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Public Economics

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James M. Poterba*

Researchers in the NBER Public Economics Program study many of the core issues that have been at the center of recent national policy debates. While the Public Economics Program is broadly concerned with the economic role of government, an expansive definition that includes some research in virtually every sub-field of economics, two of its most important research themes are the economics of taxation and the analysis of social insurance programs.

Since the last Public Economics Program Report in 2001, the United States has undergone substantial tax reform in the form of the 2003 and 2004 tax bills. Because many of the tax reform provisions that were enacted in 2001 and 2003 are scheduled to expire later this decade, further tax reforms have already been enacted in a sense. Policy debate about the extension of these tax provisions, and about the structure of the tax system more generally, seems very likely to continue through the next few years.

Tax reform has been widely discussed and there have been substantial changes in the last five years. In contrast, Social Security reform has also been widely discussed, but there have been no significant changes in the program's structure. Public programs for retirement income support have been active topics of discussion in many industrialized nations. In the United States, the earnest discussion of Social Security reform began when a Presidential commission suggested several reform proposals in 2001. Since then, various policy analysts and legislators have advanced a range of different proposals for reform. They differ in the role that they envision for the government in providing retirement income, and in their potential effects on the long-run fiscal balance of the Social Security system. Medicare, which portends to become an even more costly entitlement pro-

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* Poterba directs the NBER's Program on Public Economics and is a Professor of Economics at MIT. In this article, the numbers in parentheses refer to NBER Working Papers.

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gram over the long-term future, has attracted less policy attention than Social Security.

The NBER Public Economics Program includes a very diverse group of researchers. Nearly 120 Faculty Research Fellows and Research Associates claim affiliation with the program, although only half of those researchers cite Public Economics as their primary affiliation. Program affiliates have a long tradition of analyzing tax policies and of studying social insurance programs such as Social Security. They also study a very wide range of other topics, including environmental economics, political economy, and health economics. Program members meet twice each year at program meetings, and again for a variety of workshops during the NBER Summer Institute. In the last four years, there have been eight program meetings and more than twenty Summer Institute group meetings. Since late 2001, program affiliates have disseminated 605 working papers, or more than one sixth of all NBER papers, and published six books and a number of special issues of academic journals.

One recent innovation in the Public Economics group is the creation of several working groups that tackle specific research issues related to various topics in public policy. One such group, which Martin Feldstein and I have co-directed, focuses on the Behavioral Responses to Taxation. Its members are drawn from the U.S. Treasury Department, the Congressional Budget Office, and the Joint Committee on Taxation, as well as from NBER's ranks. This group has met to discuss completed research about, and the research agenda for, the link between tax rates and various dimensions of taxpayer behavior such as labor supply, capital gain realizations, and the reporting of aggregate taxable income. The Working Group has scheduled meetings just before or just after Program Meetings, or during the NBER's Summer Institute, to maximize participation by the NBER affiliates. A second such group directed by NBER Research Associate Douglas Shackelford of the University of North Carolina focuses on Financial Accounting and Taxation. It includes researchers in the fields of accounting, finance, and public finance. Its agenda includes issues at the intersection of public

finance and accounting, for example explaining the growing disparities between book and tax income for U.S. corporations and evaluating the impact of various tax reform proposals on accounting earnings and corporate balance sheets.

A brief report such as this cannot do justice to the breadth of research that is carried out by Public Economics Program members while also explaining the substantive contributions of this research. I have therefore decided to focus here on four broad areas: taxation, social insurance programs, political economy, and the economics of the state and local government sector. Because taxation issues are studied exclusively by researchers in the Public Economics group, while Aging, Economic Fluctuations and Growth, and Well-Being of Children Program researchers study some of the other issues (and their research is described in other Program Reports), I will devote more than equal time to the issues related to taxation. I will describe how Program members have approached a variety of topics, and I will briefly summarize their key research findings. This report unfortunately excludes far more research than it includes, and I apologize to the researchers whose work is not mentioned in this summary.

The Economic Effects of Tax Reform

There have been three important federal tax changes in the last five years. The 2001 Economic Growth and Tax Relief Reconciliation Act reduced marginal tax rates under the federal income tax, although budgetary pressures necessitated temporary rather than permanent tax reductions. The 2003 Job Growth and Taxpayer Relief Reconciliation Act reduced marginal tax burdens on dividend income by as much as 20 percentage points for some households, thereby

significantly reducing the relative tax burden on dividends relative to corporate retained earnings that generate capital gains. The 2004 tax bill introduced a transitory tax holiday for firms repatriating earnings from foreign subsidiaries, and it created a range of specialized provisions to encourage specific business activities. Researchers in the NBER Public Economics Program have analyzed the economic effects of tax changes similar to those embodied in each of these tax bills. As data on taxpayer response to the tax reforms has become available, they have also provided a rapid evaluation of actual behavioral changes in response to tax rules.

The tax changes of 2001, which were temporary, phased-in gradually, and included an immediate tax rebate as a means of stimulating economic activity, have generated several lines of research on tax policy and household behavior. A number of studies have explored how consumers responded to the increase in aftertax income that resulted from the immediate tax rebate (10784, 9308). These studies suggest that most households spent between half and three quarters of their tax rebate within six months of receiving the rebate, and that the spending effects were greatest for households with low levels of financial wealth. Other research has examined how the changes in investment incentives affected corporate investment activity (10415), and how the reduction in individual income tax liabilities raised the importance of the Alternative Minimum Tax for many individual taxpayers (10072). One of the central issues in analyzing any tax reform that changes marginal tax rates is how it will affect the amount of taxable income reported on tax returns, since this determines the revenue effects of the tax reform. NBER researchers have played a central role in developing estimates of the elasticity of taxable income with respect to marginal tax rates, and recent work supports earlier findings

of a substantial reporting response to changes in tax rates (10273, 10044).

Taxable income is the sum of many components, each of which is may be affected to different degrees by changes in marginal tax rates and in the structure of the tax base. Not surprisingly, a substantial body of research has examined the components of taxable income and their sensitivity to the tax system. One item that has attracted attention is the mortgage interest deduction. It has been actively discussed of late because the President's Advisory Panel on Tax Reform suggested tightening current limits. Several recent studies have explored the economic effects of the current deduction rules and the distribution of the resulting tax deductions across income groups and geographic locations (10322, 9284). Because house prices differ widely, there are large differences in the average value of mortgage interest deductions across states, with much higher values on the East and West Coast than in Mid-western states. Other research has considered the effect of changes in the home mortgage interest deduction in other nations, with particular emphasis on the United Kingdom (11489, 9207).

Another active topic of research on the individual income tax is the link between current tax rules and incentives for entrepreneurial activity. Two studies have explored how the progressive structure of the individual income tax, and the interplay between the individual and the corporate income tax, affect entrepreneurial activity (9226, 9015). The important role that start-up businesses play in supporting research and development and encouraging job growth makes it important to understand how tax incentives affect the creation of new enterprises. Other topics that have attracted attention are the influence of tax incentives on purchases of health insurance and health care (10977, 9567, 8657, 9855), the link between taxation and labor supply

(10316, 10935, 10139, 9429, 8774), the sensitivity of capital gain realizations to marginal income tax rates (10275, 9674, 8745), the economic effects of excise taxes on goods such as cigarettes (8872, 8777) and alcohol (8562), and the impact of tax incentives on charitable giving (10374). The Earned Income Tax Credit and its effect on the labor supply of low-income households has been widely studied (11768, 11454, 11729). While many of these studies emphasize specific issues of income tax policy, NBER researchers are still examining the broad issues raised by fundamental tax reform, such as the economic effects of shifting toward a consumption tax (9492, 9596), the fundamental determinants of tax evasion (8551), the theory of optimal taxation (10490, 10407, 10119, 10099, 9415, 9046), and the accurate measurement of the distribution of tax burdens across households (8978, 8829).

Discussions of consumption taxation and of fundamental tax reform focus attention on the current tax rules that affect saving, and in particular on opportunities for earning before-tax returns in a variety of specialized accounts such as Individual Retirement Accounts and 401(k) plans. The analysis of retirement saving programs has been a very active area of research in Public Economics, and the ongoing research has drawn insights from behavioral economics (11518), financial economics, and many other sub-fields. In addition to studying how the availability of these saving programs affects wealth accumulation (11680, 9096, 8610), a number of studies have shown that participants in employer-provided saving programs are very sensitive to default options, peer behavior, and other considerations that are usually outside the neoclassical economics analysis of saving choices (11554, 11726, 9131, 8885, 8655). Research has explored the potential use of plan default provisions to encourage saving (11074) as well as the role that employer matching

of participant contributions may play in raising participation rates (10419). Another strand of research has considered how assets held in tax-deferred accounts should be valued from the perspective of a household trying to compute a balance sheet that includes both taxable and tax-deferred assets (10395). Related work has studied the asset allocation choices that households make when they participate in tax-deferred accounts, and it has contrasted these choices with the predictions of simple models of tax-efficient asset location (9268).

The tax changes of 2003 focused on the taxation of corporate capital income. By reducing the maximum individual income tax rate on dividend income to 15 percent, instead of the top rate of more than 35 percent that prevailed in previous years, the 2003 reform substantially reduced the tax incentive for firms to retain earnings or repurchase shares rather than to distribute cash dividends. NBER Public Economics researchers have been studying the link between tax rules and corporate financial policy since the program was created, as the “Business Taxation and Finance” group, nearly thirty years ago. Not surprisingly, the dramatic change in dividend tax burdens stimulated many new research projects. These include new studies of the responsiveness of dividend payout with respect to tax rates (10321, 10391, 10572, 10841, 11449), and of the impact of the 2003 tax reform on the market value of firms with different payout policies (11452). The empirical findings suggest that in the months following the dividend tax reduction, firms increased dividend payouts at a rate that had not been seen for several decades. The tax change was a catalyst that reversed a decades-long decline in corporate dividend payout. Many firms that were paying dividends increased their payouts, and many other firms initiated cash dividends. Research on dividend policy has moved beyond the simple documentation of higher pay-

out rates to study how firm characteristics, such as stock option holdings of top managers, affected the change in payout in the aftermath of the tax change. Dividend increases were smaller at firms where managers have substantial holdings of options that would decline in value if the firm paid out earnings as dividends than at firms without such executive option holdings (11002).

While the tax treatment of dividends has attracted particular attention in the last two years, NBER researchers have also studied many other aspects of corporate income taxation. The decline in corporate tax payments during a period of high profitability, and the popular claim that U.S. corporations were moving operations offshore to reduce their tax burden, have attracted an expanding set of researchers to issues of corporate taxation. Two recent studies have explored the source of the decline in corporate tax revenues (9477, 9535), and a substantial body of research has investigated the effect of international tax rules on the behavior of multinational firms (11717, 11196, 10806, 10936, 8854). These studies generally find that large disparities in effective tax burdens across nations have the effect of shifting the geographical pattern of reported income and of some corporate activities, although international tax considerations do not appear to fully account for changes in corporate tax receipts over time. Other studies have analyzed the determinants of corporate tax avoidance and tax planning (11241, 11341, 10858, 10690, 10471, 11504) and the interplay between tax avoidance and financial fraud (10978). Researchers have investigated the differences between taxable income and book income, and the potential consequences of moving toward a tax system that relied to a greater extent on book income for the computation of tax liability (11067, 8866), as well as the role of new and sophisticated financial products in affecting corporate income tax liabilities (9243).

Much of the recent research on corporate income taxation has focused on emerging issues in the corporate sector, and a number of studies have linked this work back to long-standing concerns such as the economic incidence of the corporate income tax (11686, 9916, 9374). Other studies have also explored potential reforms of the current corporate tax structure by analyzing the design of cash-flow corporate taxes in open economies (10676, 9843) and the way that the General Agreement on Tariffs and Trade (GATT) might treat various changes in the apportionment rules that are applied to the worldwide income of multinational firms (9060).

The individual and the corporate income taxes are the focus of most Public Economics research on tax policy, but there is always some research on other tax instruments. Several recent studies have examined the estate tax and tried to summarize its incentive effects, both in theoretical models (11408) and in practice (9456, 11025, 9661, 11767). One explanation for the substantial flow of wealth from one generation to the next is that elderly households hold wealth to prepare for the possibility of late-life medical needs or other costs. This suggests that the impact of the tax code on household behavior may be affected by the structure of insurance markets. An emerging literature is beginning to explore this interaction (11185).

Most of the research described above focuses on the detailed provisions of the tax rules affecting individuals or firms. But the unusual nature of the 2001 tax changes, in particular their temporary character and the role of budgetary rules in leading Congress to enact such tax policies, has stimulated new research on the broad subject of budget rules and the link between such rules and policy outcomes such as the budget deficit. Researchers have studied the effect of sunset provisions on budget outcomes (10694), the potential impact on federal

taxes and spending of unifying the budgets of the Medicare and Social Security trust funds with the rest of the budget (10953), and the link among anti-deficit rules such as limits on government borrowing and fiscal policy outcomes (10788, 11065). More generally, recent policy debates concerning federal deficits have led to renewed interest in the evolution of fiscal policy in the United States and elsewhere (11630, 11600, 10788, 10023, 9012), and to new analyses of how budget deficits and government debt levels affect interest rates (10681). Recent research on this issue has moved beyond earlier studies that considered only the contemporaneous correlation between asset markets and deficits, and begun to model expected future fiscal policy and its impact on interest rates.

Social Security and Other Social Insurance Programs

One of the reasons that long-term fiscal policy projections have attracted so much interest is the impending growth of Social Security and Medicare, programs that provide retirement income and health insurance to elderly households. These programs represent the federal government's largest long-term commitments. It is therefore no surprise that these programs have been the focus of an active research agenda by scholars affiliated with the Public Economics Program. Much of this research is also part of the NBER Programs on Aging and on Health Care, and is consequently summarized in other Program Reports. Because the issues in Social Security reform are particularly central to public economics, I will describe several components of this research, and then discuss social insurance research more generally.

A number of studies have considered the long-term fiscal health of the Social Security program and computed the present discounted value of promised payouts less projected taxes, as well

as the sensitivity of such calculations to various assumptions (11060, 10969, 10085, 9845). Other work has examined popular perceptions of future Social Security benefits (9798); these perceptions can have an important effect on current saving decisions.

The projected shortfall of Social Security payroll taxes relative to benefit payments has stimulated numerous proposals for Social Security reform in the United States (8592, 11098). Some researchers have explored the aggregate efficiency effects of adopting a "private accounts" Social Security program (11622, 11101). Others have focused on specific design features of "private accounts" programs, such as alternative asset allocation restrictions and return guarantee programs for such accounts (11300, 11084, 9195, 8906, 8732, 8731). The experience of Chile, a nation that adopted a privatized account system in the early 1980s, has been carefully chronicled (8924), and researchers have tried to predict the labor market effects of a private accounts system (10305). An important strand of research has considered the labor market effects of existing Social Security programs either by exploiting international differences in Social Security programs to generate differences in retirement incentives (11290, 9407) or by examining the incentives created by the Social Security program in the United States (10905, 9183, 10030). Social Security redistributes resources within cohorts as well as across generations, and recent research has examined how the Social Security program has affected the economic status of the elderly and its distribution (10466, 8911, 8625).

While a substantial group of NBER researchers studies issues related to Social Security, an even larger group investigates the wide array of other social insurance programs that currently operate in the United States and other developed nations. This research touches on many

different programs and topics. Some work offers theoretical guidelines for the design of social insurance programs (11386, 11250, 10792). Two central issues that arise in evaluating any social insurance program are: the extent to which the program alleviates the problem that it is designed to address and the extent to which it causes unintended distortions in the behavior of recipients (8730). Many studies have examined one or both of these issues in the context of specific social insurance programs, such as unemployment insurance (11760, 10500, 10443, 10043), the Supplemental Security Income program (11568), Medicaid (9058), Temporary Assistance for Needy Families (TANF) (8749), disability insurance (9155, 9148, 10219), housing assistance programs (8709), and child care subsidy programs (9693). Other studies focus on various aspects of behavioral response that arise in a number of different social insurance programs. These include the effect of such programs on household saving (10487), the decision of households with regard to benefit take-up (10488, 9818), the impact of social insurance and transfer programs on labor supply (9168), and the link between social insurance programs and living arrangements (8774). As a result of empirical studies such as these, policymakers have a much better description of the key inputs to social insurance program design.

Researchers in public economics have long recognized that it is important to study government-provided social insurance programs in a broad context that recognizes the many other ways in which resources may be transferred to households that experience adverse economic shocks of various kinds. Transfers within families are one such alternative mechanism. Recent research has emphasized two others: private insurance markets and transfers from religious organizations. Some research has considered how imperfections in private insurance markets can provide a rationale for the

creation of government-provided social insurance programs, while other work recognizes that the provision of social insurance may alter the operation of private insurance markets (11039, 10989, 9714, 9031). The welfare effects of public programs can be very sensitive to the private market response. Studies of charitable work by religious organizations, and how such work is affected by the provision of government transfer programs, represent a new direction for public economics researchers. Analysis of transfers during the New Deal suggests that as public spending on anti-poverty efforts increased, private spending through church-based relief efforts declined. This suggests a novel channel of crowd-out that has not been documented heretofore. Future research on social insurance will undoubtedly continue to explore both the way that potential beneficiaries respond to public programs, and the effect of public programs on other components of the economic support network.

Political Economy, Legislative Structure, and Policy Outcomes

Much of public economics is concerned with the consequences of various government policies. Research on the incidence of various taxes and on the behavioral effects of various transfer programs fits this description. An important and growing strand of research, however, seeks to understand the link between political institutions and policy outcomes. This work asks why certain policies are enacted, not how such policies would affect economic activity. This research on “political economy” crosses several NBER Programs, including Economic Fluctuations and Growth, Industrial Organization, and Public Economics.

There are many different elements of political economy research within the

Public Economics Program, but many of them are united by a central focus on the determinants of electoral or legislative rules, and the consequences of different rules. Some work offers an explanation for the political factors that underpin the choice of different electoral rules in different U.S. cities (11236). Another strand of research examines the factors that influence bargaining power within legislatures (10530, 8973) and the link between such power and legislative outcomes (10385, 9748). A third group of studies examine an even more general set of issues about the links between electoral rules, the structure of political parties, and the choice of economic policies (10176, 10040). Political institutions are increasingly recognized as affected by the underlying tastes of voters, the power of various interest groups, and the history of political jurisdictions (9006).

The recognition that political institutions matter for policy outcomes raises the related question of whether one set of institutions may be more efficient in responding to some types of economic problems than another institutional structure. One specific context in which researchers have explored this question concerns the choice between an appointed regulator and an elected politician as the decisionmaker in particular settings (10241). The findings suggest that politicians will be more likely to outperform regulators in settings that require compensating the losers from a policy action, that do not involve specialized technical expertise, and that do not feature small but powerful vested interests that benefit from or lose from the policy choice.

Another broad issue of interest in political economy concerns “election mechanics.” This area is concerned with the factors that affect voting, campaign spending, candidate selection, and electoral outcomes. One example of such research is the attempt to understand and explain the apparent electoral advantage of incumbent officeholders (10748).

Another is the analysis of voter participation. Several studies have explored economic and other factors that influence voter turnout (9896, 8720, 10797, 11794), as well as the likelihood that an election is close enough for an individual voter to rationally believe that she might have a significant chance of affecting the outcome (8590). Other work explores the effect of campaign finance rules on the influence of interest groups and on policy outcomes (9601, 8693), and the broad question of what determines the total amount of campaign contributions and campaign spending (9409).

One intriguing line of research explores how the identity of elected officials, which may be affected by electoral rules, influences policy outcomes. This work evaluates an Indian electoral reform that reserved a significant share of elected positions on local councils for women candidates (8615). After this electoral reform, the set of policies chosen by the local councils shifted toward support for public programs that would be particularly beneficial for women rather than men. These findings reinforce other studies that suggest the important role played by electoral institutions that affect the characteristics of winning candidates.

State and Local Public Finance

While much of the tax policy debate in recent years has centered on the federal government, many important and ongoing tax policy issues affect state and local governments. Recent research by Public Economics Program affiliates has examined a number of these issues. There are wide disparities in fiscal structure across states and localities. This provides much wider variation in tax policies than at the federal level, and also results in large differences across locations in fiscal balance (11203).

A key issue in state and local public

economics, as in its federal counterpart, is the behavioral response of taxpayers confronting the tax system. An example of research related to this issue is a study of how property tax measures that grandfather a taxpayer's taxable property value affect homeowner mobility (11108). School finance also provides many opportunities for analyzing taxpayer response. Recent work has analyzed school finance reform programs in specific states, such as Texas (10722), and looked at the effect of state-level aid programs on the tax and spending decisions of local school districts (10701). A feature that distinguishes state tax analysis from its federal counterpart is the possibility of taxpayer mobility across jurisdictions. One study (10645) explores the effect of such mobility in the context of state estate taxes, and finds some evidence suggesting that older taxpayers with substantial estates migrate to states with low estate taxes. Another study examines the impact on local finances of winning a multi-jurisdiction battle for a new plant (9844). A third study explores how the ease of inter-jurisdictional mobility affects the relationship between tax rates and revenue collections (9686).

Other Directions for Research

The research summarized in the four foregoing topic areas represents only a fraction of the work carried out by Public Economics researchers. Several other studies, not mentioned above, illustrate this range. Program affiliates have studied the design of terrorism insurance (10179, 9271), the detection of teacher cheating on behalf of students taking standardized tests (9413, 9414), and the effects of differential tax treatment of different sized families on fertility behavior (8845). Because the public sector is involved in some way with virtually every aspect of modern life in industrial democracies, researchers interested in this field have

found, and, I expect, will continue to find, an astonishing array of research topics to study.

Government Service

In part because members of the Public Economics Program devote their energies to studying government policies, they are frequently invited to serve in various governmental roles. A substantial fraction of the Research Associates in the Program have devoted part of their careers to high-level policy advisory roles. This historical pattern has continued in recent years, as many program affiliates have taken a break from their academic research and spent time in policymaking roles in Washington. Research Associate R. Glenn Hubbard served as the Chairman of the Council of Economic Advisers (CEA), while Harvey Rosen, Mark McClellan, and Katherine Baicker have served, or are serving, as members of the CEA. In addition to his role at CEA, Mark McClellan has also served as Commissioner of the Food and Drug Administration and as Director of the Centers for Medicare and Medicaid Statistics. Jeffrey R. Brown has been nominated to the Social Security Advisory Board. I served on the President's Advisory Panel on Federal Tax Reform in 2005. Douglas Holtz-Eakin served as the Chief Economist of the Council on Economic Advisors, and then as Director of the Congressional Budget Office. Mervyn A. King was appointed Governor of the Bank of England in 2003. While some members of the Public Economics Program make lifetime commitments to participate directly in the policy process, and they serve in a variety of policy roles, many other members have taken only a single job in Washington and then returned to their academic careers.

The Contribution of Science and Technology to Production

James Adams*

Economists have long recognized that knowledge is a factor of production, and even the most important factor, given its role in labor quality and the design of capital goods. Still, it is one thing to assert a general proposition and quite another to provide confirmation of it in detail. My research is part of a larger initiative at NBER that seeks to provide this information. In essence, the work is a search for tangible evidence of flows of knowledge, specifically scientific and technical knowledge, followed by an examination of their effects on firms and other institutions. Of course private incentives, internal organization, public policy, and legal structure all affect the use of science and technology by firms, universities, and federal laboratories. Thus, broader aspects of modern economies and of modern economics govern the role of knowledge in production. These provide many opportunities for research.

The basic idea of the research is to begin by specifying a vector of stocks of past knowledge flows in the production function. The production function may specify outputs of final or intermediate goods or it may specify increments of new knowledge, such

as industrial inventions or discoveries in basic science. From this root idea there flow a number of subsidiary ideas. One is the reshaping of goods production and the redirection of Research and Development (R and D) that result from the accumulation of knowledge. A second is the distinction between knowledge that is internal to an organization, and outside knowledge, or knowledge spillovers. A third theme is the importance of limitations on flows of outside knowledge or knowledge spillovers that are imposed by absorptive capacity, human and institutional constraints, and the intrinsic relevance of the information. A fourth theme is the comparable importance of basic and often academic science for production, besides that of industrial R and D. Finally, the research recognizes the role that contract design and public policy play in deliberate knowledge transfer between firms and outside R and D performers. These in turn influence the limits of the firm in R and D. In pursuing each of these themes, the design, collection, and assembly of new and high quality economic data forms a critical part of the work.

Characterizing the Contribution of Knowledge

Using data on plants owned by chemical firms that span manufacturing, I have found that firm R and D in the same product area as the plant is

biased towards skilled labor, so that the skill bias of firm R and D is localized in technology space.¹ In addition, firm and industry R and D shift investment in plant capital towards equipment capital. This link should not be overlooked because equipment turns out to be skill-biased. Thus the skill bias of R and D takes place through two distinct channels, a direct one that operates through the small part of R and D that is targeted on the plant, and an indirect and potentially much larger one that operates through the accumulation of equipment capital.

The accumulation of outside knowledge, or knowledge spillovers, could alter the rate and direction of industrial R and D. Using survey data from industrial R and D laboratories as well as historical case studies, I find that outside knowledge shifts R and D effort towards learning about external research and away from internal research.² Similarly, in cross-equation tests I find that university R and D increases learning expenditures targeted on academia, and industrial R and D increases learning expenditures devoted to industry, but not conversely. These results are observationally consistent with the view that outside opportunities alter the composition of industrial R and D, presumably in more profitable directions, and are consistent with the historical case studies.

