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Financial Sector Reform: How Far Are We?

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Although the recession in the United States that started in December 2007 ended in June 2009, the impact of the Great Recession, which began when Lehman Brothers filed for bankruptcy on September 15, 2008, continues to be felt in the United States, Europe, and around the world.[1] After the bankruptcy of Lehman Brothers, policymakers, working through the G-20, quickly reached agreement on the macroeconomic policies needed to minimize the damage done by the crisis. For their part, central bankers and supervisors of financial systems, working through the newly established Financial Stability Board (FSB) and the newly enlarged Basel Committee, rapidly developed a program for reform of the financial sector and its supervision.

In this lecture I will ask how much has been achieved so far in implementing the ambitious financial sector reform program that was widely agreed at the early stages of the global financial crisis. From among the range of topics in which financial sector reforms have been instituted since 2008, I focus on three: capital and liquidity for banks and other financial institutions, macroprudential supervision, and the problem of too big to fail (TBTF).

What Happened?

The 2007–09 crisis was both the worst economic crisis and the worst financial crisis since the 1930s. Following the collapse of Lehman Brothers, many thought that we were about to witness a second Great Depression. That did not happen, in large part because policymakers had learned some of the lessons of the Great Depression. Nonetheless, the advanced economies were put through severe economic and political tests. Fortunately, policymakers succeeded in dealing with the situation better than many had feared they would; unfortunately, we are still dealing with the consequences of the col-

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This is an abbreviated and annotated version of the Martin Feldstein Lecture delivered on July 10, 2014. Stanley Fischer is the Vice-Chair of the Federal Reserve Board of Governors, a former Governor of the Bank of Israel, and a former NBER Research Associate.

lapse and the steps necessary to deal with it.

Former Congressman Barney Frank has been heard to say that economists have a wonderful technique, that of the counterfactual, to analyze what has been achieved by preventing disasters, but that real people base their judgments more on the current state of the world than on disasters that have not happened. True as that may be, we should from time to time allow ourselves to recognize that as bad as the Great Recession has been, it would have been much worse had policymakers not undertaken the policies they did — many of them unorthodox and previously untried — to deal with the imminent crisis that confronted the United States and global economies after the fall of Lehman Brothers. And for that, we owe them our gratitude and our thanks.

The Financial Sector Reform Program

Several financial sector reform programs were prepared within a few months after the Lehman Brothers failure. These programs were supported by national policymakers, including the community of bank supervisors.

The programs — national and international — covered some or all of the following nine areas:[2] (1) to strengthen the stability and robustness of financial firms, "with particular emphasis on standards for governance, risk management, capital and liquidity";[3] (2) to strengthen the quality and effectiveness of prudential regulation and supervision; (3) to build the capacity for undertaking effective macroprudential regulation and supervision; (4) to develop suitable resolution regimes for financial institutions; (5) to strengthen the infrastructure of financial markets, including markets for derivative transactions; (6) to improve compensation practices in financial institutions; (7) to strengthen international coordination of regulation and supervision, particularly with regard to the regulation and resolution of global systemically important financial institutions, later known as G-SIFIs; (8) to find appropriate ways of dealing with the shadow banking system; and (9) to improve the performance of credit rating agencies, which were deeply involved in the collapse of markets for collateralized and securitized lending instruments, especially those based on mortgage finance.

Rather than seek to give a scorecard on progress on all the aspects of the reform programs suggested from 2007 to 2009, I want to focus

on three topics of particular salience mentioned earlier: capital and liquidity, macroprudential supervision, and too big to fail.

Capital and Liquidity Ratios

At one level, the story on capital and liquidity ratios is very simple: From the viewpoint of the stability of the financial system, more of each is better.

This is the principle that lies behind the vigorous campaign waged by Anat Admati and Martin Hellwig to increase bank capital ratios, set out in their book, *The Bankers' New Clothes: What's Wrong with Banking and What to Do about It,* and in subsequent publications.[4]

But at what level should capital and liquidity ratios be set? In practice, the base from which countries work is agreement among the regulators and supervisors who belong to the Basel Committee on Banking Supervision (BCBS). At one time the membership consisted of the members of the G-10 plus Switzerland. It now includes the membership of the G-20 plus a few other countries.[5]

Following the global crisis, the BCBS moved to the Basel III agreement, which strengthens capital requirements, as opposed to Basel II, which tried to build primarily on measures of risk capital set by internal models developed by each individual bank. This approach did not work, partly because the agreed regulatory minimum capital ratios were too low, but also because any set of risk weights involves judgments, and human nature would rarely result in choices that made for higher risk weights. In the United States, the new regulations require large bank holding companies (BHCs) to use risk-weighted assets (RWAs) that are the greater of those produced by firms' internal models or the standardized risk weights, some of which have been raised, thus mitigating the problem of the use of internal risk ratings.

What has been achieved? Globally:

- The minimum tier 1 capital ratio has been raised from 4 percent to 6 percent of RWA.

- There is a minimum common equity tier 1 capital ratio of 4.5 percent of RWA.
- There is a capital conservation buffer of 2.5 percent of RWA, to ensure that banking organizations build capital when they are able to.
- A countercyclical capital buffer has been created that enables regulators to raise risk-based capital requirements when credit growth is judged to be excessive.
- A minimum international leverage ratio of 3 percent has been set for tier 1 capital relative to *total* (i.e., not risk-weighted) on-balance-sheet assets and off-balance-sheet exposures.
- There is a risk-based capital surcharge for global systemically important banks (G-SIBs) based on these firms' systemic risk.

In addition, in the United States:

- The Federal Reserve is planning to propose risk-based capital surcharges for U.S. G-SIBs, based on the BCBS proposal for G-SIBs.[6]
- The relevant U.S. regulators (the Fed, the Office of the Comptroller of the Currency, and the Federal Deposit Insurance Corporation (FDIC)) have raised the Basel III leverage ratio for U.S. G-SIBs to 5 percent; U.S. G-SIBs that do not achieve this ratio will face limits on their ability to distribute dividends and to pay discretionary employee bonuses.[7]
- Foreign banking organizations with U.S. nonbranch assets of $50 billion or more will have to form U.S. intermediate holding companies that will have to meet essentially the same capital requirements as U.S. BHCs with $50 billion or more of assets.
- Many of these rules do not apply to community banks, in light of their different business models.

One more point on bank capital: The Swiss and Swedish regulators have already gone far in raising capital requirements, including by requiring bail-in-able secondary holdings of capital in the form of contingent convertible capital obliga-

tions (CoCos). The United States may be heading in a similar direction, but not by using CoCos, rather by requiring minimum amounts of "gone-concern" loss absorbency — in the form of long-term debt — that would be available for internal financing recapitalization through a new orderly liquidation mechanism created by the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act).

In addition to enhanced capital ratios and tougher measures of risk-based capital, the Basel III accord includes bank liquidity rules, another key element of global financial regulatory reform. The Basel Committee has agreed on the Liquidity Coverage Ratio (LCR), which is designed to reduce the probability of a firm's liquidity insolvency over a 30-day horizon through a self-insurance regime of high-quality liquid assets (HQLA) to meet short-term stressed funding needs. The BCBS is also working to finalize the Net Stable Funding Ratio (NSFR), which helps to ensure a stable funding profile over a one-year horizon.

The bottom line to date: The capital ratios of the 25 largest banks in the United States have risen by as much as 50 percent since the beginning of 2005 to the start of this year, depending on which regulatory ratio you look at. For example, the tier 1 common equity ratio has gone up from 7 percent to 11 percent for these institutions. The increase in the ratios understates the increase in capital because it does not adjust for tougher risk weights in the denominator. In addition, the buffers of HQLAs held by the largest banking firms have more than doubled since the end of 2007, and their reliance on short-term wholesale funds has fallen considerably.

At the same time, the introduction of macroeconomic supervisory stress tests in the United States has added a forward-looking approach to assessing capital adequacy, as firms are required to hold a capital buffer sufficient to withstand a several-year period of severe economic and financial stress. The stress tests are a very important addition to the toolkit of supervisors, one that is likely to add significantly to the quality of financial sector supervision.

Macroprudential Policy and Supervision

In practice, there are two uses of the term "macroprudential supervision."[8] The first relates to the supervision of the financial system as a whole, with an emphasis on interactions among financial markets and institutions. The second relates to the use of regulatory or other non-interest-rate tools of policy to deal with problems arising from the behavior of asset prices.[9] For instance, when central bank governors are asked how they propose to deal with the problem of rising housing prices at a time when the central bank for macroeconomic reasons does not want to raise the interest rate, they generally reply that if the need arises, they will use macroprudential policies for that purpose. By that they mean policies that will reduce the supply of credit to the housing sector without changing the central bank interest rate.

Sector-specific regulatory and supervisory policies in the financial sector were used extensively and systematically in the United States in the period following World War II until the 1990s and are now being used in other advanced and developing countries. Elliott, Feldberg, and Lehnert review the use of such measures in the United States.[10] Frequently, these policies were aimed at encouraging or discouraging activity in particular sectors, for example agriculture, exports, manufacturing, or housing; sometimes broad, non-interest-rate measures were used to try to deal with inflation or asset-price increases, for instance, the use of credit controls.

The issue of how monetary policy should relate to asset-price inflation had been on the agenda of central bankers for many years before the Lehman Brothers' failure.[11] The issue became more prominent in the United States in the 1990s and the first few years of this century, and temporarily culminated in the Fed's "mopping-up" approach, namely that monetary policy — meaning interest-rate policy — should not react to rising asset prices or suspected bubbles except to the extent that they affect either employment and/or price stability. Operationally, this approach was much more likely to lead to action

after the bubble had burst than as it was forming.[12] The policy was tested in the bursting of the tech bubble in 2001 and appeared to be successful as the economy recovered from 2002 onward.[13] However, the mopping-up doctrine did not include the second element of the macroprudential approach — the use of regulatory and supervisory measures to deal with undesired asset-price movements when the central bank interest rate was judged not to be available for that purpose.

At present, the word macroprudential is used primarily in the second sense — of the use of regulatory and supervisory noncentral bank interest rate tools to affect asset prices. In this sense, the use of the word takes us back to a world that central bankers thought they had left by the 1990s.[14]

Now, from etymology to economics: I want to review my experience with macroprudential policies — in the second sense of noninterest regulatory and supervisory policies — as Governor of the Bank of Israel to draw a few key lessons about the use of these policies. To set the background: There was no financial crisis in Israel during the Great Recession. As domestic interest rates declined along with global rates, housing prices began to rise.[15] This is a normal part of the textbook adjustment mechanism and is expected to encourage an increase in the rate of home-building. The rate of building increased, but not sufficiently to meet the demand for housing, and prices continued to rise.[16]

The banks are the largest financial institutions in Israel and dominate housing finance. The supervisor of banks reports to the governor of the central bank. Starting in 2010, the supervisor began to implement a series of measures to reduce the supply of housing finance by the banks. Among the measures used were increasing capital requirements and provisioning against mortgages; limiting the share of any housing financing package indexed to the short-term (central bank) interest rate to one-third of the total loan, with the remainder of the package having to be linked to either the five-year real or five-year nominal interest rate; and, on different occasions, limiting the loan-

to-value (LTV) and payment-to-income (PTI) ratios.[17] Additional precautionary measures were implemented in the supervision of banks.[18]

The most successful of these measures was the limit of one-third imposed in May 2011 on the share of any housing loan indexed in effect to the Bank of Israel interest rate. Competition among the banks had driven the spread on floating-rate mortgages indexed to the Bank of Israel rate down to 60 basis points, which meant that mortgage financing was available at an extremely low interest rate. The term-structure was relatively steep, so that the requirement that the remaining two-thirds of any financing package had to be indexed to a five-year rate — whether real or nominal — made a substantial difference to the cost of housing finance. In addition, increases in both LTV and PTI ratios were moderately effective. However, increasing capital charges had very little impact in practice.

