles H. Whiteman**, University of Iowa, "Endogenous Term Premia and Anomalies in the Term Structure of Interest Rates: Explaining the Predictability Smile"

Discussant: Robert J. Hodrick, NBER and Columbia University

Qiang Dai, Stanford University, and **Kenneth J. Singleton**, NBER and Stanford University, "Specification Analysis of Affine Term Structure Models"

Discussant: David Marshall, Federal Reserve Bank of Chicago

Wayne E. Ferson, NBER and University of Washington, and **Andrew F. Siegel**, University of Washington, "The Efficient Use of Conditioning Information in Portfolios"

Discussant: John C. Heaton, NBER and Northwestern University

William Fung, Paradigm LDC, and **David A. Hsieh**, Duke University, "Empirical Characteristics of Dynamic Trading Strategies: the Case of Hedge Funds"

Discussant: Andrew W. Lo, NBER and MIT

W. Brian Arthur, **John H. Holland**, **Richard Palmer**, and **Paul Tayler**, Santa Fe Institute, and **Blake D. LeBaron**, NBER and MIT, "Asset Pricing Under Endogenous Expectations in an Artificial Stock Market"

Discussant: Bryan Routledge, Carnegie-Mellon University

The first three papers study the behavior of long-term bond yields in relation to short-term interest rates — that is, the term structure of interest rates. Recent studies have explored the ability of spreads between long and short yields to forecast subsequent movements in interest rates, and have found that spreads do forecast interest rate movements over short horizons up to about three months, and over long horizons beyond about two years, but do not forecast interest rate movements at intermediate horizons. This pattern is sometimes called a "predictability smile," because a graph of interest rate predictability has the shape of a smile. One explanation for this pattern is that long yields are influenced not only by interest rate movements, but also by changes in risk premiums on long-term bonds.

The papers by **Backus** et al. and by **Roberds** and **Whiteman** ask whether simple models with endogenous time-varying risk premiums can explain the predictability smile. Roberds and Whiteman explore a single-factor model proposed in a well-known paper by Cox, Ingersoll, and Ross; in this model the volatility and level of the short-term interest rate move together and drive the movements of the whole term structure. Roberds and Whiteman argue that this model has the potential to explain the predictability smile; Backus et al. respond that it can fit the smile or the average levels of yield spreads, but cannot explain both the smile and average spreads at the same time.

Backus et al. and Dai and Singleton explore more complicated multifactor models in which the level, long-run mean, and volatility of the short rate can move independently. For tractability, they consider "affine" models in which bond yields are related to each other linearly. **Dai** and **Singleton** provide a general framework in which to analyze such models, and they fit several models to the joint distribution of short- and long-term interest rates. Backus et al. find that these models have the potential to explain both the predictability smile and other properties of interest rates, although there are some remaining empirical difficulties at long maturities.

Dynamic trading strategies are increasingly popular in financial markets, and the next two papers on the program study the returns on such strategies. **Ferson** and **Siegel** ask what portfolio allocation rules produce the highest possible unconditional expected returns given their unconditional variances of returns, when the portfolio weights can be adjusted dynamically in response to conditioning information. They provide closed-form solutions for these unconditionally mean-variance efficient portfolios.

Fung and **Hsieh** present some new results on an unexplored dataset on hedge fund performance. Hedge funds are unregulated, private investment pools. Their trading strategies are dramatically different from mutual funds, and their returns have low correlation to the major asset markets. Yet most hedge funds use the same asset markets as mutual funds to generate returns, which supports the claim that hedge fund strategies are highly dynamic. The

authors find five dominant investment styles in hedge funds, which can account for only 43 percent of their cross-sectional variance. This means that hedge funds use many different dynamic trading strategies to generate returns.

Arthur et al. propose a theory of asset pricing based on heterogeneous agents who continually adapt their expectations to the market that these expectations aggregatively create. They explore the implications of this theory computationally using a simulation of an artificial stock market. They show that within a regime where investors explore alternative expectational models at a low rate, the market settles into the rational-expectations equilibrium of the efficient-market literature. Within a regime where the rate of exploration of alternative expectations is higher, the market self-organizes into a complex pattern. It acquires a rich psychology, technical trading emerges, temporary bubbles and crashes occur, and asset prices and trading volume show statistical features characteristic of actual market data.

Behavioral Finance Group Meets

Robert J. Shiller, NBER and Yale University, and Richard H. Thaler, NBER and University of Chicago, organized an April 26 meeting on "behavioral" explanations of financial market activity in conjunction with the April 25 meeting of the Asset Pricing Program. The following papers were discussed:

Kent Daniel, Northwestern University, **David Hirshleifer**, University of Michigan, and **Avanidhar Subrahmanyam**, University of California, Los Angeles, "A Theory of Overconfidence, Self-Attribution, and Security Market Under- and Over-Reaction"
Discussant: Werner De Bondt, University of Wisconsin

Nicholas Barberis, University of Chicago, **Andrei Shleifer**, NBER and Harvard University, and **Robert Vishny**, NBER and University of Chicago, "A Model of Investor Sentiment"
Discussant: Drazen Prelec, MIT

T. Albert Wang, Columbia University, "Overconfidence, Delegated Fund Management, and Survival"
Discussant: Terrance Odean, University of California, Berkeley

Hersh Shefrin and **Meir Statman**, Santa Clara University, "Comparing Expectations About Stock Returns to Realized Returns"
Discussant: Kenneth Froot, NBER and Harvard University

Charles Lee, Cornell University, **James Myers**, University of Washington, Seattle, and **Bhaskaran Swaminathan**, Cornell University, "What is the Intrinsic Value of the Dow?"
Discussant: Robert J. Shiller

Francois Degeorge, HEC School of Management, **Jayendu Patel**, Boston University, and **Richard J. Zeckhauser**, NBER and Harvard University, "Earnings Manipulation to Exceed Thresholds"
Discussant: Shlomo Benartzi, University of California, Los Angeles

Daniel and his coauthors propose a theory based on investor overconfidence and biased self-attribution to explain several of the patterns in securities returns that seem anomalous from the perspective of efficient markets with rational investors. The theory is based on two premises derived from evidence in psychological studies. The first is that individuals are overconfident about their ability to evaluate securities, in the sense that they overestimate the precision of their private information signals. The second is that investors' confidence changes in a biased fashion as a function of the outcomes of their decisions. The first premise implies overreaction to the arrival of private information and underreaction to the arrival of public information. This is consistent with post-corporate event and post-earnings announcement stock price "drift"; negative long-lag autocorrelations; and excess volatility of asset prices. Adding the second premise leads to positive short-lag autocorrelations; short-run post-earnings announcement drift; and negative correlation between future stock returns and long-term measures of past accounting performance.

Recent empirical research in finance has uncovered two families of pervasive regularities: underreaction of stock prices to news such as earnings announcements; and overreaction of stock prices to a series of good or bad news. **Barberis, Shleifer,** and **Vishny** present a parsimonious model of investor sentiment — that is, of how investors form beliefs — that is consistent with the empirical findings. The model is based on psychological evidence and produces both underreaction and overreaction for a wide range of parameter values.

Wang examines Friedman's [1953] "natural selection" argument, that market forces favor the survival of rational economic agents in the context of delegated fund management. The principals of large funds regularly hire and fire individual man-

agers, who make actual portfolio and trading decisions. Wang shows that although overconfident managers buy high and sell low, they can outperform their rational opponents in an efficient market. He concludes that Friedman's "natural selection" argument may not hold in a market with imperfect competition, even if the market is efficient.

There are three explanations for the association between realized returns and stock characteristics (size, book-to-market, past returns, and past sales growth): 1) data mining among stock characteristics; 2) association between stock characteristics and risk; and 3) association between stock characteristics and cognitive errors by investors. It is virtually impossible to distinguish among these competing explanations with realized returns alone since they are very noisy. **Shefrin** and **Statman** distinguish among the explanations with data on expectations about returns form stock recommendations tracked by First Call Corporation in 1994 and 1995, and from ratings of stocks by analysts and executives in the annual Fortune Magazine surveys conducted from 1982 through 1995. They reject the data mining hypothesis because characteristics related to realized returns also are related to expectations about returns. They also reject the risk hypothesis, because the signs of the relationships between characteristics and realized returns are the opposite of the signs of the relationship between characteristics and expectations about returns. Both findings are consistent with the cognitive errors hypothesis.

Lee, Myers, and **Swaminathan** use a residual income valuation model to compute a measure of the intrinsic value for the 30 stocks in the DJIA. They show that superior empirical estimates of value will not only track price more closely, but also will be better predictors of subsequent returns. They find that, since 1978, traditional indicators of market value have had little predictive power for subsequent returns. In contrast, a value-to-price (v/p) ratio based on the residual income model reliably can predict overall market returns over as short a time interval as one month. Both time-varying discount rates and forward-looking earnings information are important to the success of v/p.

Investors are keenly interested in financial reports of earnings because they provide important information for investment decisions. Thus, managers who are monitored by investors and directors face strong incentives to manipulate earnings. **Degeorge, Patel,** and **Zeckhauser** introduce consideration of behavioral/institutional thresholds for earnings in this mix of incentives and governance. They illustrate how thresholds induce specific types of earnings manipulations. Their explorations find clear support for manipulation to exceed each of three thresholds that they consider: avoid red ink; sustain recent performance; and meet market expectations. The thresholds are ranked hierarchically. The future performance of firms that possibly boost earnings to just cross a threshold appear to be poorer than that of less suspect control groups. The special saliency of a firm's fiscal-year performance induces extra noisiness in fourth quarter earnings that varies with the need to "borrow" earnings to meet thresholds.

Health Care Program Meeting

Members of the NBER's Program on Health Care, led by Alan M. Garber of NBER and Stanford University, met in Cambridge on May 15 to discuss the following papers:

Laurence C. Baker, NBER and Stanford University, and **Martin L. Brown,** National Cancer Institute, "Effect of Managed Care on Health Care Providers: Evidence from Mammography"

David M. Cutler, NBER and Harvard University, and **Elizabeth Richardson,** Harvard University, "Measuring the Health of the U.S. Population"

David M. Blau and **Charles Slusher,** University of North Carolina, and **Donna B. Gilleskie,** NBER and University of North Carolina, "The Effect of Health on Employment Transitions of Older Men"

Jonathan Gruber, NBER and MIT, **Philip Levine,** NBER and Wellesley College, and **Douglas O. Staiger,** NBER and Harvard University, "Abortion Legalization and Child Living Circumstances: Who is the Marginal Child?" (NBER Working Paper No. 6034)

Baker and **Brown** investigate the effect of managed care on the health care system, focusing on the effects it could have on the number and types of health care providers and their efficiency. In particular, they examine the relationship between managed care activity and mammography providers. They find that increases in HMO activity are associated with changes in the number of providers, the volume of services produced by each provider, and the prices they charge. This is consistent with the view that HMOs can have broad effects on health care providers.

Cutler and **Richardson** discuss an economic framework for the mea-

surement of health and present estimates of the health of the population over the past 30 years. They begin by introducing the notion of "health capital," which they define as "the present value of the utility resulting from a person's lifetime health." They identify the set of diseases a person can have and measure the prevalence of these diseases over time; then they estimate quality-of-life for a person with each disease or combination of diseases. Next, they value those quality-adjusted lifeyears in dollars. Their results show that health has been improving over time: over the past two decades, health has increased by about $300,000 for the average person, and more than that for newborns. Much of improved health is a result of reduced mortality from cardiovascular disease and increased physical functioning, conditional on having a disease.

The Health and Retirement Survey (HRS) offers newly collected data that are very detailed and useful for reexamining the effect of health on the labor force behavior of older individuals. **Blau, Gilleskie,** and **Slusher** combine the rich measures of health available in the HRS to create a multidimensional measure that includes both subjective self-reported status and objective diagnosed conditions. They use their measure to explain employment decisions over time. Their preliminary estimates suggest three important qualitative conclusions: First, self-reported measures of general health and disability are the most consistently important health measures used in the employment transition models. Second, there is no evidence to support the common practice of using a single measure of health to explain employment. Third, jointly estimating the health measures and the employment transitions reduces the estimated impact of the measures of health, although their impact remains quite large in some cases.

Legalization of abortion in five states around 1970, followed by legalization nationwide because of the Roe v. Wade decision, generates natural variation which can be used to estimate the effect of access to abortion. **Gruber, Levine,** and **Staiger** estimate that the "marginal child" who was not born because of legalization would have been 70 percent more likely to live in a single parent family, 40 percent more likely to live in poverty, 50 percent more likely to receive welfare, and 35 percent more likely to die as an infant. These effects imply that the legalization of abortion saved the government over $14 billion in welfare expenditures through 1994.

Higher Education

The NBER's Project on Higher Education, directed by Charles T. Clotfelter of NBER and Duke University, organized a meeting in Cambridge on May 16 to discuss recent research in the field. The program was:

John Pencavel, Stanford University, "The Response of Employees to Severance Pay Incentives: The Faculty of the University of California 1991–4"
Discussant: Ronald G. Ehrenberg, NBER and Cornell University

Caroline M. Hoxby, NBER and Harvard University, "Does College Tuition Reflect the Changing Nature of Competition in the Market for Higher Education?"
Discussant: Sandra Baum, Skidmore College

Wilbert van der Klaauw, New York University, "A Regression-Discontinuity Evaluation of the Effect of Financial Aid Offers on College Enrollment"
Discussant: Thomas J. Kane, NBER and Harvard University

Paula Stephan, Georgia State University, "Capitalizing the Human Capital of University Professors: The Case in Biotechnology"
Discussant: Irwin Feller, Pennsylvania State University

Richard J. Murnane, NBER and Harvard University, and **John B. Willett** and **Kathryn P. Boudett**, Harvard University, "Do School Dropouts Benefit from Obtaining a GED? From Post-Secondary Education and Training? The Answers are Related"
Discussant: William E. Becker, Jr., Indiana University

In the early 1990s, the University of California (UC) faced a serious budget problem. To respond to it, UC used funds from the retirement system to induce older faculty to quit. **Pencavel** analyzes the three waves of early "retirement" programs in the UC system. He discusses the severance incentives made available to UC faculty, and then analyzes the pattern of "quits" in terms of the monetary inducements that existed. Since UC had a defined benefit program, the severance incentives took the form of additional pension benefits. Pencavel finds a consistent and unambiguous relationship between the severance probabilities and the replacement ratio (that is, the ratio of the annual pension benefits upon acceptance of the early "retirement" program to the

faculty member's salary). On average, a 10 percent higher severance incentive is associated with about a 7 percent higher severance probability. Unfortunately, this sensitivity varies materially across the three early retirement programs, so the behavior revealed in one program does not provide a very reliable guide to severance in the next program.

The market for college education changed a great deal over the twentieth century, particularly from 1950 to the present. What was once a collection of small, local markets is now a market that is integrated nationally and regionally. These changes in market structure have important implications for tuition pricing, financial aid and scholarships, the distribution of high ability students among colleges, faculty salaries, college endowments, and the distribution of research activities. **Hoxby** illustrates the changes in market structure and the causes of those changes, including: long-distance transportation and telecommunication costs; the GI bill; standardized admissions testing; the information system generated by National Merit Program; standardized financial aid analysis; and tuition reciprocity agreements among states. She concludes by discussing the implications of the changes in the college market.

Van der Klaauw shows how idiosyncratic features of an East Coast college's financial aid offer process, particularly the simple formula used to rank students into a few groups on the basis of several continuous measures of academic ability, can be used to estimate the effects of financial aid on college enrollment. More generally, he illustrates how more detailed knowledge of the selection mechanism can aid in obtaining reliable estimates of a program's effect.

