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Article

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Using Nonstandard Data Sources to Test Economic Theories

The study of crime offers many opportunities to test microeconomic models of behavior. Often, however, standard data sources are not appropriate for such tasks. Consequently, a number of projects with which I have been involved in recent years have relied on unusual data sources.

Ian Ayres and I consider what externalities are associated with potential victims taking precautions.⁸ In particular, we look at Lojack, a radio transmitter device hidden inside automobiles (the Lojack company provided proprietary market share data). There is no external indication on the vehicle that Lojack is installed. Thus, Lojack provides general deterrence, even to vehicles without it. This is in stark contrast to observable devices, such as "The Club," that presumably cause crimes to shift from one vehicle to another. We find sharp decreases in auto theft in cities where Lojack becomes available. Further, car owners who install Lojack internalize only 10 percent of the total

social benefit, leading to underprovision of Lojack by the market, we conclude.

Sudir Venkatesh and I use an even more unusual data source: financial records kept over a four-year period by a drug-selling street gang.⁹ These include information on the price and quantity of drugs sold; wages at various levels of the organization; and expenses such as tribute, weapons, and so on. We supplement the financial information with ethnographic observations and data on arrests, deaths, and injuries. Wages appear to be surprisingly low—not much above the federal minimum wage for street-level sellers. The distribution of wages within the gang is extremely skewed, though, and there is some evidence of compensating differentials in wages. During the time period we study, the gang expands its territory, providing a number of tests of market power and pricing. Among other results, we find that gangs price below marginal cost during gang wars.

¹ S.D. Levitt, "Using Electoral Cycles in Police Hiring to Estimate the Effect of

Police on Crime," *American Economic Review*, 87(3), (June 1997), pp. 270–90.

² S.D. Levitt, "The Effect of Prison Population Size on Crime Rates: Evidence from Prison Overcrowding Litigation," *Quarterly Journal of Economics*, 111, (May 1996), pp. 319–52.

³ T. Miller, M. Cohen, and S. Rossman, "Victim Costs of Violent Crime and Resulting Injuries," *Health Affairs*, 12, (Winter 1993), pp. 186–97.

⁴ G. Becker, "Crime and Punishment: An Economic Approach," *Quarterly Journal of Economics*, 76, (March/April 1968), pp. 169–217.

⁵ S.D. Levitt, "Why Do Increased Arrest Rates Appear to Reduce Crime: Deterrence, Incapacitation, or Measurement Error?" *Economic Inquiry*, forthcoming.

⁶ D. Kessler and S.D. Levitt, "Using Sentence Enhancements to Distinguish Deterrence from Incapacitation," *NBER Working Paper No. 6484*, March 1998.

⁷ S.D. Levitt, "Juvenile Crime and Punishment," *Journal of Political Economy*, forthcoming.

⁸ I. Ayres and S.D. Levitt, "Measuring the Positive Externalities from Unobservable Victim Precaution: An Empirical Analysis of Lojack," *Quarterly Journal of Economics*, 113(1), (February 1998), pp. 43–77.

⁹ S.D. Levitt and S. Venkatesh, "An Economic Analysis of a Drug-Selling Gang's Finances," *NBER Working Paper No. 6592*, June 1998.

Do We Still Need Commercial Banks?

Raghuram G. Rajan*

According to many observers, the commercial bank—the institution that accepts deposits payable on demand and originates loans—has outlived its usefulness and is in a state of terminal decline. Commercial banks' share of total financial institution assets in the United States has fallen dramatically, from more than

70 percent around the turn of the century to just around 30 percent today.¹ Bank share of corporate debt in the United States has declined from 19.6 percent in 1979 to 14.5 percent in 1994.² Competition on both sides of the banks' balance sheet has increased. On the banks' asset side, the growth of the commercial paper and junk bond markets has given large firms an alternative to borrowing from the bank. On the liability side, new technologies and deregulation have given customers choices. Instead of being forced to deposit at the local bank branch or make pay-

ments through a bank checking account, customers are able to use mutual funds that offer much the same services.

At the same time that banks appear to be losing business to financial markets and other institutions, they are also imposing huge costs on society. The savings and loan crisis in the United States cost taxpayers several hundred billion dollars by even the most conservative estimate. Estimates of the cost of cleaning up the Japanese banking crisis now exceed \$500 billion, and few will hazard a guess as to the costs of the East Asian bank-

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ing crisis. In the face of the apparent decline in the role of banks and the large costs they can still impose on taxpayers, it is legitimate to ask whether we still need commercial banks.