There are three key lessons from this experience. First, the Bank of Israel did not have good empirical estimates of the effectiveness of the different macroprudential measures.[19] This problem is likely to be relevant in many countries, in large part because we have relatively little experience of the use of such measures in recent years.[20] Policymakers may thus be especially cautious in the use of measures of this type.

Second, measures aimed at reducing the demand for housing are likely to be politically sensitive.[21] Their use requires either very cautious and well-aimed measures by the regulatory authorities, and/or the use by the government of subsidies to compensate some of those who end up facing more difficulty in buying housing as a result of the imposition of macroprudential measures. Indeed, it often appears that there is a conflict between cautious risk management by the lenders and the desire of society to house its people decently.

Third, there is generally a need for coordination among several regulators and authorities in dealing with macroprudential problems of both types.

There are many models of regulatory coordination, but I shall focus on only

two: the British and the American. As is well known, the United Kingdom has reformed financial sector regulation and supervision by setting up a Financial Policy Committee (FPC), located in the Bank of England; the major reforms in the United States were introduced through the Dodd-Frank Act, which set up a coordinating committee among the major regulators, the Financial Stability Oversight Council (FSOC).

In discussing these two approaches, I draw on a recent speech by the person best able to speak about the two systems from close-up, Don Kohn.[22] Kohn sets out the following requirements for successful macroprudential supervision: to be able to identify risks to financial stability, to be willing and able to act on these risks in a timely fashion, to be able to interact productively with the microprudential and monetary policy authorities, and to weigh the costs and benefits of proposed actions appropriately. Kohn's cautiously stated bottom line is that the FPC is well structured to meet these requirements, and that the FSOC is not. In particular, the FPC has the legal power to impose policy changes on regulators, and the FSOC does not, for it is mostly a coordinating body.

After reviewing the structure of the FSOC, Kohn presents a series of suggestions to strengthen its powers and its independence. The first is that every regulatory institution represented in the FSOC should have the goal of financial stability added to its mandate. His final suggestion is, "Give the more independent FSOC tools it can use more expeditiously to address systemic risks."[23] He does not go so far as to suggest the FSOC be empowered to instruct regulators to implement measures somehow decided upon by the FSOC, but he does want to extend its ability to make recommendations on a regular basis, perhaps on an expedited "comply-or-explain" basis.

Kohn remarks that he does not hold up the U.K. structure of macroprudential supervision as ideal for all countries at all times and further notes that the U.K. system vests a great deal of authority in a single institution, the Bank of England. This element is not consistent with the U.S.

approach of dispersing power among competing institutions.

These are important, and difficult, issues. Kohn's proposals clearly warrant serious examination. It may well be that adding a financial stability mandate to the overall mandates of all financial regulatory bodies, and perhaps other changes that would give more authority to a reformed FSOC, would contribute to increasing financial and economic stability.

Financial Reform and TBTF

Diagnoses of what went wrong with the financial system at the start of the Great Recession in the United States generally placed heavy emphasis on the problem of too big to fail. The TBTF problem derives from the typical response of governments confronted by the potential failure of a large bank, which is to intervene to save the bank and some of its noninsured creditors.[24] In the words of Governor Tarullo, "…no matter what its general economic policy principles, a government faced with the possibility of a cascading financial crisis that could bring down its national economy tends to err on the side of intervention."[25]

I will start by discussing some of the main steps in the links between TBTF and the crisis, and between the financial sector reform program and TBTF. We begin with the link between TBTF and government intervention: Once investors believe that governments will intervene to prevent large banks from becoming bankrupt, they become willing to lend to these banks at lower rates than they would lend without the implicit guarantee. This could lead to such banks becoming larger than optimal and to encouraging them to take more risks than they would absent expected government intervention to reduce the likelihood of their becoming bankrupt.

A great deal of empirical work has attempted to measure the premium — in terms of a lower cost of financing — that the large banks typically receive. The results vary, but a representative set of estimates — that of the International Monetary Fund in its April 2014 issue of the *Global Financial Stability Report* — reports that

in 2013 their estimates of the premium were approximately 15 basis points in the United States, 25–60 basis points in Japan, 20-60 basis points in the United Kingdom, and 60–90 basis points in the euro area.[26] The estimated premium in the United States was higher at the height of the financial crisis, and has been declining since then in response to the significant steps made in the regulatory reform agenda.

Do large banks, with lower costs of financing, take bigger risks? The empirical relationship between bank size and their risk-taking has been examined by Laeven, Ratnovski, and Tong, who find that "large banks tend to have lower capital ratios, less stable funding, more market-based activities, and (to) be more organizationally complex than small banks."[27] From this they conclude that "[l]arge banks are riskier, and create more systemic risk, when they have lower capital and less-stable funding. [They] create more systemic risk (but are not individually riskier) when they engage more in market-based activities or are more organizationally complex."[28]

The key to these results is the recognition that banks have several sources of financing, and that the more they rely on market interest-rate-sensitive short-term funding, the less stable they are likely to be. Organizational complexity is certainly an issue: Maintaining managerial control, especially risk control, in a multi-activity bank, where individual rewards may be massive, is extremely difficult. Think for instance of Baring's in the late 1990s, or Societe Generale, or the so-called London Whale at JPMorgan Chase. Strong risk management is essential, but faces the hurdle of the structural incentives for risk-taking implied by limited liability for individuals and by what may be a human proclivity to take risks.[29] But of course, banks that are heavily consumer-deposit financed also fail from time to time, as a result of bad lending decisions.

It could be that large banks can finance themselves more cheaply because they are more efficient, that is, that there are economies of scale in banking. For some time, the received wisdom was that there was no evidence of such economies beyond relatively modest-sized banks, with balance

sheets of approximately $100 billion. More recently, several papers have found that economies of scale may continue beyond that level. For example, the title of a paper by Joseph Hughes and Loretta Mester, *Who Said Large Banks Don't Experience Scale Economies? Evidence from a Risk-Return Driven Cost Function*,[30] suggests that large institutions may be better able to manage risk more efficiently because of "technological advantages, such as diversification and the spreading of information … and other costs that do not increase proportionally with size." That said, these authors conclude that "[W]e do not know if the benefits of large size outweigh the potential costs in terms of systemic risk that large scale may impose on the financial system." They add that their results suggest that "strict size limits to control such costs will likely not be effective, since they work against market forces…"

The TBTF theory of why large banks are a problem has to contend with the history of the Canadian and Australian banking systems. Both these systems have several very large banks, but both systems have been very stable — in the Canadian case, for 150 years.[31] Beck, Demirguc-Kunt, and Levine (2003) examined the impact of bank concentration, bank regulation, and national institutions on the likelihood of a country suffering a financial crisis and concluded that countries are less likely to suffer a financial crisis if they have (1) a more-concentrated banking system, (2) fewer entry barriers and activity restrictions on bank activity, and (3) better-developed institutions that encourage competition throughout the economy.[32] The combination of the first finding with the other two appears paradoxical, but the key barrier to competition that was absent in Canada was the prohibition of nationwide branch banking, a factor emphasized by Calomiris and Haber in their discussion of the Canadian case.[33] In addition, I put serious weight on another explanation offered in private conversation by a veteran of the international central banking community, "Those Canadian banks aren't very adventurous," which I take to be a compliment.[34]

Why is the TBTF phenomenon so central to the debate on reform of the financial system? It cannot be because financial institutions never fail. Some do, for example, Lehman Brothers and the Washington Mutual failed in the Great Recession. Other banks were merged out of existence, often at very low prices, with the FDIC managing the resolution process. Banks in the United Kingdom and in Europe failed during the Great Recession. It cannot be because equity-holders never lose in bank crises. It could be because until now, bond holders in large banks rarely have lost significantly in crises. Rather, for fear of contagion, they ended up being protected by the government.

Almost certainly, TBTF is central to the debate about financial crises because financial crises are so destructive of the real economy. It is also because the amounts of money involved when the central bank or the government intervenes in a financial crisis are extremely large, even though the final costs to the government, including the central bank, are typically much smaller. In some cases, governments and central banks even come out slightly ahead after the crisis is over and the banks have been sold back to the private sector. Another factor may be that the departing heads of some banks that failed or needed massive government assistance to survive nonetheless received very large retirement packages.

One can regard the entire regulatory reform program, which aims to strengthen the resilience of banks and the banking system to shocks, as dealing with the TBTF problem by reducing the probability that any bank will get into trouble. There are, however, some aspects of the financial reform program that deal specifically with large banks. The most important such measure is the work on resolution mechanisms for SIFIs, including the very difficult case of G-SIFIs. In the United States, the Dodd-Frank Act has provided the FDIC with the Orderly Liquidation Authority (OLA) — a regime to conduct an orderly resolution of a financial firm if the bankruptcy of the firm would threaten financial stability. And the FDIC's single-point-of-entry approach for effecting a resolution under the new regime is a sensible proposed implementation path for the OLA.

Closely associated with the work on resolution mechanisms is the living will exercise for SIFIs. In addition, there are the proposed G-SIB capital surcharges and macro stress tests applied to the largest BHCs ($50 billion or more). Countercyclical capital requirements are also likely to be applied primarily to large banks. Similarly the Volcker rule, or the Vickers rules in the United Kingdom or the Liikanen rules in the euro zone, which seek to limit the scope of a bank's activities, are directed at TBTF, and I believe appropriately so.

What about simply breaking up the largest financial institutions? Well, there is no "simply" in this area. At the analytical level, there is the question of what the optimal structure of the financial sector should be. Would a financial system that consisted of a large number of medium-sized and small firms be more stable and more efficient than one with a smaller number of very large firms? That depends on whether there are economies of scale in the financial sector and up to what size of firm they apply — that is to say it depends in part on why there is a financing premium for large firms. If it is economies of scale, the market premium for large firms may be sending the right signals with respect to size. If it is the existence of TBTF, that is not an optimal market incentive, but rather a distortion. What would happen if it was possible precisely to calculate the extent of the subsidy or distortion and require the bank to pay the social cost of the expansion of its activity?[35] This could be done either by varying the deposit insurance rate for the bank or by varying the required capital ratios for SIFIs to fit each bank's risk profile and structure. This, along with measures to strengthen large banks, would reduce the likelihood of SIFI failure, but could not be relied upon to prevent all failures.

Would breaking up the largest banks end the need for future bailouts? That is not clear, for Lehman Brothers, although a large financial institution, was not one of the giants — except that it was connected with a very large number of other banks and financial institutions. Similarly, the savings and loan crisis of the 1980s and 1990s was not a TBTF crisis but rather a failure involving many small firms that

were behaving unwisely, and in some cases illegally. This case is consistent with the phrase, "too many to fail." Financial panics can be caused by herding and by contagion, as well as by big banks getting into trouble.

In short, actively breaking up the largest banks would be a very complex task, with uncertain payoff.

The Bottom Lines

The United States is making significant progress in strengthening the financial system and reducing the probability of future financial crises.

By raising capital and liquidity ratios for SIFIs, and through the active use of stress tests, regulators and supervisors have strengthened bank holding companies and thus reduced the probability of future bank failures.

Work on the use of the resolution mechanisms set out in the Dodd-Frank Act, based on the principle of a single point of entry, holds out the promise of making it possible to resolve banks in difficulty at no direct cost to the taxpayer — and in any event at a lower cost than was hitherto possible. However, work in this area is less advanced than the work on raising capital and liquidity ratios.

Although the BCBS and the FSB reached impressively rapid agreement on needed changes in regulation and supervision, progress in agreeing on the resolution of G-SIFIs and some other aspects of international coordination has been slow.

Regulators almost everywhere need to do more research on the effectiveness of microprudential and other tools that could be used to deal with macroprudential problems.