Stephan asks whether the value of biotech firms that go public is related to the human capital embodied in the university-based scientists affiliated with the firm. Two measures of reputation of the scientists serve as proxies for human capital: number of citations to articles, and receipt of the Nobel Prize. Stephan studies virtually all pharmaceutical biotechnology firms that made initial public offerings in the United States in the early 1990s. She finds a strong, positive relationship between the offer price and the reputation of the scientists. The proceeds raised by going public also are related strongly to reputation, implying that underwriters are not able to offset low offer prices by selling more shares. The market value of the firm also turns out to relate to the reputation of the scientists, and this relationship persists for some time. Stephan concludes that the firms capitalize on the human capital of university scientists affiliated with the firm in order to raise the resources required for research and development.

Murnane, Willett, and **Boudett** use data from the National Longitudinal Survey of Youth for the period 1979–91 to address three related questions: 1) Do male school dropouts benefit from obtaining post-secondary education and training? 2) Do male school dropouts benefit from obtaining a GED? 3) How much of the labor market benefits of the GED come from improving access to post-secondary education and training? They find that post-secondary education and training provided by employers does result in wage increases for school dropouts. "Non-company training," provided by both proprietary schools and government-funded programs, does not. Acquisition of a GED results in a modest increase in the wages of school dropouts, with the gain coming in two parts: a small initial increase in wages, followed by a small increase in the rate of wage growth. Those dropouts who use the GED to obtain access to post-secondary education or company training receive sizable increases in wages. However, less than one-quarter of male dropouts who obtain a GED receive company training or complete at least one year of college by age 26.

Meeting on Not-for-Profit Hospitals

The NBER held a discussion of not-for-profit hospitals, organized by David M. Cutler of NBER and Harvard University, at its Cambridge office on May 16. The agenda was:

Frank A. Sloan, NBER and Duke University, "Research on Not-for-Profit and For-Profit Hospitals"

Richard Frank, NBER and Harvard University, "Making Investment Decisions in Not-for-Profit Hospitals"

Martin Gaynor, NBER and Carnegie-Mellon University, "The Changing Structure of Health Care Markets and Antitrust Policy"

Thomas Lee, Partners' Health Care, "Organization, Incentives and Medical Practice, Partners' Health Care"

Panel: "Measuring the Quality of Care in Hospitals"

Arnold Epstein, Harvard University, and **Howard Hiatt**, Brigham and Women's Hospital

The first three speakers at the meeting focused on the differences between for-profit and not-for-profit hospitals. **Frank Sloan** and **Richard Frank** discussed why we have both for-profit and not-for-profit hospitals, and asked whether being for-profit versus not-for-profit leads to any difference in behavior. **Martin Gaynor** extended the discussion to the issue of antitrust and consolidation among hospitals. Again, if there is a difference between for-profits and not-for-profits, should the government regulate mergers differently depending on the financial structure of the hospitals involved? In the end, the speakers agreed that on most dimensions, there is very little difference between for-profit and not-for-profit hospitals. To the extent that differences exist, they are in the areas of financing and location choice. In the areas of patient care, access, and abuse of market power, there is little economic evidence suggesting a significant difference.

The consensus among the participants at the meeting was that for-profit and not-for-profit hospitals act in essentially the same way in today's market. They are similar in their provision of care, quality of care, and technology offered. (Public hospitals are a different entity: they provide charity care. For-profit hospitals tend to locate where they will not have to provide charity care.) One major difference, though, is that not-for-profit hospitals cannot raise capital as easily as for-profits: they are forced to rely on philanthropy as their major source of new capital.

Doctors

The last three speakers at the meeting were physicians invited to discuss how the changes in the medical industry were affecting the ways that doctors provide care and interact with hospitals and insurers. **Dr. Thomas Lee** helped to describe the organizational structure of Partner's Health Care, an organization that contains the two major Boston downtown teaching hospitals, Massachusetts General and Brigham and Women's, as well as a network of smaller hospitals, ambulatory care clinics, and doctors. The new economic reality in health care is that there is less money to be distributed to the various levels in the industry. Hospitals consolidated, partly in order to increase their bargaining power with insurers. Doctors also began to consolidate and form doctors' groups designed to increase their control and to maintain economic rents. The doctors' groups actually serve two purposes. First, they help the doctors in their negotiations over rates they pay to hospitals when they admit their patients. Second, by forming larger groups, doctors can pool their patients and take on more of the risk that had previously been held by the insurance companies, in exchange for more control over the care they provide. The doctors can monitor themselves within these groups to make sure excessive care is not provided. The movement of doctors into these groups is helping to put the control over deciding what care is excessive into the hands of those best equipped to know.

Quality of Care

Dr. Howard Hiatt examined the question of medical care quality. He presented results from the Harvard Malpractice Study, in which doctors had re-examined the medical charts of about 4 million New York patients. The doctors were looking for patients that had suffered an adverse event during their stay at the hospital in order to determine whether the event was the result of negligence. They then matched malpractice claims data with the hospital data, to see whether those patients who suffered negligent events were suing and, if so, whether they were winning their suits. The results showed great inefficiency on two levels. First, there were far more negligent events than claims paid: roughly 17 negligent events for every successful lawsuit. That suggests too little litigation. However, only 17 percent of the malpractice claims were cases where a negligent event had occurred. That suggests too much litigation. The relevance for health care quality is that litigation, if it operated properly, could be an important check on bad doctors. The current system suggests that many bad doctors are

avoiding punishment, while many good doctors are being wrongly sued.

The last speaker, **Dr. Arnold Epstein,** also was concerned about health care quality, particularly the issue of whether patients take advantage of all of the information available to them regarding the quality of their doctors and hospitals. In New York, doctors and hospitals are ranked annually for performance. The performance rating is the best of its kind, in that it takes patient mix into account when ranking doctors. The consensus among doctors is that the rankings are mostly accurate. The rankings are available to patients, and are, in fact, publicized in *The New York Times* every year. The surprising results is that patients do not seem to use the information before choosing their doctor. Dr. Epstein pointed out the irony that consumers use all available data before purchasing a car, but not before choosing a heart surgeon. Even many patients who had read the available data often did not know the ranking of the doctor they had chosen. Most participants at the meeting agreed that they would use the rankings, at least to ensure that they did not use any doctor near the bottom of the list. It was also agreed that most people would not use the rankings alone. Most people would use other resources as well, such as word of mouth and recommendations from friends and other doctors, and then choose where all of the sources tend to agree. Consumers that choose their doctors on the basis of quality, just as consumers that sue doctors following poor care, would be a powerful check maintaining high quality in medical care. The fact that consumers do not seem to take advantage of all of the resources available to them is therefore troubling.

Jason Barro assisted in the preparation of this article.

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"Election Goals and Income Redistribution: Recent Evidence from Albania," by **Anne Case.**

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The Welfare State in Transition

The Welfare State in Transition, edited by NBER Research Associates Richard B. Freeman and Robert H. Topel, and Birgitta Swedenborg, is available from the University of Chicago Press for $74.00. This volume is the result of a 1995 conference held in Stockholm which brought together Swedish and U.S. economists to discuss the changing Swedish economy. Once heralded as offering a new way of operating a capitalist system, through reliance on state unions and employer associations and the use of massive welfare redistributions, the Swedish economy plunged into crisis in the 1990s. Now Sweden is reassessing its welfare state and supporting economic institutions in the face of huge budget deficits after its most severe economic downturn since the 1930s.

The papers in this volume cover a wide range of topics, including economic growth and productivity, public employment, tax and wage policy, unemployment, and international competitiveness. At bottom, they concern whether Sweden can preserve the successes of the welfare state while reducing its excesses. Thus, this volume should be of interest not only to economists, but also to sociologists and political scientists, and to U.S. policymakers who may use the Swedish experience as a lesson for our own country.

Freeman is a professor of economics at Harvard University and director of the NBER's Program on Labor Studies; Topel is a member of that program and a professor at the University of Chicago's Graduate School of Business. Swedenborg is deputy director of SNS, the Center for Business and Policy Studies, in Stockholm.

Regionalism versus Multilateral Trade Arrangements

Volume 6 in the NBER-East Asia Seminar on Economics series, *Regionalism versus Multilateral Trade Arrangements,* will be available from the University of Chicago Press in August for $59.00. The editors of the volume, both members of the NBER's Program in International Finance and Macroeconomics, are seminar co-organizers Takatoshi Ito of Hitotsubashi University and Anne O. Krueger of Stanford University.

Until the 1980s, the conventional wisdom was that an open multilateral trading system was the wave of the future. However, in the 1980s, preferential trading agreements began to emerge as significant factors affecting world trade. This volume addresses such questions as: will regional arrangements lead to more open multilateral trade, or will they hobble further multilateral liberalization? What factors are conducive to further strengthening, versus detracting from, the multilateral system?

This volume should appeal not only to academic economists, but also to policymakers involved in trade issues, and to those whose businesses depend on international trade and its regulation.

Health and Welfare during Industrialization

Health and Welfare during Industrialization, edited by NBER Research Associates Richard H. Steckel and Roderick Floud, is now available from the University of Chicago Press for $72.00. This volume, the result of a 1995 conference held in Cambridge, includes an introductory and a concluding chapter and ten papers that examine evidence on health and welfare during and after industrialization in the United States, England, Sweden, the Netherlands, France, Germany, Japan, and Australia. It seeks to place the standard-of-living debate in comparative international perspective by examining several indicators of the quality of life, including income, health wages, education and inequality. The authors use not only traditional measure of health but also recently collected data on stature, which measure nutritional status.

This volume should be of interest to both economists and historians. Its editors are well known in this field, and have assembled a distinguished group of international scholars to contribute to the book. Floud is a professor at London Guildhall University in England, and Steckel is at Ohio State University.

Current Working Papers

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Abstracts of all papers issued since April 1997 are presented below. For previous papers, see past issues of the *NBER Reporter*. Working Papers are intended to make results of NBER research available to other economists in preliminary form to encourage discussion and suggestions for revision before final publication. They are not reviewed by the Board of Directors of the NBER.

NBER Working Papers

Do Wages Rise with Job Seniority? A Reassessment

Joseph G. Altonji and Nicolas Williams

NBER Working Paper No. 6010
April 1997
JEL Nos. J31, J41
Labor Studies

We provide new estimates of the return to job seniority using data similar to that used by Abraham and Farber [1987], Altonji and Shakotko [1987], and Topel [1991], as well as a new Panel Survey of Income Dynamics (PSID) sample. Topel obtains much larger estimates than we do because he uses a wage and a tenure that refer to different years; he uses the Current Population Survey to detrend the PSID; and there are differences between his estimator and Altonji and Shakotko's (AS) estimator. The data used by both AS and Topel point to an effect of 10 years of tenure on the log wage that is equal to .11. This is above AS's preferred estimate of .066 but far below Topel's estimate. However, this estimate is probably biased upward by the wage measure used in all three studies. We also obtain a modest estimate of the return to seniority using data for 1983–91.

On The Pricing of Intermediated Risks: Theory and Application to Catastrophe Reinsurance

Kenneth A. Froot and Paul G. J. O'Connell

NBER Working Paper No. 6011
April 1997
JEL No. 400
Asset Pricing, Corporate Finance, and International Finance and Macroeconomics

We model the equilibrium price and quantity of risk transfer between firms and financial intermediaries.

Value-maximizing firms have downward sloping demands to cede risk, while intermediaries, who assume risk, provide a less-than-fully-elastic supply. We show that equilibrium required returns will be "high" in the presence of financing imperfections that make intermediary capital costly. Moreover, financing imperfections can give rise to intermediary market power, so that small changes in financial imperfections can lead to large changes in price.

We develop tests of this alternative against the null that the supply of intermediary capital is perfectly elastic. We take the U.S. catastrophe reinsurance market as an example, using detailed data from Guy Carpenter & Co., covering a large fraction of the catastrophe risks exchanged during 1970–94. Our results suggest that the price of reinsurance generally exceeds "fair" values, particularly in the aftermath of large events, that market power of reinsurers is not a complete explanation for such pricing, and that reinsurers' high costs of capital appear to play an important role.

Spurts in Union Growth: Defining Moments and Social Processes

Richard B. Freeman

NBER Working Paper No. 6012
April 1997
Labor Studies

This paper examines the spurt in U.S. unionism during the Great Depression. I argue that this spurt is understood better as resulting from a Depression-sparked endogenous social process than from New Deal legislation and Congress of Industrial Organizations (CIO) leadership. I offer four pieces of evidence for this interpretation: 1) the ubiquity of spurts in unionization across countries, particularly in the Depression; 2) the widespread use of recognition strikes during the 1930s spurt; 3) the growth of CIO affiliates with little CIO financial or organizing aid; and 4) the growth of American Federation of Labor (AFL) affiliated unions.

I model unionization as the outcome of a conflict between union/worker organizing activity and employer opposition, both of which depend on the proportion organized. Union organizing and activity rises, then falls, with density. Employer opposition is high at low densities, but falls once unions gain control of the relevant market. The result is a nonlinear difference equation that produces spurts of union growth. The Depression initiated a spurt by increasing worker desires for unions and by raising density above the "critical level" for rapid growth in many industries.

The Incidence of Medicare

Mark McClellan and Jonathan Skinner

NBER Working Paper No. 6013
April 1997
JEL Nos. H2, I1
Aging, Health Care, and Public Economics

The Medicare program transfers more than $200 billion annually from taxpayers to beneficiaries. This paper considers the "incidence" of such transfers. First, we examine the net tax payments and program expenditures for individuals in different lifetime-income groups. We find that Medicare has led to net transfers from the *poor* to the *wealthy,* as a result of relatively regressive financing mechanisms, and of the higher expenditures and longer survival times of wealthier beneficiaries. Even with recent financing reforms, net transfers to the wealthy are likely to continue for at least several more decades. Second, we consider the insurance value of Medicare in providing a missing market for health insurance. With plausible parameter values, our simulations suggest that low-income elderly benefitted more than the dollar flows would suggest. Including this insurance value implies that, on net, there is faint redistribution from the highest income deciles to the lowest income deciles. We also consider the likely distributional impact of several proposed reforms in Medicare financing and benefits.

The Control of Strategic Alliances: An Empirical Analysis of Biotechnology Collaborations

Josh Lerner and Robert P. Merges

NBER Working Paper No. 6014
April 1997
JEL Nos. O32, O34
Productivity

We examine the determinants of control rights in technology strategic alliances between biotechnology firms and pharmaceutical corporations, as well as with other biotechnology firms. We undertake three clinical studies and an empirical analysis of 200 contracts. Consistent with the framework developed by Aghion and Tirole [1994], the allocation of control rights to the smaller party increases with its financial health. The empirical evidence regarding the relationship between control rights and the stage of the project at the time the contract is signed is less consistent with theoretical frameworks.

Understanding the Great Depression: Lessons for Current Policy

Stephen G. Cecchetti

NBER Working Paper No. 6015
April 1997
JEL Nos. E58, G28, N12
Monetary Economics

Over the four years beginning in the summer of 1929, financial markets, labor markets, and goods markets all virtually ceased to function. Throughout this, the government

policymaking apparatus seemed helpless. Since the end of the Great Depression, macroeconomists have labored diligently in an effort to understand the circumstances that led to the wholesale collapse of the economy. What lessons can we draw from our study of these events?

In this essay, I argue that the Federal Reserve played a key role in nearly every policy failure during this period, so the major lessons learned from the Great Depression concern the function of the central bank and the financial system. In my view, there is now a broad consensus supporting three conclusions. First, the collapse of the financial system could have been stopped if the central bank had properly understood its function as the lender of last resort. Second, deflation played an extremely important role in deepening the Depression. Third, the gold standard, as a method for supporting a fixed exchange rate system, was disastrous.