In all of this research, where the

* Adams is a Research Associate in the NBER's Productivity Program and is a Professor of Economics at Rensselaer Polytechnic Institute. His profile appears later in this volume.

data allow a comparison I find statistically significant effects of university science as well as industrial R and D on industrial R and D and industrial patents.³ Thus basic science as well as applied research and development are important to industrial research.

Another set of findings concerns limits on the influence of outside knowledge on R and D performing firms. In work with Adam Jaffe, I find that the effect of firm R and D on plant productivity is amortized by geographic and technological distance. We also find that the number of plants in a firm and industry dilute the impact on productivity of firm R and D and of industry R and D spillovers.⁴ These results suggest restrictions that may apply to economy-wide returns from spillovers. In other work, I find that knowledge spillovers from universities are more localized than spillovers from other firms.⁵ This finding is curious because published findings should not be localized. The puzzle is explained by the industry-university cooperative movement, which encourages firms to work with local universities. The universities are subject to incentives that allow firms to make use of their capabilities and to gain access to the wider world of scientific research. The same is not true of access to proprietary knowledge in other firms.

Channels of Knowledge Flow

In work with J. Roger Clemmons and Paula Stephan that uses data on scientific publications, a counterpart to industrial patents, I also find that technological distance and other factors limit knowledge flows among universities.⁶ In this case we explore a citation channel of knowledge flow that is conditional on reading and afterwards contributing to the science literature. The size of the channel is summed up by the citation probability. This equals actual

citations divided by potential citations within cells that are classified by citing and cited fields and years. We estimate citation functions using the citation probability as the dependent variable, where field and year effects are the independent variables.⁷ Assuming that citations represent scientific influence of papers cited, this probability is equivalent to a utilization rate of cited literature by an average citing paper. Thus, our finding that the citation probability is 10 to 100 times greater within fields than between fields can be read to imply that field boundaries amount to technological barriers, in part because of decreased relevance. The fact that cross-field citation parameters resulting from the estimation are statistically significant in less than one fourth of the possible cases only serves to reinforce this conclusion. In the same paper we find within fields that citation probabilities are greater from lesser universities to top universities than conversely, and we find that citations to peer institutions increase with rank. These results suggest that scientific influence increases with quality of university departments, which levels the capabilities of diverse institutions, but that reinforcing effects of quality among peer institutions may instead sustain differences in the capabilities of institutions.

In assessing the significance of the citation channel it is important to consider alternative channels of knowledge flow. This is despite the fact that in the literature of industrial R and D, one key channel of knowledge flow is found to be the scientific literature. The citation channel can be thought of as disembodied and informal, in that it does not require meetings or formal knowledge-sharing agreements, but it is not all-inclusive.⁸ In recent research with J. Roger Clemmons, Grant Black, and Paula Stephan, which uses the same data on publications as the citation study, I have explored an alternative

channel of collaboration in science.⁹ As an alternative to citation, collaboration is undoubtedly more costly and more time-intensive but it offers the chance to acquire tacit knowledge that would not be available otherwise.

The paper describes trends and cross-sectional patterns in scientific teams measured by authors per paper, and in institutional collaboration, measured by the location of team members in separate institutions. The data are steeply trended. Team size increases by 50 percent over the sample period. However, counts of institutions per paper increase by 60 percent. Counts of foreign institutions, while comparatively rare, increase by five-fold. We conclude that team workers in science are becoming more geographically and even internationally dispersed. This trend accelerates around the start of the 1990s, suggesting a decline in costs of collaboration. Our hypothesis is that the deployment of NSFNET and its connection to networks in Europe and Asia in the late 1980s are responsible for this change. The hypothesis is not unreasonable, given research and journal publication lags.

In addition the paper explores reasons for teams and institutional collaborations. We find that more highly ranked departments, departments whose scientists have earned prestigious awards, departments with larger stocks of federal R and D, and departments in private universities are more likely to form large teams and to engage in institutional collaboration. In the case of firms and foreign institutions especially, we find that placement of graduate students significantly increases collaboration. Finally, the evidence suggests that scientific output and influence increase with team size and institutional collaboration. Since these factors imply an increase in the division of labor, the results suggest that scientific productivity increases with the scientific division of labor.¹⁰

Limits of the Firm in R and D

Consistent with the literature of Property Rights Economics, contractual design and public policy clearly influence the extent to which firms turn to outside partners for complementary R and D assets and the extent to which they benefit from knowledge transfer.¹¹ In papers that use the data on R and D laboratories alluded to in earlier sections of this article, I have explored this aspect of the practice of industrial R and D.

In work with Eric Chiang and Jeffrey Jensen, I find that Cooperative Research and Development Agreements (CRADAs) comprise the main channel by which federal laboratories increase patents as well as firm R and D.¹² The CRADA effect survives controls for simultaneous equation bias, it survives inclusion of alternative effects of federal laboratories on firms, and it is consistent across patents and R and D expenditure in industrial laboratories. While subject to justifiable skepticism about the usefulness of incentives in this setting, the results suggest that CRADAs may be beneficial precisely because of the mutual effort that they require of firms and government laboratories. In another paper with Chiang and Katara Starkey, I have found that Industry-University Cooperative Research Centers (IUCRCs) also contribute to research productivity of industrial laboratories.¹³ Their effect entails the participation of university researchers in consulting, collaboration and placement with firms. Both CRADAs and IUCRCs are incentive-based policy initiatives put in place around 1980 whose aim was to promote knowledge transfer from the public sector to private industry. The evidence contained in the two papers suggests that they may have had an effect. Finally, in a third paper with Mircea Marcu I explore the behavior of R and

D sourcing in industrial laboratories.¹⁴ In this paper we find that sourcing appears to be driven by sentiments towards Research Joint Ventures (RJVs), the option to purchase and acquire, and research with federal laboratories. When we turn to the effects of sourcing, the evidence suggests that the primary motive is that of cost-saving. This contrasts with RJVs, which contribute to new products, and with internal research, which contributes to both patents and new products. All of this suggests that deliberately shared R and D comes in different varieties designed to meet different objectives of firms.

Ongoing Research

Along with coworkers, I continue to study the role of science and technology in production. At present we are engaged in a study of the factors that determine the speed of diffusion of scientific research across sectors and fields of science, including a comparison of the speed of diffusion of science with that of patented technology. We are also engaged in studies of the determinants of industrial scientific discovery, of the relationships between firm patents and stock market value, and scientific research both inside and outside the firm. I continue to pursue longstanding interests in research contributions of the university system.¹⁵ This system is not only a current hotbed of ideas, but the health of the system going forward may prove critical to the United States and other economies. In conclusion, I am confident that the study of the contributions of science and technology to the economy will provide grist for the economists' mill for years and even decades to come.

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² J. Adams, "Endogenous R&D Spillovers and Industrial Research Productivity," NBER Working Paper No. 7484, January 2000, revised and extended, and published as "Learning, Internal Research, and Spillovers," *The Economics of Innovation and New Technology* 15 (January 2006): pp. 5–36.

³ J. Adams, "Learning, Internal Research, and Spillovers," and J. Adams, "Comparative Localization of Academic and Industrial Spillovers," NBER Working Paper No. 8292, May 2001, and J. Adams, "Comparative Localization of Academic and Industrial Spillovers," *The Journal of Economic Geography* 2 (July 2002): pp. 253–78, reprinted in *Clusters, Networks, and Innovation*, S. Breschi and F. Malerba, eds, forthcoming, Oxford University Press.

⁴ J. Adams and A. Jaffe, "Bounding the Effects of R&D: An Investigation Using Matched Firm-Establishment Data," NBER Working Paper No. 5544, April 1996, and J. Adams and A. Jaffe, "Bounding the Effects of R&D: An Investigation Using Matched Firm-Establishment Data," *RAND Journal of Economics* 27 (Winter 1996): pp. 700–21.

⁵ J. Adams, "Comparative Localization of Academic and Industrial Spillovers."

⁶ J. Adams, J.R. Clemmons, and P. Stephan, "Standing on Academic Shoulders: Measuring Scientific Influence in Universities," NBER Working Paper No. 10875, November 2004, forthcoming in *Les Annales d'Economie et de Statistique*.

⁷ A. Jaffe and M. Trajtenberg, "International Knowledge Flows: Evidence from Patent Citations," *The Economics of Innovation and New Technology* 8 (1999): pp. 105–36.

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⁹ J. Adams, G. Black, J. R. Clemmons, and P. Stephan, "Scientific Teams and Institutional Collaborations: Evidence from U.S. Universities, 1981–1999," NBER Working Paper No. 10640, July 2004, and J. Adams, G. Black, J. R. Clemmons, and P. Stephan, "Scientific Teams and Institutional

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¹⁰ J. Adams, G. Black, J. R. Clemmons, and P. Stephan, “Scientific Teams and Institutional Collaborations: Evidence from U.S. Universities, 1981–1999.”

¹¹ D. Mowery, “The Boundaries of the U.S. Firm in R&D,” in *Coordination and Information: Historical Perspectives on the Organization of Enterprise*, N. Lamoreaux and D. Raff, eds., Chicago: University of Chicago Press for NBER, 1995.

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¹³ J. Adams, E. Chiang, and K. Starkey, “Industry-University Cooperative Research Centers,” NBER Working Paper No. 7843, August 2000, and J. Adams, E. Chiang, and K. Starkey, “Industry-University Cooperative Research Centers,” *The Journal of Technology Transfer* 26 (January 2001): pp.73-86.

¹⁴ J. Adams and M. Marcu, “R&D Sourcing, Joint Ventures, and Innovation: A Multiple Indicators Approach,” NBER Working Paper No. 10474, May 2004.

¹⁵ J. Adams, “Fundamental Stocks of

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Foreign Direct Investment Behavior of Multinational Corporations

Bruce A. Blonigen*

There is increasing recognition that understanding the forces of economic globalization requires looking first at foreign direct investment (FDI) by multinational corporations (MNCs): that is, when a firm based in one country locates or acquires production facilities in other countries. While real world GDP grew at a 2.5 percent annual rate and real world exports grew by 5.6 percent annually from 1986 through 1999, United Nations data show that real world FDI inflows grew by 17.7 percent over this same period! Additionally, MNCs mediate most world trade flows. For example, Bernard, Jensen, and Schott find that 90 percent of U.S. exports and imports flow through a U.S. MNC, with rough-

ly 50 percent of U.S. trade flows occurring between affiliates of the same MNC, or what is termed “intra-firm trade”.¹

Despite the obvious importance of FDI and MNCs in the world economy, research on the factors that determine FDI patterns and the impact of MNCs on parent and host countries is in its early stages. The most important general questions are: what factors determine where FDI occurs, and what impacts do those MNC operations have on the parent and host economies? As I discuss in a recent survey of the empirical literature addressing the first question — the determinants of FDI decisions — the answers are not straightforward.² In particular, the literature has shown that we cannot simply conclude that factors such as exchange rates or tax policies have an unambiguous general impact on FDI patterns. Instead, meaningful insights come from developing

hypotheses about, say, when a factor should matter for FDI, or even just a particular form of FDI, and then finding creative ways to test these hypotheses in the data.

Exchange Rates and FDI

One good example of this is the effect of exchange rate movements on FDI. For years, the conventional theory was to compare FDI to bonds, for which exchange rate movements do not affect the investment decision. A depreciation of the currency in the host country reduces the amount of foreign currency needed to purchase the asset, but it also reduces the nominal return one receives in the foreign currency. Thus, the rate of return for the foreign investor does not change. Empirical studies of FDI seemed to confirm this, often finding insignificant effects of exchange rates. In contradiction to this, the popular press

* Blonigen is a Research Associate in the NBER’s Program on International Trade and Investment and the Knight Professor of Social Science at the University of Oregon. His profile appears later in this issue.

often points to host-country exchange rate depreciations as a contributing factor to inward foreign investment booms, and worries about the selling of key national technological assets.

I find a resolution to this puzzle by considering FDI that involves firm-specific assets (such as patents or managerial skills) — the type of assets previous literature established as crucial to formation of MNCs and FDI.³ Such assets are typically intangible and easily transferred across a firm's operations. Thus, the purchase prices of such assets through FDI are in the host-country's currency, but returns can be generated anywhere the firm operates and are not necessarily tied to the home country's currency. This means that host-country currency depreciations theoretically can lead to increased acquisition of FDI, particularly of firms that have firm-specific assets. This hypothesis is strongly confirmed for a panel of acquisitions of U.S. firms by Japanese and German firms and provides evidence for the notion in the popular press that currency depreciations ease foreign firms' purchases of U.S. host-country technological assets.

Taxes and FDI

Another factor that the literature finds does not affect FDI in a straightforward manner is tax policy. MNCs are potentially subject to taxation in both the host and parent country. However, most parent countries have policies to reduce or eliminate double taxation of their MNCs. James R. Hines, Jr. and co-authors have shown that the way in which parent countries reduce double taxation on their MNCs (for example, allowing credits or deductions) can have quite different implications for FDI activity.⁴

Many countries also have negotiated bilateral investment treaties (BITs) to mutually reduce withholding taxes on

MNCs based in the other country. The Organisation for Economic Co-operation and Development (OECD) has been a big advocate of BITs as a way to enhance FDI across member countries. Others contend that BITs are mainly intended to share tax information across countries in order to deter tax evasion and to reduce administrative costs and, thus, should have little, or even negative, effects on FDI flows.⁵ Ron B. Davies and I examine whether the empirical evidence suggests that such treaties increase FDI flows across nations, as the OECD and many economists presume.⁶ In separate studies, we examine the evidence for the U.S. and for OECD BITs, respectively, in panel data that span a variety of bilateral country pairs over time. Across these various samples and numerous specifications, we find little evidence that these BITs increase FDI activity, a surprising result in light of OECD promotion of these treaties.

Trade Protection and FDI

The notion that trade protection encourages FDI is folk wisdom for economists, so much so that it is rarely examined empirically. But my research into this relationship has also yielded surprises. In a study examining all U.S. antidumping trade protection actions from 1980 through 1995, I find that FDI responses to these trade actions (tariff-jumping FDI) occur only for firms with previous experience as MNCs.⁷ Most firms facing such trade policies (many from developing countries) have no such experience and do not respond with FDI. Instead, these firms must face either significant antidumping duties or go through the costly process of raising U.S. prices and requesting recalculations of the duties.⁸ For domestic firms, whether foreign firms tariff-jump the antidumping duties matters significantly. Work with

Tomlin and Wilson finds that domestic firms experience a 3 percent increase in expected discounted profitability from antidumping duties unless the foreign firms subject to the duties decide to tariff-jump, in which case the domestic firms do not experience any increase.^{9,10}

Information and FDI

An almost unexplored issue in the literature has been the role of information on FDI decisions. FDI requires substantial fixed costs of identifying an efficient location, acquiring knowledge of the local regulatory environment, and coordination of suppliers. Thus, access to better information about some host countries may make FDI to that location more likely. Ellis, Fausten, and I find an interesting avenue for investigating this hypothesis using information on Japanese industrial groups called *keiretsu*.¹¹ Horizontal *keiretsu* are groups of firms across a wide range of industries, typically centered around a main bank that owns significant shares in these firms. A number of studies have focused on the potentially favorable financing received by *keiretsu* firms from their main bank as one impetus for greater investment by these firms, including FDI — but the evidence is mixed on this. However, the major firms in a *keiretsu* also get together on a regular basis in what are termed Presidential Meetings and presumably share information more than other firms would. My work with Ellis and Fausten examines whether this information affects FDI choices, by estimating how much prior-year FDI by members of a firm's *keiretsu* in a particular host country increases the likelihood that the firm will also choose that country for its FDI. We find that prior-year investment by a firm in the same *keiretsu* will raise a firm's probability of locating an investment in that same host country by about 20 percent.

A related paper with Wooster examines whether U.S. firms increase overseas investments when a new CEO who is foreign-born takes over.¹² Our examination of CEO turnover among Fortune 500 firms in the 1990s does show evidence of significant increases in FDI when a “foreign” CEO takes over. It is difficult to disentangle whether such an effect is attributable to better information of foreign markets by the foreign CEO or to different personal preferences influenced by a less U.S.-centric perspective. Regardless, the results suggest that there are likely other important factors behind FDI patterns than the standard economic ones so often mentioned in the literature.

Estimating Long-Run General-Equilibrium Determinants of FDI

Much of the literature described to this point motivates analysis with partial equilibrium models of individual firm-level FDI decisions. But we also want to have empirical specifications of FDI that are grounded in theory and that do a good job of explaining FDI patterns across the world. Researchers looking at world FDI patterns have generally used variations of a gravity framework to model FDI, specifying parent- and host-country GDPs along with distance as core determinants of FDI. These models seemingly do well to describe FDI patterns statistically, but while Anderson and van Wincoop have solidified an appropriate gravity specification as theoretically valid for trade patterns, it is not clear this is true for FDI patterns.¹³

Of course, deriving a theoretically based empirical specification of FDI is a fairly complicated problem. General equilibrium theoretical models of MNCs and their FDI activities only first began to be developed in the mid-1980s with Markusen’s development of a hor-

izontal model of FDI where an MNC replicates its process across multiple countries to avoid trade frictions, and Helpman’s vertical MNC model where firms locate their production process abroad to take advantage of lower factor costs.¹⁴ A recent important step by Carr, Markusen, and Maskus (CMM) was estimation of empirical specifications of FDI based on general equilibrium models of MNCs.¹⁵ Their work shows that other factors missing from gravity-based FDI specifications, particularly factor endowment differences, are important for explaining FDI patterns.

In recent work with co-authors I have explored the central question of how well these specifications actually fit the real-world data we observe. The empirical specification estimated by CMM was a starting point in this research, since its inclusion of endowment differences clearly outperforms a standard gravity equation of FDI. In initial work with the model, Davies, Head, and I found that the CMM model had a specification of endowment differences that was not consistent with the theory. Once corrected, the model no longer provides evidence that vertical FDI motivations are very important in overall FDI flows between countries.¹⁶ Work with Davies and Wang shows that specification error goes beyond this with not only the CMM model, but also with the gravity specification.¹⁷ Data on FDI between countries are highly skewed, with very large activity between developed countries and small or even no activity for very small countries. We show that even after logging variables, adding country fixed-effects, and splitting samples into developed countries versus less-developed countries, one is still not guaranteed of having normally distributed error terms. In other words, finding an appropriate specification that effectively models the substantial heterogeneity in FDI activity

across countries is still an open issue. Until this is resolved, using these models as control variables in studies of how new factors of interest affect FDI can be misleading.

An additional concern is that MNC models typically use a two-country framework and empirical FDI specifications use bilateral FDI data. This assumes that FDI decisions to different markets are independent. There are a number of reasons to think this may not be true. For example, U.S. firms may prefer to locate FDI in one country and then export to neighboring countries (export-platform FDI). In this case, more FDI in a particular host country would mean less in neighboring ones. Alternatively, U.S. firms may have vertical production relationships between affiliates such that more FDI in a country will naturally be associated with more in neighboring ones because of production externalities. Davies, Naughton, Waddell, and I explore this by explicitly modeling spatial interdependence in empirical estimation of U.S. FDI patterns.¹⁸ We find that spatial interdependence shows up significantly in the data, although the nature of these spatial relationships is strongly affected by the particular geographic features of the sample of countries one chooses to examine. However, our finding that the coefficients on the standard control variables in FDI studies are hardly affected by including these spatial considerations is relatively good news for previous work using these empirical specifications.

Conclusion

The study of FDI and MNCs is both fascinating and important for understanding economic globalization. There has been substantial progress in the literature in the past couple of decades, but it is complicated enough that, in many ways, we are still in the

process of uncovering what we don't know. I am excited to work on filling more gaps in our understanding in my future research efforts.

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² B.A. Blonigen, "A Review of the Empirical Literature on FDI Determinants," NBER Working Paper No. 11299, May 2005, and forthcoming, Atlantic Economic Journal.

³ B.A. Blonigen, "Firm-Specific Assets and the Link Between Exchange Rates and Foreign Direct Investment," American Economic Review, 87(3), June 1997, pp. 447–65.

⁴ For example, see J.R. Hines, "Altered States: Taxes and the Location of Foreign Direct Investment in America," NBER Working Paper No. 4397, May 1997, and American Economic Review, 86(5), December 1996, pp. 1076–94, and M.A. Desai, C.F. Foley, and J.R. Hines, "Foreign Direct Investment in a World of Multiple Taxes," NBER Working Paper No. 8440, August 2001, and Journal of Public Economics, 88(12), December 2004, pp. 2727–44.

⁵ For example, see T. Dagan, "The Tax Treaties Myth," New York University Journal of International Law and Politics, Summer 2000, pp. 939–96.

⁶ B.A. Blonigen and R.B. Davies, "The Effects of Bilateral Tax Treaties on U.S. FDI Activity," International Tax and Public Finance, 11(5), September 2004, pp. 601–22, and B.A. Blonigen and R.B. Davies, "Do Bilateral Tax Treaties Promote Foreign Direct Investment?" NBER Working Paper No. 8834, March 2002, and Handbook of International Trade, Volume II: Economic and Legal Analysis of Laws and Institutions, J. Hartigan, ed., Blackwell Publishers, 2005.

⁷ B.A. Blonigen, "Tariff-jumping Antidumping Duties," NBER Working Paper No. 7776, July 2000, and Journal of International Economics, 57(1), June 2002, pp. 31–50.

⁸ B.A. Blonigen, "Evolving Discretionary

Practices of U.S. Antidumping Activity," NBER Working Paper No. 9625, April 2003, and, forthcoming, Canadian Journal of Economics, documents the rapidly rising trend in U.S. antidumping duties and the sources of this trend. B.A. Blonigen and S.E. Haynes, "Antidumping Investigations and the Pass-Through of Exchange Rates and Antidumping Duties," NBER Working Paper No. 7873, October 1999, and American Economic Review, 92(4), September 2002, pp. 1044–61, and B.A. Blonigen and J.-H. Park, "Dynamic Pricing in the Presence of Antidumping Policy: Theory and Evidence," NBER Working Paper No. 8477, September 2001, and American Economic Review, 94(1), March 2004, pp. 134–54, address the economics of firms' strategic pricing decisions in the face of antidumping duties.

⁹ B.A. Blonigen, K. Tomlin, and W.W. Wilson, "Tariff-jumping FDI and Domestic Firms' Profits," NBER Working Paper No. 9027, June 2002, and Canadian Journal of Economics, 37(3), August 2004, pp. 656–77.

¹⁰ A related issue is how FDI may affect trade protection policies (that is, reverse causality), which I address with co-authors in B.A. Blonigen and R.C. Feenstra, "Protectionist Threats and Foreign Direct Investment," NBER Working Paper No. 5475, March 1996, and in Effects of U.S. Trade Protection and Promotion Policies, R.C. Feenstra, ed., Chicago: University of Chicago Press, 1997, pp. 55–80, and B.A. Blonigen and D.N. Figlio, "Voting for Protection: Does Direct Foreign Investment Influence Legislator Behavior?" American Economic Review, 88(4), September 1998, pp. 1002–14.

¹¹ B.A. Blonigen, C.J. Ellis, and D. Fausten, "Industrial Groupings and Foreign Direct Investment," Journal of International Economics, Vol. 65(1), January 2005, pp. 75–91. (An earlier version was circulated as "Industrial Groupings and Strategic FDI: Theory and Evidence" NBER Working Paper No. 8046, December 2000).

¹² B.A. Blonigen and R.B. Wooster, "CEO Turnover and Foreign Market Participation," NBER Working Paper No. 9527, March 2003.

¹³ J.E. Anderson and E. van Wincoop,

"Gravity with Gravititas: A Solution to the Border Puzzle," NBER Working Paper No. 8079, January 2001, and American Economic Review, 93(1), March 2003, pp. 170–92.

¹⁴ J.R. Markusen, "Multinationals, Multi-Plant Economies, and the Gains from Trade," Journal of International Economics, 16(3–4): pp. 205–26, and E. Helpman, A Simple Theory of International Trade with Multinational Corporations," Journal of Political Economy, 92(3), pp. 451–71.

¹⁵ D.L. Carr, J.R. Markusen, and K.E. Maskus, "Estimating the Knowledge-Capital Model of the Multinational Enterprise," NBER Working Paper No. 6773, October 1998, and American Economic Review, 91(3), June 2001, pp. 693–708, and J.R. Markusen, and K.E. Maskus, "Discriminating Among Alternative Theories of the Multinational Enterprise," NBER Working Paper No. 7164, June 1999, and Review of International Economics, 10(4), November 2002, pp. 694–707.

¹⁶ B.A. Blonigen, R.B. Davies, and K. Head, "Estimating the Knowledge-Capital Model of the Multinational Enterprise: Comment," NBER Working Paper No. 6773, October 1998, and American Economic Review, 93(3), June 2003, pp. 980–94.

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¹⁸ B.A. Blonigen, R.B. Davies, G.R. Waddell, and H.T. Naughton, "FDI in Space: Spatial Autoregressive Relationships in Foreign Direct Investment," NBER Working Paper No. 10939, December 2004, and "Spacey Parents: Spatial Autoregressive Patterns in Inbound FDI," NBER Working Paper No. 11466, July 2005.