It will be important to ensure that coordination among different regulators of the financial system is effective and, in particular, will be effective in the event of a crisis.

A great deal of progress has been made in dealing with the TBTF problem. While we must continue to work toward ending TBTF or the need for government financial intervention in crises, we should never allow ourselves the complacency to believe that we have put an end to TBTF.

We should recognize that despite some imperfections, the Dodd-Frank Act is a major achievement.

At the same time, we need always be aware that the next crisis — and there will be one — will not be identical to the last one, and that we need to be vigilant in both trying to foresee it and seeking to prevent it.

And if, despite all our efforts, a crisis happens, we need to be willing and prepared to deal with it.

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[1] *I began work on this lecture when I was a resident Distinguished Fellow at the Council on Foreign Relations and completed it after I joined the Federal Reserve Board on May 28, 2014. I am grateful to Dinah Walker of the Council on Foreign Relations for research assistance and to Nellie Liang, Skander Van den Heuvel, Mark Van Der Weide, William Bassett, Beth Kiser, Barbara Hagenbaugh, and Stacey Tevlin at the Federal Reserve Board for discussions, advice, and assistance. Views expressed are my own and not necessarily those of the Board of Governors of the Federal Reserve System, the Federal Open Market Committee, or the Council on Foreign Relations.* Return to text

[2] *This is a combination of the areas of reform presented in the G-30 report, Group of Thirty , "Financial Reform: A Framework for Financial Stability," Washington, D.C.: Group of Thirty, January 2009; the FSB report, Financial Stability Board, "Improving Financial Regulation: Report of the Financial Stability Board to G20 Leaders," September 2009; and some that I added.* Return to text

[3] *Group of Thirty 2009, op. cit., p. 21. For an incisive account of measures to deal with the TBTF problem, see the 2009 speech by my Federal Reserve Board colleague, D. K. Tarullo, "Confronting Too Big to Fail," speech delivered at the Exchequer Club, Washington, D.C., October 21, 2009.* Return to text

[4] *A. R. Admati and M. Hellwig,* The Bankers' New Clothes: What's Wrong with Banking and What to Do about It, *Princeton, New Jersey: Princeton University Press, 2013.* Return to text

[5] *A full list of jurisdictions and institutions represented on the Basel Committee on Banking Supervision can be found at* http://www.bis.org/about/orggov.htm Return to text

[6] *As my colleagues Chair Yellen and Governor Tarullo have noted, it may be appropriate to go beyond the risk-based surcharges proposed by the BCBS. The goal would be to reach a point where any remaining TBTF subsidies have been offset and where other social costs of a potential failure by the firm have been internalized.* Return to text

[7] *In addition, the subsidiary banks of the U.S. G-SIBs will need to meet a 6 percent leverage ratio to be considered well capitalized from the viewpoint of prompt corrective action regulations.* Return to text

[8] *The word "macroprudential" appears to have been invented in the late 1970s and was used by Andrew Crockett and others at the Bank for International Settlements (BIS) in the 1990s and later. It began to come into central banker usage in the first decade of this century. But it was the consequences of the failure of Lehman Brothers that made it a household word. See P. Clement, "The Term 'Macroprudential': Origins and Evolution,"* BIS Quarterly Review, *March 2010, pp. 59–67.* Return to text

[9] *For an authoritative, recent statement by Chair Yellen, see J. L. Yellen, "Monetary Policy and Financial Stability," speech delivered at the 2014 Michel Camdessus Central Banking Lecture, International Monetary Fund, Washington, D.C., July 2, 2014.* Return to text

[10] *For a comprehensive review of the use of such policies, see D. J. Elliott, G. Feldberg, and A. Lehnert, "The History of Cyclical Macroprudential Policy in the United States,"* Finance and Economics Discussion Series 2013–29, Board of Governors of the Federal Reserve System, May 2013. Return to text

[11] *Among the suggested solutions was the proposal that the consumer price index should include the prices of assets as representing the costs of future consumption. See A. A. Alchian and B. Klein, "On a Correct Measure of Inflation,"* Journal of Money, Credit, and Banking, 5 (1), part 1, 1973, pp. 173–91. Return to text

[12] *As is well known, support for the mopping-up approach was not unanimous, with, for example, researchers at the BIS, notably*

Claudio Borio and Bill White, presenting the view that monetary policy should be used to deal with asset-price inflation. See C. Borio and W. R. White, "Whither Monetary and Financial Stability? The Implications of Evolving Policy Regimes," paper presented at "Monetary Policy and Uncertainty: Adapting to a Changing Economy," a symposium sponsored by the Federal Reserve Bank of Kansas City, held in Jackson Hole, Wyoming, August 28–30, 2003. See also R. Rajan, "Has Financial Development Made the World Riskier?" paper presented at "The Greenspan Era: Lessons for the Future," a symposium sponsored by the Federal Reserve Bank of Kansas City, held in Jackson Hole, Wyoming, August 25–27, 2005. Return to text

[13] It could be argued that the low interest rates of the 2003–06 period were the result of the mopping-up approach. I do not see any necessary connection between the mopping-up doctrine and monetary policy in the period following the mopping up of the hi-tech boom. Return to text

[14] According to the ProQuest database, of the roughly 1,600 articles referring to the term "macroprudential" after the start of the Great Recession, almost all refer to regulatory and supervisory interventions. Return to text

[15] House prices tended to increase more rapidly in countries that did not experience a financial sector crisis during the Great Recession. For a more detailed account, see S. Fischer, "Macroprudential Policy in Action: Israel," in G. A. Akerlof, O. J. Blanchard, D. H. Romer, and J. E. Stiglitz, eds., What Have We Learned? Macroeconomic Policy after the Crisis, Cambridge, Massachusetts: The MIT Press, 2014, pp. 87–98. Return to text

[16] The supply of land to the market in Israel is fundamentally controlled by the government, which owns more than 90 percent of the land. Return to text

[17] For more details, see Fischer 2014, op. cit. Return to text

[18] Mortgages in Israel are not nonrecourse loans; in the event of nonpayment, the lender can seek to attach other assets of the borrower in addition to the house itself. Return to text

[19] Typically the impact was calculated based on an estimate of how much a measure would increase the effective interest rate paid by the borrower, but this calculation generally resulted in an overestimate of the impact of the policy change. Return to text

[20] Elliott, Feldberg, and Lehnert 2013, op. cit., present empirical results on the use of macroprudential (sense 2) measures in the United States, but their results are at too high a level of aggregation to be useful in making decisions on the deployment of specific supervisory or regulatory measures. The literature is growing. For example, Kuttner and Shim examine the effects of actions in 57 countries since the 1980s on house prices and housing credit growth. See K. N. Kuttner and I. Shim, "Can Non-Interest Rate Policies Stabilise Housing Markets? Evidence from a Panel of 57 Economies," Bank for International Settlements Working Paper No. 433, Basel: BIS, November 2013. Return to text

[21] This is a general problem but is particularly the case in the Israeli context where the bulk of the male population is conscripted into the armed forces for three years at a relatively low salary, and there is a general view that young couples deserve to be able to buy an apartment when they marry. Return to text

[22] D. Kohn, "Institutions for Macroprudential Regulation: the U.K. and the U.S.," speech delivered at the Kennedy School of Government, Harvard University, Cambridge, Mass., April 17, 2014. Return to text

[23] The FSOC would become more independent as a result of implementing Kohn's suggestions. Return to text

[24] In describing the TBTF diagnosis, I draw on Tarullo (2009). In addition, see G. H. Stern and R. J. Feldman, Too Big to Fail: The Hazards of Bank Bailouts, Washington, D.C.: Brookings Institution Press, 2004; C. W. Calomiris and S. H. Haber, Fragile by Design: The Political Origins of Banking Crises and Scarce Credit, Princeton, New Jersey: Princeton University Press, 2014; and Financial Stability Board, "Reducing the Moral Hazard Posed by Systemically Important Financial Institutions," FSB Report, Basel: BIS, October 2010. For a very readable account, see chapter 11 of A. S. Blinder, After the Music Stopped: The Financial Crisis, the Response, and the Work Ahead, New York, New York: Penguin Books, 2013. Return to text

[25] Tarullo 2009, op. cit., p. 2. Return to text

[26] International Monetary Fund, "Global Financial Stability Report," Washington, D.C.: IMF, April, 2014, chapter 3. Return to text

[27] L. Laeven, L. Ratnovski, and H. Tong, "Bank Size and Systemic Risk," International Monetary Fund Staff Discussion Note 1404, May 2014. Return to text

[28] Large banks also hold less capital than small banks because they are more diversified — for example, small U.S. banks have larger geographical concentrations and larger single-name concentrations than larger banks. Return to text

[29] In this regard one cannot fail to be impressed by the fact that in countries with a death penalty for corruption, some people appear nonetheless to be willing to take the chance of becoming rich illegally. Return to text

[30] See J. P. Hughes and L. J. Mester, "Who Said Large Banks Don't Experience Scale Economies? Evidence from a Risk-Return-Driven Cost Function," Federal Reserve Bank of Philadelphia Working Paper 11-27, July 2011. Return to text

[31] If this lecture had been delivered in 2005, I would have added the British banking system to the above list. This is evidence that the regulatory structure also matters. Return to text

[32] T. Beck, A. Demirguc-Kunt, and R. Levine, "Bank Concentration and Crises," NBER Working Paper No. 9921, August 2003. Return to text

[33] Calomiris and Haber 2014, op. cit., pp. 305–11. Return to text

[34] This comment pushes one in the direction of supporting the Volcker rule and other restrictions on commercial banks undertaking capital market activities. One criticism of the Volcker rule is that two of the key failed institutions in the recent financial crisis — Bear-Stearns and Lehman Brothers — were not banks. It is hard to see why this fact suggests that permitting commercial banks to combine their activities with those of investment banks would be a stabilizing factor for the banking system. Return to text

[35] See footnote 6 above. Return to text

Research Summaries

Risk and Information in the Municipal Bond Market

Andrew Ang *

Municipal bonds — munis — are issued by states, local governments, and other tax-exempt entities to raise money for roads, schools, utilities, public buildings, and other infrastructure investments. Totaling $3.7 trillion at the end of 2013, with approximately $400 billion in new issuance every year, the muni market is roughly one-third the size of the U.S. Treasury market. There are 50,000 issuers of municipal securities. Individual investors hold approximately 80 percent of all munis, either directly or indirectly through intermediated funds. There are three main ways in which munis differ from bonds issued by the federal government: (1) they have higher default risk, (2) they are much less liquid, in part because information in the muni market is limited, decentralized, and non-standardized, (3) and the interest earned on most munis is exempt from federal income tax.

In the area of muni default risk, Francis Longstaff and I compare the credit risk of large U.S. states with major Eurozone countries.[1] This comparison is interesting and timely because many U.S. states, like Michigan and Illinois, are fiscally challenged, as are several European countries, like Spain and Portugal. Second, states pack roughly the same economic punch as European countries: California's economy is larger than Spain's and approximately 90 percent the size of Italy's, and Michigan has an economy larger than that of Greece, Portugal, or Ireland.