Issues in the Design of Monetary Policy Rules

Bennett T. McCallum

NBER Working Paper No. 6016
April 1997
JEL Nos. E52, E58
Economic Fluctuations and Growth and Monetary Economics

This survey paper covers the following topics: distinguishing rules from discretion in practice; the feasibility of rule-like behavior by an independent central bank; optimal control versus robustness as research strategies; choice among target variables; growth-rate versus growing-level target paths; feasibility of interest rate and monetary base instruments; nominal indeterminacy as distinct from solution multiplicity; root-mean-square performance measures with interest rate and monetary base instruments; operationality of rule specifications; stochastic versus counterfactual historical simulation procedures; interactions between monetary and fiscal policies; and the fiscal theory of the price level.

Sectoral Productivity, Government Spending, and Real Exchange Rates: Empirical Evidence for OECD Countries

Menzie D. Chinn

NBER Working Paper No. 6017
April 1997
JEL Nos. F31, F41
International Finance and Macroeconomics

This paper investigates the long- and short-run determinants of the real exchange rate using a panel of data for 14 OECD countries. I analyze the data using time series, panel unit root, and panel cointegration methods.

Two dynamic productivity-based models motivate the empirical exercise. The candidates for determinants include: productivity levels in the traded and the nontraded sectors; government spending; the terms of trade; income per capita; and the real price of oil. The empirical results indicate that it is easier to detect cointegration in panel data than in the available time series. Moreover, the estimate of the rate of reversion to a cointegrating vector defined by real exchange rates and sectoral productivity differentials is estimated with greater precision as long as homogeneity of parameters is imposed upon the panel. It is more difficult to find evidence for cointegration when allowing for heterogeneity across currencies.

The most empirically successful model of the real exchange rate includes sectoral productivity measures in the long-run relation and government spending in the short-run dynamics.

Public-Private Interaction and the Productivity of Pharmaceutical Research

Iain Cockburn and Rebecca Henderson

NBER Working Paper No. 6018
April 1997
JEL Nos. H8, L2, L6, O3
Productivity

We examine the impact of publicly funded biomedical research on the in-house research of the for-profit pharmaceutical industry. Qualitative analysis of the history of the discovery and development of a sample of 21 significant drugs, and a program of interviews with senior managers and scientists, reveals a complex and often bidirectional relationship between the public and private sectors of the industry, illustrating the difficulties inherent in estimating the rate of return to public support of basic research. This analysis also highlights the importance for private sector firms of maintaining close connections to the "upstream" scientific community, which requires them to make significant investments in in-house basic research and adopting appropriate internal incentives and procedures. We measure the extent and nature of this "connectedness" using data on coauthorship of scientific papers between pharmaceutical company scientists and publicly funded researchers. These measures are correlated significantly with firms' internal organization, as well as their research performance in drug discovery as measured by important patents per research dollar. The size of the estimated impact of "connectedness" to private research productivity implies a substantial return to public investments in basic research.

Regional Integration and Foreign Direct Investment

Magnus Blomström and Ari Kokko

NBER Working Paper No. 6019
April 1997
JEL Nos. F15, F23
International Trade and Investment

This paper deals with the investment effects of regional integration agreements and discusses how such arrangements may affect inward and outward foreign direct investment flows in the integrating region. After setting up a conceptual framework for the analysis, we provide three studies focusing on different kinds of regional integration: North-North integration (Canada joining CUSFTA); North-South integration (Mexico's accession to NAFTA); and South-South integration (MERCOSUR). Our main conclusion is that the responses to an integration agreement depend largely on the environmental change brought about by the agreement and the locational advantages of the participating countries and industries. Moreover, the findings suggest that the most positive impact on FDI has occurred when regional integration agreements have coincided with domestic liberalization and macroeconomic stabilization in the member countries.

Ethical Foundations of Financial Regulation

Edward J. Kane

NBER Working Paper No. 6020
April 1997
Corporate Finance

Regulation consists of rulemaking and enforcement. Economic theory offers two complementary rationales for regulating financial institutions. Altruistic public-benefits theories treat rules as governmental instruments for increasing fairness and efficiency across society as a whole. In contrast, agency-cost theory recognizes that incentive conflicts and coordination problems arise in multiparty relationships, and that regulation introduces opportunities for imposing rules that enhance the welfare of one sector of society at the expense of another.

Each rationale sets different goals and assigns responsibility for choosing and adjusting rules differently. Altruistic theories routinely assign regulation to governmental entities. These theories empower government officials to search for market failures and to correct them. It is taken for granted that society may rely on well-intentioned government officials to use their discretion to choose actions that advance the common good.

Agency-cost theories portray regulation as a mechanism for enhancing the quality of financial services by improving incentives to perform contractual obligations in stressful circumstances. These private-benefits theories count on self-interested parties to spot market failures and to correct them by opening additional markets. In financial services, markets for regulatory services produce outside discipline that controls and coordinates industry behavior. Institutions benefit from regulation that: enhances customer confidence; increases the convenience of customer transactions; or generates cartel profits. Agency-cost theories emphasize the need to reconcile conflicts between the interests of institutions, customers, regulators, and taxpayers.

To overcome nontransparency and disinformation in the performance measurements that government regulators are permitted to transmit to taxpayers, society must strive to allocate regulatory rights, duties, and rewards in ways that reduce agency costs. To achieve accountability, public-service contracts must be supported by information flows that clarify the consequences of the policy choices being made.

Only if we assume a free flow of information may we suppose that, in long-run equilibrium, competition between government and private regulators would simultaneously improve efficiency, limit the size of net regulatory burdens, and break down cartel pricing. In a world with incomplete or asymmetric information, statutory constraints on performance measurement and the exercise of individual regulatory discretion provide a way to limit departures from socially optimal patterns of rulemaking and enforcement.

Garbage and Recycling in Communities with Curbside Recycling and Unit-Based Pricing

Thomas C. Kinnaman and Don Fullerton

NBER Working Paper No. 6021
April 1997
JEL Nos. H71, Q28
Public Economics

We estimate the impact of a user fee and a curbside recycling program on amounts of garbage and recycling, allowing for the possibility of endogenous policy choices. Previous estimates of the effects of these policies could be biased if unobserved variables, such as local preference for the environment, impact both the probability of implementing the policies and the levels of garbage and recycling in the community. We estimate a simple sequential model of local policymaking using original data gathered from a large cross-section of communities with user fees, combined with an even larger cross-section of towns without user fees but some of which have curbside recycling programs. The combined dataset is larger and more comprehensive than any used in previous studies. Without correction for endogenous policy, the price per unit of garbage collection has a negative

effect on garbage and a positive cross-price effect on recycling. When we correct for endogenous policy, then the effect of the user fee on garbage increases, and the significance of the cross-price effect on recycling disappears.

Asymmetric Volatility and Risk in Equity Markets

Geert Bekaert and Guojun Wu

NBER Working Paper No. 6022
April 1997
Asset Pricing

It appears that volatility in equity markets is asymmetric: returns and conditional volatility are correlated negatively. We provide a unified framework to investigate simultaneously asymmetric volatility at the firm and in the market and to examine two potential explanations of the asymmetry: leverage effects and time-varying risk premiums. Our empirical application uses the market portfolio and portfolios with different leverage constructed from Nikkei 225 stocks, extending the empirical evidence on asymmetry to Japanese stocks. Although asymmetry in volatility is present and significant at the market and the portfolio levels, its source differs across portfolios. We find that it is important to include leverage ratios in the volatility dynamics, but that their economic effects mostly are dwarfed by the volatility feedback mechanism. Volatility feedback is enhanced by a phenomenon that we term covariance asymmetry: conditional covariances with the market increase significantly only following negative market news. We do not find significant asymmetries in conditional betas.

Answering the Critics: Yes, ARCH Models Do Provide Good Volatility Forecasts

Torben G. Andersen and Tim Bollerslev

NBER Working Paper No. 6023
April 1997
JEL Nos. C22, C52, C53, G12, G13
Asset Pricing

Volatility permeates modern financial theories and decisionmaking processes. As such, accurate measures and good forecasts of future volatility are critical for the implementation and evaluation of asset pricing theories. In response to this, a voluminous literature has emerged for modeling the temporal dependencies in financial market volatility at the daily and lower frequencies using ARCH and stochastic-volatility-type models. Most of these studies find highly significant in-sample parameter estimates and pronounced persistence of intertemporal volatility. Meanwhile, when judged by standard forecast evaluation criteria, based on the squared or absolute returns over daily or longer forecast horizons, ARCH models provide seemingly poor forecasts of volatility. We demonstrate that ARCH models, contrary to the above contention, produce strikingly accurate interdaily forecasts for the latent volatility factor that is relevant for most financial applications.

Openness, Country Size, and the Government

Alberto Alesina and Romain Wacziarg

NBER Working Paper No. 6024
May 1997
Economic Fluctuations and Growth, Monetary Economics, and Public Economics

This paper shows that smaller countries have larger public sectors as a share of GDP, and are also more open to trade, than larger countries. These empirical observations are consistent with recent theoretical models explaining country formation and breakup.

The Limited Financing of Catastrophe Risk: An Overview

Kenneth A. Froot

NBER Working Paper No. 6025
May 1997
JEL No. 400
Asset Pricing and Corporate Finance

This paper argues that the financial exposure of households and firms to natural (catastrophe) disasters is borne primarily by insurance companies. Surprisingly, insurers use reinsurance to cover only a small fraction of these exposures, yet many insurers do not have enough capital and surplus to survive medium or large disasters. In a well-functioning financial system, these risks would be shared more widely. This paper articulates eight different explanations that may lie behind the limited risk-sharing, relating them to both recent industry developments and financial theory. I then examine how financial innovation can help to change the equilibrium toward a more efficient outcome.

Does Parents' Money Matter?

John Shea

NBER Working Paper No. 6026
May 1997
JEL Nos. J62, O15
Labor Studies

This paper asks whether parental income *per se* has a positive impact on children's accumulation of human capital. Previous research has established that income is correlated positively across generations. This does not prove that parents' money matters, however, since income presumably is correlated with unobserved

abilities transmitted across generations. I estimate the impact of parental income by focusing on variation attributable to parental factors — union, industry, and job loss experience — that arguably represent luck. When I examine a nationally representative sample, I find that changes in parental income attributable to luck have at best a negligible impact on children's human capital. On the other hand, I find that parental income does matter in a sample of low income families. These findings are potentially consistent with models in which credit market imperfections constrain low income households to make suboptimal investments in their children.

National Borders, Trade, and Migration

John F. Helliwell

NBER Working Paper No. 6027
May 1997
International Trade and Investment

This paper extends and reconciles recent estimates of the strikingly large effect of national borders on trade patterns. Trade among Canadian provinces in 1988–90 was more than 20 times as dense as trade between Canadian provinces and U.S. states. There is some evidence of a downward trend since, because of the post-free trade agreement growth in trade between Canada and the United States. Using approximate data for the volumes and distances of internal trade in OECD countries, the 1988–92 border effect for unrelated OECD countries exceeds 12. Both types of data confirm substantial border effects, even after accounting for common borders and language, with the directly-measured data for interprovincial and province-state trade producing higher estimates.

Initial estimates from a census-based gravity model of interprovincial and international migration show a much higher border effect for migration, with interprovincial migration among the Anglophone provinces almost 100 times as dense as migration from U.S. states to Canadian provinces. Migration has effects on subsequent trade patterns for international but not for interprovincial trade, suggesting the existence of nationally-shared networks, norms, and institutions as possible sources of the large national border effects for trade flows.

Testing Endogenous Growth in South Korea and Taiwan

Robert C. Feenstra, Dorsati Madani, Tzu-Han Yang, and Chi-Yuan Liang

NBER Working Paper No. 6028
May 1997
JEL Nos. F14, O47, O53
International Trade and Investment

We evaluate the endogenous growth hypothesis using sectoral data for South Korea and Taiwan. Our empirical work relies on a direct measure of the variety of products from each sector which can serve as intermediate inputs or as final goods. We test whether changes in the variety of these inputs, for Taiwan relative to Korea, are correlated with the growth in total factor productivity (TFP) in each sector, again measured in Taiwan relative to Korea. We find that changes in relative product variety (entered as either a lag or a lead) have a positive and significant effect on TFP in 8 of the 16 sectors. Seven out of these 8 sectors are classified as secondary industries, in that they rely on differentiated manufactured inputs, and therefore seem to fit the idea of endogenous growth. Among the primary industries that rely more heavily on natural resources, we find more mixed evidence.

Impact of Augmented Prenatal Care on Birth Outcomes of Medicaid Recipients in New York City

Theodore Joyce

NBER Working Paper No. 6029
May 1997
JEL No. I18
Health Economics

I examine whether New York state's Prenatal Care Assistance Program (PCAP) is associated with greater use of prenatal services and improved birth outcomes. PCAP is New York state's augmented prenatal care initiative that became a part of the Medicaid program after expansion in income eligibility thresholds in January 1990. Data are from the linkage of Medicaid administrative files with New York City birth certificates (N=23,243). For women on cash assistance, I find PCAP is associated with a 20 percent increase in the likelihood of enrollment in WIC, an increase in mean birth weight of 35 grams, and a 1.3 percentage point drop in the rate of low birth weight. Associations between PCAP and improved birth outcomes for women on medical assistance are similar, but appear contaminated by selection bias. Reductions in newborn costs associated with PCAP participation are modest, between $100–$300 dollars per recipient, and are not sufficient to offset program expenditures.

How Taxing is Corruption on International Investors?

Shang-Jin Wei

NBER Working Paper No. 6030
May 1997
JEL Nos. F02, F23, H20, H32
International Finance and Macroeconomics and International Trade and Investment

This paper studies the effect of corruption on foreign direct investment (FDI). The sample covers bilat-

eral investment from 14 source countries to 45 host countries during 1990–1. There are three central findings: 1) A rise in either the tax rate on multinational firms or the corruption level in a host country reduces inward FDI. An increase in the corruption level from that of Singapore to that of Mexico is equivalent to raising the tax rate by over 20 percentage points. 2) There is no support for the hypothesis that corruption has a smaller effect on FDI into East Asian host countries. 3) American investors are averse to corruption in host countries, but not necessarily more so than average OECD investors, in spite of the U.S. Foreign Corrupt Practices Act of 1977. On the other hand, there is some weak support for the hypothesis that Japanese investors may be somewhat less sensitive to corruption. Neither American nor Japanese investors treat corruption in East Asia any differently from that in other parts of the world.

There are other interesting and sensible findings. For example, consistent with theories that emphasize the importance of networks in trade and investment, sharing a common linguistic tie between the source and host countries and geographic proximity between the two are associated with a sizable increase in the bilateral FDI flow.

Cohort Crowding and Youth Labor Markets: A Cross-National Analysis

Sanders Korenman and David Neumark

NBER Working Paper No. 6031
May 1997
JEL Nos. J11, J21
Labor Studies

We assess the evidence on the contribution of changes in the age structure of the population to the changing fortunes of youth in labor markets in the advanced economies over the 1970s, 1980s, and early 1990s. We then use this evidence to project the likely effects of future cohort sizes on youth labor markets. We estimate a series of regression models in order to isolate the effects of exogenous changes in potential youth labor supply on youth employment and unemployment rates, using a panel data set on 15 countries over more than 20 years. Our preferred estimates indicate that large youth cohorts lead to increases in the unemployment rate of youths, with elasticities as high as 0.5 or 0.6. On the other hand, the estimates generally indicate little effect of relative cohort size on employment rates of youths.

We also find some evidence, although it is statistically weak, to suggest that labor market institutions that decrease flexibility lead to sharper responses of youth unemployment and employment rates to fluctuations in youth cohort size. Finally, because of recent declines in fertility, several European countries will experience marked reductions in the size of youth cohorts over the next 16 years (especially Ireland, Italy, Portugal, and Spain). Projections suggest that declining youth shares should improve youth labor markets in these countries, although the effects are not large when compared with longer-term changes in youth unemployment rates. Other countries cannot expect demographic changes to improve youth labor markets, since youth population shares are projected to decline moderately or to increase.