Race and Twentieth-Century American Economic History

William J. Collins*

Two recent anniversaries have put a spotlight on the economic history of race-related public policy in the United States — the fiftieth anniversary of the Supreme Court's *Brown v. Board of Education* decision and the fortieth anniversary of the Watts Riot in Los Angeles. The *Brown* decision was a landmark in the mid-century reorientation of race-related policy, as the machinery of government slowly responded to the imperatives of the Civil Rights Movement. The Watts Riot, in contrast, marked the onset of a wave of civil disturbances that broke out in predominantly black neighborhoods across the country. Although they were fundamentally different manifestations of African-American discontent, the *Brown* case and the 1960s riots have two things in common: first, they often serve as points of departure in discussions of race and labor market, housing market, and educational disparities; second, whatever their political or symbolic significance, scholars have yet to reckon fully their economic significance.

Much of my work has attempted to measure the effects of such events and to describe the underlying political economy and historical forces that contributed to their occurrence. This is undertaken with the overarching goal of building a more comprehensive and quantitative story of the economics of race in twentieth century America. In this research summary, I describe specif-

ic work on the evolution of racial disparities in educational outcomes, the political economy and impact of changes in race-specific employment and housing policy, and racial disparities in housing market outcomes, including assessments of how severe riots affected the cities in which they occurred.

Race and Schooling

In 1860, approximately 90 percent of African-Americans were slaves, and few slaves (perhaps 10 percent) learned to read and write at even a minimal level of competence. Throughout the South, it was illegal to teach slaves to read and write; consequently, African-Americans entered into the post-Emancipation period with very little exposure to formal schooling. The literacy rate gap between blacks and whites born between 1800 and 1860 (and still alive in 1870) was approximately 70 percentage points. Robert A. Margo and I use micro-level census data, a simple model of parents' incentives to invest in their children's schooling, and historical sources to describe the long-run process of racial convergence in schooling attainment from 1870 onward.¹ Despite imperfections and limitations of the data, it is clear that the key mechanism driving the convergence was "cohort replacement" — new generations of African-Americans entered the labor force with more and better schooling (relative to whites) than older generations that exited the labor force. There was nothing automatic about this process, especially in the 1890-1930 period when the disenfranchisement of southern blacks enabled administrators to ratchet up the

quality of white schools at the expense of black ones, and as the high school movement took off in the North (where few blacks lived).² In fact, there appears to have been some racial divergence in years of schooling for some birth cohorts in this period. But the incentives for investing in children's schooling were strong (despite labor market discrimination), and the overall post-1870 story is dominated by a theme of black-white convergence. The literacy rate gap among those born from 1870 to 1909 was about 20 percentage points, and for the 1910-14 birth cohort to the 1950-4 birth cohort, the racial difference in average grades of schooling fell from three to less than one. The work highlights the importance of intergenerational factors in the transmission of human capital, and it provides an important backdrop to current debates about racial differences in test scores and educational attainment.³

A subsequent paper, co-authored with Orley Ashenfelter and Albert Yoon, attempts to set the Supreme Court's *Brown v. Board* decision in the context of the history described above.⁴ Resources for black and white schools in the South began to equalize about two decades before the 1954 *Brown* decision, but it was not until the late 1960s that southern schools truly desegregated. The paper addresses two main questions. First, after estimating the labor market returns to school quality for southern-born black men, we ask how much more would they have earned (in 1970) if they had attended schools with the same measurable characteristics as white schools in their birth state? For the 1920s birth cohort, we estimate a 6 to 9 percent earnings

* Collins is a Research Associate of the NBER's Development of the American Economy Program and an Associate Professor of Economics at Vanderbilt University. His profile appears later in this issue.

loss. Second, given that school desegregation in the South occurred fairly suddenly, is there evidence that pre and post-desegregation cohorts of southern-born black students fared differently in labor markets or in terms of educational attainment (in 1990)? With numerous caveats attached to the interpretation, the answer is “yes”. Relative to same-aged non-southern-born blacks, the post-desegregation southern-born cohorts earned more than the pre-desegregation southern-born cohorts, by about 10 percent.

The Political Economy and Effects of Early Anti-Discrimination Laws

World War II catalyzed the Civil Rights Movement. Because of wartime production exigencies, African-American leaders had more political leverage than ever before. As labor markets tightened, African-American workers were in relatively high demand; still, they were initially excluded from high-paying defense-industry jobs. A. Philip Randolph, a prominent black labor leader, demanded (by threatening a march on Washington) that President Roosevelt issue an executive order to outlaw discrimination in defense work. The President’s Fair Employment Practice Committee attempted to enforce the first widely applicable anti-discrimination policy, thereby opening some new employment opportunities for black workers and providing a model regulatory agency for future anti-discrimination initiatives.⁵ The policy and the Committee expired when the war ended, but the drive to legislate similar policies and committees at the state and federal level continued.

At the federal level, the Civil Rights Act of 1964, the Voting Rights Act of 1965, and the Fair Housing Act of 1968 were the culmination of the political struggle to advance such legislation. But long before these milestones, race-specific policy changed rapidly at the state

level. The unevenness of the diffusion of anti-discrimination policy provides opportunities to study both the political economy and the effects of such policies *before* federal coverage applied a comparatively uniform standard to all places at the same time.

To explore the political economy that facilitated (or hindered) the spread of fair employment and fair housing laws, I combined historical sources and hazard models.⁶ In short, I learn that throughout the period under study, African-Americans were a relatively small and poor segment of the non-southern population. Nonetheless, the legislation gradually moved forward because the efforts of black political groups (such as the NAACP) were strongly reinforced by labor unions (particularly the CIO) and Jewish groups. The econometric estimates and historical accounts of state-level legislative campaigns complement one another in this interpretation. The hazard model coefficients, which can be used to project the likelihood of the adoption of anti-discrimination laws, also confirm the notion that federal intervention was critical in the South.

But did the sub-federal anti-discrimination policies make any real difference for black workers and households? The results from detailed analyses of individual-level census data are mixed. I find that black workers, especially women, residing in states that adopted fair employment laws in the 1940s had larger improvements in their labor market outcomes during the 1940s than black workers in similar states that did not adopt fair employment laws. But I find no such evidence for black workers in states that adopted fair employment laws in the 1950s.⁷ In a separate paper on fair housing laws and housing markets in the 1960s, I find little evidence of a significant positive effect on the quality of housing enjoyed by black households or on the level of residential segregation.⁸

Although the state fair housing laws were usually somewhat stronger in coverage and enforcement provisions than the federal Fair Housing Act of 1968, they were still considered by many contemporary observers to be too weak and too blunt to make a big difference. The results are consistent with that suggestion.

Home Ownership, Housing Values, and Riots

A series of co-authored papers explores the economic history of race, residential segregation, home ownership, and housing values.⁹ The racial gap in the home ownership rate (by household heads) was nearly the same in 2000 as it was in 1900, approximately 25 percentage points. Around mid-century, the gap widened as whites rapidly increased their rate of home ownership and as blacks moved to central cities (where ownership rates were low), but between 1960 and 1980 the gap narrowed. Even so, the ownership gap remains large, and in 2000 approximately half of the gap could not be accounted for by racial differences in income, education, location, or household composition. This is approximately the same size as the “unexplained” portion of the gap in 1940. In a separate paper, Margo and I find that there was considerable black-white convergence in the ratio of mean values of owner-occupied housing between 1940 and 1970 (from about 0.36 to 0.60) but, again, there has been little change since. It is notable that the vast majority of black-white convergence in ownership and housing values occurred before the federal Fair Housing Act and related anti-discrimination policies and before large numbers of black families moved to the suburbs.

The unprecedented wave of riots that rolled through black neighborhoods in the mid- to late-1960s looms large in the literature on race, housing, and cities, but few studies attempt to measure the

riots' economic impact. In two papers, Margo and I set out to measure the effect of the riots on the labor market outcomes and owner-occupied property values of African-Americans.¹⁰ Most of our analysis focuses on cross-city regressions of changes in labor market outcomes or property values on measures of riot severity, pre-riot trends, and several city-level characteristics. Instrumental variable estimates that exploit exogenous variation in the weather around the time of Martin Luther King's murder and in city government structure provide an alternative perspective on the riots' effects. When possible, we also examine patterns of change at the census tract level and using individual-level data. Nearly all of the evidence suggests that the riots had negative and long-lasting effects (until at least 1980) on the median value of black-owned residential property and smaller, but nontrivial, effects on the median value of all residential property. For the 1960s, the base results suggest approximately a 15 percent decline in the value of black-owned property in cities that had severe riots compared to those that did not. Our estimates of the effects on labor market outcomes are more mixed, but on the whole they suggest a significant negative riot effect on black income and employment. For example, the base results suggest approximately a 10 percent decline in median black family income in cities that had severe riots compared to others.

New Work

Two new projects will follow close on the heels of those described above, though with less focus on race-specific issues. First, I hope to study the long-run economic impact of early urban renewal and slum clearance projects (particularly in the 1950s and 1960s), which is currently unknown. Like much of the work described above, anecdotal impressions have outstripped systematic analyses of

the policy effects thus far. Second, in a co-authored paper with Martha Bailey I demonstrated the importance of the rapid decline in household service employment, especially for black women and especially after 1940, a decline that coincided with a dramatic reorganization of intra-household production and a rise in married women's labor force participation.¹¹ Currently, Bailey and I are collecting data on electrification, household appliances, domestic servants, and women's fertility and labor market outcomes to shed light on the early-to-mid twentieth century connections between women's work in the home and work in the market.

¹ W.J. Collins and R.A. Margo, "Historical Perspectives on Racial Differences in Schooling in the United States," NBER Working Paper No. 9770, June 2003, forthcoming in the Handbook of the Economics of Education, E. Hanushek and F. Welch eds. New York: North-Holland.

² C. Goldin, "America's Graduation from High School," Journal of Economic History 58 (1998): pp. 345–74.

³ See, for example, D. Neal, "Why Has Black-White Skill Convergence Stopped?" NBER Working Paper No. 11090, January 2005.

⁴ O. Ashenfelter, W.J. Collins, and A. Yoon, "Evaluating the Role of Brown v. Board of Education in School Equalization, Desegregation, and the Income of African Americans," NBER Working Paper No. 11394, June 2005, forthcoming in American Law and Economics Review.

⁵ W.J. Collins, "Race, Roosevelt, and Wartime Production: Fair Employment in World War II Labor Markets," American Economic Review 91 (2001): pp. 272–86; "African-American Economic Mobility in the 1940s: A Portrait from the Palmer Survey," Journal of Economic History 60 (2000): pp. 756–81; and M.J. Bailey and W.J. Collins, "The Wage Gains of African-American Women in the 1940s," NBER Working Paper No. 10621, July 2004.

⁶ W.J. Collins, "The Political Economy of State-Level Fair-Employment Laws, 1940–1964," NBER Historical Working

Paper No. 128, June 2000, and Explorations in Economic History 40 (2003): pp. 24–51; and W.J. Collins, "The Political Economy of State Fair-Housing Laws Prior to 1968," NBER Working Paper No. 10610, July 2004, forthcoming in Social Science History.

⁷ W.J. Collins, "The Labor Market Impact of State-Level Anti-Discrimination Laws, 1940–1960," NBER Working Paper 8310, May 2001, and Industrial and Labor Relations Review 56 (2003): pp. 244–72.

⁸ W.J. Collins, "The Housing Market Impact of State-Level Anti-Discrimination Laws, 1960–1970," NBER Working Paper No. 9562, March 2003, and Journal of Urban Economics 55 (2004): pp. 534–64.

⁹ W.J. Collins and R.A. Margo, "Race and Home Ownership: A Century-Long View," NBER Working Paper No. 7277, August 1999, and Explorations in Economic History 38 (2001): pp. 68–92; "Residential Segregation and Socioeconomic Outcomes: When Did Ghettos Go Bad?" Economics Letters 69 (2000): pp. 239–43; and "Race and the Value of Owner-Occupied Housing, 1940–1990," NBER Working Paper No. 7749, June 2000, and Regional Science and Urban Economics 33 (2003): pp. 255–86.

¹⁰ W.J. Collins and R.A. Margo, "The Labor Market Effects of the 1960s Riots," NBER Working Paper No. 10243, January 2004, and in Brookings-Wharton Papers on Urban Affairs 2004, W. Gale and J. Pack eds. Washington, DC: Brookings Institution, 2004, pp. 1–34; and "The Economic Aftermath of the 1960s Riots in American Cities: Evidence from Property Values," NBER Working Paper No. 10493, May 2004.

¹¹ M.J. Bailey and W.J. Collins, "The Wage Gains of African-American Women in the 1940s," NBER Working Paper No. 10621, July 2004. For related work, see J. Greenwood, A. Seshadri, and G. Vandenbroucke, "The Baby Boom and Baby Bust," American Economic Review (95) 1, March 2005, pp. 183–207; W.J. Collins and R.A. Margo, "Historical Perspectives on Racial Differences in Schooling in the United States," NBER Working Paper No. 9770, June 2003, forthcoming in the Handbook of the Economics of Education, E. Hanushek and F. Welch eds. New York: North-Holland.

Globalization and New Comparative Economic History

Alan M. Taylor*

Globalization is probably one of the most overused words in economics, as it is in many other realms of academic and public debate. Nonetheless, it cannot be avoided, if only because an understanding of the modern world requires us to confront it. Economically, its potential benefits seem all too apparent: for example, the fast growing industrializing economies of Asia are well connected to global markets for goods and capital. Conversely, no economically isolated country has prospered. As UN Secretary General Kofi Annan has pointed out: “The main losers in today’s very unequal world are not those that are too exposed to globalization, but those who have been left out.”

My recent research has focused on the causes and consequences of globalization, and is based on an interdisciplinary approach that straddles international economics, economic growth, and economic history. Methodologically, an historical approach has appeal because the global “economic laboratory” provides data not only across space (for cross-country comparisons) but also across time (from previous centuries to the present era). Historical data contain more variation than contemporary data alone, providing a wealth of information to be exploited. An emerging sub-field of New Comparative Economic History is devoted to exploring relationships in the very

long run in the economic environment (institutions, regimes, policies, and so on) and economic outcomes (growth, inflation, trade, capital movements, and so on).

In that vein, I have been working to address several important questions that help us understand economic globalization over the last 100–150 years, allowing us to understand the economic outcomes of today with a deeper perspective. In this research summary I highlight two strands of this work: the evolution of global capital markets and the evolution of world trade. These topics address such issues as: how can we measure the extent of globalization? What explains the rise and fall of globalization in different eras and in different countries? What are the costs and benefits of globalization?

The Ebb and Flow of Global Capital

The forces of economic globalization appear particularly strong at present, but economic historians have been at pains to point out that we are now living in the second era of globalization, not the first. The first stretched from roughly 1870 until the start of World War I in 1914 and saw unprecedented integration in international market for goods, capital, and labor. Since a key issue for the intellectual enterprise of New Comparative Economic History is whether the past can provide useful lessons for the present, we have first to answer the question of whether this past era in any way resembles the present. A first challenge is to assess quantitatively when and where the extent of market integration in the past bore any resemblance to that seen

today.

Much of my own research, including a large project in collaboration with my fellow NBER Research Associate Maurice Obstfeld, has been concerned with this question of measuring market integration over time, with a focus on global capital markets.¹ There is no agreed upon method for evaluating market integration, although we have made some progress recently using nonlinear theoretical and empirical models to better estimate transactions costs in markets using high-frequency price data. For most applications both price and quantity criteria remain relevant. Each have their weaknesses — quantities may flow, and prices may converge, between locations despite large obstacles — and auxiliary assumptions and information must be carefully considered using either criterion. Yet what we find, broadly, is that global capital markets were just as impressive in their degree of integration a century ago as they are today. Some very simple quantity criteria can sum up the story.

For example, we can look simply at the ratio of the stock of foreign investment in the world to global GDP. Plotted over time, this series has a distinctive shape. It rose dramatically from 1870 to 1914, from 7 percent to 18 percent. From 1914 to 1950 it fell precipitously to just 5 percent. It rose slowly but stayed fairly low through the 1980s, and it then surged quickly in the last two decades of the twentieth century from 25 percent to 92 percent. The data suggest that we have indeed lived through two eras of globalization, and using this yardstick, the international movement of capital one hundred years ago was no less impressive

* Taylor is a Research Associate in the NBER's Programs on the Development of the American Economy, International Trade and Investment, and International Finance and Macroeconomics, and a professor of economics at the University of California, Davis. His profile appears later in this issue.

than that witnessed today. The data also reveal two major reversals in the twentieth century: a steep decline in capital movement in the interwar years and a steep rise in the 1980s, creating a distinctive “U-shape” pattern when these data are plotted.

More formal tests are possible. For example, turning from stock data to flow data, we can look at the correlation of saving and investment rates across countries and across time. As the seminal work of Martin S. Feldstein and Charles Y. Horioka points out, a small open economy need not see any correlation of domestic investment and saving in the short run, so any correlation between the two may be considered *prima facie* evidence of capital market frictions.² We can gain some preliminary insight if we apply this methodology across time and space, using annual data from 1870 to the present. We suppose that investment is driven by where the best profit opportunities are, at home or abroad; saving is driven by consumption choices, which the household can in principle de-link from firm investment choices; and the difference between saving and investment is the current account. We need only to add the caveat that, in the long run, the two must be correlated: the long-run budget constraint of the economy dictates that “on average” the current account be in balance, allowing for initial wealth.

Econometric results show that the correlation between saving and investment almost never goes to zero — indeed, the long-run budget constraint tends to keep the measure between a minimum of 0.5 and a maximum of 1 for reasonable model simulations under a wide range of parameters. Yet this range still provides a useful yardstick. Sure enough, we find correlations in the data close to the low of 0.5, implying low frictions, in both eras of globalization: a century ago and today. We find high correlations close to the high of 1, implying high friction, in between: during the interwar

period and the Bretton Woods era (the latter being the period studied by Feldstein and Horioka). The familiar story of two globalizations — and the same “U-shape” — emerges again.

The “U-shape” pattern, which recurs in many other tests based on a variety of data and empirical methodologies, also conforms to the broad contours of the history of macroeconomic policymaking in the world’s major economies that are the main focus of the study (quite different patterns apply to developing countries). In the two eras of globalization, capital controls were notably absent and were typically frowned upon; in between, at the bottom of the “U,” capital controls became prevalent and came to be judged as the norm. How and why the history of policymaking followed these twists and turns then becomes an important question.

A central concept in international macroeconomics presents itself as a candidate explanation: the “trilemma.” The trilemma posits that economic policy cannot simultaneously achieve three goals — a fixed (or even managed) exchange rate, which may be desired for stability purposes; international capital mobility, which may be desired for access to foreign capital; and autonomous monetary policy, which may be desired for managing the business cycle or providing a lender of last resort. The logic is that under a fixed exchange rate and capital mobility, simple interest parity means that the local interest rate must equal the “world” interest rate, and monetary policy is rendered ineffective (or impossible). Something has to give if monetary policy is to be enabled: either the exchange rate must float or capital controls must be applied to suspend parity and admit interest differentials.

Prevailing narratives that tell the history of the world in four parts (that is, the macroeconomic history since 1870) build on the trilemma’s logic.³ In the classical gold standard (1870–1914) monetary

policy was subordinated to the goals of capital mobility and a fixed exchange rate. In the interwar period, perhaps because of increasing democratic pressure, governments felt the need to use autonomous monetary policy; what gave was the peg (the collapse of the gold standard) or, in some cases, capital mobility. But the economic chaos and instability of the interwar period was intolerable to those planning the contours of the postwar global economy at Bretton Woods, and fixed exchange rates were still viewed as a *sine qua non* for a stable world economy. The new arrangements would sacrifice capital mobility to keep currencies on “adjustable” pegs to the dollar and yet preserve monetary policy autonomy. Still, this system could not endure: capital movements (often disguised) grew in the 1960s, the adjustability of pegs invited speculative attacks, and importing rising inflation from the U.S. anchor currency imposed costs on the other players. From 1971 onwards, the major economies have floated, adapting to (even encouraging) capital mobility, and resolving the trilemma in the only other way that preserves policy autonomy.

The trilemma sounds like a nice story, but what is its explanatory power and historical relevance? This hitherto unexplored question can be addressed by examining the degree of correlation between “local” and “world” interest rates, controlling for the type of exchange rate regime and capital control regime in operation. Tested in this way, the trilemma finds strong support in all historical eras from the Gold Standard to the present and under a wide variety of macroeconomic regimes. These findings provide an evidentiary base for our accounts of global macroeconomic history; they also give much-needed empirical weight to the idea of the trilemma, one of the most fundamental constraints that economic policymakers have all too often ignored, to their peril.

The Rise and Fall of World Trade

The historical patterns of globalization seen in capital markets also carry over to goods markets and the history of international trade. Circa 1870, the ratio of world trade to GDP stood at 10 percent, rising to 21 percent by 1914, falling to 9 percent by 1938, and then rising to 27 percent by 1992: a first phase of globalization followed by that twentieth-century “U-shape” again. What can explain this rise and fall (and rise) of world trade? This has been another major goal in my research.⁴

To understand trade patterns in the long run requires that we adopt a theoretical model and estimate its parameters using long-run data. Two models stand out as leading contenders for this job. First, the Heckscher-Ohlin model, in which trade happens as a result of differences in countries’ factor endowments; second, the so-called gravity model, in which countries export differentiated products in proportion to their own country size and subject to distance-related transport costs.⁵

Getting the Heckscher-Ohlin model to match real world data has generated endless problems with postwar data: relative abundance (or scarcity) of a particular factor is a poor predictor of whether said factor will tend to be exported (respectively, imported) by any given country. Instead, the so-called factor content of trade goes the “wrong” way. And, even more perplexing, the volume of trade is far too small to be consistent with the model — the so-called paradox of “missing trade,” which can only be solved (or assumed away) theoretically with strong anti-trade axioms of home bias. It thus might be expected that with data from distant history, from the period 1870-1939, we might also encounter problems with the theory. This is broadly true, although we can find some weak support for the model as it applies to nat-

ural resources — arguably the factors that were uppermost in Heckscher and Ohlin’s minds.⁶

Turning to the gravity model, however, results in something more like an empirical success with historical data, as I have found in research with various collaborators. Again, this matches the empirical success of the gravity model using postwar data. Yet if our goal is to understand why trade rose and fell so markedly over time, an unadorned gravity model is not much help, since relative country sizes and distances change little over time. Instead we need to include other measures of policies, institutions, and the changing economic environment, and some obvious candidates stand out here for the late nineteenth and early-to-mid twentieth century: the rise and fall of the gold standard, a monetary arrangement which was believed to be a stimulus of world trade; the transportation revolution, which dramatically lowered long-distance shipping costs before 1914 through technological change in shipping and the construction of major canals; changes in tariff policy, particularly after 1914 when trade policy activism became common; and the impact of wars, particularly the two World Wars which affected a large fraction of the world economy.

The results of these studies give little hope that a monocausal explanation will suffice to explain the history of world trade. We find that the gold standard made a difference, and when two countries both go onto the gold standard their bilateral trade rises by 42 percent, which helps to account for much of the rise in trade before 1914, and much of its disappearance by 1939. There are direct parallels here, of course, with the contemporary debate over the impact of common currencies on trade, especially the long-run impacts of the euro. We also find that the decline of transport costs likewise made a big difference in the 1870-1914 period, explaining a large fraction of the trade boom; but after 1914, trade costs

rose (relative to wholesale prices) helping to turn the boom into a bust. Interwar tariff policy, especially in the 1930s, was also an important culprit in the collapse of world trade.

Finally, war matters. In very recent work, we have found that wars have a profound — and very persistent — effect on trade between countries.⁷ In wartime perhaps 90 percent or more of trade between countries simply disappears; but even after the war ends, we find that it takes about ten years for trade to return to normal “peacetime” levels. This also helps to explain the precipitous drop in interwar trade and the slow post-1945 recovery: globally about 10 to 20 percent of world trade was probably destroyed by the “war effect” alone. We also find large “negative externalities” from war, in the sense that even neutral countries suffer a drop in trade when their trading partners enter a conflict. A speculative and rough estimate of the costs of such “lost trade” finds that they might be significant in welfare terms, of the same order of magnitude as the costs of lost human capital (measured by lost wages attributable to deaths or injuries). We have therefore been able to document a quantitatively important cost of war that is subject to large spillovers, and that has been little understood until now.

Future Research

Historical research on the past evolution of the global economy sheds new light on the causes and consequences of economic integration and the problems and challenges it may cause for people, firms, and policymakers today and tomorrow. In recent years we have arrived at new insights using the systematic, quantitative, cross-country and cross-time approach of the New Comparative Economic History, but there remain many unanswered questions.

Understanding the frictions in the global economy is a central task for students of international trade and

finance in the past and present.⁸ Methodologically, we shall continue to develop better techniques to assess how globalization has evolved, and how well integrated markets are at any given time.⁹ We can then better understand how close we are to a hypothetical single market in goods and capital or how severe is “market failure.” These assessments also need to take into account the wide ranges of policies and institutions that have operated across time and space and which have encouraged or inhibited international trade and finance.

The latest research casts doubt on simple generalizations that globalization is always beneficial or always harmful; rather, its benefits appear to be greater in countries that climb up the ladder of institutional quality. In time we will develop a more detailed knowledge of how globalization has worked in different contexts. We will then be better placed to know whether the promises of prosperity held out by the process of globalization will be shared by only a few, or — as Kofi Annan and many others hope — by many.