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Third, both states and Eurozone countries are in currency unions — of the U.S. dollar and the Euro, respectively. There are many economic, legal, and political linkages between states, just as there are similar, but weaker, linkages among European countries. Most importantly, states are sovereign borrowers under the U.S. Constitution and there is no bankruptcy mechanism for state default, just as there is no institutional bankruptcy mechanism for any sovereign borrower. Both U.S. states and Eurozone countries have previously defaulted. Spain, Austria, and Greece defaulted in the 1930s and 1940s. Greece most recently defaulted in 2012. U.S. states have also defaulted: eight states went bankrupt in the 1830s and 1840s, ten states defaulted during the late 1800s, and the last state to default was Arkansas in 1933. We compare U.S. state and European country credit risk estimated from Credit Default Swap (CDS) contracts, in which purchasers of default protection receive a payoff when a sovereign defaults and in the meantime make regular, insurance-like payments to the providers of default protection. In our pricing model, defaults are triggered by two sources. First, Portugal may default because of an event specific to Portugal that does not affect other countries. Second, a Europe-wide shock could trigger a Portuguese default. Similarly, if the U.S. defaults, this might cause Illinois to default (exposure to systemic risk), but Illinois might also default on its own (state-specific risk). We find that U.S. and European systemic risk — the risk that affects all states or Eurozone countries in each respective currency union — is approximately the same, but it varies over

time and is strongly related to financial market variables. For example, large negative returns in stocks lead to increases in systemic default probabilities, and systemic credit risk increases contemporaneously as credit risk in corporations rises. When uncertainty in financial markets increases, the resulting global flight to U.S. Treasuries reduces relative U.S. credit risk. We separate a state or Eurozone country's total credit risk into systemic and sovereign-specific components. Several states have little or no systemic default risk; in Illinois, New York, and Ohio, defaults are likely to be induced only by state-specific events. We find that systemic default risk is three times as large a component of default risk in Europe as it is in the United States. This result — that systemic risk exposure is much lower in the U.S. — directly contradicts theories that large systemic risk is caused by common macroeconomic fundamentals and close economic integration.

Richard Green and I summarize the illiquidity and poor information environment of munis — the second way that munis differ from U.S. Treasuries.[2] The trading costs for retail investors are remarkably large. Round-trip transaction costs for individuals are in excess of 2 percent and often reach 5 percent. This is more than double what institutions pay, more than twice what it costs to trade a corporate bond, and many times what it costs to trade a stock. Dealer mark-ups over the reoffering price, often represented to issuers as the price at which the bonds are sold to the public, can be as high as 5 percent. These costs represent roughly six months to one year of the return on a typical muni. Studies sug-

gest that the high costs of trade are due in part to the monopoly power of intermediaries.[3] Dividing up all muni bond transactions into deciles based on the number of trades per year, thus excluding bonds that never trade, the 10 percent most illiquid bonds trade once every five to six years. The typical bond trades twice per year: from a customer to a dealer and then from the dealer to another customer. The 10 percent most liquid bonds trade only once every two days, on average. One contributor to the poor liquidity of muni bonds is that munis are extremely heterogeneous and are bundled with complex embedded derivatives. These derivatives are not standardized and can vary widely from issue to issue, even within a given series of several separate bonds constituting a single underwriting deal. Approximately 60 percent of all muni financing in dollar terms involves embedded derivatives. Complexity, opacity, and the political economy of muni issuers often lead to sub-optimal behavior, which leads to unnecessary costs borne by taxpayers.

One such practice is advance refunding. Richard Green, Yuhang Xing, and I show that advance refunding led to $7 to $9 billion of lost value over 1995 to 2013.[4] These amounts are conservative, as data limitations restricted our analysis to only 65 percent of all pre-refunded bonds traded over this period. In an advance refunding, a municipality issues new debt to pay off an existing bond, which is not yet callable but will be callable in the future. Proceeds from the new debt, issued generally at a lower interest rate, are used to fund a trust that meets all interest payments up to the call date, and pays the call price, of the original bond. The trust generally holds U.S. Treasury bonds, which are specially issued by the Treasury for this purpose. Issuing new securities to fund payments on existing liabilities has zero net present value. But, in the advance refunding, value is destroyed by the issuer through pre-committing to call.

The City of Detroit (currently in bankruptcy) and the Detroit School District engaged in 19 advance refunding deals and by doing so lost $60 million in option value. In addition, there are significant fees paid by municipalities in entering refundings — which are often referred to as "de-fees-sance" by underwriters and traders. Although no value is created with an advance refunding, the practice sometimes provides short-term budget relief. Municipalities can only issue new debt to fund capital projects, but they are rarely restricted from refunding existing debt to meet operating needs, as long as the maturity is not increased. The advance refunding allows the municipality to borrow against future potential interest savings. Current interest expenses, paid out of the operating budgets, are reduced, while future payments after the call date are increased. The amount of implicit borrowing being done by advance refunding over 1995 to 2013 exceeded $13 billion. We find that there is a pronounced skew in the option value destroyed, with the worst 5 percent of transactions representing a destruction of value of $5.3 to $7.5 billion. Thirty of the worst 50 deals were done by school districts. In characterizing the amount of value destroyed, one of the most robust variables is the number of convictions of public officials divided by the state's population. States with more corrupt public officials are also states where municipal officers destroy more value in advance refundings. Poorer states also tend to lose more money in advance refundings. These results are consistent with municipalities using advance refundings as a non-transparent way to borrow money.

The third difference between munis and U.S. Treasuries is tax treatment. Indeed, a defining characteristic of munis is that most are exempt from tax. Muni yields are, on average, lower than Treasuries — except during the financial crisis of 2008 to 2009, and a few years afterwards. The tax exemption of munis lowers their yields, on average, compared with taxable Treasuries, whereas the aforementioned credit and illiquidity effects tend to raise muni yields. There are some important classes of munis with taxable coupons. Build America Bonds (BABs) were introduced by the federal government as part of the American Recovery and Reinvestment Act of 2009. The program expired on December 31, 2010, but there has been discussion in policy circles of bringing it back in some form. An investor in a BAB has to pay income tax on the interest payments, but the issuer's net costs are lower because it receives a subsidy from the federal government to offset its borrowing costs. The subsidy is for the life of the BABs. Since BABs are taxable, the program theoretically enlarges the market for munis beyond the traditional clienteles. I study the pricing of BABs with Vineer Bhansali and Yuhang Xing.[5] BABs allow local and state governments to obtain financing at least 50 basis points lower, on average, than issuing regular munis. Individual investors subject to the highest marginal tax rates, however, receive higher yields buying regular munis rather than BABs. Two potential reasons regular munis have higher yields than after-tax BABs are the greater issue sizes of BABs, which fosters greater liquidity, and the fact that the taxable-bond curve is generally less steep than the muni-yield curve.

There are several interesting tax effects within munis. Even though a muni might be tax-exempt at issue, investors trading munis in secondary markets may be taxed on their investment in this bond. Depending on their purchase price and other factors, such investors may not face any taxes, or they may face ordinary income taxes or capital gains taxes, on the income from their investment. There can be different tax treatments for a given investor across different bonds from the same issuer. This feature makes the muni market a good laboratory to examine the effect of taxes on asset prices. All the taxes are paid at the bond's maturity or when the bond is sold, even though the interest payments are tax exempt. An attractive feature of studying tax effects in the muni market is that it is dominated by individual investors who must pay federal taxes, unlike other asset classes where corporations and institutional investors dominate and many of the institutional investors are tax exempt. Income taxes are paid if the muni is trading at market discount, which for a par bond occurs when

the transaction price is sufficiently below par. Market discount is taxable as ordinary income. The tax code provides a *de minimis* exemption, so that if the market discount is small, the investor pays capital gains tax instead of income tax. Finally, if the transaction price is above par, then the muni is not subject to tax. The tax code does not require the amortization of muni premiums, as it does for taxable bonds. I find that, as expected, yields on market-discount munis are higher than yields on munis that are fully tax exempt; this compensates for their additional tax liabilities.[6] But the implied tax rates are much larger than can be supported by present-value models. These higher yields are not due to illiquidity or other effects. The implicit tax rates sometimes exceed 100 percent! A rational story for the high yields of market-discount munis could be a convenience yield demanded by individuals to deal with the complexities of computing tax liabilities. A behavioral story

is that individuals have a particular aversion to taxes not justified by rational models. The tax premium can persist because the muni market is fragmented: even if investors were to know about the effect, many may not be offered market-discount bonds by dealers. Large mutual funds also tend to shy away from market-discount munis because they would be required to pass through income taxes to their underlying individual investors — and many individual investors are drawn to these muni mutual funds to avoid income taxes in the first place.

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4   A. Ang, R. C. Green, and Y. Xing, "Advance Refundings of Municipal Bonds," NBER Working Paper No. 19459, September 2013. Return to text
5   A. Ang, V. Bhansali, and Y. Xing, "Build America Bonds," NBER Working Paper No. 16008, May 2010, and Journal of Fixed Income, 20 (1) 2010, pp. 67–73. Return to text
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The Impact of New Deal Spending and Lending During the Great Depression

Price V. Fishback *

The Great Recession of the 2000s has led many policymakers and scholars to invoke Franklin Roosevelt's New Deal as a source of ideas for how to deal with our current problems. Over the past 15 years, I have worked with Shawn Kantor and a number of other co-authors to examine the economic consequences of a variety of New Deal spending and loan programs.

The Great Depression led to a dramatic change in attitudes toward federal spending and regulation. Between 1929

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and 1932, real GDP declined by 25 percent and unemployment rates rose above 20 percent. In response, Herbert Hoover and Republican Congresses nearly doubled federal spending from 3 to 5.9 percent of peak 1929 GDP and established the Reconstruction Finance Corporation (RFC) to lend to local governments for poverty relief and to aid troubled banks and businesses. Meanwhile, real tax revenues declined from 4 to 2.4 percent of 1929 GDP by 1932 and the federal budget reached a deficit of 3.5 percent of 1929 GDP. Seeking to balance the budget, Hoover and Congress held spending constant and raised a wide range of taxes in their last year in office.

Promising a New Deal to combat the

problems of the Great Depression, Franklin Roosevelt and a Democratic majority in Congress were elected in a landslide in 1932. Inundated by a broad range of problems, they offered dozens of new programmatic and regulatory fixes. Many new programs involved large increases in funding; real federal outlays increased from 5.9 percent of 1929 real GDP in 1933 to nearly 11 percent by 1939. The deficit fluctuated but the budget never got too much further out of balance because real tax revenues expanded by roughly the same amount.[1]

The grant and loan programs covered a wide variety of issues. About half of the grants went to federal funding of poverty relief, largely delivered as work relief with limited work hours and hourly earnings of

less than two-thirds of the earnings on traditional government projects. Seventeen percent went to veterans. Another 18 percent financed the building of roads and large public works, paying workers regular wages. To offset the lost income of farm owners, the Agricultural Adjustment Administration (AAA) used 11 percent of the grants to pay farmers to take land out of production and thus limit output and raise farm prices. The majority of loans went to farmers for mortgages and crop loans or to the Home Owners' Loan Corporation (HOLC) to purchase troubled mortgages and refinance them.

To gauge the impact of these New Deal programs, we compiled and digitized panel data sets for cities, counties, and states from a variety of sources. Many of the datasets used in the published papers can be found at my website at the University of Arizona (https://econ.arizona.edu/faculty/fishback.asp). New data sets will continue to be posted there as we publish papers that use them. We analyze the data using the econometric methods developed for panel data sets with multiple observations for each location. The analysis usually identifies the impact of a particular New Deal program by focusing on changes over time within the same locations while holding constant changes at the national level, such as changes in the money supply or in national regulations that vary from year to year. In some cases the identification comes from deviations from time trends within the same locations while controlling for the national changes. In nearly every setting, we need to deal with feedback effects from the economy to the New Deal policies, and with potential inability to control for relevant factors that are correlated with the New Deal policy as well as the outcome being studied. We have therefore used a variety of instrumental variable techniques that tighten the focus of the analysis on aspects of each New Deal policy that are not correlated with the outcome variable of interest. A number of ideas for instruments have come from the political economy literature on the distribution of New Deal funds. The latest research in that literature was presented at two New Deal conferences sponsored by the NBER and

the Bradley Foundation.[2] A number of papers from the conferences on a variety of aspects of the New Deal were published in a special issue of *Explorations in Economic History* in October 2013.