Predation and Its Rate of Return: The Sugar Industry, 1887–1914

David Genesove and Wallace P. Mullin

NBER Working Paper No. 6032
May 1997
JEL Nos. L13, L41
Industrial Organization

We study entry into the American sugar refining industry before World War I and show that the price wars which followed two major episodes of entry were predatory. Our proof is twofold: by direct comparison of price to marginal cost; and by construction of predicted competitive price cost margins, which we show exceed observed margins. We argue that predation occurred only when its relative cost to the dominant firm was small. It most probably was used to deter future additions to capacity. It also was used to lower the purchase price of preexisting firms after one episode of entry.

Complementarity and Cost Reduction: Evidence from the Auto Supply Industry

Susan Helper

NBER Working Paper No. 6033
May 1997
Productivity

Over the last 20 years, the success of Japanese manufacturing firms has brought renewed attention to the importance of cost reduction on existing products as a source of productivity growth. This paper uses survey data and field interviews from the auto supply industry to explore the determinants of average-cost reduction for a sample of 171 plants in the United States and Canada between 1988 and 1992. The main result is that the determinants of cost reduction differ markedly between firms that had employee involvement programs in 1988 and firms that did not. The two groups of firms achieved equal amounts of cost reduction, but did so in very different ways. Firms with employee involvement saw their costs fall more if they also had "voice" relationships with customers and workers. Firms without such involvement gained no cost-reduction benefit from these programs; instead, their cost-reduction success was largely a function of increases

in volume. These results support Milgrom and Roberts's concept that certain production practices exhibit complementarity.

Abortion Legalization and Child Living Circumstances: Who is the "Marginal Child?"

Jonathan Gruber, Phillip Levine, and Douglas Staiger

NBER Working Paper No. 6034
May 1997
JEL Nos. I18, J13
Children, Health Care, and Public Economics

We estimate the impact of changes in abortion access in the early 1970s on the average living standards of cohorts born in those years. In particular, we address the selection process that is inherent in the abortion decision: is the "marginal child" who is not born when access to abortion increases more or less disadvantaged than the average child? Legalization of abortion in five states around 1970, followed by legalization nationwide because of the 1973 Roe v. Wade decision, generates natural variation which can be used to estimate the effect of access to abortion. We find that cohorts born after abortion was legalized experienced a significant reduction in a number of adverse outcomes. Our estimates imply that the marginal child who was not born because of legalization would have been 70 percent more likely to live in a single parent family, 40 percent more likely to live in poverty, 50 percent more likely to receive welfare, and 35 percent more likely to die as an infant. These effects imply that the legalization of abortion saved the government over $14 billion in welfare expenditures through 1994.

Insuring Consumption Against Illness

Paul Gertler and Jonathan Gruber

NBER Working Paper No. 6035
May 1997
JEL Nos. O15, I18, H53
Health Care and Public Economics

One of the most sizable and least predictable shocks to economic opportunities in developing countries is major illness, in terms of both expenditures for medical care and lost income from reduced labor supply and productivity. As a result, families may not be able to smooth out their consumption over periods of illness. In this paper, we investigate the extent to which families are able to insure consumption against major illness. We use a unique panel dataset from Indonesia that combines excellent measures of health status with information about consumption. We focus on the effect of large exogenous changes in physical functioning. We find that there are significant economic costs associated with these illnesses, albeit more from income loss than from medical expenditures. We also find that full consumption insurance does not exist. Indeed, the deviation from complete consumption smoothing is significant, particularly for illnesses that severely limit physical function. Families are able to smooth less than 30 percent of the income loss caused by these illnesses. These estimates suggest that there would be large welfare gains from the introduction of formal disability insurance. Also, the large public subsidies for medical care typical of most developing countries may improve welfare by providing consumption insurance.

Environmental Regulation, Investment Timing, and Technology Choice

Wayne B. Gray and Ronald J. Shadbegian

NBER Working Paper No. 6036
May 1997
JEL Nos. Q28, O33
Productivity and Public Economics

We began this project interested in collecting "real-world" insights about how environmental regulation affects the paper industry. Based on conversations with people in the industry and visits to paper mills, we formulated several hypotheses related to the choice of technology in new mills and the investment decision for existing plants. We tested these hypotheses, using data on technology choice for 686 paper mills and data on annual investment for 116 mills.

The choice of technology is influenced by environmental regulation. New mills in states with strict environmental regulations are less likely to employ the more polluting technologies that involve pulping. Differences between air and water pollution regulations also emerge, with the dirtiest technology in each medium avoiding those states with the strictest regulations. The magnitudes of the impacts are sizable, with a one standard deviation increase in stringency associated with reduction of several percentage points in the probability of choosing a dirty technology.

State regulatory stringency and plant technology have little or no effect on annual investment spending at existing plants. However, pollution abatement investment is related significantly to productive (non-abatement) investment. Plants with high abatement investment spend less on productive capital. The magnitude of the impact corresponds to nearly complete crowding out of productive investment by abatement investment. Examining investment timing, we find that abatement and

productive investment tend to be concentrated in the same years, consistent with the high cost of shutting down a paper mill for renovations.

Ohio School Milk Markets: An Analysis of Bidding

Robert H. Porter and J. Douglas Zona

NBER Working Paper No. 6037
May 1997
JEL Nos. L13, L41, L66
Industrial Organization

We examine the institutional details of the school milk procurement process, bidding data, statements of dairy executives, and supply characteristics in Ohio during the 1980s. We compare the bidding behavior of a group of firms to a control group. We find that the behavior of each of the firms differs from that of the control group. We argue that the behavior of these firms is consistent with collusion. The estimated average effect of collusion on market prices is about 6.5 percent, or roughly the cost of shipping school milk about 50 miles.

Unemployment vs. Mismatch of Talents: Reconsidering Unemployment Benefits

Ramon Marimon and Fabrizio Zilibotti

NBER Working Paper No. 6038
May 1997
JEL Nos. J64, J65, D33
Economic Fluctuations and Growth

We develop an equilibrium search-matching model with risk-neutral agents and two-sided ex-ante heterogeneity. Unemployment insurance has the standard effect of reducing employment, but also helps workers to get a *suitable* job. Our predictions are consistent with the contrasting performance of the labor markets in Europe and the United States in terms of unemployment, productivity growth, and wage inequality. To illustrate, we construct two fictitious economies with calibrated parameters which differ only by the degree of unemployment insurance. We assume that they are hit by a common technological shock which enhances the importance of mismatch. This shock reduces the proportion of jobs which workers regard as acceptable in the economy with unemployment insurance ("Europe"). As a result, unemployment doubles in this economy. In the laissez-faire economy ("United States"), unemployment remains constant, but wage inequality increases more and productivity grows less because of the larger mismatch. This model can be used to address a number of normative issues.

Wage Dispersion and Country Price Levels

Robert E. Lipsey and Birgitta Swedenborg

NBER Working Paper No. 6039
May 1997
JEL Nos. E31, F3, J31
International Finance and Macroeconomics and International Trade and Investment

In this paper, we investigate whether there is a relationship between the degree of wage dispersion in a country and its price level relative to other countries, compared in a common currency. We find that once we allow for a country's real per capita income and deviations of its exchange rate from its trend value, there is a pervasive relationship between wage dispersion and prices. Low wage dispersion, defined as a relatively small difference between the median wage and the wage of the lowest paid decile of workers, is associated with high price levels. The relationship applies more frequently to service prices than to goods prices, but where it does apply, the effects of wage dispersion are as large for goods as for services.

The Impact and Organization of Publicly-Funded Research and Development in the European Community

Maryann P. Feldman and Frank R. Lichtenberg

NBER Working Paper No. 6040
May 1997
JEL Nos. H5, L52, O3
Productivity

This paper examines R and D activities in the European Community using the Community R and D Information Service (CORDIS) databases. We find that a country's private companies tend to be specialized in the same scientific fields as its universities and public organizations. In addition, we construct indicators of the degree of tacitness of R and D and find that greater expected ability to communicate research outcomes encourages less centralized R and D programs. Programs that yield tangible results are less centralized geographically and administratively. The more that research leads to codifiable knowledge, the less centralized R and D activity there needs to be.

Public Health Insurance and Private Savings

Jonathan Gruber and Aaron Yelowitz

NBER Working Paper No. 6041
May 1997
JEL Nos. H51, I18, E21
Aging, Children, Health Care, and Public Economics

Recent theoretical work suggests that means-tested and asset-tested social insurance programs can explain the low savings rates of lower income households in the United States. We assess the validity of this hypothesis by investigating the effect of Medicaid, the health insurance program for low income women and children, on savings behavior. We use data on asset holdings from the

Survey of Income and Program Participation, and on consumption from the Consumer Expenditure Survey, matched to information on the eligibility of each household for Medicaid. Exogenous variation in Medicaid eligibility is provided by the dramatic expansion of this program from 1984 to 1993. We show that Medicaid eligibility has a sizeable and significant negative effect on wealth holdings; we estimate that in 1993 the Medicaid program lowered wealth holdings among the eligible population by 17.7 percent. We confirm this finding by uncovering a strong positive association between Medicaid eligibility and consumption expenditures: in 1993, the program raised consumption expenditures among eligibles by 5.2 percent. We also exploit the fact that asset testing was phased out by the Medicaid program over this period; we show that these Medicaid effects are much stronger in the presence of an asset test, confirming the importance of asset testing for household savings decisions.

The Future of Old-Age Longevity: Competitive Pricing of Mortality Contingent Claims

Charles Mullin and Tomas Philipson

NBER Working Paper No. 6042
May 1997
Aging, Health Care, and Health Economics

The future course of mortality in old age is highly important for public sector expenditures in countries where old-age programs, such as Social Security and Medicare in the United States, account for large fractions of the public budget. We argue that the competitive market prices of mortality-contingent claims, such as annuities and life insurance, contain information about the market's opinion of the pace of increase in longevity in old age. We develop methods to identify and estimate the mortality that is implicit in the market prices of such claims by identifying survival functions from prices of contracts that differ in their duration. Using these methods, and the cohort-specific prices of U.S. term life insurance contracts in 1990–6 for individuals aged 60 in each calendar year, we find that the patterns inferred from these prices indicate a continued decline in cohort-specific mortality at rates equal to or greater than recent historical trends; about a 5 percent reduction in relative terms in the mortality hazards per successive cohort.

The Pricing of U.S. Catastrophe Reinsurance

Kenneth A. Froot and Paul G. J. O'Connell

NBER Working Paper No. 6043
May 1997
JEL No. 400
Corporate Finance

We explore two theories that have been advanced to explain the patterns in the pricing of U.S. catastrophe reinsurance. The first is that price variation is tied to demand shocks, driven in effect by changes in actuarially expected losses. The second holds that the supply of capital to the reinsurance industry is less than perfectly elastic, with the consequence that prices are bid up whenever existing funds are depleted by catastrophe losses. Using detailed reinsurance contract data from Guy Carpenter & Co. over a 25-year period, we test these two theories. Our results suggest that imperfections in the capital market are more important than shifts in actuarial valuation for understanding catastrophe reinsurance pricing. Shifts in supply, rather than demand, seem to explain most features of the market in the aftermath of a loss.

Evidence from Patents and Patent Citations on the Impact of NASA and Other Federal Labs on Commercial Innovation

Adam B. Jaffe, Michael S. Fogarty, and Bruce A. Banks

NBER Working Paper No. 6044
May 1997
Productivity

We explore the commercialization of government-generated technology by analyzing patents awarded to the U.S. government and the citations to them from subsequent patents. We use information on citations to federal patents in two ways: 1) to compare the average technological impact of NASA patents, "other Federal" patents, and a random sample of all patents using measures of "importance" and "generality;" and 2) to trace the geographic location of commercial development by focusing on the location of inventors who cite NASA and other federal patents. We find, first, that the evidence is consistent with increased effort to commercialize federal lab technology generally and NASA specifically. The data reveal a striking NASA "golden age" during the second half of the 1970s which remains a puzzle. Second, spillovers are concentrated within a federal lab complex of states representing agglomerations of labs and companies. The technology complex links five NASA states through patent citations: California, Texas, Ohio, DC/Virginia/Maryland, and Alabama. Third, qualitative evidence provides some support for the use of patent citations as proxies for both technological impact and knowledge spillovers.

Average Interest

George Chacko and Sanjiv Ranjan Das

NBER Working Paper No. 6045
May 1997
Asset Pricing

We develop analytic pricing models for options on averages by means of a state-space expansion method. These models augment the class of Asian options to markets where the underlying traded variable follows a mean-reverting process. The approach builds from the digital Asian option on the average and enables pricing of standard Asian calls and puts, caps and floors, as well as other exotica. The models may be used to hedge long period interest rate risk cheaply; to hedge event risk (regime-based risk); to manage long-term foreign exchange risk by hedging through the average interest differential; to manage credit risk exposures; and to price specialized options, like range-Asians. The techniques we explore provide several advantages over existing numerical approaches.

Inflation and the User Cost of Capital: Does Inflation Still Matter?

Darrel Cohen, Kevin A. Hassett, and R. Glenn Hubbard

NBER Working Paper No. 6046
May 1997
JEL Nos. E5, E6
Economic Fluctuations and Growth, Monetary Economics and Public Economics

In the late 1970s, many economists argued that there were large deleterious effects of inflation on the user cost of capital for U.S. firms. Since that time, the tax code has changed, the level of inflation has dropped significantly, and the "canonical" model of investment has evolved considerably. In this paper, we demonstrate that the net effect of these changes has — under reasonable assumptions — not relegated inflation to the sidelines. Indeed, we conclude that: 1) inflation, even at its relatively low current rates, continues to increase the user cost of capital significantly; 2) the marginal gain in investment in response to a percentage-point reduction in inflation is larger for lower levels of inflation; 3) the beneficial effects for steady-state consumption of lowering inflation even further than has been achieved to date likely would be significant; and 4) inflation has only a small impact on intratemporal distortion in the allocation of capital within the domestic business sector. We also show that the magnitude of the inflation effect on the user cost of capital is likely much smaller in open economies.

The Effect of Welfare Payments on the Marriage and Fertility Behavior of Unwed Mothers: Results from a Twins Experiment

Jeff Grogger and Stephen G. Bronars

NBER Working Paper No. 6047
May 1997
JEL Nos. I3, J1
Labor Studies and Public Economics

We study one aspect of the link between welfare and unwed motherhood: the relationship between benefit levels and the time-to-first-marriage or the time-to-next-birth among women whose first child was born out of wedlock. We use births of twins to generate effectively random variation in welfare benefits among mothers within a state. That allows us to control for unobservable characteristics of states which typically confound the relationship between welfare payments and behavior. The twins approach yields evidence that higher base levels of welfare benefits: 1) lead initially unwed white mothers to forestall their eventual marriage; and 2) lead initially unwed black mothers to hasten their next birth. The magnitudes of these effects are small, however. Moreover, we find no evidence that the *incremental* benefit paid upon the birth of an additional child affects fertility.

Balladurette and Juppette: A Discrete Analysis of Scrapping Subsidies

Jérôme Adda and Russell Cooper

NBER Working Paper No. 6048
May 1997
JEL Nos. E62, E65, E21
Economic Fluctuations and Growth

This paper studies the effects of subsidies on durable goods markets. In particular, we study a recent policy in France where the governments of Balladur and Juppé subsidized the replacement of old cars with new ones. We construct a dynamic, stochastic discrete choice model of car ownership at the household level. We use the resulting decision rules and equilibrium conditions to estimate the underlying parameters of the model. We then evaluate the short- and long-run effects of the French policies. We find that these policies do stimulate the automobile sector in the short run but, through the induced changes in the cross-sectional distribution of cars' ages, they create the basis for subsequent low activity. Further, while these policies increase government revenues in the short run, in the long run revenues are lower relative to a baseline without intervention.