¹ This research was recently published in book form: M. Obstfeld and A.M. Taylor, *Global Capital Markets: Integration, Crisis, and Growth, Japan-U.S. Center Sanwa Monographs on International Financial Markets* (Cambridge: Cambridge University Press, 2004). We gratefully acknowledge the financial support of the Sanwa Prize in International Economics and Financial Markets. The related background papers, all of which appeared as NBER Working Papers, were published as follows: M. Obstfeld, J.C. Shambaugh, and A.M. Taylor, “The Trilemma in History: Tradeoffs among Exchange Rates, Monetary Policies, and Capital Mobility,” NBER Working Paper No. 10396, March 2004, and *Review of Economics and Statistics* 87 (August 2005), pp.423–38; “Monetary Sovereignty, Exchange Rates, and Capital Controls: The Trilemma in the Interwar Period,” NBER Working Paper No. 10393, March 2004, and *IMF Staff Papers* 51 (Special Issue 2004):

pp.75–108; M. Obstfeld and A.M. Taylor, “Sovereign Risk, Credibility, and the Gold Standard: 1870–1913 versus 1925–31,” NBER Working Paper No. 9345, November 2002, and *Economic Journal* 113 (April 2003), pp.1–35; “Globalization and Capital Markets,” NBER Working Paper No. 8846, March 2002, in *Globalization in Historical Perspective*, M. D. Bordo, A. M. Taylor, and J. G. Williamson, eds. (Chicago: University of Chicago Press, 2003); A.M. Taylor, “A Century of Current Account Dynamics,” NBER Working Paper No. 8927, May 2002, and *Journal of International Money and Finance* 21 (November 2002), pp. 725–48; A.M. Taylor, “A Century of Purchasing Power Parity,” NBER Working Paper No. 8012, November 2000, and *Review of Economics and Statistics* 84 (February 2002), pp.139–50; M. Obstfeld and A.M. Taylor, “The Great Depression as a Watershed: International Capital Mobility in the Long Run,” NBER Working Paper No. 5960, May 1999, in *The Defining Moment: The Great Depression and the American Economy in the Twentieth Century*, M. D. Bordo, C. D. Goldin, and E. N. White, eds. (Chicago: University of Chicago Press, 1998)

² See M.S. Feldstein and C.Y. Horioka, “Domestic Saving and International Capital Flows,” *Economic Journal* 90 (1980), pp. 314–29.

³ For an influential example, see B.J. Eichengreen, *Globalizing Capital: A History of the International Monetary System* (Princeton, N.J.: Princeton University Press, 1996).

⁴ The relevant published papers are as follows, and all appeared first as NBER Working Papers: A. Estevadeordal, B. Frantzi, and A.M. Taylor, “The Rise and Fall of World Trade, 1870–1939,” NBER Working Paper No. 9318, November 2002, and *Quarterly Journal of Economics* 118 (May 2003), pp. 359–407; A. Estevadeordal and A.M. Taylor, “Testing Trade Theory in Ohlin’s Time,” NBER Working Paper No. 8842, March 2002, in *Bertil Ohlin: A Centennial Celebration, 1899–1999*, R. Findlay, L. Jonung, and M. Lundahl, eds. (Cambridge: MIT Press, 2002); A. Estevadeordal and A.M. Taylor, “A Century of Missing Trade?” NBER Working Paper No. 8301, May 2001, and *American Economic Review* 92 (March 2002), pp.383–93.

⁵ For a thorough survey of these models see R.C.

Feenstra, *Advanced International Trade: Theory and Evidence* (Princeton, N.J.: Princeton University Press, 2004).

⁶ The application of the Heckscher-Ohlin model to the late nineteenth century works rather better when its price predictions, rather than quantity predictions, are put to the test. See K.H. O’Rourke, A.M. Taylor, and J.G. Williamson, “Factor Price Convergence in the Late Nineteenth Century,” NBER Historical Working Paper No. 46, November 1996, and *International Economic Review* 37(1996), pp. 499–530; and K.H. O’Rourke and J.G. Williamson, *Globalization and History: The Evolution of a Nineteenth-Century Atlantic Economy* (Cambridge: MIT Press, 1999).

⁷ R.Glick and A.M. Taylor, “Collateral Damage: Trade Disruption and the Economic Impact of War,” NBER Working Paper No. 11565, August 2005.

⁸ See, for example, M. Obstfeld and K. Rogoff, “The Six Major Puzzles in International Finance: Is There a Common Cause?” NBER Macroeconomics Annual (2000), pp. 339–90; and J.E. Anderson and E. van Wincoop, “Trade Costs,” *Journal of Economic Literature*, 42 (2004), pp. 691–751.

⁹ In this area, one of the most promising avenues appears to be the use of nonlinear models of price adjustment to infer transaction costs. See E. Canjels, G. Prakash-Canjels, and A.M. Taylor, “Measuring Market Integration: Foreign Exchange Arbitrage and The Gold Standard, 1880–1913,” NBER Working Paper No. 10583, June 2004, and *Review of Economics and Statistics* 86 (November 2004), pp. 868–82; M.P. Taylor and A.M. Taylor, “The Purchasing Power Parity Debate,” NBER Working Paper No. 10607, July 2004, and *Journal of Economic Perspectives* 8 (Fall 2004), pp. 135–58; A.M. Taylor, “Potential Pitfalls for the Purchasing-Power Parity Puzzle? Sampling and Specification Biases in Mean-Reversion Tests of the Law of One Price,” NBER Working Paper No. 7577, March 2000, and *Econometrica* 69 (March 2001), pp. 473–98; M. Obstfeld and A.M. Taylor, “Nonlinear Aspects of Goods-Market Arbitrage and Adjustment: Heckscher’s Commodity Points Revisited,” NBER Working Paper No. 6053, June 1997, and *Journal of the Japanese and International Economies* 11 (December 1997), pp. 441–79.

NBER Profile: *James Adams*

James Adams is a Research Associate in the Productivity Program of the National Bureau of Economic Research and a professor of economics at Rensselaer Polytechnic Institute. He received his Ph.D. degree from the University of Chicago. Before moving to Rensselaer he taught at the University of Florida and Iowa State University. He has also held visiting positions at the U.S. Bureau of Labor Statistics, the Bureau of the Census, and the George J. Stigler Center for the Study of the Economy and the State at the University of Chicago.

Adams recently served on a National Research Council panel on telecommunications R and D. He also has advised the Bureau of the Census and the Advanced Technology Program of the National Institute of Standards and Technology on the measurement of R and D.

In recent years, Adams's research interests have centered on the connections between industrial productivity in the output of goods and inventions, industrial R and D, and pre-technology science, especially university research. His interests also extend to the boundary between technological change and labor and public economics.

He is married to Jennifer Cobb Adams, has three cats, and lives in the scenic hill country near Rensselaer, New York. He enjoys music, especially classical music from the seventeenth and eighteenth centuries; reading of a wide-ranging character; and nature studies. When time and the weather permit, he likes to kayak and canoe the lakes of northern New York and Vermont. He also finds that bicycling, hiking, and puttering around the house form useful breaks from research and teaching.



NBER Profile: *Bruce A. Blonigen*



Bruce A. Blonigen is a Research Associate in the NBER's Program on International Trade and Investment and the Knight Professor of Social Science in the economics department at the University of Oregon. He received his Ph.D. in economics from the University of California, Davis in 1995. While completing his dissertation, he also worked as an economist for the Research Division of the Office of Economics at the U.S. International Trade Commission.

Blonigen teaches courses in international economics, industrial organization, and statistical methods at both the graduate and undergraduate level. He won the University of Oregon's Ersted Award for Distinguished Teaching in 2003.

Blonigen has published numerous articles on foreign direct investment, as well as on the economics of trade policy, particularly antidumping trade protection. He maintains a website that shares information and data on U.S. antidumping activity. He also serves on the editorial boards of the *Journal of International Economics*, *Canadian Journal of Economics*, and the *North American Journal of Economics and Finance*, and is a Departmental Editor for the *Journal of International Business Studies*.

Blonigen lives in Eugene, Oregon with his wife Denice Gray and their son, Ben. In his spare time, Blonigen is an avid golfer, and enjoys hikes and vacations with the family.

NBER Profile: *William J. Collins*

William J. Collins is a Research Associate in the NBER's Development of the American Economy Program and an Associate Professor of Economics at Vanderbilt University. Both his A.B. (1993) and his Ph.D. (1998) degrees in economics are from Harvard University.

Collins joined the Vanderbilt faculty in 1998. In the same year, he received the Economic History Association's Allan Nevins Prize for the best dissertation on a North American topic.

During the 2001-2 academic year, Collins was a National Fellow at the NBER; in the 2003-4 academic year, he

was the Model-Okun Fellow at the Brookings Institution. Collins serves on the editorial boards of *Social Science History*, *Historical Methods*, and the *Journal of Economic History*. He also manages the book reviews on North American topics for the *Journal of Economic History*.

Collins grew up near Reading, Pennsylvania, and now lives in Nashville, Tennessee. In his spare time, he reads fiction and poetry, catches up on old movies, enjoys music around Nashville, and visits friends and family in Boston and elsewhere.



NBER Profile: *Alan M. Taylor*



Alan M. Taylor is a Research Associate in the NBER's Programs on the Development of the American Economy, International Finance and Macroeconomics, and International Trade and Investment. He is also a Professor of Economics and a Chancellor's Fellow at the University of California, Davis, and the Director of the Center for the Evolution of the Global Economy. He received his Ph.D. from Harvard University.

For his dissertation, Taylor was awarded the Alexander Gerschenkron Prize by the Economic History Association. For their work on global capital markets, he and Maurice Obstfeld were awarded the 1997 Sanwa Prize in International Economics and Financial

Markets. Taylor has served as a consultant or visitor with the World Bank, the International Monetary Fund, the Inter-American Development Bank, and the Federal Reserve Bank of San Francisco. He currently holds a John Simon Guggenheim Memorial Fellowship and has spent most of the last year on sabbatical in Paris and London.

When not on leave, Taylor lives in Davis, California, with his wife (who is a professor of literature), daughter, and cat. When he can find the time, Taylor enjoys listening to jazz and traveling to either very urban or very remote places. He occasionally descends snow slopes and stands in rivers, but any resemblances to skiing and fly-fishing are purely coincidental.

Conferences

Risks of Financial Institutions

An NBER Conference on the Risks of Financial Institutions was held in Cambridge on November 10. Mark Carey, Federal Reserve Board, and Rene M. Stulz, NBER and Ohio State University, organized the meeting, at which the following papers were discussed:

Deborah Lucas, Northwestern University and NBER, and **Robert McDonald**, Northwestern University, “An Options-Based Approach to Evaluating the Risk of Fannie Mae and Freddie Mac”

Diana Hancock and **Wayne Passmore**, Federal Reserve Board, “Understanding Market Discipline in the Presence of Implicit Government Guarantees: An Analysis of Subordinated Bond and Stock Returns for GSEs and for Bank Holding Companies”
Discussant for both papers: Thomas Wilson, ING

Markus Brunnermeier, Princeton University, and **Lasse Heje Pedersen**, New York University, “Market Liquidity and Funding Liquidity”
Discussant: Jeremy C. Stein, Harvard University and NBER

Gregory W. Brown, University of North Carolina, Chapel Hill; **Söhnke M. Bartram**, Lancaster University; and **John E. Hund**, University of Texas at Austin, “Estimating Systemic Risk in the International Financial System”
Discussant: Anthony Saunders, New York University

Viral Acharya and **Timothy Johnson**, London Business School, “Insider Trading in Credit Derivatives”
Discussant: Louis Scott, Morgan Stanley

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

University of Pennsylvania and NBER, “Roughing It Up: Including Jump Components in the Measurement, Modeling, and Forecasting of Return Volatility”(NBER Working Paper No. 11775)

Discussant: Eric Ghysels, University of North Carolina, Chapel Hill

Samuel Hanson, Harvard University; **M. Hashem Pesaran**, University of Cambridge; and **Til Schuermann**, Federal Reserve Bank of New York, “Firm Heterogeneity and Credit Risk Diversification”

Discussant: David M. Lando, Copenhagen Business School

Sanjiv Das, Santa Clara University; **Darrell Duffie**, Stanford University and NBER; **Nikunj Kapadia**, University of Massachusetts; and **Leandro Saita**, Stanford University, “Common Failings: How Corporate Defaults Are Correlated”
Discussant: David Li, Barclays Capital

Fannie Mae and Freddie Mac assume a significant amount of interest and prepayment risk and all of the credit risk for about half of the eight trillion dollar U.S. residential mortgage market. Their hybrid government-private status, and the perception that they are too big to fail, make them a potentially large, but mainly unaccounted for, risk to the federal government. Measuring the size and risk of this liability is technically difficult, but important for the debate over the appropriate regulation of these institutions. **Lucas** and **McDonald**

take an options pricing approach to evaluating these costs and risks. Under the base case assumptions, the estimated value of the guarantees is \$7.9 billion over ten years, with a combined 0.5 percent value at risk of \$122 billion. The authors evaluate the sensitivity of these estimates to various modeling assumptions, and also to the regulatory regime, including forbearance policies and capital requirements. Their analysis highlights the benefits, but also the challenges, of taking on options-based approach to evaluating the value of fed-

eral credit guarantees.

When studying changes in the risks of large bank holding companies (BHCs) and government-sponsored enterprises (GSEs), researchers routinely argue that changes in the responsiveness of stock and subordinated bond returns to exogenous risk factors can be interpreted as reflecting changes in investors' views about the firm's expected losses. However, investors may perceive that these large firms have substantial implicit government guarantees. **Hancock** and **Passmore** show that

these guarantees can confound the interpretation of stock and bond return responsiveness, making changes in the responsiveness of bond returns difficult to interpret. They also show that changes in the responsiveness of stock returns are almost impossible to interpret. These results suggest that implicit guarantees can hide investors' perceptions of changes in expected loss attributable to important risk factors, thereby confounding market and regulatory efforts to correctly price and manage risks. The authors provide conditions under which bond returns can be usefully interpreted as reflecting expected losses and thus the relative riskiness of firms. They consider the risk-sensitivity of subordinated bond returns of highly rated BHCs and of GSEs to macroeconomic shocks during two periods: April 1, 2001 to May 31, 2003 and June 1, 2003 to September 15, 2004. Although the GSEs (Fannie Mae and Freddie Mac) and the largest U.S. bank holding companies may benefit substantially from a perceived implicit government guarantee of their liabilities, the political support for government backing of the GSEs seemed less certain to investors in the later period, while there was no news, or legislative developments, that likely would have changed the perceived implicit government guarantees for BHCs. The authors show that the responsiveness of subordinated bond returns to macroeconomic shocks during the two sample periods indicate that: 1) BHCs' bond returns across the two periods became less sensitive to changes in macroeconomic factors that affect credit risks but more sensitive to changes in macroeconomic factors that influence interest rate risks; 2) changes in implicit guarantees made it difficult to interpret GSE bond returns across the two periods; and 3) bond investors generally believed that GSEs are at least as risky, and maybe more risky, (that is, their expected losses are more sensitive

to macroeconomic risk factors) when compared with BHCs. While their technique does not identify the source of this potentially greater risk, the authors note that financial theory would suggest that GSEs might have greater risks because they are less diversified and not as well capitalized as BHCs.

Brunnermeier and **Pedersen** provide a model that links a security's market liquidity — that is, the ease of trading it — to traders' funding liquidity — that is, their availability of funds. Traders provide market liquidity and their ability to do so depends on their funding — that is, their capital and the margins charged by their financiers. In times of crisis, reductions in market liquidity and funding liquidity are mutually reinforcing, leading to a liquidity spiral. The model here explains the empirically documented features that market liquidity: 1) can suddenly dry up (in other words, is fragile); 2) has commonality across securities; 3) is related to volatility; 4) experiences “flight to liquidity” events; and 5) co-moves with the market. Finally, the model shows how the Fed can improve current market liquidity by committing to improving funding in a potential future crisis.

With a unique and comprehensive dataset, **Bartram**, **Brown**, and **Hund** develop and use three distinct methods to quantify the risk of a systemic failure in the global banking system. They examine a sample of 334 banks (representing 80 percent of global bank equity) in 28 countries around six global financial crises (such as the Asian and Russian crises and September 11, 2001), and show that these crises did not create large probabilities of global financial system failure. First, they show that cumulative negative abnormal returns for the subset of banks not directly exposed to a negative shock (unexposed banks) rarely exceed a few percent. Second, they use structural models to obtain more precise point estimates of

the likelihood of systemic failure. These estimates suggest that systemic risk is limited, even during major financial crises. For example, maximum likelihood estimation of bank failure probabilities implied by equity prices suggests the Asian crisis induced less than a single percent increase in the probability of systemic failure. Third, the authors estimate systemic risk as implied by equity option prices of U.S. and European banks. The largest values are for the Russian crisis and September 11; these show increases in estimated average default probabilities of only around 1-2 percent. Taken together, the results suggest statistically significant, but economically small, increases in systemic risk around even the worst financial crises of the last ten years. Although policy responses are endogenous, the low estimated probabilities suggest that the distress of central bankers, regulators and politicians about the events they study may be overstated, and that current policy responses to financial crises and the existing institutional framework may be adequate to handle major macroeconomic events.

Insider trading in the credit derivatives market has become a significant concern for regulators and participants. **Acharya** and **Johnson** attempt to quantify the problem. Using news reflected in the stock market as a benchmark for public information, they report evidence of significant incremental information revelation in the credit default swap (CDS) market under circumstances consistent with the use of non-public information by informed banks. Specifically, the information revelation occurs only for negative credit news and for entities that subsequently experience adverse shocks. Moreover, the degree of advance information revelation increases with the number of banks that have lending/monitoring relations with a given firm, and this effect is robust to controls for non-

informational trade. They find no evidence, however, that the degree of asymmetric information adversely affects prices or liquidity in either the equity or credit markets. If anything, with regard to liquidity, the reverse appears to be true.

A rapidly growing literature has documented important improvements in financial return volatility measurement and forecasting through the use of realized variation measures constructed from high-frequency returns, coupled with simple modeling procedures. Building on recent theoretical results in Barndorff-Nielsen and Shephard (2004a, 2005) for related bi-power variation measures, **Andersen, Bollerslev, and Diebold** provide a practical and robust framework for non-parametrically measuring the jump component in asset return volatility. In an application to the DM/\$ exchange rate, the S&P500 market index, and the 30-year U.S. Treasury bond yield, they find that jumps are both highly prevalent and distinctly less persistent than the continuous sample path variation process. Moreover, many jumps appear directly associated with specific macroeconomic news announcements. Separating jump from non-jump movements in a simple but sophisticated volatility fore-

casting model, the authors find that almost all of the predictability in daily, weekly, and monthly return volatilities comes from the non-jump component. Their results thus set the stage for a number of interesting future econometric developments and important financial applications by separately modeling, forecasting, and pricing the continuous and jump components of the total return variation process.

Hanson, Pesaran, and Schuermann consider a simple model of credit risk and derive the limit distribution of losses under different assumptions regarding the structure of systematic and idiosyncratic risks and the nature of firm heterogeneity. Their theoretical results indicate that if firm-specific risk exposures (including their default thresholds) are heterogeneous but come from a common parameter distribution, then there is no scope for further risk reduction through active credit portfolio management for sufficiently large portfolios. However, if the firm risk exposures are drawn from different parameter distributions, say for different sectors or countries, then further risk reduction is possible, even asymptotically, by changing the portfolio weights. In either case, neglecting parameter heterogeneity can lead to

underestimation of expected losses. But, once expected losses are controlled for, neglecting parameter heterogeneity can lead to overestimation of risk, whether measured by unexpected loss or value-at-risk. These results are confirmed empirically using returns and credit ratings for firms in the United States and Japan across seven sectors. Ignoring parameter heterogeneity results in far riskier credit portfolios.

Das, Duffie, Kapadia, and Saita develop, and apply to data on U.S. corporations from 1979-2004, tests of the standard doubly-stochastic assumption under which firms' default times are correlated only as implied by the correlation of factors determining their default intensities. This assumption is violated in the presence of contagion or "frailty" (unobservable explanatory variables that are correlated across firms). The tests here do not depend on the time-series properties of default intensities. The data do not support the joint hypothesis of well-specified default intensities and the doubly-stochastic assumption. There is also some evidence of default clustering in excess of that implied by the doubly-stochastic model with the given intensities.



IASE: Strengthening Global Financial Markets

The NBER and Pontificia Universidade Catolica do Rio de Janeiro (PUC-Rio) jointly sponsored a meeting of the Inter-American Seminar on Economics in Brazil on December 2 and 3. This Seminar focused on “Strengthening Global Financial Markets.” NBER Research Associate Sebastian Edwards of University of California, Los Angeles, and Marco Garcia of PUC-Rio, organized the following program:

Joshua Aizenman, University of California at Santa Cruz and NBER, and **Ilan Noy**, University of Hawaii, “Endogenous Financial and Trade Openness in a Volatile World”
Comments: Maria Cristina Terra, Postgraduate School of Economics - Brazil (EPGE), and Thierry Verdier, Centre for Economic Policy Research

Bernardo S. de M. Carvalho, Gávea Investments, and **Marcio Garcia**, “Ineffective Controls on Capital Inflows under Sophisticated Financial Markets: Brazil in the Nineties”
Comments: Gustavo Franco and Marcelo Abreu, PUC-Rio

Sebastian Edwards, “Financial Openness, Crises, and Output Losses”
Comments: Edmar Bacha, Bank of Italy, and Marcelo Muinhos, Banco Central do Brasil

Viviana Fernandez, Universidad de Chile, “The International CAPM and a Wavelet-based Decomposition of Value at Risk”
Comments: Marcelo Medeiros, PUC-Rio, and Caio Ibsen, IBMEC Business School-Rio

Ross Levine, NBER and Brown University, and **Sergio L. Schmukler**, The World Bank, “Internationalization and Stock Market Liquidity”
Comments: Ugo Panizza, Inter-American Development Bank, and Eduardo Loyo, IMF

Ricardo J. Caballero, NBER and MIT; **Takeo Hoshi**, NBER and University of California at San Diego; and **Anil K Kashyap**, University of Chicago and NBER, “Zombie Lending and Depressed Restructuring in Japan”
Comments: Vinicius Carrasco and Walter Novaes, PUC-Rio

Ana Carla A Costa, Banco Central do Brasil, and **Joao Manoel Pinho de Mello**, PUC-Rio, “Judicial Risk and Creditor Expropriation: Micro Evidence from Brazilian Payroll Loans”
Comments: Renato Flores, EPGE/FGV, and Beny Parnes, PUC-Rio

Eduardo Levy-Yeyati, Universidad Torcuato di Tella, “Liquidity Insurance in Financially Dollarized Economy”
Comments: Marco Bonomo, EPGE, and Alejandro Werner, Subsecretaria de Hacienda y Credito Publico do Mexico

Barry J. Eichengreen, University of California at Berkeley and NBER; and **Poonam Gupta** and **Ashoka Mody**, IMF, “Sudden Stops and IMF Programs”
Comments: Ilan Goldfajn, PUC-Rio, and Affonso Celso Pastore, ACPastore & Associados

Aizenman and **Noy** study the endogenous determination of financial and trade openness when both are volatile. First, they outline channels leading to two-way feedback between the different modes of openness; next, they identify these feedbacks empirically. They find that a single standard deviation increase in commercial openness is associated with a 9.5 percent (of GDP) increase in de-facto financial openness, controlling for political economy and macroeconomic factors. Similarly, an increase in de-facto finan-

cial openness has powerful effects on future trade openness. While de-jure restrictions on capital mobility do not affect de-facto financial openness, de-jure restrictions on the current account have large adverse effect on commercial openness. This suggests that it is much easier to overcome restrictions on capital account convertibility than restrictions on commercial trade. Having established (Granger) causality, the authors investigate the relative magnitudes of these directions of causality using Geweke’s (1982) decomposition

methodology. They find that almost all of the linear feedback between trade and financial openness can be accounted for by G-causality from financial openness to trade openness (53 percent) and from trade to financial openness (34 percent). They conclude that, in an era of rapidly growing trade integration, countries cannot choose financial openness independent of their degree of openness to trade—dealing with greater exposure to financial turbulence by curbing financial flows will likely be ineffectual.

Carvalho and **Garcia** analyze the Brazilian experience in the 1990s to assess the effectiveness of controls on capital inflows in restricting financial inflows and changing their composition towards long-term flows. Econometric exercises (VARs) lead them to conclude that controls on capital inflows were effective in deterring financial inflows for only a brief period, from two to six months. The hypothesis to explain the ineffectiveness of the controls is that financial institutions performed several operations aimed at avoiding capital controls. The authors conducted interviews with market players in order to provide several examples of the financial strategies that were used in this period to invest in the Brazilian fixed income market while bypassing capital controls. Their main conclusion is that controls on capital inflows, while they may be desirable, are of very limited effectiveness under sophisticated financial markets. Therefore, policymakers should avoid spending the scarce resources of bank supervision trying to implement them and focus more in improving economic policy.

Edwards uses a broad multi-country dataset to analyze the relationship between restrictions to capital mobility and external crises. The analysis focuses on two manifestations of external crises: sudden stops of capital inflows; and current account reversals. He deals with two important policy-related issues: first, does the extent of capital mobility affect countries' degree of vulnerability to external crises; and second, does the extent of capital mobility determine the depth of external crises — as measured by the decline in growth — once the crises occur? Overall, his results cast some doubts on the assertion that increased capital mobility has caused heightened macroeconomic vulnerabilities. He finds no systematic evidence suggesting that countries with higher capital mobility tend to have a higher

incidence of crises, or to face a higher probability of having a crisis, than countries with lower mobility. His results do suggest, however, that once a crisis occurs, countries with higher capital mobility may face a higher cost, in terms of growth decline.