The fiscal stimulus package of 2009 has led to renewed policy interest in fiscal multipliers. I worked with several people to compile annual evidence on federal funds distributed to each state for over 50 programs between 1930 and 1940.[3] Valentina Kachanovskaya and I then used the panel to estimate the multiplier for federal funds at the state level using several definitions of federal funding.[4] Except for AAA payments, the multiplier estimates ranged between 0.4 and 1.0. We typically could not reject the hypothesis that the multiplier was one. A multiplier of one means that an additional dollar of federal funding distributed to the state was associated with a rise in state income of one dollar. Some of that money was spent on consumer durables like automobiles; we found that an additional dollar of federal funds was associated with a rise in the value of car registrations of about 15 cents.

Public Works and Relief Spending

The form of federal spending during the 1930s also mattered a great deal. The public works and relief programs generally raised economic activity, but the AAA farm payments had conflicting effects. In the state multiplier study, public works and relief grants had the highest multipliers, ranging from 0.88 to 1.1. Several other studies also show positive effects on other socioeconomic outcomes. Counties with more public works and relief spending had higher growth in retail sales per capita during the 1930s, as well as more net in-migration.[5] The inflows of new migrants had mixed effects on the welfare of the existing population because the inflow was associated with shorter work weeks, more difficulties in obtaining relief when unemployed, and some out-migration.[6] Relief spending reduced crime rates and many death rates. A 10 percent increase in work relief spending was associated with a 1.5 percent reduction in property crime. An

increase in private employment was even better because a 10 percent rise in private employment was associated with a 10 percent reduction in property crime.[7] Meanwhile, our estimates suggest that an additional $2 million of relief spending, measured in the prices of year 2000, in a city was associated on average with one fewer infant death, one less suicide, 2.4 fewer deaths from infectious disease, and one less death from diarrhea, in that city. Such spending would also lead to an increase in the birth rate back to its long-term trend.[8] Old age assistance, on the other hand, did not reduce the death rates of the elderly, possibly because it largely replaced payments in regular programs.[9]

Relief spending had weak and sometimes negative effects on measures of *private* employment. Valentina Kachanovskaya and I find that additional federal spending in a state had a negative effect on private employment.[10] In a study of monthly panel data for cities, Todd Neumann, Kantor and I find small positive effects of relief spending on private employment before 1936 — one private job for eight relief cases — but a negative effect in later years.[11] The lack of strong positive employment effects of the relief grants may be one reason why the unemployment rate failed to fall below 10 percent over the course of the decade.

AAA Farm Program

The New Deal introduced modern farm subsidies. AAA payments to farmers to take land out of production had conflicting effects. In the cross-state study of multipliers, an additional dollar of AAA payments was associated with an increase in personal income of at most 15 cents, and the effect was negative in other specifications. The AAA mostly aided landowners, particularly large landowners, by paying them to take land out of production, but this came at the expense of many farm workers. In a paper that was presented at two recent NBER New Deal conferences, Briggs Depew, Paul Rhode, and I find that the AAA led to sharp drops in the employment of white and black farm laborers, sharecroppers, and tenants.[12]

These mixed effects are also found in our earlier studies. AAA grants had slight negative effects on retail sales per capita and on net migration.[13]

Mortgage Policies

During both the 1930s and the 2000s, there were sharp rises in home mortgage delinquencies and foreclosures. The New Deal sought to solve the mortgage crisis by creating the Home Owners' Loan Corporation (HOLC). I worked with Jonathan Rose and Kenneth Snowden to examine the operations and impact of the HOLC.[14] We expanded upon earlier NBER-sponsored research by C. Lowell Harriss.[15] The HOLC issued bonds, which they used to purchase from lenders over a million nonfarm mortgages in which the borrowers were in trouble through no fault of their own. They then refinanced the mortgages for the borrowers. At its peak, the HOLC held mortgages on roughly 10 percent of all nonfarm homes in America. The HOLC came close to fully replacing toxic mortgages on lenders' books because it often paid prices that covered the principal owed, interest owed, and taxes paid by the lender. When the loan was refinanced, the HOLC used the amount paid to the lender as the basis of the refinanced loan; therefore, the borrowers did not get a break on the amount owed. Borrowers benefitted because the HOLC refinanced at a low interest rate, lengthened the period of the loan, and used a modern, direct-reduction loan contract where each loan payment immediately retired part of the principal owed. They also benefitted because the HOLC was very slow to foreclose, often waiting through more than 1.5 years of delinquency to allow borrowers more time to get back on their feet in the horrendous economy of the 1930s. Even so, the agency ended up foreclosing on 20 percent of its loans. The HOLC benefitted from a federal guarantee on its bonds, which allowed it to issue bonds at low interest rates and to practice its patient foreclosure policy. The *ex ante* risk for the HOLC probably implies a federal subsidy of 20 to 30 percent of the value of the loans. After the HOLC closed down its operations in 1951, however, its losses added up to only about 2 percent of the value of the loans because it was often able to sell foreclosed homes when housing prices recovered during World War II. The HOLC also had positive effects on housing markets, helping to stave off further declines in home prices and home ownership rates after 1933. In smaller counties throughout the U.S., we estimate that the HOLC prevented housing prices from dropping another 16 percent and kept about 11 percent of nonfarm homeowners from losing their homes.

The New Deal led to a huge expansion of government activity in a wide variety of sectors at all levels of government, and I can only cover part of the research that we have performed here.[16] Our ongoing research is focused on four areas of the New Deal: more in-depth work on the impact of the farm spending and lending programs,[17] labor markets,[18] the responses of state governments to the Great Depression and the New Deal, and further research on the boom and bust in housing and mortgage markets, which is one of the subjects addressed in a NBER conference volume on the economic history of housing.[19]

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Education Inputs and Human Capital Production

C. Kirabo Jackson[*]

Economists have long studied the role of education spending, schools, and teachers in the production of human capital. The recent availability of detailed datasets and powerful computing has permitted researchers to present more

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conclusive evidence regarding these topics. In this summary, I describe my recent work on these issues. I first discuss my work on the basic question of whether increased resources for school districts improve students' long-run outcomes. I then narrow down the unit of analysis and discuss the effect of individual schools and particular school policies. Finally, I look inside schools and discuss my research on the role of teachers in promoting student learning.

The Importance of School Spending?

Since the Coleman Report[1] (1966) showed that variation in school resources was unrelated to variation in student outcomes, researchers have questioned whether increased school spending actually improves students' short- and long-run outcomes. The existing evidence on the effect of school spending on student outcomes used test scores as the

main outcome and yielded mixed results. Moreover, because there is mounting evidence that focusing on test scores may miss important effects on longer-run outcomes, the effect of school spending on long-run outcomes was unknown. In recent work,[2] Rucker Johnson, Claudia Persico, and I revisit the basic question of "does money matter?" We compile a panel of high-frequency school spending data linked to detailed information on the passage of state school-finance reforms. We then link the spending and reform data to detailed, nationally representative data on children born between 1955 and 1985 and followed through 2011 to study the effect of the reform-induced changes in school spending on long-run adult outcomes. We use the timing of the passage of court-mandated reforms as an exogenous shifter of school spending across cohorts within the same district. We find that a 20 percent increase in per-pupil spending each year for all 12 years of public school for children from poor families leads to about 0.9 more completed years of education, 25 percent higher earnings, and a 20 percentage-point reduction in the annual incidence of adult poverty. In contrast, we find small effects for children from non-poor families. We present several patterns to support a causal interpretation of the estimates.

We reconcile our findings with the mixed results in the existing literature by showing that even with a rich set of controls, relying on potentially endogenous changes in school spending will lead one to infer incorrectly that there is no relationship between school spending and student outcomes. Using higher-quality data and an improved methodology, our findings provide new, compelling evidence that money does matter and that increased school spending can meaningfully improve the longer-run outcomes of affected children.

Effective Schools and School Policies

Related to the question of whether school spending matters is the question of what kinds of education spending matter. A natural way to determine this is to identify the kinds of schools and programs that improve student outcomes. However, because students and parents typically select to schools and neighborhoods, it is often difficult to attribute differences in outcomes across schools to the schools themselves.

In a series of papers, I employ data from Trinidad and Tobago to address these selection issues. At the end of primary school, students take an exam and submit an ordered list of four secondary school choices. The students' scores and choices are used to assign them to secondary schools using a serial dictatorship algorithm. Specifically, the highest-scoring student is assigned to their top choice, the next-highest-scoring student is assigned to their top choice among remaining schools, and so on until all school slots are filled. This algorithm creates many test score cut-offs such that students who have the same set of school choices and very similar test scores are assigned to different schools solely because some scored just above a cut-off while the others did not. In these papers, I construct instrumental variables based on the discontinuities created by the assignment mechanism to address self-selection bias and identify the causal effects of attending certain kinds of schools.

In one paper,[3] I assess whether and to what extent students benefit from attending a more-selective school. I find that attending a more-selective school has large positive effects on examination performance and secondary-school completion. The effects are twice as large for girls as for boys. In a follow-up paper,[4] I explore the extent to which the benefits of attending such schools are due to differences in inputs across schools or can be directly attributed to the high achievement levels of the peers. I compare the marginal effect of higher-achieving peers obtained within schools (a direct peer effect) to that of the marginal effect of higher-achieving peers obtained across schools. I present a framework within which the ratio of these two quantities yields the fraction of the school selectivity effect that can be directly attributed to selective schools providing higher-achieving peers. Making such comparisons, short-run (direct) peer quality accounts for approximately one-tenth of the school selectivity effect on average, but at least one-third among the most selective schools. Because practices and inputs may not account for a sizable share of the benefits of attending the most-selective schools, these findings underscore that to understand how to improve student outcomes we must not only know which schools are successful, but also must know why.

Another potentially important innovation is single-sex schooling. Proponents of single-sex education argue that (a) single-sex schools allow for instruction tailored to the needs of each sex, (b) the presence of the opposite sex is distracting, and (c) single-sex schooling decreases gendered course selection. If these hypotheses hold true, then simply re-shuffling students to achieve sex-segregation would increase overall educational attainment and increase the representation of females in math and science fields. In another study,[5] I investigate the effects of attending single-sex secondary schools. I limit the analysis to public schools that share the same curriculum and follow the same national regulations to isolate a single-sex schooling effect. While simple comparisons show much better outcomes for those at single-sex schools, instrumental-variables models show that most students perform no better at single-sex schools and that girls took no more science or math courses. However, I do find that females with strong expressed preferences for single-sex schools do benefit. The results highlight the importance of dealing with selection and accounting for treatment heterogeneity. More broadly, the findings highlight the fact that there is likely no single school type that is best for all students. Looking at school interventions in a separate set of papers, I analyze the Texas Advanced Placement Incentive Program (APIP). The APIP is a high school college-prep intervention that includes cash

incentives for both teachers and students for passing scores earned on AP exams, teacher training, and curricular oversight. The program is targeted to schools serving predominantly minority and low-income students with the aim of improving college readiness. As the APIP was adopted in different schools at different times, I identify the program effect by comparing the change in outcomes of cohorts within the same school, before and after APIP adoption, to the change in outcomes for cohorts in comparison schools over the same time period. Because adoption of the APIP was not random, I present a series of tests to support a causal interpretation. In the first study,[6] I find that exposed cohorts passed more AP or IB examinations, had higher SAT scores, and were more likely to matriculate in college. In follow-up work[7] I find that exposed cohorts were more likely to persist in college, earn more college credits, hold higher GPAs, earn a bachelor's degree, be employed, and earn higher wages. These benefits were most pronounced for Hispanic students. These findings indicate that high-quality programs can improve the long-run economic well-being of disadvantaged students who attend inner-city schools.

The Importance of Teachers

Because students spend most of their time in school interacting with teachers, it is natural to seek to understand the role that teachers play in improving student outcomes, and how different policies affect teachers. These issues are investigated in a series of papers that employ rich administrative data from North Carolina linking students to teachers.