An Economic Theory of GATT

Kyle Bagwell and Robert W. Staiger

NBER Working Paper No. 6049
May 1997
JEL Nos. F02, F13, F15
International Trade and Investment

Despite the important role played by GATT in the world economy,

economists have not developed a unified theoretical framework that interprets and evaluates the principles that form the foundation of GATT. We propose such a framework here. Working within a general equilibrium trade model, we represent government preferences with a very general formulation that includes all the major political-economy models of trade policy as special cases. Using this general framework, we establish three key results. First, GATT's principle of *reciprocity* can be viewed as a mechanism for implementing efficient trade agreements. Second, through the principle of reciprocity, countries can implement efficient trade agreements if and only if they also abide by the principle of *nondiscrimination*. Third, *preferential agreements* undermine GATT's ability to deliver efficient multilateral outcomes through the principle of reciprocity, unless these agreements take the form of customs unions among partners that are sufficiently similar.

Labor Mobility from Academe to Commerce

Lynne G. Zucker, Michael R. Darby, and Maximo Torero

NBER Working Paper No. 6050
May 1997
JEL Nos. J60, J44, O31
Productivity

After a breakthrough discovery, scientific knowledge with natural excludability may best be transferred to industry by the labor mobility of top scientists from universities and research institutes to firms. We model labor mobility as a function of the scientists' quality (as measured by scientific citations) and their reservation wage. Labor quality and the cost of moving determine the reservation wage, which also depends on the trial frequency (number of potential firm employers), potential interfering offers from universities, and the increase in productivity experienced by top scientists already in firms (reducing their reservation values). Applying our model to bioscience and related biotechnology industries, we find broad support in a group duration analysis. The time that star scientists remain in a university before moving to a firm is decreased significantly as the quality of the bioscientists and their focus on human genetics increases; is decreased as the expected frequency of offers increases, with increases in local firms commercializing the technology, and as the percentage of ties to scientists outside the bioscientist's organization increases; and is decreased by the experienced increase in productivity of other nearby star scientists who have already moved to firms. Only the number of top quality universities in the local area, through interfering university "moves," increases the time that a star scientist remains in a university before moving to a firm. We find some evidence of heterogeneity when we decompose the sample of bioscientists by their destination status; only quality remains significant across both *affiliated* scientists (full-time employment in a firm) and *linked* scientists (part-time employment), with all variables that are significant in the duration model also entering for linked scientists.

Experimental Estimates of Education Production Functions

Alan B. Krueger

NBER Working Paper No. 6051
June 1997
JEL Nos. I21, J24
Children and Labor Studies

This paper analyzes data from Project STAR, an experiment in which 11,600 Tennessee kindergarten students and teachers were assigned randomly to one of three types of classes beginning in the 1985–6 school year: small classes (13–17 students); regular-size classes (22–25 students); and regular-size classes with a teacher's aide. According to the original design, students were to remain in their initial class type through the third grade. In practice, however, students in regular-size classes randomly were re-assigned at the end of kindergarten, and about 10 percent of students moved between class types in second and third grade. Attrition was also common. I used several statistical methods to investigate the impact of these limitations. My main conclusions are: 1) on average, performance on standardized tests increases by about 4 percentile points in the first year that students are assigned to a small class, irrespective of the grade in which the student first attends a small class; 2) after initial assignment to a small class, student performance increases by about one percentile point per year relative to those in regular-size classes; 3) teacher's aides have little effect on student achievement; 4) class size has a larger effect on test scores for minority students and for those who receive free lunch; 5) the beneficial effect of smaller classes does not appear to result from *Hawthorne* effects.

Productivity Measurement and the Impact of Trade and Technology on Wages: Estimates for the U.S., 1972–1990

Robert C. Feenstra and Gordon H. Hanson

NBER Working Paper No. 6052
June 1997
JEL Nos. F14, J30
International Trade and Investment and Productivity

We develop an empirical framework to assess the importance of trade and technical change on the wages of production and nonproduction workers. Trade is measured

by the foreign outsourcing of intermediate inputs, while technical change is measured by the shift towards high-technology capital, for example computers. In our benchmark specification, we find that both foreign outsourcing and expenditures on high-technology equipment can explain a substantial amount of the increase in the wages of nonproduction (high-skilled) relative to production (low-skilled) workers that occurred during the 1980s. Surprisingly, expenditures on high-technology capital *other than* computers are most important. These results are very sensitive, however, to our benchmark assumption that industry prices are independent of productivity. When we allow for the endogeneity of industry prices, expenditures on computers becomes the most important cause of the increased wage inequality, and have a 50 percent greater impact than foreign outsourcing does.

Nonlinear Aspects of Goods-Market Arbitrage and Adjustment: Heckscher's Commodity Points Revisited

Maurice Obstfeld and Alan M. Taylor

NBER Working Paper No. 6053
June 1997
JEL Nos. F31, F41
International Finance and Macroeconomics

We propose that analysis of purchasing power parity (PPP) and the law of one price (LOOP) should take into account explicitly the possibility of "commodity points": thresholds delineating a region of no central tendency among relative prices, possibly because of a lack of perfect arbitrage in the presence of transactions costs and uncertainty. More than 80 years ago, Heckscher stressed the importance of such incomplete arbitrage in the empirical application of PPP. We devise an econometric method to identify commodity points. We treat price adjustment as a nonlinear process; a threshold autoregression offers a parsimonious specification within which both thresholds and adjustment speeds are estimated by maximum likelihood methods. Our model performs well using post-1980 data, and yields parameter estimates that appear quite reasonable: adjustment outside the thresholds might imply half-lives of price deviations measured in months rather than years, and the thresholds correspond to popular rough estimates as to the order of magnitude of actual transport costs. The estimated commodity points appear to be related positively to objective measures of market segmentation, notably nominal exchange rate volatility.

Less of a Luxury: The Rise of Recreation Since 1888

Dora L. Costa

NBER Working Paper No. 6054
June 1997
JEL Nos. D12, N11, N12
Development of the American Economy and Labor Studies

I show that recreation has become much more egalitarian over the last hundred years by estimating elasticities of recreational expenditure in 1888–90, 1917–9, 1935–6, 1972–3, and 1991. I find that elasticities of expenditure have fallen from around 2 at the beginning of the century to slightly more than one today. I attribute this decline to rising incomes, declines in the price of recreation, and investment in public recreational goods. My findings have implications for trends in the well-being of the poor relative to the rich, and for long-term trends in work hours and labor force participation rates.

The Economics of Prefunding Social Security and Medicare Benefits

Martin Feldstein and Andrew Samwick

NBER Working Paper No. 6055
June 1997
JEL Nos. H55, E2
Aging, Economic Fluctuations and Growth, Health Care, and Public Economics

This paper presents a detailed analysis of the economics of prefunding benefits for the aged, focusing on Social Security but indicating some of the analogous magnitudes for prefunding Medicare benefits. We use detailed Census and Social Security information to model the transition to a fully funded system based on mandatory contributions to individual accounts. The funded system that we examine would permanently maintain the level of benefits now specified in current law and would require no new government borrowing (other than eventually selling the bonds that are officially in the Social Security Trust Fund). During the transition, the combined rate of payroll tax and mandatory saving initially rises by 2 percentage points (to a total of 14.4 percent) and then declines so that, in less than 20 years, it is less than the current 12.4 percent payroll tax.

We estimate the impact of such prefunding on the growth of the capital stock and the level of national income and show that the combination of higher pretax wages and lower payroll taxes could raise wages net-of-income-and-payroll-taxes by more than 35 percent in the long run. We also discuss distributional issues and the way that the poor can be at least as well off as under Social Security. A stochastic simulation shows that a small increase in the mandatory saving rate would reduce the risk of receiving less than the scheduled level to less than 1 per-

cent. We present separate calculations of the value of the "forward-looking recognition bonds" and "backward-looking recognition bonds" which the government might issue if it decides not to pay future Social Security benefits explicitly.

What Do a Million Banks Have to Say About the Transmission of Monetary Policy?

Anil K Kashyap and Jeremy C. Stein

NBER Working Paper No. 6056
June 1997
Corporate Finance, Economic Fluctuations and Growth, and Monetary Economics

In an effort to shed new light on the monetary transmission mechanism, we create a panel data set that includes quarterly observations of every insured commercial bank in the United States over the period 1976–93. Our key cross-sectional finding is that the impact of monetary policy on lending behavior is significantly more pronounced for banks with less liquid balance sheets — that is, banks with lower ratios of cash and securities to assets. Moreover, this result is entirely attributable to the smaller banks in our sample, those in the bottom 95 percent of the size distribution. Among other things, our findings provide strong support for the existence of a "bank lending channel" of monetary policy transmission.

Public Radio in the United States: Does it Correct Market Failure or Cannibalize Commercial Stations?

Steven T. Berry and Joel Waldfogel

NBER Working Paper No. 6057
June 1997
JEL Nos. H41, L33, L82
Industrial Organization, Law and Economics, and Public Economics

Radio signals are pure public goods whose total value to society is the sum of their value to advertisers and listeners. Because broadcasters can capture only part of the value of their product as revenue, there is the potential for a classic problem of underprovision. Small markets have much less variety in commercial programs than larger markets, suggesting a possible problem of underprovision. Public funding of radio broadcasting targets programming in three formats — news, classical music, and jazz — with at least some commercial competition. Whether public support corrects a market failure depends on whether the market would have provided similar services in the absence of public broadcasting. To examine this, we ask whether public and commercial classical stations compete for listening share and revenue. We then directly examine whether public stations crowd out commercial stations. We find that public broadcasting crowds out commercial programming in large markets, particularly in classical music and to a lesser extent in jazz. Although the majority of government subsidies to radio broadcasting are allocated to stations without commercial competition in their format (thereby possibly correcting inefficient market underprovision), roughly a quarter of subsidies support direct competition with existing commercial stations.

Tax Rates and Work Incentives in the Social Security Disability Insurance Program: Current Law and Alternative Reforms

Hilary Williamson Hoynes and Robert Moffitt

NBER Working Paper No. 6058
June 1997
JEL Nos. J3, H2
Aging and Public Economics

The Social Security Disability Insurance (SSDI) Program has been criticized by economists for a long time for its apparent work disincentives stemming from the imposition of 100-percent tax rates on earnings. However, the program has been modified in recent years to allow recipients to keep some of their earnings for fixed periods of time. Moreover, additional proposals have been made for lowering the tax rate further and for providing various additional financial work incentives. We use the basic labor supply model to show the expected effect of these reforms on work effort. In addition, we provide a numerical simulation that shows the magnitude of the monetary incentives provided by the reforms for different categories of individuals. We find that the proposed reforms have ambiguous effects on work effort and, contrary to perceived wisdom, possibly could reduce work effort and increase the number of SSDI recipients. However, the simulations show that reforms based on earnings subsidies for private employers are more likely to increase work effort and to lower the caseload.

Were Trade and Factor Mobility Substitutes in History?

William J. Collins, Kevin H. O'Rourke, and Jeffrey G. Williamson

NBER Working Paper No. 6059
June 1997
JEL Nos. F1, F2, N7
Development of the American Economy and International Trade and Investment

Trade theorists have come to understand that their theory is ambiguous on the question: Are trade and factor flows substitutes? While this sounds like an open invitation for empirical research, hardly any serious econometric work has been published in this area. We use history to

fill the gap. We treat the experience of the Atlantic economy between 1870 and 1940 as panel data with almost 700 observations. When we extract shorter run business cycles and "long swings" from the panel data, substitutability is rejected soundly. When secular relationships are extracted over longer time periods and across trading partners, substitutability again is rejected soundly. Finally, we explore immigration policy and find that policymakers never behaved as if they viewed trade and immigration as substitutes.

The Gold Standard and the Great Depression

Barry Eichengreen and Peter Temin

NBER Working Paper No. 6060
June 1997
Development of the American Economy and Monetary Economics

This paper, written primarily for historians, attempts to explain why political leaders and central bankers continued to adhere to the gold standard as the Great Depression intensified. We do not focus on the effects of the gold standard on the Depression, which we and others have documented elsewhere, but on the reasons why policymakers chose the policies they did. We argue that the mentality of the gold standard was pervasive and compelling to the leaders of the interwar economy. It was expressed and reinforced by the discourse among these leaders. It was opposed and finally defeated by mass politics, but only after the interaction of national policies had drawn the world into the Great Depression.

Identifying Inflation's Grease and Sand Effects in the Labor Market

Erica L. Groshen and Mark E. Schweitzer

NBER Working Paper No. 6061
June 1997
JEL Nos. E31, E52, J30
Monetary Economics

Inflation has been accused of causing distortionary price and wage fluctuations (sand) as well as having been lauded for facilitating adjustments to shocks when wages are rigid downwards (grease). We investigate whether these two effects in a labor market can be distinguished by the following identification strategy: inflation-induced deviations among changes in employers' mean wages represent unintended intramarket distortions (sand); while inflation-induced, inter-occupational changes in wages reflect intended alignments with intermarket forces (grease).

Using a unique 40-year panel of changes in wages at large mid-western employers, we find evidence to support the identification strategy. We also find some indications that occupational wages in large firms became more flexible in the past four years. These results strongly support other findings that grease and sand effects exist, but also suggest that the effects offset each other in a welfare sense and in terms of unemployment. Thus, at levels up to 5 percent, the net impact of inflation on unemployment is beneficial but statistically indistinguishable from zero. It turns detrimental after that. When positive, the net benefits never exceed 10 percent of the gross benefits.

Does Inflation Harm Economic Growth? Evidence for the OECD

Javier Andrés and Ignacio Hernando

NBER Working Paper No. 6062
June 1997
JEL Nos. E31, F43, O49
Monetary Economics

In this paper we study the correlation between growth and inflation at the OECD level, within the framework of the so-called *convergence equations*. We also discuss whether this correlation withstands a number of improvements in the empirical models, designed to address the most common criticisms of this evidence. Our main findings are: 1) the negative correlation between growth and inflation is not explained by the experience of high-inflation economies; 2) the estimated costs of inflation are still significant once country-specific effects are allowed for in the empirical model; and 3) the observed correlation cannot be dismissed on the grounds of reverse causation (from GDP to inflation).

The Legacy of Deposit Insurance: The Growth, Spread, and Cost of Insuring Financial Intermediaries

Eugene N. White

NBER Working Paper No. 6063
June 1997
JEL Nos. N22, G21, G28
Development of the American Economy and Monetary Economics

Without the Great Depression, the United States would not have adopted deposit insurance. While the New Deal's anti-competitive barriers largely have collapsed, insurance has become deeply rooted. This paper examines how market and political competition for deposits raised the level of coverage and spread insurance to all depository institutions. A comparison of the cost of federal insurance with a counterfactual of an insurance-free system shows that federal insurance ultimately imposed a higher cost but achieved political acceptance because of the distribution of the burden.

Excess Capital Flows and the Burden of Inflation in Open Economies

Mihir A. Desai and James R. Hines Jr.

NBER Working Paper No. 6064
June 1997
JEL Nos. F32, H87, E31
Monetary Economics and Public Economics

This paper estimates the efficiency consequences of interactions between nominal tax systems and inflation in open economies. Domestic inflation changes aftertax real interest rates at home and abroad, thereby stimulating international capital movement and influencing domestic and foreign tax receipts, saving, and investment. The efficiency costs of inflation-induced international capital reallocations are typically much larger than those that accompany inflation in closed economies, even if capital is imperfectly mobile internationally. Differences among inflation rates are responsible for international capital movements and accompanying deadweight losses, suggesting that international monetary coordination has the potential to reduce the inefficiencies associated with inflation-induced capital movements.