Fernandez formulates a time-scale decomposition of an international version of the Capital Asset Pricing Model that accounts for both market and exchange-rate risk. In addition, she derives an analytical formula for time-scale value at risk and marginal value at risk (VaR) of a portfolio. She applies the methodology to stock indexes of seven emerging economies in Latin America and Asia, for the sample period 1990-2004. Her main conclusions are: 1) the estimation results hinge upon the choice of the world market portfolio. In particular, the stock markets of the sampled countries appear to be more integrated with other emerging countries than with developed ones. 2) Value at risk depends on the investor's time horizon. In the short run, potential losses are greater than in the long run. 3) Additional exposure to some specific stock indices will increase value at risk to a greater extent, depending on the investment horizon. These results are in line with recent research in asset pricing that stresses the importance of heterogeneous investors.

What is the impact of internationalization (firms raising capital and trading in international markets) on the liquidity of the remaining firms in domestic markets? To address this question, **Levine** and **Schumkler** assemble a panel database of more than 2,700 firms from 45 emerging economies over the period 1989-2000, constructed from annual and daily data. First, they find evidence of migration. There is a reduction in the domestic trading of firms that cross-list or issue depositary receipts in foreign public exchanges as trading migrates from domestic to

international markets. Second, there are liquidity spillovers within markets. Aggregate domestic trading activity is associated with the liquidity of individual firms in the same market. The evidence is consistent with the view that when firms cross-list or issue depositary receipts in public international markets, the domestic trading activity of their shares falls, hurting the liquidity of the remaining firms in their home market.

Caballero, Hoshi, and Kashyap proposes a bank-based explanation for the decade-long Japanese slowdown. The starting point for their story is the well-known observation that most large Japanese banks were only able to comply with capital standards because regulators were lax in their inspections. To facilitate this forbearance, the banks often engaged in sham loan restructuring that kept credit flowing to otherwise insolvent borrowers ("zombies"). Thus, the normal competitive outcome, whereby the zombies would shed workers and lose market share, was thwarted. The authors' model highlights the restructuring implications of the zombie problem. The counterpart of the congestion created by the zombies is a reduction in profits for potential new and more productive entrants, which discourages their entry. In this context, even solvent banks will not find good lending opportunities. The authors confirm their story's key predictions — that zombie-dominated industries exhibit more depressed job creation and destruction, lower productivity, and greater excess capacity. Most importantly, they present firm-level regressions showing that the increase in zombies has depressed the investment and employment growth of non-zombies and has been associated with a widening of the productivity gap between zombies and non-zombies. The evidence suggests that the healthiest non-zombies were harmed the most by the zombies.

A large body of literature has

stressed the institution-development nexus as critical in explaining differences in countries' economic performance. The empirical evidence, however, has been mainly on the aggregate level, associating macro performance with measures of quality of institutions. **A Costa and De Mello**, by relating a judicial decision on the legality of payroll debit loans in Brazil to bank-level decision variables, provide micro evidence on how creditor legal protection affects market performance. Payroll debit loans are personal loans with principal and interests payments directly deducted from the borrowers' payroll check, which, in practice, makes collateral out of future income. In June 2004, a high-level federal court upheld a regional court ruling that had declared payroll deduction illegal. Using personal loans without payroll deduction as a control group, the authors assess whether the ruling had an impact on market performance. The evidence indicates that it had an adverse impact on banks' risk perception, on interest rates, and on the amount lent.

Unlike the financial dollarization (FD) of external liabilities, the dollarization of domestic financial assets (domestic FD) has received comparatively less attention until very recently, when increasingly it has been seen as a key source of real exchange rate exposure and balance sheet problems. **Levy-Yeyati** focuses on an a complementary—and often overlooked—angle of domestic FD: the limit it imposes on the central bank as domestic lender of last resort (LLR), and the resulting exposure to (dollar) liquidity runs. He addresses this issue in three steps. First, he illustrates the incidence of FD on the propensity to suffer bank runs (and the authorities' belated reaction) by means of two recent banking crises, Argentina 2001 and Uruguay 2002, and shows that FD has been an important motive for self-liquidity insurance in the form of reserve accumulation. Next, he explores the incentive problems associated with centralized self-insurance (holdings of reserves at the central bank). In this light, he argues for a combined scheme of decentralized liquid

asset requirement (LAR) and an ex-ante suspension-of-convertibility clause or "circuit breaker" (CBR), as a way to reduce self-insurance costs while limiting bank losses in the event of a run.

Eichengreen, Gupta, and Mody present evidence on the impact of IMF programs on sudden stops in capital flows. Their results are consistent with the notion that IMF programs have some positive effect in reducing the incidence of these events. At the same time, there is little evidence that larger Fund programs more effectively inoculate countries against sudden stops. Newly-negotiated programs seem to be more effective in this regard than long-standing arrangements. It is tempting to interpret both observations as indicating that the signaling effect of IMF programs matters more than the emergency financial assistance. Finally, the authors are unable to identify evidence that IMF programs are more effective at insulating countries from sudden stops when they already have fundamentally strong policies in place.



Structural Changes in the Global Economy

On December 9 and 10, an NBER/Universities Research Conference on “Structural Changes in the Global Economy: Implications for Monetary Policy and Financial Regulation” took place in Cambridge. NBER Research Associates Andrew B. Abel, The Wharton School, and Janice C. Eberly, Northwestern University’s Kellogg School of Management, organized this program:

F. Owen Irvine, Michigan State University, and **Scott Schuh**, Federal Reserve Bank of Boston, “The Roles of Comovement and Inventory Investment in the Reduction of Output Volatility”

Discussant: William Dupor, Ohio State University

Stephen G. Cecchetti, Brandeis University and NBER; **Alfonso Flores-Lagunes**, University of Arizona; and **Stefan Krause**, Emory University, “Assessing the Sources of Changes in the Volatility of Real Growth”

Discussant: James H. Stock, Harvard University and NBER

Sebnem Kalemli-ozcan, University of Houston and NBER; **Ariell Reshef**, New York University; and **Bent E. Sorensen**, University of Houston, “Productivity and Capital Flows: Evidence from U.S. States”

Discussant: John Coleman, Duke University

Charles A. Trzcinka and **Andrey D. Ukhov**, Indiana University, “Financial Globalization and Risk Sharing: Welfare Effects and the Optimality of Open Markets”

Discussant: Leonid Kogan, MIT and NBER

Giovanni Olivei, Federal Reserve Bank of Boston, and **Silvana Tenreyro**, London School of Economics, “The Timing of Monetary Policy Shocks”

Discussant: Marc Giannoni, Columbia University and NBER

Hoyt Bleakley, University of California, San Diego, and **Kevin Cowan**, Inter-American Development Bank, “Maturity Mismatch and Financial Crises: Evidence from Emerging Market Corporations”

Discussant: Mark Aguiar, Federal Reserve Bank of Boston

Prasanna Gai and **Nicholas Vause**, Bank of England, and **Peter Kondor**, London School of Economics, “Procyclicality, Collateral Values, and Financial Stability”

Discussant: Adriano Rampini, Northwestern University

Söhnke Bartram, Lancaster University; **Gregory W. Brown**, University of North Carolina at Chapel Hill; and **John Hund**, University of Texas at Austin, “Estimating Systemic Risk in the International Financial System”

Discussant: Craig Furfine, Federal Reserve Bank of Chicago

Most of the reduction in GDP volatility since 1983 is accounted for by a decline in the comovement of output among industries that hold inventories. This decline is not simply a passive byproduct of reduced volatility in common factors or shocks. Instead, structural changes occurred in the long run and there were dynamic relationships among industries’ sales and inventory investment behavior — especially in the automobile and related industries, which are linked by supply and distribution chains that feature new production

and inventory management techniques. Using a HAVAR model (Fratantoni and Schuh 2003) with only two sectors — manufacturing and trade — **Irvine** and **Schuh** discover structural changes that reduced the comovement of sales and inventory investment both within and between industries. As a result, the response of aggregate output to all types of shocks was dampened. Structural changes accounted for more than 80 percent of the reduction in output volatility, thus weakening the case for “good luck,” and altered industries’

responses to federal funds rate shocks, thus suggesting that the case for “better monetary policy” is complicated by changes in the real side of the economy.

In much of the world, growth is more stable than it once was. Looking at a sample of 25 countries, **Cecchetti**, **Flores-Lagunes**, and **Krause** find that in 16 of them, real GDP growth is less volatile today than it was 20 years ago. And, these declines are large, averaging more than 50 percent. What accounts for the fact that real growth has been more stable in recent years? The

authors survey the evidence and competing explanations and find support for the view that improved inventory management policies, coupled with financial innovation, adopting an inflation targeting scheme, and increased central bank independence have all been associated with more stable real growth. Furthermore, they find weak evidence suggesting that increased commercial openness has coincided with increased output volatility.

Kalemli-Ozcan, Reshef, and Sorensen study the determinants of net capital income flows within the United States where capital freely moves across state borders. They use a simple neoclassical model in which total factor productivity (TFP) varies across states and over time and capital ownership is perfectly diversified across state borders. Capital will flow to states that experience an increase in TFP resulting in net cross-state investment positions. Net ownership positions revert to zero over time in the absence of further TFP movements. States with increasing TFP pay net capital income to states with declining TFP relative to the U.S. average. While TFP cannot be directly observed, the authors can identify states with high TFP growth as states with high output growth. By comparing the level of state personal income to state gross product, they construct indicators of net capital income flows. They then examine empirically whether net capital income flows between states correspond to the predictions of the model and whether net capital positions tend to converge to zero. The empirical findings indicate persistent net capital income flows across states, which are an order of magnitude larger than the equivalent counterparts across countries. Thus, the results imply that frictions associated with borders are likely to be the main explanation for low international capital flows.

Trzcinka and Ukhov study the

welfare effects of investment barriers and the opening of markets to foreigners. They construct an equilibrium model of international asset pricing without agency costs that allows endogenous market participation among heterogeneous agents. Equilibrium prices and the set of participating and non-participating agents are jointly determined in equilibrium and the ability of agents to choose to participate in the market affects prices of domestic and foreign assets. The authors examine the welfare effects of non-participation and find that when a country moves from complete segmentation to open markets for foreigners, the cost of capital falls in the domestic market. This is consistent with empirical findings in the international asset pricing literature. Through the endogenous participation mechanism, the model is able to capture sources of economic growth. Contrary to previous models, however, this one shows that opening markets is not Pareto-optimal and the authors identify a class of domestic agents whose welfare is lower after the opening of markets. These findings have political economy interpretations and policy implications.

A vast empirical literature has documented delayed and persistent effects of monetary policy on output. **Olivei and Tenreyro** show that this finding results from the aggregation of output impulse responses that differ sharply depending on the timing of the shock: When the monetary policy shock takes place in the first two quarters of the year, the response of output is quick, sizable, and dies out at a relatively fast pace. In contrast, output responds very little when the shock takes place in the third or fourth quarter. The authors propose a potential explanation for the differential responses based on uneven staggering of wage contracts across quarters. Using a stylized dynamic general equilibrium model, they show that a

very modest amount of uneven staggering can generate differences in output responses similar to those found in the data.

Substantial attention has been paid in recent years to the risk of maturity mismatch in emerging markets. Although this risk is microeconomic in nature, the evidence advanced thus far has taken the form of macro correlations. **Bleakley and Cowan** evaluate this mechanism empirically at the micro level by using a database of over 3000 publicly traded firms from fifteen emerging markets. They measure the risk of short-term exposure by estimating, at the firm level, the effect on investment of the interaction of short-term exposure and aggregate capital flows. This effect is (statistically) zero, contrary to the prediction of the maturity-mismatch hypothesis. This conclusion is robust to using a variety of different estimators, alternative measures of capital flows, and controls for devaluation effects and access to international capital. The authors do find evidence that short-term-exposed firms pay higher financing costs and liquidate assets at resale prices, but not that this reduction in net worth translates into a drop in investment.

Gai, Kondor, and Vause analyze how the risk-sharing capacity of the financial system varies over the business cycle, leading to pro-cyclical fragility. They show how financial imperfections contribute to under-insurance by entrepreneurs, generating a pecuniary externality that leads to the build-up of systematic risk during upturns. Increased asset price uncertainty emerges as a symptom of the sectoral concentration that builds up during booms. The liquidity of the collateral asset is shown to play a key role in amplifying the financial cycle. The welfare costs of financial stability, in terms of the efficiency costs attributable to financial frictions and the volatility costs attributable to amplifica-

tion, also are illustrated.

With a unique and comprehensive dataset, **Bartram, Brown, and Hund** develop and use three distinct methods to quantify the risk of a systemic failure in the global banking system. They examine a sample of 334 banks (representing 80 percent of global bank equity) in 28 countries around 6 global financial crises (such as the Asian and Russian crises and September 11, 2001), and show that these crises did not create large probabilities of global financial system failure. First, they show that cumulative negative abnormal returns for the subset of banks not directly exposed to a negative shock (unexposed

banks) rarely exceed a few percent. Second, they use structural models to obtain more precise point estimates of the likelihood of systemic failure. These estimates suggest that systemic risk is limited even during major financial crises. For example, maximum likelihood estimation of bank failure probabilities implied by equity prices suggests that the Asian crisis induced less than a 1 percent increase in the probability of systemic failure. Third, they obtain estimates of systemic risk implied by equity option prices of U.S. and European banks. The largest values are obtained for the Russian crisis and September 11 and these show increases in estimated

average default probabilities of only around 1-2 percent. Taken together, the results suggest statistically significant, but economically small, increases in systemic risk around even the worst financial crises of the last ten years. Although policy responses are endogenous, the low estimated probabilities suggest that the distress of central bankers, regulators, and politicians about the events studied here may be over-stated, and that current policy responses to financial crises and the existing institutional framework may be adequate to handle major macroeconomic events.

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18th Annual TRIO Conference

The Eighteenth Annual TRIO Conference, so-named because it is jointly sponsored by the NBER, the Centre for Economic Policy Research (CEPR), and the Tokyo Center for Economic Research (TCER), took place on December 9 and 10 in Tokyo. This year's conference focused on "International Finance." It was organized by Shin-ichi Fukuda, University of Tokyo; Takeo Hoshi, NBER and University of California, San Diego; Takatoshi Ito, NBER and University of Tokyo; and Andrew K. Rose, NBER and University of California, Berkeley. The program was:

Eiji Ogawa and **Junko Shimizu**, Hitotsubashi University, "Stabilization of Effective Exchange Rates under a Common Currency Basket System"
Discussants: Taizo Motonishi, Kansai University, and Mark Spiegel, Federal Reserve Bank of San Francisco

Etsuro Shioji, Yokohama National University, "Invoicing Currency and the Optimal Basket Peg for East Asia: A New Open Economy Macroeconomics Perspective"
Discussants: Kentaro Iwatsubo, Hitotsubashi University, and Eiji Ogawa

Shang-jin Wei, IMF and NBER, "Connecting Two Views on Financial Globalization: Can We Make Further Progress?"
Discussants: Yuko Hashimoto, Toyo University, and Elias Papaioannou, European Central Bank

Takatoshi Ito, and **Yuko Hashimoto**, "Intra-Day Seasonality in Activities of the Foreign Exchange Markets: Evidence from the Electronic Broking System"
Discussants: Robert F. Engle, University of California, San Diego and NBER, and Paolo Pesenti, Federal Reserve Bank of New York

Shin-ichi Fukuda, and **Masanori Ono**, Fukushima University, "On the Determinants of Export Prices: History vs. Expectations"
Discussants: Andrew K. Rose, and Kiyotaka Sato, Yokohama National University

Allan Drazen, University of Maryland and NBER, and **Stefan Hubrich**, T. Rowe Price, "A Simple Test of the Effect of Exchange Rate Defense"
Discussants: Shin-ichi Fukuda, and Shigenori Shiratsuka, Bank of Japan

Paolo Pesenti, "Shocks, Reforms, and Monetary Rules: A Scenario Analysis for Japan"
Discussants: Kazuo Ueda, University of Tokyo, and Tsutomu Watanabe, Hitotsubashi University

Richard Portes, London Business School and NBER; **Elias Papaioannou**; and **Gregorios Siourounis**, Barclays Capital, "Optimal Currency Shares in International Reserves: The Impact of the Euro and the Prospects for the Dollar"
Discussants: Takeo Hoshi and Takatoshi Ito

Mark Spiegel; **Takeshi Kobayashi**, Chukyo University; and **Nobuyoshi Yamori**, Nagoya University, "Quantitative Easing and Japanese Bank Equity Values"
Discussants: Naohiko Baba, Bank of Japan, and Itsuhiro Fukao, Keio University

Andrew K. Rose, "Size Really Doesn't Matter: In Search of a National Scale Effect"
Discussants: Allan Drazen and Etsuro Shioji

Ogawa and **Shimizu** investigate how effectively a common currency basket peg would stabilize the effective exchange rates of East Asian currencies. The authors use an Asian Monetary Unit (AMU), which is a weighted average of the ASEAN10 plus 3 (Japan, China, and Korea) currencies, as the common currency basket; they compare their results with others on the

stabilization effects of the common G3 currency (the U.S. dollar, the Japanese yen, and the euro) basket in the East Asian countries (Williamson, 2005). They find that the AMU peg system would be more effective in reducing fluctuations of effective exchange rates as more countries in East Asia applied it. Further, the AMU peg system would more effectively stabilize effective

exchange rates than a common G-3 currency basket peg system for four (Indonesia, the Philippines, Singapore, and Thailand) of the seven countries they study. These results suggest that the AMU basket peg would be useful for the East Asian countries whose intraregional trade weights are relatively higher than their trade weights with outsiders.

Shioji analyzes the relationship between East Asia's choice of currency regime and the transmission of foreign shocks to this area. He develops a three-country model that consists of East Asia, Japan, and the United States, in the tradition of the "new open economy macroeconomics" literature. Using numerical simulations, Shioji derives the optimal weight attached to the Japanese yen in East Asia's currency basket, to which this region pegs its own currency; optimality is defined with respect to stabilization of its trade balance (or other measures). In particular, this paper takes into account the reality that most international transactions are invoiced in the U.S. dollar, and asks how incorporating that fact into the model changes the conclusion about the optimal basket weights.

For many developing countries, financial globalization does not automatically lead to improvement. According to the literature, there is a threshold effect: only countries that have met a minimum set of conditions, such as having attained reasonable control of corruption and a certain level of rule of law, can expect to benefit significantly from financial globalization. And, there is a composition effect: foreign direct investment (FDI), and perhaps portfolio inflows, are likely to be more beneficial and less volatile than international bank lending, while total capital flows — the sum of all types of capital flows — may not have a strong positive effect on the recipient countries' rates of growth and their consumption risk sharing. Further, the threshold and composition effects can be two sides of the same coin, as better institutional quality in a capital-importing country may lead to a more favorable composition of capital inflows for that country (Wei, 2000b, 2001; Wei and Wu, 2002; and Faria and Mauro, 2004). But the earlier literature did not disentangle the possibly different effects of

financial development and the quality of bureaucratic institutions. **Wei** shows that these effects can indeed be different. In particular, bad public institutions (reflected, for example, in a higher level of bureaucratic corruption) strongly discourage FDI, and possibly foreign debt, in the shares of a country's total foreign liabilities, but appear to encourage the relative prominence of borrowing from foreign banks. In comparison, low financial sector development discourages inward portfolio equity flows but encourages inward FDI. Therefore, views on the connection between domestic institutions and the structure of international capital flows must be nuanced. To gain confidence that the documented data patterns reflect causal relations, Wei uses instrumental variables for the institutional measures based on the economic histories of the countries in his sample (in particular, the mortality rate of earlier European settlers and the origin of legal systems). The instrumental variables approach bolsters the case that bad institutions are a cause of unfavorable composition of capital inflows.

Ito and **Hashimoto** examine intra-day patterns of exchange rate behavior, using the "firm" bid-ask quotes and transactions of JPY-USD and Euro-USD pairs recorded in the electronic broking system of the spot foreign exchanges. First, activities of quotes and transaction volumes are high in the beginning hours of the three major currency markets — Tokyo, London, and New York — and low during the Tokyo and London lunch hours and late afternoon in New York. The U-shape of intra-day activities only occurs among Tokyo and London participants. Second, activities do not increase toward the end of business hours in the New York market, even on Fridays (ahead of weekend hours of non-trading). Third, an average bid-ask spread is narrow (wide), when quote and deal fre-

quencies are high (low, respectively), except for the beginning hour of Tokyo (GMT 0), when the bid-ask spread is ideal despite high levels of activity.

Fukuda and **Ono** investigate the choice of invoice currency under exchange rate uncertainty. Their analysis is motivated by the fact that the U.S. dollar has been the dominant vehicle currency in developing countries. Their theoretical analysis is based on an open-economy model of monopolistic competition. The export prices are set before exchange rates are known. When the market is competitive enough, the exporting firms tend to set their prices so as not to deviate from those of the competitors. As a result, a coordination failure can lead the third currency to be an equilibrium invoice currency. Since multiple equilibria are Pareto ranked, this implies that the equilibrium choice of the invoice currency may lead to a less efficient equilibrium. The role of expectations is important in the static framework. However, in the staggered price-setting framework, history becomes another key determinant of the equilibrium currency pricing. The role of history becomes conspicuous when the firms discount future profits, particularly in the competitive local market. The result suggests that both history and expectations explain why the firm tends to choose the U.S. dollar as vehicle currency.

High interest rates used to defend the exchange rate signal that a government is committed to fixed exchange rates, but may also signal weak fundamentals. **Drazen** and **Hubrich** test the effectiveness of the interest rate defense by disaggregating it into the effects on future interest rate differentials, expectations of future exchange rates, and risk premiums. While much previous empirical work has been inconclusive because of offsetting effects, tests that "disaggregate" the effects provide significant information.

Raising overnight interest rates strengthens the exchange rate over the short-term, but also leads to an expected depreciation at a horizon of a year and longer and an increase in the risk premium, consistent with the argument that it also signals weak fundamentals.

Using a two-country general equilibrium model calibrated to the Japanese economy vis-à-vis the rest of the world, **Pesenti** simulates the macroeconomic transmission of demand and supply shocks contingent on whether or not the zero interest floor (ZIF) is binding in monetary policy. First, he shows that negative demand shocks have more prolonged and startling effects on the economy when the ZIF is binding than during normal times when it is not binding. Next, he illustrates how positive supply shocks that raise potential output (such as structural reforms) can actually extend the period of time over which the ZIF may be expected to bind, and therefore make the economy more sensitive to negative demand shocks. Finally, he focuses on the problems associated with inflation-targeting rules and the advantages of policy rules that include price-level-path targeting, both in a deflationary environment and in normal times when the ZIF is not binding.

Foreign exchange reserve accumulation has risen dramatically over the past five years. The introduction of the euro and the increased liquidity in other major currencies has increased the pressure on central banks to diversify away from the dollar. This could have sub-

stantial implications for the international financial system. **Papaioannou, Portes, and Siourounis** use a mean-variance framework to estimate optimal weights among the main international currencies and to assess how the euro has changed this allocation over time. They also incorporate rebalancing costs, which they proxy with (mean and extreme) currency bid-ask spreads. The results indicate that the recent drop in euro spreads fully compensated for the diversification losses associated with fewer currencies. The authors then perform some simple simulations for the optimal currency allocation of four large emerging market countries (Russia, Brazil, China and India) incorporating a central bank's desire to hold a sizable portion of its portfolio in the currencies of its foreign debt and international trade. The constrained optimization suggests that the euro potentially rivals the dollar as an international reserve currency. Actual dollar allocations are far greater than the optimizer implies, consistent with the current dominant role of the dollar as a reserve currency. But the increased tendency of many developing countries to issue euro-denominated assets and trade with the euro zone may shift this equilibrium and put pressure on the dollar.

One of the primary motivations offered by the Bank of Japan (BOJ) for its quantitative easing program — whereby it maintained a current account balance target in excess of required reserves, effectively pegging short-term interest rates at zero — was to maintain

credit extension by the troubled Japanese financial sector. **Kobayashi, Spiegel, and Yamori** conduct an event study concerning the anticipated impact of quantitative easing on the Japanese banking sector by examining the impact of the introduction and expansion of the policy on Japanese bank equity values. They find that excess returns of Japanese banks were greater when increases in the BOJ current account balance target were accompanied by “non-standard” expansionary policies, such as raising the ceiling on BOJ purchases of long-term Japanese government bonds. The authors also provide cross-sectional evidence that suggests that the market perceived that the quantitative easing program would disproportionately benefit financially weaker Japanese banks.

Rose searches for a “scale” effect in countries. He uses a panel data set that includes 200 countries over forty years and links the population of a country to a host of economic and social phenomena. Using both graphical and statistical techniques, he searches for an impact of size on the level of income, inflation, material well-being, health, education, the quality of a country's institutions, heterogeneity, and a number of different international indices and rankings. He has little success; small countries are more open to international trade than large countries, but are not systematically different otherwise.

Science Watch Ranks NBER First in Citations

Science Watch, the bimonthly newsletter of Thomson Scientific, named the NBER as the institution with the most cited publications in economics and business. The NBER also ranked third in “citation impact” as measured by the number of citations

per paper. These rankings are based on the number of published papers cited in nearly 200 journals in economics, business, and accounting and management that are indexed by Thomson Scientific, and on citations per paper.

With more than 30,000 citations

between 1995 and April 2005, the NBER was the most mentioned institution in the field of economics and business. Based on these figures, *Science Watch* declared that the NBER is one of the most influential institutions in business and economics.