Policymakers, educators, parents, and researchers agree that teachers are one of the most important components of the schooling environment. This conclusion is based on the consistent finding that certain teachers tend to improve student test scores much more than others. While economists do not care about test scores per se, the focus on test scores occurs because they are often the best available measure of student skills.

However, the research on non-cognitive skills provides reason to suspect that teacher effects on test scores may fail to capture teachers' overall effects. In one paper,[8] I investigate the extent to which teachers improve students' longer-run outcomes in ways not captured by their effects on test scores but reflected in other student behaviors. I estimate the effects of 9th grade teachers on test scores, attendance, suspensions, course grades, and remaining in school. I then link these estimates to longer-run indicators (high school dropout/completion, SAT taking, and intentions to attend college). Because identification of teacher effects is more complicated in high school settings than elementary school settings, I follow my earlier work[9] and condition on students' academic track. I find that teachers have causal effects on skills not measured by testing, but reflected in absences, suspensions, grades, and on-time grade progression. Moreover, teacher effects on these non-test outcomes (a proxy for non-cognitive skills) predict effects on dropout, SAT-taking, and college plans above and beyond teachers' effects on test scores. The results show that test scores alone fail to identify many excellent teachers and may understate the long-run importance of teachers. More broadly the results underscore the importance of accounting for the effect of interventions on both cognitive and non-cognitive dimensions of skill.

Given the importance of teachers, from a policy perspective it is important to better understand the determinants of teacher effectiveness. Because the high-quality data required to credibly measure teacher effectiveness have only recently become readily available to researchers, there is little conclusive evidence on the determinants of teacher effectiveness. In two papers, I investigate the role of the schooling context. In one piece,[10] I investigate the importance of the match between teachers and schools for student achievement. If match effects are economically important, policymakers should consider what kinds of teacher/school pairings are most pro-

ductive and should consider the effect of policies on match quality. I show that teachers who switch schools are relatively more effective at improving student test scores after a move to a different school than before — suggesting that teachers tend to leave schools at which they are less effective. This result is not driven by temporary jumps or dips in productivity surrounding a move, non-random sorting of students to teachers, or teachers moving to better schools on average. I also estimate teacher-school match effects directly by decomposing the variability in test scores into portions that can be explained by individual teachers, individual schools, and the match between teachers and schools. When we control for match quality, the estimated effect of what is typically referred to as teacher quality declines by about one quarter. Moreover, the match-quality variable has about two-thirds as much explanatory power as the teacher-quality variable. These findings indicate that teacher quality is not a fixed quantity so that certain teachers are more effective in certain school environments than others. The findings also suggest that because teachers tend to leave "bad" matches, teacher turnover is not unambiguously negative and could be welfare-enhancing on average.

A teacher's colleagues are an important factor in the schooling environment. In related work[11] with Elias Bruegmann, we analyze the role that teachers play in the professional development of their colleagues. We observe the outcomes of the same teachers at the same schools over time, and document that a teacher's students have larger test-score gains when the effectiveness of the teacher's colleagues, as measured by both observable qualifications and historical performance in the classroom, improves. These spillovers are strongest for less-experienced teachers, persist over time, and can account for about 20 percent of a teacher's effectiveness in raising test scores, thereby suggesting a peer-learning interpretation. We rule out that the results are driven by teachers sorting to their peers, students sorting to teach-

ers, or unobserved school-specific shocks that might coincide with teacher turnover. This paper provides some of the first credible and quantifiable evidence of learning associated with one's peers in the workplace. Moreover, this is the first paper to show that a teacher's effectiveness at raising test scores is at least in part due to learned behavior associated with her colleagues.

As a whole, these studies shed new light on the policies, practices, and institutions that may best produce human capital. They highlight that adequate financial resources facilitate improved outcomes, and they point to identifiable school types, school practices, and teacher policies that promote student learning.

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The Consequences of U.S. Fuel Performance Standards

Christopher R. Knittel[*]

The United States consumes more petroleum-based liquid fuel per capita than any other developed country — 30 percent more than the second-highest consumer (Canada) and 40 percent more than the third-highest consumer (Luxembourg). The majority of U.S. oil consumption — 70 percent — goes into the transportation sector.

A variety of policies has been adopted to reduce petroleum consumption, with the justification for such policies usually being the negative effects of this consumption. For example, the transportation sector contributes to local pollution, accounting for 67 percent of carbon monoxide emissions, 45 percent of nitrogen oxide (NOx) emissions, and significant emissions of particulate matter and volatile organic compounds. These emissions contribute to air pollution and lead to health problems ranging from respiratory ailments to cardiac arrest. Both NOx and volatile organic compounds are precursors to ground-level ozone (smog). The transportation sector accounts for roughly 30 percent of U.S. greenhouse gas emissions, contributing to climate change. In addition, oil consumption leads to externalities associated with energy security and to potential macroeconomic costs associated with oil dependency.

Within the United States, a number of policies aimed at reducing oil consumption rely on "performance standards."[1] In the transportation con-

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text, performance standards require manufacturers, for example automobile manufacturers, to meet some performance benchmark. In the case of Corporate Average Fuel Economy (CAFE) standards, the geometric average fuel economy of a given manufacturer must exceed the benchmark. For local pollutants, standards are typically set on average per-mile emissions of a given pollutant, such as nitrogen oxides or carbon monoxide.

Policymakers more recently have adopted performance standards for fuels. For example, California's "Low Carbon Fuel Economy Standard" (LCFS) sets a maximum average carbon intensity for fuels — effectively a CAFE standard for fuels. The LCFS in essence requires a fuel producer to sell a prescribed amount of comparatively low-carbon fuels, such as some types of ethanol, for every gallon of gasoline sold. At the federal level, the Renewable Fuel Standard (RFS), while not setting a direct performance standard, sets a minimum total amount of different types of ethanol that must be sold in a given year. The way the RFS is implemented makes it similar to a performance standard.

While the United States traditionally has relied on performance standards, taxing various externalities directly — so-called "Pigouvian taxes," after the British economist A.C. Pigou who advocated them — would provide an alternative approach to reducing the externalities associated with fuel consumption. In a series of research studies, Stephen Holland, Jonathan Hughes, and I compare the economic consequences of fuel-based performance standards and Pigouvian taxes, notably carbon taxes. This research summary briefly describes the work and points to future directions for research.

The Economic Efficiency of Low Carbon Fuel Standards

Our first project in this line of research analyzes how an LCFS affects market equilibria and uses simulations to understand the outcomes of national LCFSs that reduce the average carbon intensity of fuels by 1, 5, and 10 percent.[2] Our theoretical modeling illustrates that a performance standard can be thought of as a tax-and-subsidy program. In particular, any product whose carbon intensity is better than the standard is subsidized, while any product whose carbon intensity is worse than the standard is taxed. The relative size of the tax/subsidy moves linearly with the fuels' carbon intensities.

We can readily compare these pricing effects to those of Pigouvian taxes. Under Pigouvian taxes, the tax moves linearly with the fuels' carbon intensities, but no fuels are subsidized. We show that if demand is perfectly inelastic, then an LCFS can achieve economic efficiency; however, if demand is not perfectly inelastic the average cost of the LCFS per unit of carbon reduced will exceed the average cost of carbon reductions under a Pigouvian carbon tax.

Having established the theoretical properties of a LCFS, we next simulate market outcomes. This entails parameterizing the demand for liquid fuels, the supply curves for gasoline and ethanol, and the relative carbon intensity of the two fuels. We investigate a number of alternative sets of assumptions. Our results suggest that the social cost of greenhouse gas reductions under an LCFS tends to be at least five times greater than the social cost of greenhouse gas reductions under carbon pricing. While changing the underlying parameter assumptions has significant implications for the level of costs, changes in the relative costs across the two policies are much smaller.

Unintended Consequences of Performance Standards

Our next paper in this line of work, with additional co-author Nathan Parker, expands the scope of policies and refines our supply curves for low-carbon fuels.[3] In particular, we analyze not just carbon pricing and LCFSs, but also the existing U.S. Renewable Fuel Standard and the biofuel subsidies that expired in 2012. We also expand the scope of economic outcomes that we analyze, and consider changes in land-use patterns, the potential for uncontrolled emissions, and incentives for innovation.

The Renewable Fuel Standard defines minimum sales for five different "types" of biofuels, differentiated by their carbon intensities. For each gallon of gasoline a refinery sells, it must sell some fraction of a gallon of ethanol. We use detailed, spatially-differentiated, simulation-based information on the distillation method, the feedstock, and collection and transportation costs required to produce ethanol to construct supply curves for the different types of ethanol, representing supply conditions in 2020. Our supply curves not only provide us with information on the cost of a given type of ethanol, but also its carbon content, the county where the distillery would be located, and the source and county location of the feedstock for the ethanol. These supply curves allow us not only to simulate market outcomes under different policies, but to also understand how county-level land use patterns and other outcomes change as a result of the policy.

We begin by simulating the reduction in greenhouse gas emissions resulting from the existing RFS. We then define an LCFS and carbon-pricing policy that leads to the same reduction in greenhouse gas emissions.[4] The performance standards rely more heavily on replacing gasoline consumption with ethanol consumption to achieve policy goals, while the Pigouvian taxes rely more heavily on reductions in consumption than on increases in biofuels. For example, our simulations suggest that the RFS leads to an additional 39 million acres of crop land devoted to production of ethanol feedstocks, compared to business as usual, to achieve a 10.2 percent reduction in greenhouse gas emissions, while carbon pricing results in only 1.2 million addition acres devoted to such crops.[5]

By construction, all of our policies lead to the same reduction in greenhouse gas emissions; however, if there exist other negative externalities associated with biofuels, then focusing only on greenhouse gas reductions understates the economic inefficiencies of performance standards. What are these other externalities? There has been considerable work measuring the externalities associated with land-use changes and farming practices, including the costs associated with habitat loss and fertilizer run-off. We consider a range of values for the cost of such externalities, varying from $10 to $25 per acre of additional cropland devoted to ethanol feedstock production. Under these assumptions, the cost of the externalities arising from land-use changes from the RFS is between 6 and 16 percent of the social cost of carbon. There are virtually no such externalities from a carbon pricing policy.

The heavy reliance on ethanol for greenhouse gas reductions under performance standards, instead of demand reductions, leads to the potential for a second unintended consequence: uncontrolled emissions arising from understating the carbon intensity of corn-based ethanol. The true carbon intensity of ethanol is controversial and difficult to estimate because tailpipe emissions must be adjusted for upstream carbon credits from biomass growth. Some claim corn-based ethanol has 80 percent of the carbon content of gasoline, while others claim it has more carbon than gasoline.[6] If the political process leads to policies that are based on an underestimate of the carbon content of biofuels, perhaps due to lobbying by renewable fuel proponents, then performance standards result in more "uncontrolled" emissions than carbon pricing. Our simulations suggest that if the true carbon intensity of corn-based ethanol is 90 percent of gasoline, instead of the assumed 80 percent, uncontrolled emissions are 7 percent and 4 percent of claimed emission reductions under the RFS and LCFS, respectively; they would be less than 1 percent for carbon pricing.

Finally, we compare the incentives to develop "second-generation" biofuels under an LCFS and carbon pricing. In principle, the RFS requires second-generation biofuels. Development of these fuels has lagged the RFS requirements, however, leading to annual waivers for their required sales. Therefore, understanding how different policies may affect innovation incentives is important for understanding their long-run implications.

We calculate the change in social surplus from having biofuels in the market by simulating outcomes with and without the supply curves for the second-generation biofuels. We find that the increase in social surplus is larger under carbon pricing under an LCFS. This is because the incentives to develop second-generation biofuels are inefficiently low under the LCFS regime, because the implicit price on carbon is lower than that corresponding to the optimal Pigouvian tax. The latter provides the socially efficient incentive for the development of new technologies.