Are International R&D Spillovers Trade Related? Analyzing Spillovers Among Randomly Matched Trade Partners

Wolfgang Keller

NBER Working Paper No. 6065
June 1997
JEL Nos. F12, F2, O3, O4, C15
Productivity

In this paper, I analyze recent findings by Coe and Helpman [1995] on trade-related spillovers of international R and D. I propose a Monte Carlo-based test for robustness which compares the elasticity of domestic productivity with respect to foreign R and D estimated by Coe and Helpman with an elasticity which is based on counterfactual international trade patterns. I also show that these randomly created trade patterns give rise to positive estimates of international R and D spillovers, which are larger and explain more of the variation in productivity across countries than if "true" bilateral trade patterns are used. This finding casts doubt on the claim that patterns of international trade are important in driving R and D spillovers.

Japanese Research Consortia: A Microeconometric Analysis of Industrial Policy

Lee Branstetter and Mariko Sakakibara

NBER Working Paper No. 6066
June 1997
JEL Nos. F2, L5, O3
Productivity

The existence of strong "spillover" effects of private R and D increases the potential social contribution of R and D but may depress the private incentives to undertake it. R and D consortia offer a potentially effective means of internalizing this externality, and a number of prominent economists have argued for public support of such consortia (for example, Romer, 1993). Governments in Europe and North America have adopted policies to promote the formation of such consortia, motivated less by economic theory than by the perception that the Japanese government has used such policies to great effect [Tyson, 1992]. Despite the existence of a large theoretical literature analyzing the potential benefits and costs of R and D consortia, there has been little corresponding empirical work on their efficacy.

In this paper, we undertake the *first* large-sample econometric study of Japanese government-sponsored research consortia. We use firm-level data on research inputs and outputs to measure the impact of participation on the *ex-post* research productivity of the firm. We find that frequent participation in these consortia has a positive impact on research expenditure and research productivity. These results hold after controlling for the potential endogeneity of the intensity of participation in consortia to participating firms' research productivity. Furthermore, we find that part of this impact arises from the increased knowledge spillovers that take place within these consortia. Not only are these results useful in providing empirical evidence on the theory of research joint ventures, but they are also useful in shedding light on the question of what role Japanese "industrial policy" played in Japanese technological innovation during the 1980s. We conclude with directions for further research.

Recent Immigrants: Unexpected Implications for Crime and Incarceration

Kristin F. Butcher and Anne M. Piehl

NBER Working Paper No. 6067
June 1997
JEL Nos. F22, K42
Labor Studies

Among 18–40 year-old men in the United States, immigrants are less likely to be institutionalized than the native born, and much less likely to be institutionalized than native-born men with similar demographic characteristics. Furthermore, earlier immigrants are more likely to be institutionalized than more recent immigrants. Although all immigrant cohorts appear to assimilate toward the higher institutionalization rates of the native born as time in the country increases, recent immigrants do not increase their institutionalization rates as quickly as one would predict

from the experience of earlier immigrant cohorts. These results are the opposite of what one would predict from the literature on immigrant earnings, where earlier immigrants typically are found to have better permanent labor market characteristics.

Debt and Corporate Performance: Evidence from Unsuccessful Takeovers

Assem Safieddine and Sheridan Titman

NBER Working Paper No. 6068
June 1997
JEL Nos. G32, G33, G34
Corporate Finance

This paper examines how debt affects firms after failed takeovers. Using a sample of 573 unsuccessful takeovers, we find that, on average, targets significantly increase their debt levels. Targets that increase their debt levels more than the median amount reduce their levels of capital expenditures, sell off assets, reduce employment, increase focus, and increase their operating cash flows. These leverage-increasing targets also realize superior stock price performance over the five years following the failed takeover. In contrast, those firms that increase their leverage the least show insignificant changes in their level of investment and their operating cash flows and realize stock price performance that is no different from their benchmarks. Those failed targets that increase their leverage the least, and fail to get taken over in the future, realize significant negative stock returns after their initial failed takeovers. The evidence is consistent with the hypothesis that debt helps firms to remain independent not because it entrenches managers, but because it commits the manager to making the improvements that would be made by potential raiders.

Intra-National, Intra-Continental, and Intra-Planetary PPP

Charles Engel, Michael K. Hendrickson, and John H. Rogers

NBER Working Paper No. 6069
June 1997
International Finance and Macroeconomics

We build a model of adjustment toward PPP for a panel of real exchange rates. Our model eliminates some inconsistencies in previous models, which implied that a model for the real exchange rate of country B relative to country C was not commensurate with the posited model of the real exchange rate for A relative to B, and A relative to C. Our model allows us to handle in a natural way correlations across exchange rates in a panel. We put restrictions on an underlying model which yields a simple covariance matrix that can be estimated easily by GLS methods. We also put restrictions on the underlying model which allow us to estimate easily a panel PPP model in which the speed of adjustment is not the same for all real exchange rates. Our model, applied to the price levels of eight cities in four countries and two continents, does not find evidence in favor of reversion of PPP.

Intergenerational Earnings Mobility, Inequality, and Growth

Ann L. Owen and David N. Weil

NBER Working Paper No. 6070
June 1997
JEL Nos. O40, J62, J31
Economic Fluctuations and Growth

We examine a model in which per capita income, inequality, intergenerational mobility, and returns to education all are determined endogenously. Individuals' wages depend on their ability, which is a random variable. They purchase an education with transfers received from their parents, and are subject to liquidity constraints. In the model, multiple steady state equilibriums are possible: countries with identical tastes and technologies can reach differing rates of mobility, inequality, and per capita income. Equilibriums with higher levels of output also have lower inequality, higher mobility, and more efficient distributions of education.

Money, Sticky Wages, and the Great Depression

Michael D. Bordo, Christopher J. Erceg, and Charles L. Evans

NBER Working Paper No. 6071
June 1997
JEL Nos. N12, E32
Development of the American Economy, Economic Fluctuations and Growth, and Monetary Economics

This paper examines the ability of a simple stylized general equilibrium model that incorporates nominal wage rigidity to explain the magnitude and persistence of the Great Depression in the United States. The impulses to our analysis are money supply shocks. The Taylor contracts model is surprisingly successful in accounting for the behavior of major macroaggregates and real wages during the downturn phase of the Depression, that is, from the third quarter of 1929 through mid-1933. Our analysis supports the hypothesis that a monetary contraction operating through a sticky wage channel played a significant role in accounting for the downturn, and also provides an interesting refinement to this explanation. In particular, both the absolute severity of the Depression's downturn and its relative severity compared to the 1920–1 recession are likely attributable to the price decline having a much larger unanticipated component during the Depression, as well as less flexible wagesetting practices during this lat-

ter period. Another finding casts doubt on explanations for the 1933–6 recovery that rely heavily on the substantial remonetization that began in 1933.

Eurowinners and Eurolosers: The Distribution of Seigniorage Wealth in EMU

Hans-Werner Sinn and Holger Feist

NBER Working Paper No. 6072
June 1997
JEL Nos. E58, F33, F42
Public Economics

The European Monetary Union (EMU) will involve socialization of the existing seigniorage wealth of the national central banks, because the Euro will have to be bought by these banks in exchange for assets which have been accumulated in the historical process of money creation. This socialization will create windfall gains for countries with relatively low monetary bases, such as France and the United Kingdom, and it will be disadvantageous for countries like Germany, the Netherlands, and Spain, that will suffer per capita wealth losses of between 406 and 182 ecus. This paper quantifies the gains and losses in seigniorage wealth under alternative scenarios of membership and bank regulation.

Measuring Market Integration: A Model of Arbitrage with an Econometric Application to the Gold Standard, 1879–1913

Gauri Prakash and Alan M. Taylor

NBER Working Paper No. 6073
June 1997
JEL Nos. N1, F3
Development of the American Economy

A major question in the literature on the classical gold standard concerns the efficiency of international arbitrage. Most authors have examined efficiency by looking at: the spread of the gold points; gold-point violations; the flow of gold in profitable or unprofitable directions; tests of various asset market criteria, including speculative efficiency and interest arbitrage. These studies have many limitations, both methodological and empirical. We offer a new methodology for measuring market integration, based on a theoretical model of arbitrage applicable to any type of market. Our model is econometrically tractable using the techniques of threshold autoregressions. We study the efficiency of the dollar-sterling gold standard in this framework, and we radically improve the empirical basis for investigation by compiling a new, high-frequency series of continuous daily data from 1879 to 1913. Using data at this frequency, we can derive reasonable econometric estimates of the size of transaction-cost bands (as compared with direct cost estimates). We also can estimate the speed of adjustment through which disequilibriums (gold-point violations) were corrected. The changes in these measures over time provide an insight into the evolution of market integration in the classical gold standard.

Measuring the Energy Savings from Home Improvement Investments: Evidence from Monthly Billing Data

Gilbert E. Metcalf and Kevin A. Hassett

NBER Working Paper No. 6074
June 1997
JEL Nos.E22, Q40, Q48
Public Economics

An important factor driving energy policy over the past two decades has been the "Energy Paradox," the perception that consumers apply unreasonably high hurdle rates to energy saving investments. We explore one possible explanation for this apparent puzzle: that realized returns fall short of the returns promised by engineers and product manufacturers. Using a unique dataset, we find that the realized return to attic insulation is statistically significant, but the median estimate (12.3 percent) is close to a discount rate for this investment implied by a Capital Asset Pricing Model analysis. We conclude that the case for the Energy Paradox is weaker than has been believed previously.

Output Price and Markup Dispersion in Micro Data: The Roles of Producer Heterogeneity and Noise

Mark J. Roberts and Dylan Supina

NBER Working Paper No. 6075
June 1997
JEL Nos. L10, D40
Industrial Organization

This paper provides empirical evidence on the extent of producer heterogeneity in the output market by analyzing output price and price-marginal-cost markups at the plant level for 13 homogenous manufactured goods. It relies on micro data from the U.S. Census of Manufactures for 1963–87. The amount of price heterogeneity varies substantially across products. Over time, plant transition patterns indicate more persistence in the pricing of individual plants than would be generated by purely random movements. High-price and low-price plants remain in the same part of the price distribution with high frequency, suggesting that underlying time-invariant structural factors contribute to the price dispersion. For all but two products, large producers have lower output prices. We estimated marginal cost and the markups for each plant. The markup remains unchanged or increases with plant size for all but four

of the products, and declining marginal costs play an important role in generating this pattern. The lower production costs for large producers are passed on, at least partially, to purchasers as lower output prices. Plants with the highest and lowest markups tend to remain so over time, although the persistence in markups overall is less than for output price, suggesting a larger role for idiosyncratic shocks in generating markup variation.

The Home Market, Trade, and Industrial Structure

Donald R. Davis

NBER Working Paper No. 6076
June 1997
JEL Nos. F1, O1, R1
International Trade and Investment

Does national market size matter for industrial structure? This has been suggested by theoretical work on "home market" effects, as in Krugman [1980, 1995]. In this paper, I show that what previously was regarded as an assumption of convenience — transport costs only for the differentiated goods — matters a great deal. In a focal case in which differentiated and homogeneous goods have identical transport costs, the home market effect disappears. I discuss the available evidence on the relative trade costs for differentiated and homogenous goods and find no compelling argument that market size will matter for industrial structure.

Merger Policies and Trade Liberalization

Henrik Horn and James Levinsohn

NBER Working Paper No. 6077
June 1997
JEL Nos. F12, F15, L4
International Trade and Investment

This paper is about the interactions between what is traditionally considered trade policy and a narrow but important aspect of competition policy: merger policy. We focus on the links between merger policies and trade liberalization, emphasizing in particular the role that international agreements, such as the GATT, play when merger policies are chosen nationally. Of special concern is the possibility that liberalization of international trade will induce countries increasingly to use competition policies to promote national interests at the expense of other countries. We examine the incentives for a welfare maximizing government to make such a substitution. Interpreting merger policy as a choice of degree of industrial concentration, we investigate how the merger policy that is optimal from the point of view of an individual country is affected by restrictions on the use of tariffs and export subsidies.

Gender and Youth Employment Outcomes: The U.S. and West Germany, 1984–91

Francine D. Blau and Lawrence M. Kahn

NBER Working Paper No. 6078
June 1997
JEL Nos. J31
Children and Labor Studies

This paper examines gender differences in labor market outcomes for hard-to-employ youth in the United States and West Germany during 1984–91. We find that young, less educated American men and especially women are far less likely to be employed than their German counterparts. Moreover, less educated young women and men in the United States have lower earnings relative to more highly educated youth in their own country, and also fare much worse than less educated German youth in absolute terms, after we correct for purchasing power. The relatively high employment rates of less educated German youth combined with their relatively high wages raise the question of how they are successfully absorbed into the labor market. We show that the large public sector in Germany functions as an employer of last resort in effect, absorbing some otherwise unemployable low skilled youth. Our findings also suggest that the U.S. welfare system accounts for very little of the U.S.-German difference in employment rates.

From Socialist Showcase to Mezzogiorno? Lessons on the Role of Technical Change from East Germany's Post-World War II Growth Performance

Wolfgang Keller

NBER Working Paper No. 6079
July 1997
JEL Nos. O3, O4, P2
Productivity

This paper emphasizes the contribution of technical change, broadly defined, to productivity growth in explaining the relative performance of East and West Germany after World War II. I argue that previous work focused excessively on physical capital investments in determining productivity differentials; this led to an overestimation of East German performance during the Socialist era, and an overly pessimistic assessment of the East German prospects of catching up with West Germany after reunification. I show, first, that the rates of technical change in the manufacturing industries of East German states were significantly below those in Western states. That helps to explain the fact that East Germany was not the socialist showcase it was frequently taken for before German reunification. Second, I demonstrate that the rates of technical change in the East German states have been considerably higher than those in the West since German reunification. This suggests that the Mezzogiorno

prediction for East Germany — that it will stay persistently behind West Germany as Italy's South does relative to its North — based on an analysis of the need for physical capital accumulation alone, will prove too pessimistic.

Contagion and Volatility with Imperfect Credit Markets

Pierre-Richard Agénor and Joshua Aizenman

NBER Working Paper No. 6080
July 1997
JEL Nos. F34, F36
International Finance and Macroeconomics

This paper interprets contagion effects as perceived increases (triggered by events occurring elsewhere) in the volatility of aggregate shocks impinging on the domestic economy. We analyze the implications of this approach in a model with two types of credit market imperfections: domestic banks borrow at a premium on world capital markets; and, domestic producers (whose demand for credit results from needs for working capital) borrow at a premium from domestic banks, which have a comparative advantage in monitoring the behavior of domestic agents. Financial intermediation spreads are determined by a markup that compensates for the expected cost of contract enforcement and state verification and for the expected revenue lost in adverse states of nature. Higher volatility of producers' productivity shocks increases both financial spreads and the producers' cost of capital, resulting in lower employment and a higher incidence of default. The welfare effects of volatility are non-linear. Higher volatility does not impose any welfare cost for countries characterized by relatively low volatility and efficient financial intermediation. The adverse welfare effects are large (small) for countries that are at the threshold of full integration with international capital markets (close to financial autarky), that is, countries characterized by a relatively low (high) probability of default.

Unemployment Expectations, Jumping (S,s) Triggers, and Household Balance Sheets

Christopher D. Carroll and Wendy E. Dunn

NBER Working Paper No. 6081
July 1997
JEL Nos. D1, D8, D9, E2, E3
Economic Fluctuations and Growth and Monetary Economics

We examine the relationship among household balance sheets, consumer purchases, and expectations. We find few robust empirical relationships between balance sheet measures and spending, but we do find that unemployment expectations are correlated robustly with spending. We then construct a formal model of the consumption of durables and nondurables with an explicit role for unemployment and household debt. We find the model capable of explaining several empirical regularities which are, at best, unexplained by standard models. Finally, we show that a loosening of liquidity constraints can produce a runup in debt similar to that experienced recently in the United States. After such a liberalization, consumer purchases show heightened sensitivity to the uncertainty of labor income, providing a potential rigorous interpretation of the widespread view that the buildup of debt in the 1980s may have played an important role in the weakness of consumption during and after the 1990 recession.