Further Questions

In order to answer this, we have to ask two further questions. First, what functions do banks perform? Second, is the institutional form that carried out these functions no longer useful?

Before I go further, let me be more specific about the institutional form under investigation. The U.S. Banking Act of 1971 defines the "commercial bank" as an institution that offers demand deposits and originates loans. Therefore, a money market mutual fund is not a bank (it does not originate loans) and a finance company is also not a bank (it does not offer demandable deposits). To start with, I adopt this product-based description as my working definition of a commercial bank.

What Banks Do: Liquidity Provision

Banks essentially perform two functions. First, they provide liquidity. Every time customers withdraw money from an automated teller machine or write a check, they rely on the bank's liquidity provision function. Because this is the immediate point of contact most of us have with banks, early influential papers in banking quite naturally focused on the role of banks in meeting the liquidity needs of depositors.³ Still, there is very little difference between a demand deposit that an investor holds and a line of credit extended to a firm. Both products require the bank to pay the client money on demand. Therefore it seems natural to conclude that the bank provides liquidity on both sides of the balance sheet—to both depositors and borrowers.

Why might a bank want to do this?

A bank can achieve scale economies by using the same underlying reserve of liquid assets and the same institutional arrangements (access to the central bank's discount window and to other banks) to meet the unexpected demands of both borrowers and depositors. Also, the demands may offset each other (borrowers draw down lines of credit at different times from depositors), economizing on the need to hold low-return reserves.⁴ Anil Kashyap, Jeremy Stein, and I find evidence suggesting complementarities between demand deposits and lines of credit for banks in the United States—the more a bank does of one, the more it does of the other. Moreover, our work suggests that synergies between the products arise because a bank can economize on holdings of liquid assets when the two products are jointly offered.

In summary, banks appear to provide liquidity in many ways, not just through demand deposits, and the banks' ability to take advantage of diversification is what gives them an advantage in servicing these various demands.

What Banks Do: Fund Complex Positions

The second major function banks perform is to fund complex, illiquid positions.⁵ Historically, this has taken the form of making term loans to borrowers who are "difficult" credits. By virtue of their past relationships with client firms, banks know more about their future prospects, as well as about alternative uses for the firms' assets.⁶ Consequently, they can lend more than other less-knowledgeable lenders.⁷ Consistent with these theories, Mitchell Petersen and I find that, correcting for other effects, the availability of credit to small firms increases with the length of their banking relationship and the number of dimensions across which they interact with their bank.⁸

Also, the bank's specific lending skills and knowledge have to be brought into play when the bank wants to coax repayment. As a result, the loans are hard to sell to other potential lenders without similar skills or knowledge. Thus the bank's positions have historically been illiquid.⁹

The positions that banks enter are complex and illiquid for a variety of other reasons. In particular, many of the transactions between the bank and its borrower may be governed by an implicit understanding rather than by explicit contracts. If explicit contracts are incomplete, then implicit arrangements can be more flexible and allow for superior transactions.

Petersen and I consider the following natural experiment to test this premise¹⁰: The theory suggests that implicit arrangements between two parties typically are harder to sustain when competitive alternatives are open to the partners. Some areas of the United States have relatively concentrated banking markets. In these areas, implicit arrangements should be easier to sustain. Specifically, a bank can give a borrower subsidized credit when the borrower most needs it—when it is young or distressed—with the intent of recouping the subsidy when the firm is more mature or healthy. Unlike in a more competitive market, the bank can make the intertemporal cross-subsidy, confident that the firm has no alternative but to stick with the bank when mature or healthy.¹¹ Petersen and I find evidence consistent with this argument. Small young firms in areas in the United States where there are few banks get more credit than similar firms in areas where banking is more competitive. Moreover, firms in concentrated areas pay less than similar firms in competitive areas for their credit when young (they receive subsidized financing when most needed), and pay more when old (they repay earlier subsidies). More generally, our evidence suggests that more compli-

cated intertemporal transactions are possible within bank-firm relationships than are possible through explicit contracting.

Because of their nature, however, these implicit relationships are hard for outsiders to track or take over. Thus banking relationships add to the complexity and illiquidity of bank positions.