We also decompose changes in social surplus into changes in consumer surplus, changes in the producer surplus of corn-based ethanol producers, and changes in the producer surplus of second-generation producers. Under the LCFS, there is a larger increase in consumer surplus from the development of second-generation biofuels, compared to carbon pricing, but there is a large reduction in producer surplus because corn-based ethanol producers are harmed by the development of second-generation ethanol under the LCFS.

Why Do We Have Performance Standards?

Given the higher social cost of greenhouse gas reductions and the other potentially negative unintended consequences of performance standards, we investigate one potential reason for their popularity: the distribution of winners and losers under alternative policies.[7] As noted, the

detailed supply curves for different types of ethanol described above allow us to trace the origin of the feedstock and distillery for each gallon of ethanol sold in the market. That is, for each gallon of ethanol sold, we can trace not only the type of feedstock used, but also the county in which the feedstock was grown or originated and the location of the distillery that manufactured the ethanol. Given data on the costs associated with distilleries and feedstocks, we are then able to calculate and simulate the county-level economic rents from different policies. We combine this with changes in consumer surplus to generate county-level net gains and losses from the different policies toward transportation fuel use.

Our simulations suggest another key difference between performance standards for transportation fuels and carbon taxes. While the average social cost per unit of greenhouse gas emissions abated is higher under performance standards than under carbon pricing, the distribution of gains and losses across counties is right-skewed, with a very long right tail. In short, while the social cost may be higher for the average county under performance standards, there are far greater numbers of bigger winners under performance standards than under carbon pricing. For example, while the social cost of greenhouse gas reductions under the RFS is roughly $60 per ton, one county gains over $6,500 per person per year. In contrast, the social cost of greenhouse gas reductions under carbon pricing is less than $20 per ton, but no county gains more than $1,100 per person per year. There are similar differences at different points of the distribution. For example, the 90th percentile of county gains and losses under the RFS is roughly $700 per person per year; the 90th percentile under carbon pricing is $35. The fact that the average person may lose slightly more under the RFS, but that there are also large winners, may imply that no individual has an incentive to lobby against an RFS, while some individuals have a large incentive to lobby for an RFS.

We also investigate whether differ-ences in the distributions of winners and losers correlates with political activity. We aggregate our county-level measures of winners and losers to Congressional House districts and correlate these with campaign contributions and House voting behavior on H.R. 2454, also known as the Waxman-Markey Bill, which would have established a national cap-and-trade program for greenhouse gas emissions. The bill would have severely limited the economic rents associated with the RFS. Therefore interested parties likely viewed the Waxman-Markey Bill and the RFS as competitors.

We find that our simulated gains and losses from the RFS help to explain House voting behavior and campaign contributions even after we condition on the Congress Member's ideology, the district's per-capita greenhouse gas emissions, power plant emissions, corn production, and gains under cap and trade. A Congressman whose district stands to gain more from the RFS than from carbon pricing was less likely to vote for the Waxman-Markey bill. Furthermore, the Congressman was more likely to get campaign contributions from organizations that opposed Waxman-Markey if the Congressional district's simulated gains from the RFS were larger. These results suggest a political-economy-based explanation for the popularity of externality-reduction policies that are not as economically efficient as Pigouvian taxes.

Summary

The U.S. has historically relied on performance standards to reduce externalities associated with the transportation sector. My work has tried to better understand how performance standards affect the economic cost of emission reductions, incentives for innovation, and the distribution of winners and losers. Future work should investigate these issues for other alternatives to Pigouvian taxes, such as subsidies, and allow for additional potential market failures.

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NBER Profile: *Andrew Ang*

Andrew Ang is a Research Associate in the NBER's Program on Asset Pricing and the Ann F. Kaplan Professor of Business at Columbia Business School. He has been on the faculty at Columbia University since 1999, when he received his Ph.D. from Stanford Business School. Andrew grew up in Australia, and graduated with an actuarial studies degree from Macquarie University in 1994. He spent just under a year in the real world before starting graduate school, a move which was Pareto-improving for him and industry. He was appointed a Faculty Research Fellow of the NBER in 2001 and a Research Associate in 2006.

Ang's research agenda seeks to characterize the nature of risk and return in asset prices. His work spans bond markets, equities, asset management and portfolio allocation, and alternative investments. He has received a variety of grants from government and industry organizations, such as the NSF, Netspar, Q-Group, and INQUIRE. He has recently finished a book, *Asset Management: A Systematic Approach to Factor Investing*, published by Oxford University Press in 2014, which is a comprehensive guide showing how factor risk premiums can be harvested in portfolio design and incorporated in various aspects of investment management.

Ang lives in New York City with his wife and two children, ages six and four. He has just experienced a positive shock of more free time after stepping down as the chair of the Finance and Economics Division, and hopes to devote it to improving his piano playing and doing more research.

NBER Profile: *Price V. Fishback*

Price Fishback is the Thomas R. Brown Professor of Economics at the University of Arizona and a Research Associate in the NBER's Development of the American Economy Program. His co-authored books published by the University of Chicago Press include *Well Worth Saving: How the New Deal Safeguarded Homeownership* (2013); *Government and the American Economy: A New History* (2007) and *A Prelude to the Welfare State: The Origins of Workers' Compensation* (2000). He published *Soft Coal, Hard Choices: The Economic Welfare of Bituminous Coal Miners, 1890–1930* with Oxford University Press in 1992. His current research includes studies of the boom, bust, and slow recovery in housing and mortgage markets in the 1920s and 1930s, the impact of New Deal programs, the impact of World War II, long run changes in climate and government policy and how they affect agriculture, and the response of state governments to the Great Depression and New Deal. Price is the current Executive Director of the Economic History Association and served as co-editor of *The Journal of Economic History* from 2008 to 2012. He was one of the organizers of the Cliometrics Conference between 1996 and 2008. The term "cliometrics" was coined in the 1960's and is a quantitative approach to economic history using economics and statistics.
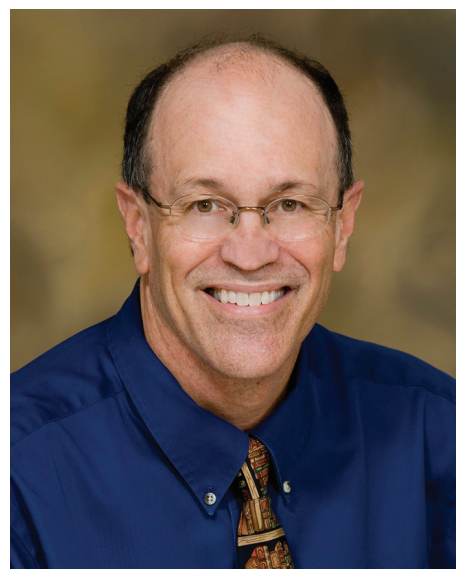
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Jackson's research focuses on the economics of education. He has studied topics such as the effect of school spending on students' long-run outcomes, the effect of teachers on students' cognitive and non-cognitive skills, the effect of attending selective schools on student outcomes, and the effect of teachers on the effectiveness of their colleagues.

Jackson received his B.A. in Ethics, Politics and Economics from Yale University in 2002 and his Ph.D. in Economics from Harvard University in 2007. Before joining Northwestern, he was an Assistant Professor in the Department of Labor Economics at Cornell University.

Jackson lives in Chicago, Illinois, with his wife, Shayna Silverstein, and their three-month-old son. In his spare time he enjoys playing tennis, "discovering" new restaurants, cooking, and walking his dog.

NBER Profile: *Christopher R. Knittel*

Christopher R. Knittel is a Research Associate in the NBER's Environmental and Energy Economics; Industrial Organization, and Productivity; Innovation, and Entrepreneurship Programs. He is also the William Barton Rogers Professor of Energy Economics in the Sloan School of Management at MIT, Director of the Center for Energy and Environmental Policy Research at MIT, and Co-Director of The E2e Project at MIT, the University of California, Berkeley, and the University of Chicago.

Knittel's research focuses on environmental and energy economics, often approaching research questions from an industrial organization perspective. His work is interested in how consumers respond to changes in product attributes, how firms interact in these markets, and what these mean for policy. In addition to his work in environmental and energy economics, he has worked on banking markets.

Knittel is the co-editor of the *Journal of Public Economics* and sits on the editorial board of the *Journal of Energy Markets* and the *Journal of Transportation Economics and Policy*. Chris received his Ph.D. in economics from the University of California, Berkeley, a M.A. in economics from the University of California, Davis, and a B.A. in economics and political science from California State University, Stanislaus. Before joining MIT, Chris held faculty positions at Boston University and the University of California, Davis.

Knittel lives in Lexington, Massachusetts with his wife Allison, son Caiden, and new Brittany puppy, Cael. In his spare time he enjoys golfing, woodworking, hiking, photography, and just about every other hobby known to man.

Conferences

Japan Project Meeting

The NBER in collaboration with the Center for Advanced Research in Finance, the Center on Japanese Economy and Business, and the Australia-Japan Research Centre held a meeting on the Japanese economy in Tokyo on July 31 and August 1, 2014. The organizers were: Shiro Armstrong, Australian National University; Charles Horioka, University of the Philippines and NBER; Takeo Hoshi, Stanford University and NBER; Tsutomu Watanabe, University of Tokyo; and David Weinstein, Columbia University and NBER. The following papers were presented and discussed:

- **Gary Hansen**, University of California, Los Angeles and NBER, and **Selo Imrohoroglu**, University of Southern California, "Fiscal Reform and Government Debt in Japan: A Neoclassical Perspective"

- **Jessie Handbury**, University of Pennsylvania; **Tsutomu Watanabe**; and **David Weinstein**, "How Much Do Official Price Indexes Tell Us About Inflation?"

- **Saroj Bhattarai** and **Bulat Gafarov**, Pennsylvania State University, and **Gauti Eggertsson**, Brown University and NBER, "Time Consistency and the Duration of Government Debt: A Signaling Theory of Quantitative Easing"

- **Suparna Chakraborty**, University of San Francisco, and **Joe Peek**, Federal Reserve Bank of Boston, "Lending to Unhealthy Firms in Japan during the Lost Decade: Which, Technical or Financial?"