Teen Drinking and Education Attainment: Evidence From Two-Sample Instrumental Variables (TSIV) Estimates

Thomas S. Dee and William N. Evans

NBER Working Paper No. 6082
July 1997
JEL Nos. I12, I18, I2
Health Economics

Recent research has suggested that one of the important, life-cycle consequences of teen drinking is reduced scholastic achievement. Furthermore, it has been argued that state excise taxes on beer and minimum legal drinking ages (MLDA) can have a positive impact on educational attainment. However, there is reason to question whether these results have sound empirical support. Some of the prior research has assumed that the decision to drink is made independently of schooling decisions. Furthermore, estimates that have recognized the potential simultaneity of these decisions may be identified poorly since they rely solely on the cross-state variation in beer taxes and MLDA as exogenous determinants of teen drinking.

A more convincing identification strategy would rely on the within-state variation in alcohol availability over time. To this end, we use the increases in the state MLDA during the late 1970s and 1980s as an exogenous source of variation in teen drinking. Using data from the 1977–92 Monitoring the Future (MTF) surveys, we demonstrate that teens who faced an MLDA of 18 were substantially more likely to drink than teens who faced a higher drinking age. If teen drinking did reduce educational attainment, then attainment within a state should have risen after the MLDA was increased. Using data from over 1.3 million respondents who belong to the 1960–9 birth cohorts in the 1990 Public-Use Micro-

data Sample (PUMS), we find that changes in the MLDA had small and statistically insignificant effects on measures of educational attainment, such as high school completion, college entrance, and college completion. A new technique developed by Angrist and Krueger [1992, 1995] allows us to tie these results together. Using matched cohorts from the MTF and PUMS datasets, we report TSIV estimates of the effect of teen drinking on educational attainment. These TSIV estimates are smaller than the corresponding single-equation probit estimates and are statistically insignificant, indicating that teen drinking does not have an independent effect on educational attainment.

Business Success and Businesses' Beauty Capital

Ciska M. Bosman, Gerard A. Pfann, Jeff E. Biddle, and Daniel S. Hamermesh

NBER Working Paper No. 6083
July 1997
JEL No. J71
Labor Studies

We examine whether a difference in pay for beauty is supported by different productivity of people according to looks. Using a sample of advertising firms, we find that those firms with better-looking executives have higher revenues and faster growth than do otherwise identical firms whose executives are not so good looking. The impact on revenue far exceeds the likely effect of beauty on the executives' wages. This suggests that their beauty creates firm-specific investments, in the form of improved relationships within work groups, the returns to which are shared by the firm and the executive.

Rational Atrophy: The U.S. Steel Industry

Aaron Tornell

NBER Working Paper No. 6084
July 1997
Productivity

During the 1970s and 1980s the U.S. steel industry received trade protection. However, these rents were not used to improve competitiveness. Instead, they were reflected in higher wages and a greater share of profits invested in sectors not related to steel. Moreover, the steel industry failed to adopt technological innovations on a timely basis and was displaced by the minimills. I rationalize these puzzling outcomes using a dynamic game between workers and firms.

Education and Saving: The Long-Term Effects of High School Financial Curriculum Mandates

B. Douglas Bernheim, Daniel M. Garrett, and Dean M. Maki

NBER Working Paper No. 6085
July 1997
JEL Nos. D12, E21, H31
Aging and Public Economics

Over the last 40 years, the majority of states have adopted consumer education policies, and a sizable minority have specifically mandated that high school students receive instruction on topics related to household financial decisionmaking (budgeting, credit management, saving and investment, and so forth). In this paper, we attempt to determine whether the curricula arising from these mandates have had any discernable effect on adult decisions regarding saving. Using a unique household survey, we exploit the variation in requirements both across states and over time to identify the effects of interest. The evidence indicates that mandates have significantly raised both exposure to financial curricula and subsequent asset accumulation once the exposed students reached adulthood. These effects appear to have been gradual rather than immediate, a probable reflection of implementation lags.

Contract Renegotiation in Agency Problems

Aaron S. Edlin and Benjamin E. Hermalin

NBER Working Paper No. 6086
July 1997
JEL Nos. C78, D23, K12, L23
Law and Economics

We study the ability of an agent and a principal to achieve the first-best outcome when the agent invests in an asset that has greater value if owned by the principal than by the agent. When contracts can be renegotiated, a well-known danger is that the principal can hold up the agent, undermining his or her investment incentives. We begin by identifying a countervailing effect: investment by the agent can increase the value for the asset, thus improving the agent's bargaining position in renegotiation. We show that option contracts will achieve the first best outcome whenever this threat-point effect dominates the holdup effect. Otherwise, achieving the first best outcome is difficult and, in many cases, impossible. In those cases, we show that if parties have an appropriate signal available, then the first best outcome is still attainable for a wide class of bargaining procedures. However, a noisy signal means that the optimal contract will involve terms that courts might view as punitive and thus refuse to enforce.

Physician Fee Policy and Medicaid Program Costs

Jonathan Gruber, Kathleen Adams, and Joseph P. Newhouse

NBER Working Paper No. 6087
July 1997
JEL No. I18
Health Care and Public Economics

We investigate the hypothesis that increasing access for the indigent to physicians' offices shifts care from hospital outpatient settings and lowers Medicaid costs (this is the so-called "offset effect"). To evaluate this hypothesis, we exploit a large increase in physicians' fees in the Tennessee Medicaid program, using Georgia as a control state. We find that beneficiaries shifted care from clinics to offices, but that there was little or no shifting from hospital outpatient departments or emergency rooms. Thus, we find no offset effect in outpatient expenditures. Inpatient admissions and expenditures fell, reducing overall program spending by 8 percent. Because the inpatient reduction did not occur in diagnoses that were sensitive to ambulatory care, however, we cannot demonstrate a causal relationship with the fee change.

Age Discrimination Laws and Labor Market Efficiency

David Neumark and Wendy A. Stock

NBER Working Paper No. 6088
July 1997
JEL Nos. J14, J18, J26, J71
Aging and Labor Studies

In Lazear's [1979] model of efficient long-term incentive contracts, employers impose involuntary retirement based on age. The model implies that age discrimination laws, which bar involuntary terminations based on age, discourage the use of such contracts and reduce efficiency. Alternatively, by making it costly for firms to dismiss older workers who are paid more than their marginal product, such laws may serve as precommitment devices that make credible the long-term commitment to workers that firms must make under Lazear contracts. Given that employers remain able to use financial incentives to induce retirement, age discrimination laws instead may strengthen the bonds between workers and firms and encourage efficient Lazear contracts.

We assess evidence on these alternative interpretations of age discrimination laws by estimating the effects of such laws on the steepness of age-earnings profiles. If long-term incentive contracts are strengthened or become more prevalent, average age-earnings profiles should steepen for workers who enter the labor market after age discrimination laws are passed, and vice versa. The empirical analysis uses decennial Censuses of Population and state-level variation in age discrimination laws induced by state and federal legislation. The evidence indicates that age discrimination laws lead to steeper age-earnings profiles for cohorts entering the labor market, suggesting that these laws encourage the use of Lazear contracts, and increase efficiency.

"The Bigger They Are, The Harder They Fall": How Price Differences Across U.S. Cities Are Arbitraged

Paul G. J. O'Connell and Shang-Jin Wei

NBER Working Paper No. 6089
July 1997
JEL Nos. F31, C32
International Finance and Macroeconomics and International Trade and Investment

Recent empirical work has made headway in exploring the nonlinear dynamics of deviations from the law of one price and purchasing power parity that are apt to arise from transaction costs. However, there are two important facets of this work that need improvement. First, the choice of empirical specification is arbitrary. Second, the data used are typically composite price indexes which are subject to potentially serious aggregation biases.

We examine the evidence for transport-cost-induced nonlinear price behavior within the United States. We address both of the above shortcomings. First, we use a simple continuous-time model to inform the choice of empirical specification. The model indicates that the behavior of deviations from price parity depends on the relative importance of fixed and variable transport costs. Second, we employ data on disaggregated commodity prices, yielding a "pure" measure of the deviations from price parity. We find strong evidence of nonlinear reversion in these deviations. The nature of this reversion suggests that fixed costs of transportation are integral to an understanding of law-of-one-price deviations.

Tariff Policy for a Monopolist Under Incomplete Information

Dobrin R. Kolev and Thomas J. Prusa

NBER Working Paper No. 6090
July 1997
JEL Nos. F13, D82, L12
International Trade and Investment

We examine the incentives for governments to levy optimal tariffs on foreign monopolists. With complete information, the home government uses tariffs to extract rents, therefore implementing a policy of discriminatory tariffs which entails higher tariffs on more efficient firms. By contrast if the government is not completely informed about costs, under reasonable conditions the unique self-enforcing outcome involves pooling, whereby firms export the same quantity regardless of effi-

ciency. Because of the distortions created by incomplete information, we find home country welfare, in general, is higher under a policy of uniform tariffs than under one of discriminatory tariffs. Our results suggest that trade policies that are motivated by rent extraction are not likely to be robust to the introduction of incomplete information.

Environmental Controls, Scarcity Rents, and Pre-Existing Distortions

Don Fullerton and Gilbert Metcalf

NBER Working Paper No. 6091
July 1997
JEL Nos. H2, Q2
Public Economics

Debate about the "Double Dividend Hypothesis" has focused on whether an environmental policy raises revenue that can be used to cut other distorting taxes. In this paper, we show that this focus has been misplaced. We derive welfare results for alternative policies in a series of analytical general equilibrium models involving both clean and dirty goods that might be produced with emissions as well as with other resources, in the presence of other pre-existing distortions, such as labor taxes or even monopoly pricing. We show that the welfare effects of environmental protection can be achieved without exacerbating the labor distortion by taxes that raise revenue, or certain command and control regulations that raise no revenue, and even by subsidies that cost revenue. The pre-existing labor tax distortion is exacerbated instead by policies that generate privately-retained scarcity rents. These rents raise the cost of production and equilibrium output prices, and thus reduce the real net wage. Such policies include both those that restrict quantity command and control, and certain marketable permit policies.

Monetary Policy in Japan, Germany and the United States: Does One Size Fit All?

Menzie D. Chinn and Michael P. Dooley

NBER Working Paper No. 6092
July 1997
JEL Nos. E52, E43
International Finance and Macroeconomics

We study the post-war evidence for Japan to see whether the same specification for both the economy and the monetary policy rule is useful for understanding Japan's economy and monetary policy. A recurrent theme in the literature on Japanese monetary policy is that there are significant differences in policy procedures and objectives as compared to other industrial countries. In this paper, we propose an "out of sample" test of a set of restrictions on a vector autoregression used by Clarida and Gertler [1997] in their analysis of the Bundesbank's behavior. Our interpretation of the evidence is that, with minor adjustments, the same specification provides a useful framework for understanding monetary policy in Japan. Perhaps the most interesting finding is that the Bank of Japan, as compared to other central banks, appears to react to inflation over longer forecast horizons.

Economic Geography and Regional Production Structure: An Empirical Investigation

Donald R. Davis and David E. Weinstein

NBER Working Paper No. 6093
July 1997
JEL Nos. F1, O1, R1
International Trade and Investment

There are two principal theories of why countries or regions trade: comparative advantage and increasing returns to scale. Yet there is virtually no empirical work that assesses the relative importance of these two theories in accounting for production structure and trade. We use a framework that nests an increasing returns model of economic geography featuring "home market effects" with a Heckscher-Ohlin model. We use these trade models to explain the structure of regional production in Japan. We find economic geography effects in 8 of 19 manufacturing sectors, including such important ones as transportation equipment, iron and steel, electrical machinery, and chemicals. Moreover, we find that these effects are economically very significant. This latter result contrasts with those of Davis and Weinstein [1997], who find economic geography to be of scant economic significance for the structure of OECD production. We conclude that while economic geography may explain little about the international structure of production, it is very important for understanding the regional structure of production.

Financial Fragility and the Great Depression

Russell Cooper and Dean Corbae

NBER Working Paper No. 6094
July 1997
JEL Nos. E32, E44, E41
Economic Fluctuations and Growth and Monetary Economics

We analyze a financial collapse, such as what occurred during the Great Depression, from the perspective of a monetary model with multiple equilibriums. The economy we consider is financially fragile because of increasing returns to scale in the intermediation process. Intermediaries provide the link between savers and firms that require working capital for production. Fluctuations in the intermediation process are driven by variations in the confidence which agents place in the financial system. Our model quite closely matches the

qualitative movements in some financial and real variables (the currency/deposit ratio; ex-post real interest rates; the level of intermediated activity; deflation; employment; and production) during the Great Depression period.

Free Trade, Growth, and Convergence

Dan Ben-David and Michael B. Loewy

NBER Working Paper No. 6095
July 1997
JEL Nos. E1, F1, O4
International Trade and Investment

What is the impact on output of movement towards free trade? Can trade liberalization have a permanent effect on output levels, and more importantly, does it have an impact on steady-state growth rates? The model that we develop emphasizes the role of knowledge spillovers emanating from heightened trade in income convergence and on growth rates over the long run. The model also facilitates an analysis of the dynamic behavior of income levels and terms of trade — as well as of growth rates — during the transition between steady states. Among our results are that unilateral liberalization by one country has a level effect on the liberalizing country, reducing the income gap between it and other wealthier countries. In some cases, the liberalizing country may even leapfrog over initially wealthier countries. From the long-run growth perspective, unilateral (and multilateral) liberalization generates a positive impact on the steady-state growth of all the trading countries.

International Trade and Structural Change

Dan Ben-David and David H. Papell

NBER Working Paper No. 6096
July 1997
JEL Nos. C22, F1
International Trade and Investment

In light of the substantial movement towards trade liberalization during the postwar period, this paper attempts to determine if and when countries experienced statistically significant changes in the paths of their export-GDP and import-GDP ratios. We find that: 1) most trade ratios exhibited a structural break in their time paths; 2) postbreak trade exceeded prebreak trade for the majority of countries; 3) the coincidence in timing between the import and export breaks does not appear to be particularly strong, and; 4) there is little relation between the extent of changes in imports and the extent of changes in exports for most countries.

Social Security and Retirement in the U.S.

Peter Diamond and Jonathan Gruber

NBER Working Paper No. 6097
July 1997
JEL Nos. H55, J26
Aging, Labor Studies, and Public Economics

The largest entitlement program in the United States today is Social Security (SS). We provide an overview of the interaction between the SS system and retirement behavior. We begin by documenting historical trends in labor force participation and program receipt, and contemporaneous patterns of work and income receipt for the current cohort of older persons. We then present an overview of the structure of the SS program in the United States, and review existing evidence on the relationship between SS and retirement. Finally, we present results of a simulation model which measures the implicit tax/subsidy rate on work after age 55 through the SS system. We find that, for married workers, the system is roughly neutral with respect to work after age 62, but that it heavily penalizes work after age 65. But there are larger tax rates on single workers and on high earning workers.

The Risk and Return from Factors

Louis K. C. Chan, Jason Karceski, and Josef Lakonishok

NBER Working Paper No. 6098
July 1997
JEL No. G12
Asset Pricing

The ability to identify the factors which best capture the covariation of systematic return is central to applications of multifactor pricing models. This paper uses a common dataset to evaluate the performance of various proposed factors in capturing comovements in return. Factors associated with the market, size, past return, book-to-market, and dividend yield help to explain return comovement on an out-of-sample basis (although they are not necessarily associated with large premiums in average returns). Except for the default premium and the term premium, macroeconomic factors perform poorly. We document regularities in the behavior of the more important factors, and confirm their influence in the Japanese and U.K. markets as well.