Monetary Economics

NBER’s Program on Monetary Economics met in Cambridge on November 4. NBER Research Associates Michael D. Bordo of Rutgers University and Julio J. Rotemberg of MIT organized the meeting. The following papers were discussed:

Gauti Eggertsson, Federal Reserve Bank of New York, “Great Expectations and the End of the Great Depression”
Discussant: Hugh Rockoff, Rutgers University

Michael D. Bordo, **Christopher Erceg**, **Andrew Levin**, and **Ryan Michaels**, Federal Reserve Board,

“Three Great American Disinflations”
Discussant: Francois Velde, Federal Reserve Bank of Chicago

Refet Gurkanak, Bilkent University; **Andrew Levin**; and **Eric Swanson**, Federal Reserve Bank of San Francisco, “Does Inflation Targeting Anchor Long-Run Inflation Expectations? Evidence from Long-Term Bonds Yields in the U.S., U.K., and Sweden”
Discussant: Kenneth Kuttner, Oberlin College

Timothy Cogley, University of California, Davis, and **Argia Sbordone**, Federal Reserve Bank of New York, “A Search for a Structural

Phillips Curve”
Discussant: Jean Boivin, Columbia University

Igor Livshits and **James Macgee**, University of Western Ontario; and **Michele Tertilt**, Stanford University, “Accounting for the Rise in Consumer Bankruptcies”
Discussant: Stephen Zeldes, Columbia University

Lutz Kilian, University of Michigan, “Exogenous Oil Supply Shocks: How Big Are They and How Much Do They Matter for the U.S. Economy?”
Discussant: Ana Maria Herrera, Michigan State University

Eggertsson argues that the recovery from the Great Depression was driven by a shift in expectations. This shift was caused by President Franklin Delano Roosevelt’s (FDR) policy actions. On the monetary policy side, FDR abolished the gold standard and — even more importantly — announced an explicit policy objective of inflating the price level to pre-Depression levels. On the fiscal policy

side, FDR expanded government real and deficit spending, making his policy objective credible. Eggertsson evaluates the economic consequences of FDR; he uses a dynamic stochastic general equilibrium model, assuming sticky prices and rational expectations.

In their paper, **Bordo** and his co-authors examine three famous episodes of disinflation (or deflation) in U.S. history, including episodes fol-

lowing the Civil War, World War I, and the Volcker disinflation of the early 1980s. For each of these episodes, they derive measures of policy predictability that attempt to quantify the extent to which each deflation was anticipated by economic agents. They use their measures to help account for the disparate real effects observed across episodes, and in turn relate them to the policy actions and communication

strategy of the monetary authority. They then proceed to account for the salient features of each episode within the context of a stylized model. Their simulations indicate how a more predictable policy of gradual deflation could have helped avoid the sharp post-WWI depression. But the simulations also suggest that securing the benefits of gradualism requires a supporting institutional framework and communication strategy that allows the private sector to make reliable inferences about the course of policy.

Gürkaynak, Levin, and Swanson investigate the extent to which inflation targeting helps anchor long-run inflation expectations by comparing the behavior of daily bond yield data in the United Kingdom and Sweden, both inflation targeters, to that in the United States, a non-inflation-targeter. Using the difference between far-ahead forward rates on nominal and indexed bonds as a measure of compensation for expected inflation and inflation risk at long horizons, the authors examine the extent to which far-ahead forward inflation compensation moves in response to macroeconomic data releases and monetary policy announcements. In the United States, forward inflation compensation exhibits highly significant responses to economic news. In the United Kingdom, there is a level of sensitivity similar to that in the United States prior to the Bank of England gaining independence in 1997, but a striking absence of such sensitivity since the central bank became independent. In Sweden, inflation compensation has been insensitive to economic news over the whole period for which the authors have data. The authors show that these results also are matched by the times-series behavior of far-ahead forward interest rates and inflation compensation over this period. All of these findings suggest that a known and credible inflation target significant-

ly helps to anchor the private sector's views of the distribution of long-run inflation outcomes.

The foundation of the New Keynesian Phillips curve is a model of price setting with nominal rigidities that implies that the dynamics of inflation are well explained by the evolution of real marginal costs. Cogley and **Sbordone** attempt to analyze whether this is a structurally invariant relationship. To assess this, they first estimate an unrestricted time-series model for inflation, unit labor costs, and other variables, and present evidence that their joint dynamics are well represented by a vector autoregression with drifting coefficients and volatilities, as in Cogley and Sargent (2004). Then, following Sbordone (2002, 2003), they apply a two-step minimum distance estimator to estimate deep parameters. Based on their results, they argue that the price-setting model is structurally invariant.

Personal bankruptcies in the United States have increased dramatically, rising from 1.4 per thousand working age population in 1970 to 8.5 in 2002. **Livshits, MacGee, and Tertilt** use a heterogeneous agent life-cycle model with competitive financial intermediaries who can observe households' earnings, age, and current asset holdings to evaluate several commonly offered explanations. They find that an increase in uncertainty (income shocks, expense uncertainty) cannot quantitatively account for the rise in bankruptcies. Instead, stories related to a change in the credit market environment are more plausible. In particular, a combination of a decrease in the credit market transactions cost together with a decline in "stigma" does a good job at accounting for the rise in consumer bankruptcy. The authors also argue that the abolition of usury laws and other legal changes have played little role.

Since the oil crises of the 1970s,

there has been strong interest in the question of how oil production shortfalls caused by wars and other exogenous political events in OPEC countries affect oil prices, U.S. real GDP growth, and U.S. CPI inflation. **Kilian** focuses on the modern OPEC period since 1973. His results differ along a number of dimensions from the conventional wisdom. First, he shows that under reasonable assumptions, the timing, magnitude, and even the sign of exogenous oil supply shocks may differ greatly from current state-of-the-art estimates. Second, the common view — that the case for the exogeneity of at least the major oil price shocks is strong — is supported by the data for the 1980–1 and 1990–1 oil price shocks, but not for other oil price shocks. Notably, statistical measures of the net oil price that increase relative to the recent past do not represent the exogenous component of oil prices. In fact, only a small fraction of the observed oil price increases during crisis periods can be attributed to exogenous oil production disruptions. Third, compared to previous indirect estimates of the effects of exogenous supply disruptions on real GDP growth that treated major oil price increases as exogenous, the direct estimates that Kilian obtains suggest a sharp drop after five quarters rather than an immediate and sustained reduction in economic growth for a year. They also suggest a spike in CPI inflation three quarters after the exogenous oil supply shock rather than a sustained increase in inflation, as is sometimes conjectured. Finally, Kilian's results put into perspective the importance of exogenous oil production shortfalls in the Middle East. He shows that exogenous oil supply shocks made remarkably little difference overall for the evolution of U.S. real GDP growth and CPI inflation since the 1970s, although they did matter for some historical episodes.

Health Care Program Meeting

The NBER's Health Care Program met in Cambridge on November 4. NBER Research Associate David M. Cutler, of Harvard University, and Program Director Alan M. Garber, of Stanford University, organized the meeting. These papers were presented:

Nancy Beaulieu, Harvard University and NBER; **David M. Cutler**; and **Katherine Ho**, Columbia University and NBER, "The Business Case for Diabetes Disease Management at Two Managed Care Organizations"

Mark Pauly, University of Pennsylvania and NBER; **Christy Thompson**, Independence Blue Cross; **Thomas Abbott**, Medstat, Inc.; **William Sage**, Columbia University; and **James Margolis**, Medical Group Management Association, "Who Pays: the Incidence of Higher Malpractice Premiums"

Yu-chu Shen, Naval Postgraduate School and NBER; and **Glenn Melnick**, University of Southern California, "Is Managed Care Still an Effective Cost Containment Device?"

Dana Goldman, RAND Corporation and NBER; **Pinar Karaca-mandic** and **Geoffrey Joyce**, RAND Corporation; and **Neeraj Sood**, RAND Corporation and NBER, "Adverse Selection in Retiree Prescription Drug Plans"

Ernst R. Berndt, MIT and NBER; **Alisa S. Busch** and **Sharon-lise Normand**, Harvard University; and **Richard G. Frank**, Harvard University and NBER, "Real Output in Mental Health Care During the 1990s" (NBER Working Paper No. 11557)

Diabetes is the most common and costly of all chronic diseases. There is broad-based agreement on how to manage the disease, yet fewer than 40 percent of diabetics receive guideline levels of medical care. **Beaulieu, Cutler, and Ho** investigate the reasons for this phenomenon by examining the business case for improved diabetes care from the perspective of a single health plan (HealthPartners of Minnesota). The potential benefits accruing to a health plan from diabetes disease management include medical care cost savings and higher premiums. The potential costs to the health plan derive from disease management program costs and adverse selection. The authors find that the implementation of diabetes disease management coincided with large health improvements. Medical care cost savings over several years were small in the closed panel group practice but moderate for the health plan overall. The difference in cost savings between these two patient populations could be attributable to scale or differences in the baseline health of the populations. They find evidence that adverse selection and the timing of cost

and benefits worsen the health plan business case. In addition, the payment systems, from purchaser to health plan and health plan to provider, are very weakly connected to the quality of diabetes care further weakening the business case. Finally, overlapping provider networks create a public goods externality that limits the health plan's ability to privately capture the benefits from its investments.

Malpractice premiums are higher in some states than in others for apparently similar physician practices. They are rising, and they are rising at different rates. Someone clearly is paying more into the health care or health insurance system, but who? In the first instance, obviously physician practices pay the malpractice premium, but they may be able to shift some or all of high or growing premiums onto insurers and patients. The question of the "incidence" of premiums is an important part of understanding how the system behaves and has been behaving over time. An answer to this question would also help in judging the distribution of gains and losses from efforts to constrain premiums or damage awards. If all the gain from lower premiums goes to

physicians, public attitudes may be different than if it is shared with the public. **Pauly, Thompson, Abbott, Sage, and Margolis** report on a study of premium incidence over the period 1994-2002, when the malpractice insurance system again went into "crisis" as premiums rose significantly in some geographic areas and for some kinds of physicians.

Shen and Melnick take a historical perspective in examining the effects of managed care growth and hospital competition on hospital cost and revenue growth. Looking at managed care's boom period (1990-4), its mature period (1994-8), and its backlash period (1998-2003), they find that higher managed care presence was indeed effective in slowing down hospital cost and revenue growth during the boom and the mature periods. However, it lost its cost containment effect during the backlash period. This result persists under different estimation methods designed to reduce biases that might result from omitted variable bias and measurement errors. On the other hand, competition effects appear to persist throughout the three periods. Such persistent competition effects were ini-

tially the result of aggressive selective contracting in the high managed care markets, but were later dominated by the less saturated, but growing, managed care markets that seem to catch up with the more developed markets.

Rising co-payments for prescription drugs, coupled with already low rates of compliance for chronic therapies, raise concerns about the consequences of the design of pharmacy benefits. **Goldman, Karaca-mandic, Joyce, and Sood** consider one innovative such benefit by which patients with the greatest therapeutic benefit from a prescription drug have lower co-payments. Patients often do not fully internalize future medical benefits of a drug therapy and hence do not use the drug optimally. Better price incentives (through lower co-payments) to patients with higher potential efficacy would encourage optimal compliance

and could lead to future health plan savings in terms of avoided health services utilization. The authors model such a co-payment scheme for one of the largest classes of prescription drugs: cholesterol-lowering (CL) therapy. Using claims data from 88 health plans, they study 62,274 patients aged 20 and older who initiated CL therapy between 1997 and 2001. They examine the association between co-payments and compliance in the year following initiation of therapy, and the association between compliance and subsequent hospital and emergency department service use for up to four years following initiation. They use the results to simulate the effects of co-payments that vary depending on a patient's risk of cardiovascular events. They show that strategically reducing co-payments for patients most at-risk can improve overall compliance and reduce use of other expensive

services. In an era of consumer-directed health care and improved information technology, tailoring co-payments to the expected therapeutic benefit of a patient can increase the clinical and economic efficacy of prescription medications.

Health accounts document changes over time in the level and composition of health spending. There has been a continued evolution in the ability to track such outlays. Less rapid has been the ability to interpret changes in spending. **Berndt, Busch, Frank and Normand** apply quality-adjusted price indexes for several major mental disorders to national mental health account estimates to assess changes in real "output". They show that using the new price indexes reveals large gains in real output relative to application of BLS indexes.

Macroeconomics and Individual Decisionmaking

The NBER's Working Group on Macroeconomics and Individual Decisionmaking met in Cambridge on November 5. Working Group Directors George A. Akerlof, University of California, Berkeley, and Robert J. Shiller, NBER and Yale University, set the following agenda:

Nabil Al-najjar, Sandeep Baliga, and David Besanko, Northwestern University, "The Sunk Cost Bias and Managerial Pricing Practices"

Discussant: Truman Bewley, Yale University

William T. Dickens, Brookings Institution; **Lorenz Goette**, University of Zurich; **Erica L.**

Groschen, Federal Reserve Bank of New York; **Steinar Holden**, University of Oslo; **Julian Messina, Jarkko Turunen, and Melanie Ward**, European Central Bank; and **Mark E. Schweitzer**, Federal Reserve Bank of Cleveland, "The Interaction of Labor Markets and Inflation: Analysis of Micro Data from the International Wage Flexibility Project"

Discussant: Ricardo Reis, Princeton University and NBER

Refet S. Gürkaynak, Bilkent University, and **Justin Wolfers**, University of Pennsylvania and NBER, "Macroeconomic Derivatives: An Initial Analysis of Market-Based Macro

Forecasts, Uncertainty and Risk"
Discussant: Paul Willen, Federal Reserve Bank of Boston

Ricardo J. Caballero, MIT and NBER, and **Arvind Krishnamurthy**, Northwestern University, "Financial System Risk and Flight to Quality"
Discussant: Jon Faust, Federal Reserve Board

Annamaria Lusardi, Dartmouth College and NBER, and **Olivia S. Mitchell**, University of Pennsylvania and NBER, "Financial Literacy and Planning: Implications for Retirement Well-Being"
Discussant: Andrew Caplin, New York University and NBER

Al-Najjar, Baliga, and Besanko provide an explanation for why the

sunk cost bias persists among firms competing in a differentiated product

oligopoly. Firms experiment with cost methodologies that are consistent with

real-world accounting practices, including ones that allocate fixed and sunk costs to determine variable costs. These firms follow naive adaptive learning to adjust prices. Costing methodologies that increase profits are reinforced. The authors show that all firms eventually display the sunk cost bias. For the canonical case of symmetric linear demand, they obtain comparative statics results showing how the degree of the sunk cost bias changes with demand.

The adoption of explicit or implicit inflation targets by many central banks, and the low stable rates of inflation that have ensued, raise the question of how inflation affects market efficiency. **Dickens, Goette, Groshen, Holden, Messina, Schweitzer, Turunen, and Ward** study three market imperfections that cause the rate of inflation to affect labor market efficiency. First, the presence of substantial resistance to *nominal* wage cuts in a low inflation environment can slow the adjustment of relative wages to labor market shocks and thus result in a misallocation of resources. Alternatively, to the extent that the downward rigidity prevents real wage cuts, rather than nominal wage cuts, inflation will not improve efficiency. In this case, only increases in real wages resulting from productivity growth can reduce the misallocation of resources caused by a real wage floor. Higher inflation is associated with more frequent wage and price changes, higher search costs for goods or jobs, and greater uncertainty about the future path of wages and prices. These effects can lead to errors and adjustment lags in wage setting and diminish the information value of observed wages. Thus, increased inflation may also cause a misallocation of resources. In short, inflation can grease the wheels of economic adjustment in the labor market by relieving the constraint imposed by downward nominal wage rigidity, but not if there is also

substantial downward real wage rigidity. At the same time, inflation can throw sand in the wheels of economic adjustment by degrading the value of price signals. Knowledge of which of these imperfections dominates at different levels of inflation and under different institutional regimes can be valuable for choosing an inflation target and for learning more about the economic environment in which monetary policy is conducted. The authors briefly review the empirical literature in order to motivate the method used to distinguish these three labor market imperfections. Next, they describe the data and empirical approach which applies a common protocol to 31 distinct panels of workers wage changes. Then they establish that wage changes show substantial dispersion that rises with the rate of wage inflation, as predicted by grease and sand effects. To identify the three imperfections under consideration, they examine histograms of wage changes (that are corrected for measurement errors) for the particular asymmetries and spikes that are characteristic of downward real and nominal wage rigidity. This process yields estimates of the prevalence of real and nominal wage rigidity for each dataset and year, which they then analyze for insight into the causes and consequences of wage rigidities. Finally, they examine the linkage between estimates of true wage change dispersion and inflation for evidence of sand effects.

In September 2002, a new market in “Economic Derivatives” was launched allowing traders to take positions on future values of several macroeconomic data releases. **Gürkaynak and Wolfers** provide an initial analysis of the prices of these options. They find that market-based measures of expectations are similar to survey-based forecasts although the market-based measures somewhat more accurately predict financial market responses to

surprises in data. These markets also provide implied probabilities of the full range of specific outcomes, allowing the authors to measure uncertainty, assess its driving forces, and compare this measure of uncertainty with the dispersion of point-estimates among individual forecasters (a measure of disagreement). They also assess the accuracy of market-generated probability density forecasts. A consistent theme is that few of the behavioral anomalies present in surveys of professional forecasts survive in equilibrium, and that these markets are remarkably well calibrated. Finally, they assess the role of risk, finding little evidence that risk-aversion drives a wedge between market prices and probabilities in this market.

Caballero and Krishnamurthy present a model of flight to quality episodes that emphasizes financial system risk and the Knightian uncertainty surrounding these episodes. In the model, agents are uncertain about the probability distribution of shocks in markets different from theirs, treating such uncertainty as Knightian. Aversion to Knightian uncertainty generates demand for safe financial claims. It also leads agents to require financial intermediaries to lock-up capital to cover their own markets’ shocks in a manner that is robust to uncertainty over other markets, but is wasteful in the aggregate. Locked collateral cannot move across markets to offset negative shocks and hence can trigger a financial accelerator. A lender of last resort can unlock private capital markets to stabilize the economy during these periods by committing to intervene should conditions worsen.

Some recent evidence suggests that many American households will not be able to maintain their lifestyles in retirement. Little is known about why people fail to plan for retirement, and whether planning and information costs might affect retirement saving patterns. To

better understand these issues, **Lusardi** and **Mitchell** devised and fielded a purpose-built module on planning and financial literacy for the 2004 Health and Retirement Study (HRS). This module measures how workers make their saving decisions, how they collect the information for making these decisions, and whether they possess the financial literacy needed to make these decisions. The resulting analysis shows that financial illiteracy is widespread among older Americans: only half of the age 50+ respondents could correctly answer two simple questions regarding interest compounding and inflation,

and only one-third understood these as well as stock market risk. Women, minorities, and those without a college degree were particularly at risk of displaying low financial knowledge. The authors also evaluate whether people tried to figure out how much they need to save for retirement, whether they devised a plan, and whether they succeeded at the plan. In fact, these calculations prove to be difficult: fewer than one-third of our age 50+ respondents ever tried to devise a retirement plan, and only two-thirds of those who tried, actually claim to have succeeded. Overall, fewer than one-fifth of the

respondents believed that they engaged in successful retirement planning. The authors also find that financial knowledge and planning are clearly interrelated: those who displayed financial knowledge were more likely to plan and to succeed in their planning. Moreover, those who did plan were more likely to rely on formal planning methods such as retirement calculators, retirement seminars, and financial experts, and less likely to rely on family/relatives or co-workers. Finally, Lusardi and Mitchell show that keeping track of spending and budgeting habits appears conducive to retirement saving.

Asset Pricing

The NBER's Program on Asset Pricing met in Cambridge on November 11. Jessica Wachter, NBER and The Wharton School, and Luis M. Viceira, Harvard Business School, organized the meeting. The following papers were discussed:

Bernard Dumas, INSEAD and NBER, and **Alexander Kurshev** and **Raman Uppal**, London Business School, "What Can Rational Investors Do About Excessive Volatility and Sentiment Fluctuations?"
Discussant: Leonid Kogan, MIT and NBER

Lubos Pastor and **Pietro Veronesi**, University of Chicago and NBER, "Technological Revolutions and Stock Prices"
Discussant: Markus Brunnermeier, Princeton University and NBER

Jun Pan, MIT and NBER, and **Kenneth Singleton**, Stanford University and NBER, "Default and Recovery Implicit in the Term Structure of Sovereign CDS Spreads"
Discussant: Francis Longstaff, University of California, Los Angeles and NBER

Ravi Bansal and **Ed Fang**, Duke University, and **Amir Yaron**, University of Pennsylvania and NBER, "Equity Capital: A Puzzle?"
Discussant: John Heaton, University of Chicago and NBER

Borja Larrain, Federal Reserve Bank of Boston, and **Motohiro Yogo**, University of Pennsylvania, "Does Firm Value Move Too Much to be Justified By Subsequent Changes in Cash Flow?"
Discussant: Malcolm Baker, Harvard

University and NBER

Jacob Boudoukh, **Matthew Richardson**, and **Robert Whitelaw**, New York University and NBER, "The Myth of Long-Horizon Predictability"

Amit Goyal, Emory University, and **Ivo Welch**, Brown University and NBER, "A Comprehensive Look at the Empirical Performance of Equity Premium Prediction"

John Y. Campbell, Harvard University and NBER, and **Samuel B. Thompson**, Harvard University, "Predicting the Equity Premium Out of Sample: Can Anything Beat the Historical Average?" (NBER Working Paper No. 11468)
Discussant for all three papers: John Cochrane, University of Chicago and NBER

Dumas, **Kurshev**, and **Uppal** analyze the trading strategy that would allow an investor to take advantage of

"excessive" stock price volatility and "sentiment" fluctuations. They construct a general equilibrium model of

sentiment. In it, there are two classes of agents; stock prices are excessively volatile because one class is overconfi-

dent about a public signal. As a result, this class of irrational agents changes its expectations too often, sometimes being excessively optimistic, sometimes being excessively pessimistic. The authors determine and examine the trading strategy of the rational investors who are not overconfident about the signal. They find that, because irrational traders introduce an additional source of risk, rational investors reduce the proportion of wealth invested into equity, except when they are extremely optimistic about future growth. Moreover, their optimal portfolio strategy is based not just on a current price divergence but also on a model of irrational behavior and a prediction concerning the speed of convergence. Thus, the portfolio strategy includes a protection in case there is a deviation from that prediction. The authors find that long maturity bonds are an essential accompaniment of equity investment, as they serve to hedge this “sentiment risk.” Even though rational investors find it beneficial to trade on their belief that the market is excessively volatile, the answer to the question posed in the title is: “There is little that rational investors can do optimally to exploit, and hence eliminate, excessive volatility, except in the very long run.”

During technological revolutions, stock prices of innovative firms tend to exhibit high volatility and bubble-like patterns, which are often attributed to investor irrationality. **Pastor** and **Veronesi** develop a general equilibrium model that rationalizes the observed price patterns. High volatility is a result of high uncertainty about the average productivity of a new technology. Investors learn about this productivity before deciding whether to adopt the technology on a large scale. For technologies that ultimately are adopted, the nature of uncertainty changes from idiosyncratic to systematic as the adoption becomes more likely; as a result, stock prices fall after an initial run-up. This “bubble” in

stock prices is observable ex post but unpredictable ex ante, and it is most pronounced for technologies characterized by high uncertainty and fast adoption. The authors examine stock prices in the early days of American railroads, and find evidence consistent with a large-scale adoption of the railroad technology by the late 1850s.

Pan and **Singleton** explore in depth the nature of the risk-neutral credit-event intensities (λ^Q) that best describe the term structures of sovereign CD spreads. They examine three distinct families of stochastic processes: the square-root, log-normal, and three-halves processes. Their models use different specifications of mean reversions and time-varying volatilities to fit both the distributions of spreads and the variation over time in the shapes of the term structures of spreads. They find that the models imply highly persistent λ^Q that are strongly correlated with measures of global credit event risks and the VIX index of option-implied volatilities. Moreover, the correlations across countries of the model-implied credit-event intensities are large, and change with credit-market conditions. There are substantial model-implied risk premiums associated with unpredictable future variation in λ^Q . The authors show that the term structure of CD spreads allows them to separately identify both the loss rate in the event of default, L^Q , and the parameters of the process, λ^Q . Unconstrained estimates of L^Q are much lower than the values typically assumed in the financial industry. Finally, to shed light on the economic consequences of differing levels of L^Q or persistence in λ^Q , the authors explore the sensitivity of the prices of options on CD contracts to alternative settings of the parameters governing the default process.

In almost any equilibrium model, shifts in sectoral wealth have direct implications for asset returns, inducing investors to hold more or less of their wealth in the sector. For an expanding

sector, these inducements can be in the form of higher-mean or lower-volatility assets. **Bansal**, **Fang**, and **Yaron** document that shifts in sectoral financial wealth have virtually no bearing on the subsequent mean and volatility of sectoral returns. About 90 percent of the wealth share fluctuations are attributable to movements in net payout and 10 percent to changes in expected returns. The evidence shows that sectoral wealth and asset returns are not related — this leads to the equity capital puzzle.

Through the flow-of-funds identity and the capital accumulation equation, **Larrain** and **Yo** develop a present-value model that relates the market value of corporate assets to its expected future cash flow. The relevant measure of cash flow is net payout, which is the sum of dividends, interest, and net equity and debt repurchases. A variance decomposition of the ratio of net payout to assets shows that 12 percent of its variation is explained by asset returns, while 88 percent is explained by cash flow growth. The constant discount rate present-value model is adequate for valuing corporate assets, in contrast to its failure for valuing equity.