- **Shigeru Fujita**, Federal Reserve Bank of Philadelphia, and **Ippei Fujiwara**, Australian National University, "Aging and Deflation: Japanese Experience"

- **Andrew Bernard** and **Andreas Moxnes**, Dartmouth College and NBER, and **Yukiko Saito**, Research Institute of Economy, Trade, and Industry (RIETI), "Production Networks, Geography, and Firm Performance"

- **Serguey Braguinsky**, Carnegie Mellon University; **Atsushi Ohyama**, Hokkaido University; **Tetsuji Okazaki**, University of Tokyo; and **Chad Syverson**, University of Chicago and NBER, "Acquisitions, Productivity, and Profitability: Evidence from the Japanese Cotton Spinning Industry"

- **Hanna Halaburda** and **Jordan Siegel**, Harvard University, and **Naomi Kodama**, Hitotsubashi University, "The Unfairness Trap: A Key Missing Factor in the Economic Theory of Discrimination"

Summaries of these papers may be found at: http://www.nber.org/confer/2014/JPMs14/summary.html

Tax Policy and the Economy

The NBER held a conference titled "Tax Policy and the Economy" in Washington on September 18, 2014. The organizer was Jeffrey Brown of University of Illinois, Urbana-Champaign and NBER. The following papers were presented:

- **Casey Mulligan**, University of Chicago and NBER, "The New Full-time Employment Taxes"

- **Bradley Heim**, Indiana University; **Ithai Lurie**, Department of the Treasury; and **Kosali Simon**, Indiana University and NBER, "The Impact of the Affordable Care Act Young Adult Provision on Labor Market Outcomes: Evidence from Tax Data"

- **Louis Kaplow**, Harvard University and NBER, "Government Policy and Labor Supply with Myopic or Targeted Savings Decisions"

- **Martin Feldstein**, Harvard University and NBER, "Raising Revenue by Limiting Tax Expenditures"

- **George Bulman**, University of California, Santa Cruz, and **Caroline Hoxby**, Stanford University and NBER, "The Returns to the Federal Tax Credits for Higher Education"

Summaries of these papers may be found at: http://www.nber.org/confer/2014/TPEs14/summary.html

The Macroeconomic Consequences of Risk and Uncertainty

The NBER held its annual Universities Research Conference in Cambridge on September 19 and 20, 2014. Research Associates Nicholas Bloom of Stanford University and Xavier Gabaix of New York University organized the meeting on the topic "The Macroeconomic Consequences of Risk and Uncertainty." These papers were discussed:

- **Pedro Bordalo**, University of London; **Nicola Gennaioli**, Bocconi University; and **Andrei Shleifer**, Harvard University and NBER, "Stereotypes" (NBER Working Paper No. 20106)

- **Anna Orlik**, Federal Reserve Board, and **Laura Veldkamp**, New York University and NBER , "Understanding Uncertainty Shocks and the Role of Black Swans"

- **Gill Segal** and **Ivan Shaliastovich**, University of Pennsylvania, and **Amir Yaron**, University of Pennsylvania and NBER, "Good and Bad Uncertainty: Macroeconomic and Financial Market Implications"

- **George Alessandria**, Federal Reserve Bank of Philadelphia; **Horag Choi**, Monash University; **Joseph Kaboski**, University of Notre Dame and NBER; and **Virgiliu Midrigan**, New York University and NBER, "Microeconomic Uncertainty, International Trade, and Aggregate Fluctuations"

- **Marina Azzimonti**, Federal Reserve Bank of Philadelphia, "Partisan Conflict"

- **John Campbell** and **Luis Viceira**, Harvard University and NBER, and **Carolin Pflueger**, University of British Columbia, "Monetary Policy Drivers of Bond and Equity Risks" (NBER Working Paper No. 20070)

- **Jesús Fernández-Villaverde**, University of Pennsylvania and NBER; **Pablo Guerrón-Quintana**, Federal Reserve Bank of Philadelphia; **Keith Kuester**, University of Bonn; and **Juan Rubio-Ramírez**, Duke University, "Fiscal Volatility Shocks and Economic Activity" (NBER Working Paper No. 17317)

- **Dario Caldara**, **Cristina Fuentes-Albero**, and **Egon Zakrajsek**, Federal Reserve Board, and **Simon Gilchrist**, Boston University and NBER, "The Macroeconomic Impact of Financial and Uncertainty Shocks"

- **François Gourio**, Federal Reserve Bank of Chicago and NBER; **Michael Siemer**, Federal Reserve Board; and **Adrien Verdelhan**, MIT and NBER, "Uncertainty Betas and International Capital Flows"

- **Zhaogang Song**, Federal Reserve Board, and **George Gao**, Cornell University, "Rare Disaster Concerns Everywhere"

- **Pablo Fajgelbaum**, University of California, Los Angeles and NBER; **Edouard Schaal**, New York University; and **Mathieu Taschereau-Dumouchel**, University of Pennsylvania, "Uncertainty Traps" (NBER Working Paper No. 19973)

- **Bryan Kelly**, University of Chicago and NBER; **Hanno Lustig**, University of California, Los Angeles and NBER; and **Stijn Van Nieuwerburgh**, New York University and NBER, "Firm Volatility in Granular Networks" (NBER Working Paper No. 19466)

Summaries of these papers may be found at: http://www.nber.org/confer/2014/URCf14/summary.html

Productivity Growth and Innovation in the Long Run

In conjunction with the Organization for Economic Cooperation and Development (OECD), the NBER held a meeting on "Productivity Growth and Innovation in the Long Run" on September 25 and 26, 2014. The conference was held at the OECD's Conference Center in Paris. The program was organized by Research Associate Nicholas Bloom of Stanford University and Chiara Criscuolo of the OECD. The program included seven panel discussions on distinct topics. These topics, and the speakers who discussed each of them, are listed below:

- Session 1: Will Long-Term Patterns in Global Productivity Continue?

    Chair: **Graziella Bertocchi**, University of Modena and Reggio Emilia

    Speakers: **Francesco Caselli**, London School of Economics and NBER, and **Diego Comin**, Dartmouth College and NBER

- Session 2: The Future of Productivity: Inequality and Growth

    Chair: **Stefano Scarpetta**, Employment and Social Affairs Directorate, OECD

    Speakers: **William Kerr,** Harvard Business School and NBER, and **Andrew Leigh,** Member of Parliament in Australia

- Session 3: The Future of Productivity: Sustainability Issues

    Chair: **Simon Upton**, Environment Directorate, OECD

    Speakers: **Michael Greenstone**, University of Chicago and NBER, and **Federick van der Ploeg**, University of Oxford

- Session 4: The Long-Term Future of Productivity: The State of the Debate

    Chair: **Jonathan Haskel**, Imperial College London

    Speakers: **Robert Gordon**, Northwestern University and NBER, and **Joel Mokyr**, Northwestern University and NBER

- Session 5: The Drivers of Productivity: The Role of Organizational Change and Other Firm-Level Factors

    Chair: **Andrew Wyckoff**, Science, Technology, and Innovation Directorate, OECD

    Speakers: **Nicholas Bloom**, and **Luis Garicano**, London School of Economics, and **Catherine Mann**, OECD

- Session 6: The Drivers of Productivity: Technical Progress, Diffusion, and Resource Allocation

    Chair: **Christian Kastrop**, Economics Department, OECD

    Speakers: **Ufuk Akcigit**, University of Pennsylvania and NBER, and **Chad Syverson**, University of Chicago and NBER

- Session 7: The Drivers of Productivity: Agglomeration and Network Issues

    Chair: **Joaquim Oliveira Martins**, Directorate for Public Governance and Territorial Development, OECD

    Speakers: **Gilles Duranton**, University of Pennsylvania, and **César Hidalgo**, Massachusetts Institute of Technology

Video recordings of the presentations may be found at: http://www.oecd.org/economy/productivity-growth-and-innovation-in-the-long-run.htm

NBER News

37th Annual NBER Summer Institute

The NBER hosted its 37th annual Summer Institute during a three-week period in July. There were 2,528 registered participants, a new record. This included 565 researchers who were attending the Summer Institute for the first time. Slightly less than one third of the participants were NBER affiliates.

Stanley Fischer, the Vice-Chair of the Federal Reserve Board of Governors, former Governor of the Bank of Israel, and a former NBER Research Associate, delivered the 2014 Martin Feldstein lecture. His topic was "Financial Sector Reform: How Far Are We?" The text of his lecture appears earlier in this issue of the *NBER Reporter*.

Daron Acemoglu of the Massachusetts Institute of Technology and **Matthew Jackson** of Stanford University delivered the 2014 NBER Methods Lectures on "Theory and Application of Network Models." These lectures, which drew a diverse audience from many different fields, have been posted on the NBER website at: http://www.nber.org/econometrics_minicourse_2014

The participants at the 2014 Summer Institute represented 432 organizations, including colleges and universities, central banks, government agencies, corporations, and think tanks. There were more than 150 graduate student participants. The Summer Institute included nearly 500 research presentations, which touched on many different topics. A full list of meetings and the papers presented may be found at: http://www.nber.org/confer/2014/SI2014/SI2014.html

Program and Working Group Meetings

Economic Fluctuations and Growth Program Meeting

The Economic Fluctuations and Growth Program held a program meeting on July 12, 2014, in Cambridge. Research Associates Lawrence Christiano of Northwestern University and Charles Jones of Stanford University organized the program. They selected the following papers for presentation and discussion:

- **Gauti Eggertsson**, Brown University and NBER, and **Neil Mehrotra**, Brown University, "A Model of Secular Stagnation"

- **Simon Gilchrist**, Boston University and NBER; **Raphael Schoenle**, Brandeis University; and **Jae Sim** and **Egon Zakrajšek**, Federal Reserve Board, "Inflation Dynamics During the Financial Crisis"

- **Roland Bénabou**, Princeton University and NBER, and **Davide Ticchi** and **Andrea Vindigni**, IMT Institute for Advanced Studies - Lucca, "Forbidden Fruits: The Political Economy of Science, Religion, and Growth"

- **Valerie Ramey**, University of California , San Diego and NBER, and **Sarah Zubairy**, Texas A&M University, "Government Spending Multipliers in Good Times and in Bad: Evidence from U.S. Historical Data"

- **Paul Beaudry**, University of British Columbia and NBER; **Dana Galizia**, University of British Columbia; and **Franck Portier**, Toulouse School of Economics, "Reconciling Hayek's and Keynes' Views of Recessions"

- **Daron Acemoglu**, MIT and NBER; **Ufuk Akcigit**, University of Pennsylvania and NBER; and **Murat Alp Çelik**, University of Pennsylvania,"Young, Restless, and Creative: Openness to Disruption and Creative Innovations"

Summaries of these papers can be found at: http://nber.org/confer/2014/EFGs14/summary.html

Bureau Books

The Economics of Food Price Volatility

The Economics of Food Price Volatility, edited by Jean-Paul Chavas, David Hummels, and Brian D. Wright, is now available from the University of Chicago Press.

There has been an increase in food price instability in recent years, with varied consequences for farmers, market participants, and consumers. Before policymakers can design schemes to reduce food price uncertainty or ameliorate its effects, they must first understand the factors that have contributed to recent price instability. Does it arise primarily from technological or weather-related supply shocks, or from changes in demand like those induced by the growing use of biofuels? Does financial speculation affect food price volatility?

The researchers who contributed to *The Economics of Food Price Volatility* address these and other questions. They examine the forces driving both recent and historical patterns in food price volatility, as well as the effects of various public policies in affecting this volatility. Chapters include studies of the links between food and energy markets, the impact of biofuel policy on the level and variability of food prices, and the effects of weather-related disruptions in supply. The findings shed light on the way price volatility affects the welfare of farmers, traders, and consumers.

The price of the clothbound volume is $130, and the e-book is $104.

Measuring Economic Sustainability and Progress

Measuring Economic Sustainability and Progress, edited by Dale W. Jorgenson, J. Steven Landefeld, and Paul Schreyer, is now available from the University of Chicago Press.

Since the Great Depression, researchers and statisticians have recognized the need for more extensive methods of measuring economic growth and sustainability. The recent recession renewed commitments to closing long-standing gaps in economic measurement, including those related to sustainability and well-being.

This volume in the Studies in Income and Wealth series explores collaborative solutions from academics, policy researchers, and official statisticians to some of today's most important economic measurement challenges. Contributors expand past research on the integration and extension of national accounts to establish a more comprehensive understanding of the distribution of economic growth and its impact on well-being, including health, human capital, and the environment. The research contributions assess, among other topics, specific conceptual and empirical proposals for extending national accounts.

The price of the clothbound volume is $130, and the e-book is $7 for 30 days and $104 for permanent ownership.

Tax Policy and the Economy, Volume 28

Tax Policy and the Economy, Volume 28, edited by Jeffrey Brown, is now available from the University of Chicago Press.

The papers in this volume illustrate the depth and breadth of the research by NBER research associates who study taxation and government spending programs. The first paper explores whether closely held firms are used as tax shelters. The second examines the taxation of multinational corporations. The third discusses the taxation of housing, focusing on the ways in which current income tax rules may affect location and consumption decisions and lead to economic inefficiencies. The fourth paper offers a historical perspective on the political economy of gasoline taxes, with a particular focus on the response to the oil shocks of the early 1970s. The fifth and final paper uses the tools of financial economics to estimate the unfunded liabilities of the Pension Benefit Guaranty Corporation.

The clothbound volume is $60 and the e-book is $48.