The Structure of Firm R&D and the Factor Intensity of Production

James D. Adams

NBER Working Paper No. 6099
July 1997
JEL Nos. D21, O32, L23, J23
Productivity

This paper examines the influence of the structure of firm R and D,

industry R and D spillovers, and plant-level physical capital on the factor intensity of production. By the *structure* of firm R and D, I mean its distribution across states and products. By *factor intensity*, I mean the cost shares of variable factors, which in this study are blue collar labor, white collar labor, and materials. I characterize the effect of the structure of firm R and D on factor intensity using a translog cost function with quasi-fixed factors. This cost function gives rise to a system of variable cost shares which depends on factor prices, firm and industry R and D, and physical capital.

I then estimate this system using a sample of plants owned by chemical firms. I find that total firm R and D, industry R and D spillovers, and plant-level physical capital are factor-biased towards labor as a whole, and factor-saving in materials. None of these three factors *consistently* increases the factor intensity of white collar workers relative to blue collar workers. Since white collar workers are the more skilled of the two grades of labor, none of these factors is strongly associated with *skill bias*.

When I turn to the structure of firm R and D, I find that its strongest effect on the factor intensity of white collar workers occurs when the R and D is conducted in the same product area as the plant. Indeed, the skill bias effect of firm R and D in the same product dominates all other variables, implying that skill bias is technologically "localized" within firms. All told, the findings suggest that skill bias is governed by *portions* of the firm's R and D program targeted on particular plants, rather than being transmitted through capital or by general firm and industry know-how.

Changes Over Time in Union Relative Wage Effects in Great Britain and the United States

David G. Blanchflower

NBER Working Paper No. 6100
July 1997
Labor Studies

This paper uses broadly comparable microdata at the level of the individual to examine the extent to which union relative wage effects vary across groups and through time. The main findings are: 1) The union wage gap averages 15 percent in the United States and 10 percent in Great Britain. 2) The gap is correlated positively with the (lagged) unemployment rate, and appears to be untrended in both countries. Union wages are sticky. 3) The size of the wage gap varies across groups. In both the United States and Great Britain, the differential is relatively high in the private sector, in non-manufacturing, for manual laborers, the young, and the least educated. 4) In the United States there are no differences by race or gender in the size of the differential. In Great Britain it is higher both for women and for non-whites. The fact that the differential has remained more or less constant in both Great Britain and the United States is a puzzle, particularly given the rapid declines in union membership in both countries. The evidence is not consistent with the widely held view that union power has been emasculated.

R&D and Productivity: The International Connection

Elhanan Helpman

NBER Working Paper No. 6101
July 1997
International Trade and Investment

Countries differ greatly in R and D spending, and these differences are particularly striking when comparing developed with developing countries. This paper examines the extent to which the benefits of R and D are concentrated in the investing countries. I argue that significant benefits spill over to other countries in the world. This argument is supported by quantitative estimates of such cross-country effects.

The Rising Well-Being of the Young

David G. Blanchflower and Andrew J. Oswald

NBER Working Paper No. 6102
July 1997
Labor Studies

Many observers believe that times are becoming harder for young people in Western society. This paper looks at the evidence and finds that the conventional wisdom is wrong. Using the U.S. General Social Surveys and the Eurobarometer Surveys, we study the reported happiness and life-satisfaction scores of random samples of young men and women. The data cover the United States and 13 European countries. Our main finding is that from the 1970s to the 1990s the well-being of the young increased quite markedly. We consider a number of possible explanations.

Saving, Investment, and Gold: A Reassessment of Historical Current Account Data

Matthew T. Jones and Maurice Obstfeld

NBER Working Paper No. 6103
July 1997
JEL Nos. F21, F32, N10
International Finance and Macroeconomics and International Trade and Investment

This paper revises pre-World War II current account data for 13 countries by treating gold flows on a consistent basis. The standard sources of historical data often fail to distinguish between monetary gold exports, which are capital-account credits,

and nonmonetary gold exports, which are current-account credits. The paper also adjusts historical investment data to explain changes in inventories. We use the revised data to construct estimates of saving and investment for the period from 1850 to 1945.

Our methodology for removing monetary gold flows from the current account naturally leads to a gold-standard version of the Feldstein-Horioka hypothesis on capital mobility. Our regression results broadly agree with those of Eichengreen, who found a significantly positive cross-sectional correlation between saving and investment, even during some periods when the gold standard prevailed. Despite reaching broadly similar conclusions, we estimate correlations between saving and investment that are somewhat lower and less significant than those that Eichengreen found. In particular, we find that in comparison to other interwar subsamples, the saving-investment correlation is markedly low during the fleeting years of a revived world gold standard, 1925–30.

An Empirical Investigation of Firms' Responses to Minimum Standards Regulations

Tasneem Chipty and Ann Dryden Witte

NBER Working Paper No. 6104
July 1997
JEL Nos. L15, L5, K3
Public Economics

Using firm level data for a nationally representative sample of markets, we study firms' responses to minimum standards and other forms of regulatory intervention on the probability of exit and the distribution of observable product quality. Our empirical work is motivated by the literature on quality and price competition in the presence of minimum standards. We find that minimum standards increase the probability that firms will exit certain markets. Moreover, we find that exit can cause both the average and the maximum quality observed in the market to decline. This perverse regulatory effect occurs when excessively high standards cause high quality firms to exit. When minimum standards do not lead to exit, they can increase the average and maximum quality of products in the market. Such standards not only can force low quality firms to raise their quality, but also may cause high quality firms to increase their quality, presumably in an attempt to alleviate price competition and to differentiate themselves from their now higher quality rivals.

The Sensitivity of Experimental Impact Estimates: Evidence from the National JTPA Study

James J. Heckman and Jeffrey A. Smith

NBER Working Paper No. 6105
July 1997
JEL Nos. C93, H43
Labor Studies

The recent experimental evaluation of the U.S. Job Training Partnership Act (JTPA) program found that training had negative effects on the earnings of disadvantaged male youth and no effect on the earnings of disadvantaged female youth. These findings provided justification for Congress to cut the budget of JTPA's youth component by over 80 percent. In this paper, we examine the sensitivity of the experimental impact estimates along several dimensions of construction and interpretation. We find that the statistical significance of the male youth estimates is extremely fragile, and that the magnitudes of the estimates for both youth groups are sensitive to nearly all the factors we consider. In particular, accounting for experimental control group members who substitute training from other providers leads to a much more positive picture regarding the effectiveness of JTPA classroom training. Our study indicates the value of sensitivity analyses in experimental evaluations and illustrates that experimental impact estimates, like those from nonexperimental analyses, require careful interpretation if they are to provide a reliable guide to policymakers.

Income, Schooling, and Ability: Evidence from a New Sample of Identical Twins

Orley Ashenfelter and Cecilia Rouse

NBER Working Paper No. 6106
July 1997
JEL No. I21
Children and Labor Studies

We develop a model of optimal schooling investments and estimate it using new data on approximately 700 identical twins. We estimate an average return to schooling of 9 percent for identical twins, but estimated returns appear to be slightly higher for less able individuals. Simple cross-section estimates are marginally biased upward. These empirical results imply that more able individuals attain more schooling because they face lower marginal costs of schooling, not because of higher marginal benefits.

Adverse Selection in Health Insurance

David M. Cutler and Richard J. Zeckhauser

NBER Working Paper No. 6107
July 1997
Health Care and Public Economics

Individual choice over health insurance policies may result in risk-based sorting across plans. Such adverse selection induces three types

of losses: efficiency losses from individuals being allocated to the wrong plans; risk sharing losses since premium variability is increased; and losses from insurers distorting their policies to improve their mix of insureds. We discuss the potential for these losses, and present empirical evidence on adverse selection in two groups of employees: Harvard University, and the Group Insurance Commission of Massachusetts (GIC, which serves state and local employees). In both groups, adverse selection is a significant concern. At Harvard, the University's decision to contribute an equal amount to all insurance plans led to the disappearance of the most generous policy within three years. At the GIC, adverse selection has been contained by subsidizing premiums on a proportional basis and managing the most generous policy very tightly. A combination of prospective or retrospective risk adjustment, coupled with reinsurance for high cost cases, seems promising as a way to provide appropriate incentives for enrollees and to reduce losses from adverse selection.

The Usual Suspects? Productivity and Demand Shocks and Asia-Pacific Real Exchange Rates

Menzie David Chinn

NBER Working Paper No. 6108
July 1997
JEL Nos. F31, F41
International Finance and Macroeconomics

This paper examines the evidence for a productivity-based explanation for real exchange rate behavior of East Asian currencies. Using data on sectoral output and employment, I calculate relative prices and relative productivities for China, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, Taiwan, and Thailand. Time-series regressions of the real exchange rate on relative prices indicate a role for relative prices for Indonesia, Japan, and Korea. In terms of real exchange rates and relative productivity ratios, there is a relationship for Japan, Malaysia, and the Philippines. Only when augmenting the regressions with real oil prices are significant relationships obtained for Indonesia and Korea. Panel regression results are slightly more supportive of a relative price view of real exchange rates. However, the panel regressions incorporating productivity variables, as well as other demand side factors, are less encouraging, except for a small subset of countries (Indonesia, Japan, Korea, Malaysia, and the Philippines). Surprisingly, government spending does not appear to be a determinant of real exchange rates in the region.

Internal and External Labor Markets: An Analysis of Matched Longitudinal Employer-Employee Data

John M. Abowd and Francis Kramarz

NBER Working Paper No. 6109
July 1997
JEL Nos. J31, D21
Labor Studies

We decompose the real, annual full-time compensation costs of 1.1 million French workers over a 12-year period into one part that reflects their external opportunity wage and one part that reflects their internal wage rate. Using these components of compensation, we investigate the extent to which firm size-wage differentials and interindustry wage differentials are attributable to variability in the external wage (that is, person effects) versus variability in the internal wage (that is, firm effects). For France, we find that most of the firm size-wage effect and most of the interindustry wage effect are attributable to person effects: differences in the external wage rates.

The Costs of Hiring and Separations

John M. Abowd and Francis Kramarz

NBER Working Paper No. 6110
July 1997
Labor Studies

In this article, we estimate the costs of hiring, separation, and retirement of employees for a representative sample of French establishments in 1992. We use data from three sources: the Wage Structure Survey (ESS); the Workforce Movement Questionnaire (DMMO); and the Occupational Structure Survey (ESE). We show that the estimated costs are generally asymmetric (hiring is cheaper than terminations), increasing, and concave functions of the number of entries or exits (either retirements or terminations). There is a fixed component to each of these costs that is related to the structure of the firm's personnel department. Our estimates imply that firms should not adjust gradually to the desired level of employment.

Minimum Wages and Youth Employment in France and the United States

John M. Abowd, Francis Kramarz, Thomas Lemieux, and David N. Margolis

NBER Working Paper No. 6111
July 1997
JEL Nos. J31, J23
Labor Studies

We use longitudinal individual data on wages and employment for young people in France and the United States to investigate the effect of intertemporal changes in an individual's status vis-à-vis the real minimum wage on employment transition rates. We find that movements in both French and American real minimum wages are associated with relatively important employment effects in general, and very strong effects on

workers employed at the minimum wage. In the French case, albeit imprecisely estimated, a 1 percent increase in the real minimum wage decreases the employment probability of a young man currently employed at the minimum wage by 2.5 percent. In the United States, a decrease in the real minimum wage of 1 percent increases the probability that a young man employed at the minimum wage came from nonemployment by 2.2 percent. These effects get worse with age in the United States, and are mitigated by eligibility for special employment promotion contracts in France.

NBER Historical Papers

Nutritional Status and Agricultural Surpluses in the Antebellum United States

Lee A. Craig and Thomas Weiss
NBER Historical Paper No. 99
April 1997
JEL Nos. N5, I1, Q1

We model the relationship among local agricultural surpluses, nutritional status, and height. We also test the hypothesis that adult height is correlated positively with the local production of nutrition in infancy. We rely on two samples of Union Army recruits: one all white, the other all black. In the white sample, a local protein surplus one standard deviation above the mean yields an additional 0.1 inches in adult height; a similar deviation in surplus calorie production yields an additional 0.2 inches. For blacks, however, the effect is probably negligible.

Manufacturing Where Agriculture Predominates: Evidence from the South and Midwest in 1860

Kenneth L. Sokoloff and Viken Tchakerian
NBER Historical Paper No. 100
April 1997
JEL Nos. N0, N5, O0, Q0

We use the 1860 Census of Manufactures to study rural antebellum manufacturing in the South and Midwest. We find that manufacturing output per capita was similar across regions in counties that specialized in the same agricultural products. The southern deficit in manufactures per capita appears to have been attributable largely to the very low levels of output in counties that specialized in cotton production. This implies that it was the South's capabilities for the highly profitable cotton production, not the existence of slavery per se, that was responsible for the region's limited industrial development, at least in rural areas. Our other major finding is that in both the South and the Midwest, measured total factor productivity was significantly lower in counties that specialized in wheat (the most seasonal of agricultural products in terms of labor requirements). This is consistent with suggestions that agricultural districts in which the predominant crops were highly seasonal in their requirements for labor were well suited to supporting manufacturing during the off-peak periods.

Wages in California During the Gold Rush

Robert A. Margo
NBER Historical Paper No. 101
June 1997
JEL No. N31

The California Gold Rush was a tremendously large unexpected shock that prompted the costly reallocation of labor to a frontier region. Using newly-collected archival data, this paper presents estimates of nominal and real wages in Gold Rush California. Consistent with a simple dynamic model of labor market adjustment, real wages rose sharply during the early years of the Rush (1848–52), declined abruptly following massive inmigration, and then remained constant for the remainder of the 1850s. However, although the Rush itself was a transitory event, it left California wages permanently higher. Estimates based on census data suggest that the supply of labor into Gold Rush California was about half as elastic as the supply of labor into Alaska during the Pipeline Era.

Sears Roebuck in the Twentieth Century: Competition, Complementarities, and the Problem of Wasting Assets

Daniel Raff and Peter Temin
NBER Historical Paper No. 102
June 1997

Sears Roebuck and Co. faced similar challenges in the 1920s and the 1980s. On the strength of the early period's strategic investment decisions, the company grew into the nation's largest retailer and a pervasive factor in the economy. In the later period, unanswered challenges nearly destroyed the company. We analyze the elements that contributed to the success in the 1920s and to the near disaster in the 1980s and place them in a broader and more systematic context. We argue that successful innovations combine a focus on an attractive market with an exploitation and even enhancement of a firm's existing competitive strengths.

NBER Technical Papers

Time-to-Build and Cycles

Patrick K. Asea and Paul J. Zak

NBER Technical Working Paper No. 211
May 1997
JEL Nos. E32, C61
International Finance and Macroeconomics

We analyze the dynamics of a simple growth model in which production occurs with a delay while new capital is installed (time-to-build). The time-to-build technology yields a system of functional (delay) differential equations with a unique steady state. We demonstrate that the steady state, though typically a saddle, may exhibit Hopf cycles on a measurable set of the parameter space. Furthermore, the optimal path to the steady state is oscillatory. We provide a counter-example to the claim that "models with a time-to-build technology are not intrinsically oscillatory." We also provide a primer on the central technical apparatus: the mathematics of functional differential equations.

An Efficient Generalized Discrete-Time Approach to Poisson-Gaussian Bond Option Pricing in the Heath-Jarrow-Morton Model

Sanjiv R. Das

NBER Technical Working Paper No. 212
June 1997
JEL Nos. G13, C63
Asset Pricing

Term structure models employing Poisson-Gaussian processes may be used to accommodate the observed skewness and kurtosis of interest rates. This paper extends the discrete-time, pure-Gaussian version of the Heath-Jarrow-Morton (HJM) model to the pricing of American-type bond options when the underlying term structure of interest rates follows a Poisson-Gaussian process. The Poisson-Gaussian process is specified using a hexanomial tree (six nodes emanating from each node), and the tree is shown to be recombining. The scheme is parsimonious and convergent. This model extends the class of HJM models by introducing a more generalized volatility specification than has been used so far, and inducting jumps, yet retaining lattice recombination, thus making the model useful for practical applications.

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