The prevailing view in finance is that the evidence for being able to predict long-horizon stock returns is significantly stronger than for short-horizon returns. **Boudoukh**, **Richardson**, and **Whitelaw** show that, for all practical purposes, the estimators are almost perfectly correlated across horizons under the null hypothesis of no predictability. For example, for the persistence levels of dividend yields, the analytical correlation is 99 percent between the 1- and 2-year horizon estimators and 94 percent between the 1- and 5-year horizons, because of the combined effects of overlapping returns and persistence of the predictive variable. Common sampling error across equations leads to OLS coefficient estimates and R-squares that are roughly proportional to the horizon

under the null of no predictability. This is the precise pattern found in the data. They corroborate the asymptotic theory and extend the analysis using extensive simulation evidence. The authors then perform joint tests across horizons for a variety of explanatory variables, and there is little or no evidence of predictability in the data.

Economists have suggested a whole range of variables that predict the equity premium: dividend price ratios, dividend yields, earnings-price ratios, dividend payout ratios, corporate or net issuing ratios, book-market ratios, beta premia, interest rates (in various guises), and consumption-based macroeconomic ratios (cay). **Goyal** and **Welch** comprehensively reex-

amine the performance of these variables, both in-sample and out-of-sample. They find that most variables would not have helped an investor outpredict the historical equity premium mean. Most would have hurt outright. None deserves an unqualified endorsement.

A number of variables are correlated with subsequent returns on the aggregate U.S. stock market in the twentieth century. Some of these variables are stock market valuation ratios, others reflect patterns in corporate finance or the levels of short- and long-term interest rates. Goyal and Welch (2004) have argued that in-sample correlations conceal a systematic failure of these variables out of sample: none are able to beat a simple forecast

based on the historical average stock return. In their paper, **Campbell** and **Thompson** show that forecasting variables with significant forecasting power in-sample generally have a better out-of-sample performance than a forecast based on the historical average return, once sensible restrictions are imposed on the signs of coefficients and return forecasts. The out-of-sample predictive power is small, but they find that it is economically meaningful. They also show that a variable is quite likely to have poor out-of-sample performance for an extended period of time even when the variable genuinely predicts returns with a stable coefficient.

Corporate Finance

The NBER's Program on Corporate Finance met at the Harvard Business School on November 11. Heitor Almeida and Daniel Wolfenzon, NBER and New York University Stern School of Business, organized this program:

Viral Acharya, London Business School, and **Rangarajan Sundaram** and **Kose John**, New York University, "Cross-Country Variations in Capital Structures: The Role of Bankruptcy Codes"

Discussant: Matias Braun, University of California, Los Angeles

Jean Helwege, University of Arizona; **Christo Pirinsky**, Texas A&M University; and **Rene Stulz**, Ohio State University and NBER, "Why Do Firms Become Widely Held? An Analysis of

the Dynamics of Corporate Ownership"

Discussant: Randall Morck, NBER and University of Alberta

Amir Sufi, University of Chicago and NBER, "Bank Lines of Credit in Corporate Finance: An Empirical Analysis"

Discussant: Murillo Campello, University of Illinois

Marianne Bertrand, University of Chicago and NBER, **Francis Kramarz**, CREST-ENSAE; **Antoinette Schoar**, MIT and NBER; and **David Thesmar**, HEC, "Politically Connected CEOs and Corporate Outcomes: Evidence from France"

Discussant: Mara Faccio, Vanderbilt University

Massimo Massa, INSEAD, and **Andrei Simonov**, Stockholm School of Economics, "Shareholder Homogeneity and Firm Value: The Disciplining Role of Non-Controlling Shareholders"

Discussant: Martijn Cremers, Yale University

Alexander Dyck, University of Toronto; **Natalya Volchkova**, Russian-European Center for Economic Policy; and **Luigi Zingales**, Harvard University and NBER, "The Corporate Governance Role of the Media: Evidence from Russia"

Discussant: Stefano Dellavigna, UC, Berkeley

Acharya, **Sundaram**, and **John** investigate the impact of bankruptcy codes on firms' capital-structure

choices. They develop a theoretical model to identify how firm characteristics may interact with the bankruptcy

code in determining optimal capital structures. A novel and sharp empirical implication emerges from this model:

the difference in leverage choices under a relatively equity-friendly bankruptcy code (such as the U.S. code) and one that is relatively more debt-friendly (such as the U.K. code) should be a decreasing function of the anticipated liquidation value of the firm's assets. Using a large database of U.S. and U.K. firms over the period 1990 to 2002, they subject this prediction to extensive empirical testing, both parametric and non-parametric, using different proxies for liquidation values and different measures of leverage. They find strong support for the theory; that is, proxies for liquidation value are both statistically and economically significant in explaining leverage differences across the two countries. On the other hand, many of the other factors that are known to affect within-country leverage (such as size) cannot explain across-countries differences in leverage.

Helwege, Pirinsky, and Stulz consider IPO firms from 1970 to 2001 and examine the evolution of their insider ownership over time to understand better why and how U.S. firms that become widely held did so. In their sample, a majority of firms has insider ownership below 20 percent after ten years. The authors find that a firm's stock market performance and trading play an extremely important role in its insider ownership dynamics. Firms that experience large decreases in insider ownership and/or become widely held have high valuations, good recent stock market performance, and liquid markets for their stocks. In contrast and surprisingly, variables suggested by agency theory have limited success in explaining the evolution of insider ownership.

Sufi uses novel data collected from annual 10-K SEC filings to conduct the first large sample empirical examination of the use of bank lines of credit by public corporations. He finds that the supply of lines of credit by banks to corporate borrowers is particularly sensitive to the borrowers' historical profitability. Even

among borrowers with access to a bank line of credit, banks use strict covenants on profitability, and the borrower loses access to the unused portion of the line of credit when it experiences a drop in profitability. These findings identify a specific constraint (the inability to obtain a line of credit) that causes low profitability firms to hold larger cash balances in their liquidity management strategies.

A number of papers have documented that political leaders may use their power to grant favors to connected private firms. In this paper, **Bertrand, Kramarz, Schoar, and Thesmar** investigate the reverse perspective: they ask whether politically connected business leaders alter corporate decisions to bestow "re-election favors" onto incumbent politicians. They study this question in the context of France, where they document a large overlap in educational and professional background between the CEOs of publicly-traded firms and politicians: more than half of the assets traded on the French stock markets are managed by CEOs who were formerly civil servants. Overall, the results support the hypothesis that connections between CEOs and politicians factor into corporate decisions on job creation and destruction. Firms managed by connected CEOs create more jobs (and destroy fewer plants) in politically more contested areas, and especially around election years. The authors find weak evidence that these networks between politicians and business executives follow partisan lines. In return, "favors" extended by connected CEOs to politicians seem to be reciprocated through privileged access to subsidy programs and lower taxes. Finally, the authors show that firms managed by politically connected CEOs have lower performance than non-connected firms, suggesting that political connections might impose a cost on the firms.

Massa and Simonov study how the shareholding structure of a firm affects its stock price and profitability. They

argue that the degree of shareholder homogeneity affects firm value. Homogeneous shareholders act as a disciplining device on managers, inducing higher profitability, higher stock price, lower volatility and higher transparency. Shareholder homogeneity represents an alternative and indirect source of corporate governance based on the stock market. The authors test this hypothesis by using a dataset containing information on all the shareholders for each firm in Sweden from 1995 to 2001. They construct two novel proxies for shareholder homogeneity: the first is based on the age cohort of the shareholders, and the second on their degree of college interaction. For each firm, they measure the degree of homogeneity of all shareholders. Using this proxy, they show that greater homogeneity increases firm profitability and returns, and reduces analyst error, analyst dispersion, and stock volatility.

Dyck, Volchkova, and Zingales study the effect of media coverage on corporate governance outcomes by focusing on Russia in the period 1999—2002. Russia provides multiple examples of corporate governance abuses, where traditional corporate governance mechanisms are ineffective, and where they can identify an exogenous source of news coverage arising from the presence of an investment fund, the Hermitage fund, that tried to shame companies by exposing their abuses in the international media. The authors find that the probability that a corporate governance abuse is reversed is affected by the coverage of the news in the Anglo-American press. The result is not attributable to the endogeneity of news reporting, since this result holds even when they instrument media coverage with the presence of the Hermitage fund among its shareholders and the "natural" newsworthiness of the company involved. They confirm this evidence with a case study.

Behavioral Economics

The NBER's Working Group on Behavioral Economics, directed by NBER Research Associates Robert J. Shiller of Yale University and Richard H. Thaler, University of Chicago, met in Cambridge on November 12. The following papers were discussed:

Andrei Shleifer and **Sendhil Mullainathan**, Harvard University and NBER, "Persuasion in Finance"
Discussant: Shane Frederick, MIT

Jeffrey Wurgler, New York University and NBER, and **Malcolm Baker**, Harvard University and NBER, "Government Bonds and the Cross-Section of Stock Returns"

Discussant: Bhaskaran Swaminathan, Cornell University

Markus Brunnermeier, Princeton University, and **Christian Julliard**, London School of Economics, "Money Illusion and Housing Frenzies"

Discussant: Christopher J. Mayer, Columbia University and NBER

Yiming Qian and **Matthew Billett**, University of Iowa, "Are Overconfident Managers Born or Made? Evidence of Self-Attribution Bias from Frequent Acquirers"
Discussant: Ulrike Malmendier, Stanford University and NBER

Harrison Hong, Princeton University, and **Marcin Kacperczyk**, University of British Columbia, "The Price of Sin: The Effects of Social Norms on Markets"

Discussant: Owen Lamont, Yale University and NBER

Luigi Guiso, University of Chicago; **Paola Sapienza**, Northwestern University and NBER; and **Luigi Zingales**, Harvard University and NBER, "Trusting the Stock Market"(NBER Working Paper No. 11648)

Discussant: Joshua Coval, Harvard University

Persuasion is a fundamental part of social activity, yet it is rarely studied by economists. **Mullainathan** and **Shleifer** compare the traditional economic model, in which persuasion is an effort to change the listener's mind using information, with a behavioral model, in which persuasion is an effort to fit the message into the audience's already held beliefs. They present a simple formalization of the behavioral model, and compare the two models using data on financial advertising in *Money* and *Business Week* magazines over the course of the internet bubble. The evidence on the content of persuasive messages is broadly consistent with the behavioral model of persuasion.

Baker and **Wurgler** document that U.S. government bonds co-move more strongly with bond-like stocks: stocks of large, mature, low-volatility, profitable, dividend-paying firms that are neither high growth nor distressed. This pattern may be caused by common shocks to real cash flows, rationally required returns, or flights to quality in which

drops in investor sentiment increase the demand for both government bonds and bond-like stocks. Consistent with both the required returns and sentiment channels, the authors find a common predictable component in bonds and bond-like stocks. Consistent with the sentiment channel, they find that bonds and bond-like stocks co-move with inflows into government bond and conservative stock mutual funds.

A reduction in inflation can fuel run-ups in housing prices if people suffer from money illusion. For example, basing the decision on whether to rent or buy a house simply on monthly rent relative to current monthly mortgage payments, agents do not properly take into account that inflation lowers future real mortgage payments, therefore systematically mis-evaluating real estate. After empirically decomposing the price-rent ratio into a rational component and an implied mispricing, **Brunnermeier** and **Julliard** find that: 1) inflation and the nominal interest rate explain a large share of the time-series variation of the

mispricing; 2) the run-ups in housing prices starting in the late 1990s can be reconciled with the contemporaneous reduction in inflation and nominal interest rates; and 3) the tilt effect cannot rationalize these findings.

Billett and **Qian** explore the source of managerial hubris in mergers and acquisitions by examining the history of deals made by individual acquirers. Their study has three main findings: 1) compared to their first deals, acquirers of second and higher-order deals experience significantly more negative announcement effects; 2) while acquisition likelihood increases in the performance associated with previous acquisitions, previous positive performance does not curb the negative wealth effects associated with future deals; 3) top management's net purchase of stock is greater preceding high order deals than it is for first deals. The authors interpret these results as consistent with self-attribution bias leading to managerial overconfidence. They also find evidence that the market anticipates future deals based

on an acquirer's acquisition history and impounds such anticipation into stock prices.

Hong and **Kacperczyk** provide evidence for the effects of social norms on markets by studying "sin" stocks — publicly-traded companies involved in producing alcohol, tobacco, and gaming. They hypothesize that there is a societal norm to not fund operations that promote vice and that some investors, particularly institutions subject to norms, pay a financial cost in abstaining from these stocks. Consistent with this hypothesis, sin stocks are less held by certain institutions, such as pension plans (but not by mutual funds who are natural arbitrageurs), and less followed by analysts than other stocks. Consistent

with them facing greater litigation risk and/or being neglected because of social norms, they outperform the market even after accounting for well-known return predictors. Corporate financing decisions and time-variation in norms for tobacco also indicate that norms affect stock prices. Finally, the authors gauge the relative importance of litigation risk versus neglect for returns. Sin stock returns are not systematically related to various proxies for litigation risk, but are weakly correlated with the demand for socially responsible investing, consistent with them being neglected.

Guiso, **Sapienza**, and **Zingales** provide a new explanation for the limited stock market participation puzzle. In deciding whether to buy stocks, investors

factor in the risk of being cheated. The perception of this risk is a function not only of the objective characteristics of the stock, but also of the subjective characteristics of the investor. Less trusting individuals are less likely to buy stock and, conditional on buying stock, they will buy less stock. The calibration of the model shows that this problem is sufficiently severe to account for the lack of participation of some of the richest investors in the United States as well as for differences in the rate of participation across countries. The authors also find evidence consistent with these propositions in Dutch and Italian micro-data, as well as in cross-country data.

Higher Education

The NBER's Working Group on Higher Education met in Cambridge on November 17. Director Charles T. Clotfelter, NBER and Duke University, organized this program:

Jesse Rothstein, Princeton University and NBER, and **Albert Yoon**, Northwestern University, "Mismatch in Law School"

Discussant: Thomas J. Kane, Harvard University and NBER

Christopher Cornwell and **David Mustard**, University of Georgia, "Merit Aid and Sorting: The Effects of HOPE-Style Scholarships on College Ability Stratification"

Discussant: Susan Dynarski, Harvard

University and NBER

Devin Pope, University of California, Berkeley, and **Jaren Pope**, North Carolina State University, "Understanding College Choice Decisions: How Sports Success Garners Attention and Provides Information"

Discussant: Sarah Turner, University of Virginia and NBER

John J. Siegfried and **T. Aldrich Finegan**, Vanderbilt University, and **Wendy Stock**, Montana State University, "Time-to-Degree for the Economics PhD Class of 2001-02" and "Attrition in Economics Ph.D. Programs"

Discussant: Ronald G. Ehrenberg, Cornell University and NBER

Scott Carrell, Dartmouth College, and **Frederick V. Malmstrom** and **James E. West**, U.S. Air Force Academy, "Peer Effects in Academic Cheating"

Discussant: David Zimmerman, Williams College and NBER

Ofer Malamud, University of Chicago, "Breadth vs. Depth: The Effect of Academic Specialization on Labor Market Outcomes"

Discussant: Bruce Sacerdote, Dartmouth College and NBER

According to the "mismatch" hypothesis, affirmative action preferences in admissions induce minority students to attend selective schools

where they are unable to compete with their more qualified white classmates. **Rothstein** and **Yoon** implement two tests of mismatch using data on law

students. Students attending more selective law schools earn substantially lower grades than similarly-qualified students at less selective schools, but

are no less likely to graduate or pass the bar exam, and obtain better jobs at higher salaries. The authors also compare black students to whites. In the upper four quintiles of the LSAT-undergraduate GPA distribution, blacks and whites graduate and pass the bar exam at similar rates, though blacks attend more selective schools and earn lower grades; blacks also obtain better post-law-school jobs. In the bottom quintile, black bar passage rates are lower. However, this cannot confidently be attributed to mismatch, as many more whites than blacks are unable to gain admission to law school, introducing the potential for sample selection bias.

In the last 15 years there has been a significant increase in merit aid. Since the early 1990s nearly 30 state-sponsored merit programs have been started, about half of which are based largely on Georgia's HOPE Scholarship. Coincident with this increase in merit aid has been increased attention to sorting in various aspects of life, especially in education. **Cornwell** and **Mustard** examine the extent to which merit-based aid exacerbates or ameliorates sorting by ability in higher education. They use data from Peterson's Guide to Colleges and the Integrated Post-secondary Education Data System (IPEDS) to evaluate this relationship. From these sources they create a large panel dataset of institutions of higher learning in the Southern Regional Education Board (SREB), and test how merit aid affects sorting between and within states. Their empirical strategy treats HOPE as a natural experiment and contrasts the quality of freshmen at Georgia colleges to their out-of-state counterparts. The difference-in-differences estimates show that HOPE increased the quality of entering freshmen in Georgia institutions relative to their out-of-state peers. At the highest-quality institutions HOPE raises all

measures of student quality and the homogeneity of students by ability. The lowest-quality institutions experience no statistically significant effect from HOPE on any measure of student quality. The authors conclude that state-sponsored merit aid programs increase the retention of high ability students for college and also increase the ability stratification of institutions within states. They also examine two indirect measures of student selectivity: acceptance and yield rates. HOPE decreases acceptance rates at all types of institutions, but the percentage change is largest at the universities, which are most space constrained. HOPE increases yield rates for universities but not for any other institution categories. Put together, these results suggest that HOPE substantially increased the selectivity at universities. In addition to Georgia, five other states (Arkansas, Florida, Kentucky, Louisiana, Maryland, and South Carolina) in the SREB started large-scale merit aid programs during the sample period. The data show that in general universities in these states experience similar gains in verbal and math SAT scores and the percentage of students who graduate in the top 10 percent of their high school classes. There are two exceptions. Louisiana, which uses a relatively low threshold criterion to qualify for its merit award, experiences no statistically significant increase in SAT scores from its merit program. Florida's Bright Futures Scholarship appears to reduce the SAT scores of incoming students while increasing the fraction of students who graduated from the top 10 percent of their high school classes.

Deciding where to apply to college among the thousands of four-year schools in the United States is a daunting task for most teenagers. High school students are typically not aware of all of the benefits that each school might offer. In fact, observation suggests that

many students may be more familiar with a school's recent sports record than its academic quality. **Pope** and **Pope** develop a simple model of school choice that incorporates the limited awareness that high school students may have regarding the utility of attending different colleges. Their model predicts that college sports success may increase a school's future applications both by making students more aware of that college and by increasing the utility associated with attending that school. Using an administrative dataset that records where high school students sent their SAT scores, the authors analyze the effect of sports success on sent test scores for all 332 schools that participate in NCAA Division I basketball or football. They show that sent test scores act as a reasonable proxy for sent applications. Their results indicate that sports success in a given year can increase the total number of students that send their test scores the following year by up to 10 percent. They also show that certain demographic groups (males, blacks, and students who played sports in high school) are significantly more influenced by sports success and that schools can expect changes in sent test scores by up to 15–20 percent after a good sports year for these groups. The authors conclude that the increase in sent test scores stems from both the increased exposure/awareness that schools receive because of sports and the increased utility that students associate with attending a school with a strong sports program.

Stock and **Siegfried** use survey responses from Ph.D. graduates and thesis advisors to estimate the time required for the class of 2001–2 to earn a degree. Median time to earn the Ph.D. is 5.5 years, up from 5.25 years for the class of 1996–7. The time required to write a dissertation is a little longer than the time required to complete comprehensive examinations and course work.

Graduates who had their first child while in a Ph.D. program are estimated to finish almost one year later than others. Those with predominantly fellowship support finished about six months faster than those funded predominantly by a teaching assistantship, as did those whose dissertation was a set of essays rather than a single topic treatise. Americans who did their undergraduate work at either a Top-50 U.S. liberal arts or other U.S. college or university that does not offer a Ph.D. in economics finished faster than their counterparts who earned a bachelor's degree from a U.S. university that offers a Ph.D. in economics. International students from predominantly English speaking countries finished faster than other students studying in the United States on temporary visas.

Stock, Finegan, and Siegfried use information about 586 individuals who matriculated into two economics Ph.D. programs in Fall 2002 to estimate first- and second-year attrition rates. After two years, 26.5 percent of the initial cohort had left, equally divided between the first and second years. Attrition varies widely across individual programs. It is lower among the most highly rated 15 programs, for students with higher verbal and quantitative GRE scores, and for those on a research assistantship. Poor academic performance is the most cited reason for with-

drawal. About 15 percent transfer to other economics programs because they are dissatisfied with some aspect of the particular program where they first enrolled.

Using self-reported academic honor violations from the classes of 1959 through 2002 at the three major U.S. military service academies (Air Force, Army, and Navy), **Carrell, Malmstrom, and West** measure how peer honesty influences individual cheating behavior. All else equal, they find higher levels of peer cheating result in a substantially increased probability that an individual will cheat. They identify through separate estimation procedures an exogenous (contextual or pre-treatment) peer effect and an endogenous (during treatment) peer effect. Results for the (first-order) exogenous peer effect indicate that one additional high school cheater creates 0.33 to 0.48 new college cheaters. Results for the (first-order) endogenous peer effect indicate that one additional college cheater creates 0.61 to 0.86 new college cheaters. These results imply that, in equilibrium, the social multiplier for academic cheating ranges between 2.56 and 3.97.

Malamud examines the tradeoff between early and late specialization in the context of higher education. While some educational systems require students to specialize early by choosing a major field of study prior to entering

university, others allow students to postpone this choice. Malamud develops a model in which individuals, by taking courses in different fields of study, accumulate field-specific skills and receive noisy signals of match quality in these fields. With later specialization, students have more time to learn about match quality in each field but less time to acquire specific skills once a field is chosen. Malamud derives comparative static predictions between regimes with early and late specialization, and tests these predictions across British systems of higher education using university administrative data and survey data on 1980 university graduates. He finds that individuals in Scotland, where specialization occurs relatively late, are less likely to switch to an occupation that is unrelated to their field of study compared to their English counterparts who specialize earlier. According to the model, the return to being well matched to an occupational field is high relative to the return to specific skills and there may therefore be benefits to later specialization. Malamud also finds strong evidence in support of the prediction that individuals who switch to unrelated occupations earn lower wages but no evidence that the cost of switching differs between those specializing early and late.

Education Program Meeting

The NBER's Education Program met in Cambridge on November 18. Program Director Caroline M. Hoxby, NBER and Harvard University, chose the following papers for discussion:

David N. Figlio, University of Florida and NBER, "Why Barbie Says 'Math is Hard'"

Margaret Ledyard, University of Texas at Austin, "Why are Private Schools Small? School Location, Returns to Scale, and Size"

Stephanie Riegg Cellini, University of California, Los Angeles, "Funding Schools or Financing Students: Public Subsidies and the Market for Two-Year College Education"

Joshua Angrist, MIT and NBER, and **Aimee Chin**, University of Houston; and **Ricardo Godoy**, Brandeis University, "Is Spanish-Only Schooling Responsible for the Puerto-Rican Language Gap?"

Lex Borghans and **Bart Golsteyn**, University of Maastrich, "Imagination,

Time Discounting, and Human Capital Investment Decisions"

Nora Gordon, University of California, San Diego and NBER; **Elizabeth Cascio**, University of California, Davis and NBER; **Sarah Reber**, University of California, Los Angeles; and **Ethan Lewis**, Federal Reserve Bank of Philadelphia, "Financial Incentives and the Desegregation of Southern Public Schools"

Figlio adopts a novel approach to discerning one pathway through which family and cultural expectations and resultant identity-formation could influence young women's choices about studies and potential future careers. He posits that a girl with a more feminine name may be treated systematically differently by parents, teachers, and peers, or may herself relate to more feminine stereotypes. In such a circumstance, girls with more feminine names may be more likely to select coursework that is more "traditionally female"—such as the humanities and foreign languages—and shy away from coursework that is more "traditionally male"—such as advanced math and science. Of course, names are not exogenously given to girls. Parents often pay great attention to the names they give their children, and parents with different proclivities toward mathematics and science, say, may systematically select different names for their daughters. In order to avoid confounding unmeasured family-specific factors with causal effects of names, Figlio uses a unique dataset of pairs of highly-achieving sisters provid-

ed to him by a large Florida school district. He then relates the name that a given high-achieving sister has to her propensity to take calculus and physics in high school, as compared with her high-achieving sisters with different names. Parents often give pairs of sisters very different names in terms of their femininity, offering the opportunity to directly test the presumption that a name can have causal influences on a girl's academic development. Figlio finds that girls with more feminine names are less likely to self-select into advanced mathematics and science classes in high school, holding constant family fixed effects and prior achievement. These results suggest that environmental factors play a large role in determining whether women choose mathematics and science as potential careers.

Private schools are, on average, a third of the size of public schools. But why are they small? Two possible explanations are differences in demand and differences in production. If the returns to scale are similar for private and public high schools, then an increase in

school choice through private school vouchers could lead to larger private high schools. This would be a demand effect—private schools are smaller because fewer people want to go to them. Using cost estimates for public schools from Ledyard (2004), **Ledyard** can account for approximately 70 percent of the difference in size between public and Catholic high schools. She holds costs fixed, and uses data on private school location, size, and affiliation to predict the size of Catholic schools.

Both public and private two-year colleges rely on public subsidies to make their education affordable for students. Public community colleges receive government support directly in the form of subsidies, while private for-profit colleges or proprietary schools receive government support indirectly in the form of grants or vouchers given to students. **Cellini** analyzes the impact of these two funding schemes on the entry decisions of proprietary schools and enrollments in community colleges. She uses a new administrative dataset of for-profit colleges in California, panel data methods, and a unique regression

discontinuity design. She finds that an increase in public funding for a local community college diverts students from the private to the public sector and causes a corresponding decline in the number of proprietary schools in the county. Raising student financial aid awards, on the other hand, expands the overall pool of sub-baccalaureate students and causes proprietary schools to enter the market. This effect is particularly strong in counties with high poverty rates where more students are eligible for aid.

Between 1898 and 1948, English was the language of instruction for most post-primary grades in Puerto Rican public schools. Since 1949, the language of instruction in all grades has been Spanish. **Angrist, Chin, and Godoy** use this policy change to estimate the effect of English-intensive instruction on the English-language skills of Puerto Ricans. Although naïve estimates suggest that English instruction increased English-speaking ability among Puerto Rican natives, estimates that allow for education-specific cohort trends show no effect. This result is surprising in light of the strong presumption by American policymakers at the time that English instruction was the

best way to raise English proficiency. It suggests that increased emphasis on using English as the language of instruction may do little to benefit Puerto Ricans who remain on the island today.

While economic theory regards education as an important investment, the reality of students' behavior does not always seem to support this view. **Borghans and Golsteyn** aim to analyze the behavior of students at college from an investment perspective. They provide robust paradoxical findings that college students with higher discount rates stay longer in education. The explanation they pursue is that a higher discount rate can partly be a consequence of a lack of imagination about the future work life. If so, the discount rate will be very high at moments when there are major changes in circumstances, in this case when students go from college to work. This provides incentives for students who lack a clear picture about their future work-finding life to stay in education. To test this model, the authors measure the crucial individual attributes, ask students about the way they made their choices, and present them other choices that reveal the nature of their behavior. The empir-

ical results support the model, so the main conclusion is that a lack of imagination induces students to stay longer in education while it reduces the efficiency of this investment.

Cascio, Gordon, Lewis, and Reber examine whether the financial incentives put in place by two pieces of federal legislation — the Civil Rights Act of 1964 and the Elementary and Secondary Education Act of 1965 — played a causal role in desegregating southern schools. The latter targeted a large federal education program toward the South, while the former tied the receipt of funds under this new program to nondiscrimination. Using a newly collected dataset on school desegregation and school finance for the 1960s, the authors find that districts with relatively more to lose under federal funding allocation rules engaged in more student desegregation, were more likely to have desegregated their faculties, and were more likely to have received their federal funding by the fall of 1967. Qualitatively similar results are found for the fall of 1966. These results suggest that legislative and executive enforcement efforts — not just the courts — contributed to the desegregation of southern education.

Political Economy

The NBER's Working Group on Political Economy, directed by NBER Research Associate Alberto F. Alesina of Harvard University, met in Cambridge on November 19. The following papers were discussed:

Timothy Besley, London School of Economics; **Torsten Persson**, Stockholm University and NBER; and **Daniel Sturm**, University of Munich, "Political Competition and Economic Performance: Theory and Evidence from the United States"
Discussant: Roberto Perotti, Università Bocconi and NBER

Allan Drazen, University of Maryland and NBER, and **Marcela Eslava**, Universidad de los Andes, "Pork Barrel Cycles"

Discussant: Alessandro Lizzeri, New York University

John N. Friedman and **Richard T. Holden**, Harvard University, "Optimal Gerrymandering"

Discussant: Roland G. Fryer, Harvard University

Kenneth L. Sokoloff, UC, Los Angeles and NBER, and **Eric M. Zolt**,

UC, Los Angeles, "Inequality and the Evolution of Institutions of Taxation: Evidence from the Economic History of the Americas"

Discussant: William Easterly, New York University

Per Pettersson-Lidbom, Stockholm University, and **Matz Dahlberg**, Uppsala University, "An Empirical Approach for Estimating the Causal Effect of Soft Budget Constraints on Economic Outcomes"

Discussant: Antonio Merlo, University of Pennsylvania

Besley, Persson, and Sturm formulate a model to explain why the lack of political competition may stifle economic performance; they use the United States as a testing ground for the model's predictions, exploiting the 1965 Voting Rights Act which helped to break the near monopoly on political power of the Democrats in southern states. They find that changes in political competition have quantitatively important effects on state income growth, state policies, and quality of Governors. By their bottom-line estimate, the increase in political competition triggered by the Voting Rights Act raised long-run per capita income in the average affected state by about 20 percent.

Drazen and Eslava present a model of political budget cycles in which incumbents influence voters by targeting government spending to specific groups of voters at the expense of other voters or other expenditures. Each voter faces a signal extraction problem: being targeted with expenditure before the election may reflect opportunistic manipulation, but may also reflect a sincere preference of the incumbent for the types of spending

that voter prefers. The authors show the existence of a political equilibrium in which rational voters support an incumbent who targets them with spending before the election even though they know it may be electorally motivated. In equilibrium, voters in the more "swing" regions are targeted at the expense of types of spending not favored by these voters. This will be true even if they know they live in swing regions. However, the responsiveness of these voters to electoral manipulation depends on whether they face some degree of uncertainty about the electoral importance of the group they are in. Use of targeted spending also implies voters can be influenced without election-year deficits, consistent with recent finding for established democracies.

Standard intuitions for optimal gerrymandering involve concentrating one's extreme opponents in "unwinnable" districts ("throwing away") and spreading one's supporters evenly over "winnable" districts ("smoothing"). These intuitions are not robust and depend crucially on arbitrary modeling assumptions. **Friedman and Holden** characterize the

solution to a problem in which the gerrymanderer observes a noisy signal of voter preferences from a continuous distribution and creates N districts of equal size to maximize the expected number of districts that she wins. They show that "throwing away" districts is not generally optimal, nor is "smoothing." The optimal solution involves creating a district that matches extreme "Republicans" with extreme "Democrats," then continuing to match toward the center of the signal distribution. The value to being the gerrymanderer increases with the extremity of voter preferences, the quality of the signal, and the number of districts.

Sokoloff and Zolt turn to history to gain a better perspective on how and why tax systems vary. They focus on the societies of the Americas over the nineteenth and twentieth centuries, for two major reasons. First, despite the region having the most extreme inequality in the world, the tax structures of Latin America are generally recognized as among the most regressive, even by developing country standards. Second, as has come to be widely appreciated, the

colonization and development of the Americas constitute a natural experiment of sorts that students of economic and social development can exploit. Beginning more than 500 years ago, a small number of European countries established colonies in diverse environments across the hemisphere. The different circumstances meant that largely exogenous differences existed across these societies, not only in national heritage, but also in the extent of inequality. The principal concern in this paper is with how the extent of inequality may influence the design and implementation of tax systems. Several salient patterns emerge. The United States and Canada (like Britain, France, Germany, and even Spain) were much more inclined to tax wealth and income during their early stages of growth — and into the twentieth century — than developing countries are today. Although the U.S. and Canadian federal governments were similar to those of their counterparts in Latin America in relying primarily on the taxation of foreign trade (overwhelmingly tariffs) and excise taxes, the greater success or inclination of state (provincial) and local governments in North America to tax wealth (primarily in the form of property or estate taxes) and income (primarily in the form of business taxes), as well as the much larger relative sizes of these sub-national govern-

ments in North America, accounted for a radical divergence in the overall structure of taxation. Tapping these progressive sources of government revenue, state and local governments in the United States and Canada, even before independence, began directing substantial resources toward public schools, improvements in infrastructure involving transportation and health, and other social programs. In contrast, the societies of Latin America, which had come to be characterized soon after initial settlement by rather extreme inequality in wealth, human capital, and political influence, tended to adopt tax structures that were significantly less progressive in incidence and manifested greater reluctance or inability to impose local taxes to fund local public investments and services. These patterns persisted, moreover, well into the twentieth century — indeed up to the present day. The apparent association between initial inequality and the institutions of taxation and public finance is all the more intriguing in that Sokoloff and Zolt find corresponding patterns across different regions of the United States and across different countries of Latin America.

Pettersson-Lidbom and Dahlberg develop an empirical framework for estimating the causal effect of soft budget constraints on economic outcomes. Their point of departure is that the

problem of the soft budget constraint is a problem of credibility; that is, inability of a supporting organization to commit itself not to extend more resources to a budget-constrained organization (in other words, bailouts) *ex post* than it was prepared to provide *ex ante*. This means that current economic behavior of a budget-constrained organization will depend upon its *expectations* of being bailed out in the future. Thus, to estimate the causal effect of soft budget constraints (that is, bailout expectations) on economic outcomes, one has to measure these expectations and link them to the current behavior of the budget-constrained organization. The authors argue that one can use information about realized bailouts to construct credible measures of bailout expectations. They apply an empirical framework to Swedish local governments, which provide an attractive testing ground for the soft budget constraint since the central government has extended a total of 1,697 bailouts over the period 1974 to 1992. The authors find that bailout expectations have a causal effect on economic behavior. The estimated effect is quite sizeable: on average, a local government increases its debt by 30 percent if it is certain of being bailed versus when it is certain of not being bailed out.

International Trade and Investment

The NBER's Program on International Trade and Investment met at the Bureau's California office on December 2 and 3. Program Director Robert C. Feenstra of University of California, Davis, organized the meeting. The following papers were discussed:

Carsten Eckel, University of Goettingen, and **J. Peter Neary**, University College Dublin, "Multi-Product Firms and Flexible Manufacturing in the Global Economy"

Volker Nocke, University of Pennsylvania, and **Stephen Yeaple**, University of Pennsylvania and NBER, "Endogenizing Firm Scope: Multiproduct Firms in International Trade"

Pol Antras, **Mihir A. Desai**, and **C. Fritz Foley**, Harvard University and NBER, "FDI Flows and Multinational Firm Activity"

Lee J. Branstetter and **Raymond Fisman**, Columbia University and NBER; **C. Fritz Foley**; and **Kamal Saggi**, Southern Methodist University, "Intellectual Property Rights, Imitation, and Foreign Direct Investment: Theory and Evidence"

Andrew B. Bernard, Dartmouth College and NBER; **J. Bradford Jensen**, Institute for International Economics; and **Peter Schott**, Yale University and NBER, "Transfer Pricing by U.S.-Based Multinational Firms"

Diego Puga and **Daniel Trefler**, University of Toronto and NBER, "Wake Up and Smell the Ginseng: The Rise of Incremental Innovation in Low-Wage Countries"

Svetlana Demidova, Pennsylvania State University; **Hiau Looi Kee**, The World Bank; and **Kala Krishna**, Pennsylvania State University and NBER, "Rules of Origin and Firm Heterogeneity"

Christian Broda, University of Chicago; **Nuno Limão**, University of Maryland; and **David E. Weinstein**, Columbia University and NBER, "Optimal Tariffs: The Evidence"

Eckel and **Neary** present a new model of multi-product firms (MPFs) and flexible manufacturing and explore its implications in partial and general equilibrium. International trade integration affects the scale and scope of MPFs through a competition effect and a demand effect. The authors demonstrate how MPFs adjust in the presence of single-product firms and in heterogeneous industries. Their results are in line with recent empirical evidence and suggest that MPFs in conjunction with flexible manufacturing play an important role in the impact of international trade on product diversity – that is, the range of products produced by all firms.

Nocke and **Yeaple** develop a theory of multi-product firms that differ in their organizational capabilities. In the model, a firm's unit cost is the endogenous outcome of its choice of the

number of its product lines. The more product lines a firm manages, the higher are its unit costs, but this trade-off is less severe for firms with greater organizational capabilities. Paradoxically, more efficient firms optimally increase their scope to such an extent that their unit costs are higher than those of less efficient firms. The model thus explains the empirical puzzle that there is a negative relationship between firm size and Tobin's Q. Positive industry shocks — such as those caused by trade liberalization — induce a merger wave that alters the intra-industry dispersion of observed productivity as high-Q firms buy or sell product lines with low-Q firms.

How are foreign direct investment (FDI) flows and patterns of multinational firm (MNC) activity determined in a world with frictions in financial contracting and variations in institution-

al environments? As developers of technologies, MNCs have long been characterized as having comparative advantage in monitoring the deployment of their technology. **Antras**, **Desai**, and **Foley** show that, in a setting of non-contractible monitoring and financial frictions, this comparative advantage endogenously gives rise to MNC activity and FDI flows. The mechanism generating MNC activity is not the risk of technological expropriation by local partners but the demands of external funders who require MNC participation to ensure value maximization by local entrepreneurs. The model delivers distinctive predictions for the impact of weak institutions on patterns of MNC activity and FDI flows, with weak institutional environments limiting the scale of multinational firm activity but increasing the share of that activity that is financed by multinational

parents through FDI flows. In addition to accounting for distinctions between patterns of MNC activity and FDI flows, the model can help explain substantial two-way FDI flows between countries with high levels of financial development and small and unbalanced FDI flows between countries with different levels of financial development. The main predictions of the model are tested and confirmed using firm-level data on U.S. outbound FDI.

Does the adoption of stronger intellectual property rights (IPR) in developing countries enhance or retard their industrial development? How does such a policy shift affect industrial activity in the developed countries, where most innovative activity is concentrated? **Branstetter, Fisman, Foley, and Saggi** address these questions both theoretically and empirically. On the theoretical side, they develop a North-South product cycle model in which Northern innovation, Southern imitation, and FDI are all endogenous. This model predicts that IPR reform in the South leads to increased FDI from the North, as Northern firms shift production to Southern affiliates. This increased FDI drives an acceleration of Southern industrial development, as the South's share of global manufacturing and the pace at which production of more recently invented goods shifts to the South both increase. The model also predicts that as production shifts to the South, Northern resources will be reallocated to R and D, driving an increase in the global rate of innovation. The authors confront the theoretical model with evidence on the response of U.S. multinationals to a series of well-documented IPR reforms by developing countries in the 1980s and 1990s. Their results indicate that U.S.-based MNCs expand the scale of their activities in reforming countries after IPR reform, and this effect is disproportionately strong for affiliates whose parents rely

strongly on patented intellectual property as part of their global business strategy. Data tracking industry level value-added in the reforming countries point to an overall expansion of industrial activity after IPR reform. Finally, evidence from highly disaggregated trade data also suggests that the expansion of multinational activity leads to a higher net level of production shifting to developing countries, more than offsetting any possible decline in the imitative activity of indigenous firms.

Bernard, Jensen, and Schott examine how prices set by multinational firms vary across arm's-length and related-party customers. They find that arm's length prices are substantially and significantly higher than related party prices for U.S.-based multinational exporters. The price difference is large even when comparing the export of the same good by the same firm to the same destination country in the same month by the same mode of transport. The price wedge is smaller for commodities than for differentiated goods and is increasing in firm size and firm export share. The difference between arm's length and related party prices is also significantly greater for goods sent to countries with lower taxes and higher tariffs. Changes in exchange rates have differential effects on arm's length and related party prices; an appreciation of the dollar strongly reduces the difference between the prices

Increasingly, a small number of low-wage countries such as China and India are involved in innovation — not “big ideas” innovation, but the constant incremental innovations needed to stay ahead in business. **Puga and Trefler** provide some evidence of this new phenomenon and develop a model in which there is a transition from old-style product-cycle trade to trade involving incremental innovation in low-wage countries. They explain why levels of involvement in innovation vary across

low-wage countries and even across firms within each low-wage country. They then draw out implications for the location of production, trade, capital flows, earnings and living standards.

Demidova, Kee, and Krishna develop a heterogeneous firm model to study the effects of trade policy, trade preferences, and the rules of origin (ROOs) needed to obtain them. They apply their model to Bangladeshi garment exports to the United States and European Union. There are differences across products and export destinations that make for an interesting natural experiment. These differences generate differences in the composition of exporters and productivity. The authors use data on Bangladeshi garment exporters to construct firm-level total factor productivity (TFP) estimates. They then test the predictions of the model on the relationship between the distributions of TFP of various groups of firms. They show that the facts match the predictions of the model.

The theoretical debate over whether countries can and should set tariffs in response to export elasticities goes back over a century to the writings of Edgeworth (1894) and Bickerdike (1907). Despite the optimal tariff argument's centrality in debates over commercial policy, there exists no evidence about whether countries actually use it in setting tariffs. **Broda, Limão, and Weinstein** estimate disaggregate export elasticities and find that countries that are not members of the World Trade Organization systematically set higher tariffs on goods that are supplied inelastically. The result is robust to the inclusion of political economy variables and a variety of model specifications. Moreover, they find that countries with higher aggregate market power have on higher average tariffs. In short, there is strong evidence in favor of the optimal tariff argument.

Productivity Program Meeting

The NBER's Program on Productivity met in Cambridge on December 2. Program Director Ernst R. Berndt of MIT and Pierre Azoulay, NBER and Columbia University, organized the meeting. The agenda was:

Amy Finkelstein and **Daron Acemoglu**, MIT and NBER, "Input and Technology Choices in Regulated Industries: Evidence from the Health Care Sector"

Discussant: David M. Cutler, Harvard University and NBER

Pierre Azoulay, and **Joshua Graff Zivin**, Columbia University and NBER, "Peer Effects in the Workplace:

Evidence from Professional Transitions for the Superstars of Medicine" Discussant: Manuel Trajtenberg, Tel Aviv University and NBER

Laura Schultz and **Sumiye Okubo**, Bureau of Economic Analysis — Report on the BEA/NSF R and D Satellite Accounts: Estimating the Returns and Spillovers from Business R and D

Yonghong Wu, University of Illinois; **David Popp**, Syracuse University and NBER; and **Stuart Bretschneider**, Syracuse University, "The Effects of Innovation Policies on Business R&D: A Cross-National Empirical Study"

Discussant: Margaret Kyle, Duke University and NBER

Nick Bloom, Stanford University, and **John Van Reenan**, London School of Economics, "Measuring and Explaining Management Practices Across Firms and Countries"

Discussant: Richard B. Freeman, Harvard University and NBER

James D. Adams, Rensselaer Polytechnic University and NBER, and **J. Roger Clemmons**, University of Florida, "Industrial Scientific Discovery"

Discussant: Scott Stern, Northwestern University and NBER

Acemoglu and **Finkelstein** examine the implications of regulatory change for the input mix and technology choices of regulated industries. They present a simple neoclassical framework that emphasizes changes in relative factor prices faced by regulated firms under different regimes, and investigate how this might affect technology choices through substitution of (capital embodied) technologies for tasks previously performed by labor. They empirically examine some of the implications of the framework by studying the change from full cost to partial cost reimbursement under the Medicare Prospective Payment System (PPS) reform, which increased the relative price of labor faced by U.S. hospitals. Using the interaction of hospitals' pre-PPS Medicare share of patient days with the introduction of these regulatory changes, they document a substantial increase in capital-labor ratios and a large decline in labor inputs associated

with PPS. Most interestingly, they find that the PPS reform seems to have encouraged the adoption of a range of new medical technologies. They also show that the reform was associated with an increase in the skill composition of these hospitals, which is consistent with technology-skill or capital-skill complementarities.

Azoulay and **Zivin** estimate the magnitude of knowledge spillovers generated by 4,764 academic superstars in the life sciences onto their coauthors' research productivity. Using matched employee-employer data, the authors measure how scientific output (grants, publications, and patents) for a coauthor changes when the superstar moves to or from a different institution. Preliminary results indicate that superstars generate substantial spillovers through two independent channels: location and co-authorship. Location spillovers decline more than linearly with geographic distance. Substitution

away from collaboration with other scientists cancels a significant portion of the benefits of exposure to superstar talent. The authors also find that the location spillovers declined markedly in the 1990s.

Wu, **Popp**, and **Bretschneider** examine the effect of three major national innovation policies (patent protection, R and D tax incentives, and government funding of business R and D) on business R and D spending. Unlike previous work, their study considers the effect of openness to international trade. They use data from nine OECD countries (Australia, Canada, France, Germany, Italy, Japan, Spain, United Kingdom, and United States) in 1985–95. Their results show that all three innovation policies play a significant role in stimulating business funded and performed R and D. Among the components of patent rights, enforcement of patent legal regime and duration of protection term consistently

have a positive effect on business R and D decisions. In addition, R and D performed by the government has a positive effect on business R and D, while R and D by the higher education sector has a negative impact on business R and D. The authors also find modest empirical support for the positive role of openness to international trade in business R and D investment.

Bloom and Reenen use an innovative survey tool to collect *management practice* data from 732 medium-sized manufacturing firms in the United States, France, Germany, and the United Kingdom. These measures of managerial practice are strongly associated with productivity, profitability, Tobin's Q, sales growth, and survival rates. Management practices also display significant cross-country differences, with U.S. firms on average better managed than European firms, and significant within-country differences with a long tail of extremely badly managed firms. The authors find this is attributable to: different levels of product market competition, associated with better management; and family firms passing management control down to the eldest sons (*primo geniture*), associated with worse management. European firms report lower levels of competition,

while French and British firms also report substantially higher levels of *primo geniture* because of the influence of Norman legal origin. These two factors explain up to two thirds of the average U.S.-Europe management gap.

Adams and Clemmons estimate science production functions for top R and D firms in the United States. Their data include estimated flows of basic science from universities to firms, from firms to other firms, and within firms. The underlying evidence consists of papers and citations from the Institute for Scientific Information (ISI) in Philadelphia, Pennsylvania. The data cover the top 200 R and D firms and the top 110 universities during 1981–99. These account for most U.S. scientific research during this period. Their empirical estimates are based on a panel of firms, science fields, and years that is an extract from the papers and citations data. Using this panel, they find that science spillovers from universities and other firms occur primarily within fields. Industry is much less of a barrier and, in fact, most knowledge flows occur between, rather than within industries. Citation and collaboration spillovers from universities, citation spillovers from other firms, and citation spillbacks from firms' past research all

make significant contributions to scientific discovery. The authors also uncover a host of potential biases. First, the response of discovery to the firms' own R and D is biased upward by the failure to include science spillovers from universities and other firms. Second, the university citation spillover is biased upward by the failure to include collaboration between firms and universities. Third, the effects of spillovers and spillbacks are biased downward when zeroes of the spillovers and spillbacks are not considered by the estimation procedure. The elasticity of firms' science output with respect to university citation spillovers is consistently larger than the firm spillover elasticity. In addition, the marginal product of university spillovers exceeds the marginal product of firm spillovers, so that additional science output per dollar of university R and D is several times larger than additional output per dollar of firm R and D. University collaboration only serves to increase this productivity advantage of universities. Since university R and D is primarily funded by government, this potency of university spillovers appears to reassert the role of publicly funded science in propagating knowledge externalities throughout the U.S. economy.

Bureau Books

Corruption and Reform: Lessons from America's Economic History

Corruption and Reform: Lessons from America's Economic History, edited by Edward L. Glaeser and Claudia Goldin, is available from the University of Chicago Press. This NBER Conference Report may be purchased for \$75.00 from: University of Chicago Press, Order Department, 11030 South Langley Avenue, Chicago, IL 60628-2215; 1-800-621-2736. Academic discounts are available.

Despite recent corporate scandals, the United States is among the world's least corrupt nations. But in the nineteenth century, municipal governments and robber barons alike found new ways to steal from taxpayers and swindle investors. In *Corruption and Reform*,

contributors explore this shadowy period of U. S. history in search of better methods of fighting corruption worldwide today.

The chapters in this volume address the measurement and consequences of fraud and corruption and the forces that ultimately led to their decline within the United States. They show that various approaches to reducing corruption, such as deregulation and in particular "free banking" in the 1830s, have met with success. In the 1930s, corruption was kept in check when new federal bureaucracies replaced local administrations in doling out relief. Another deterrent to corruption was the independent press, which kept a watchful

eye over government and business. These and other facets of American history analyzed in this volume make it indispensable as background for anyone interested in corruption today.

Glaeser is a Research Associate in the NBER's Programs on Aging, Law and Economics, and Economic Fluctuations and Growth. He is also the Fred and Eleanor Glimp Professor of Economics at Harvard's Kennedy School of Government.

Goldin directs the NBER's Program on the Development of the American Economy and is the Henry Lee Professor of Economics at Harvard.

The Democratization of Invention: Patents and Copyrights in American Economic Development, 1790-1920

The Democratization of Invention: Patents and Copyrights in American Economic Development, 1790-1920, by B. Zorina Khan, is available from Cambridge University Press for \$60.00.

An examination of the evolution and impact of American intellectual property rights during the "long nineteenth century," this monograph compares the American system to that of the more oligarchic societies of France and Britain. The United States created the first modern patent system and its policies toward inventors were the most liberal in the world. Individuals who did not have the resources to directly exploit their inventions benefited disproportionately from secure

property rights and the operation of efficient markets. When markets expanded, these inventors contributed to the proliferation of new technologies and improvements. In contrast to its leadership in the area of patents, the U.S. copyright regime was among the weakest in the world, in keeping with its utilitarian objective of promoting the general welfare. American patent and copyright institutions promoted a process of democratization that not only furthered economic and technological progress but also provided a conduit for the creativity and achievements of disadvantaged groups.

The topics discussed in this book, part of the NBER's series on Long-

Term Factors in Economic Development, include: patent laws and litigation; women inventors in America; patentees and married women's property rights; and intellectual property and economic development.

Khan is a Faculty Research Fellow in the NBER's Program on the Development of the American Economy and a member of the economics faculty at Bowdoin College.

Orders for the book should be sent to the Press at: 100 Brook Hill Drive, West Nyack, NY 10994-2133. Or, by phone: 800-872-7423 (U.S. and Canada); 95-800-010-0200 (Mexico); or 845-353-7500.

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