Finally, banks' comparative advantage in financial innovation make their positions novel and therefore illiquid in the face of a less advanced market. There are several possible reasons that banks have an advantage in innovation. New financial instruments and contracts typically are incomplete in many ways when they are first introduced. Payments or responsibilities have not been spelled out fully for many possible situations, partly because those situations have not been anticipated. There needs to be a trial period during which the contract may be tried out in real-world situations and the appropriate contractual features for dealing with initially unforeseen contingencies developed. The firms with which a bank has relationships form an ideal testing ground because the relationships allow the contract to be perfected in a nonadversarial environment. However, this ability to enter into innovative contracts that the market does not fully understand adds to the complexity of the banks' positions and their illiquidity.¹²

Why Both Functions?

These two functions, liquidity provision and funding complex positions, seem incompatible. In the first, the bank must come up with money on demand, while in the second, the bank holds investments that, because of their novelty or dependence on the bank's specific knowledge, are hard to undo or liquidate. Excessive investment in illiquid positions make the illiquid bank susceptible to inef-

ficient runs.¹³ It seems silly to tie the two functions together; hence there are increasingly strident calls from politicians and some academics to break up the bank and distance the two functions.

Yet, the widespread coexistence of these functions in the bank, both historically and across countries, should give us pause. Could there be synergies between the two functions? Douglas Diamond and I argue that, because bankers' specialized skills enable them to manage complicated positions, they have the ability to extract high rents from their investors. Bankers can commit to extracting lower rents in the future by issuing demand deposits that are a "hard" claim. More generally, by providing liquidity, a bank also can commit itself to lower compensation for managing complex positions. This reduces the bank's cost of financing those positions. Diamond and I also explain why we would not see industrial firms financing themselves with demandable deposits.¹⁴

Stewart Myers and I point to another source of synergy.¹⁵ Banks have to maintain a store of very liquid assets in order to meet unexpected demand for liquidity. However, these liquid assets can be invested at short notice against the interests of financiers. The potential for opportunistic risky investment by the banker can raise the bank's cost of financing. One way for the bank to avoid opportunistic risks is for it to embed part of its value in complex illiquid positions. Because these positions are hard to unwind, they give financiers time to react to changes in the bankers' strategy. The positions are also a (limited) source of rents for bankers (discussed earlier), and they may be unwilling to jeopardize these in order to undertake short-term opportunistic investments.

In summary, the function of liquidity provision requires issuing demandable claims that have the ancillary

effect of keeping in check the bank's rents from managing illiquid positions. Moreover, the bank's remaining rents and the illiquidity of its positions increase its stake in the future. As a result, the bank can commit to holding liquid assets safely without the straitjackets of rules and regulations that other institutions, such as money market mutual funds, require. Thus there are synergies flowing both ways that reduce the bank's cost of financing when it undertakes both functions together.

Is the Institutional Form Dead?

Equipped with some theory, we can ask whether the bank is dead. If the institutional form is defined in terms of its products—demand deposits and industrial loans—then the data suggest a definite decline in its importance in industrial countries. Depositors are moving away from banks to money market mutual funds and large firms are issuing public debt to meet their financing needs rather than borrowing from banks.

On the face of it, therefore, disintermediation appears rampant. However, if one looks closer, it appears that banks continue to provide their traditional functions, albeit through nontraditional products. For example, one could observe the dramatic increase in volume of commercial paper issuances relative to bank commercial loans and conclude, incorrectly, that the role of banks in providing liquidity to borrowers is declining. In fact, instead of providing liquidity directly to a large firm, a bank provides a backup line of credit that can be drawn down in case the firm's commercial paper cannot be refinanced. It is much more effective for the bank to provide such contingent guarantees than to directly fund the firm's liquidity needs: With contingent guarantees, the same unit of liquid reserves can back the needs of

multiple firms. By contrast, with direct funding, a unit of liquid reserve is fully locked up in meeting the liquidity needs of a single firm.

Since banks have begun to use their balance sheets more cleverly, old measures—such as the relative size of bank assets—are no longer useful in describing the importance of the role of banks. A more useful indicator is one that adds capitalized fee income to bank assets. By this measure, banks continue to maintain their importance.¹⁶

While banks are not dying out, they may be changing. With the widespread availability of information and increases in both processing capability and regulatory infrastructure, many more transactions can be handled directly in the market or by specialized institutions. This has forced banks to give up products that have become commodity-like and to refocus on products where bank value-added is still substantial. Typically, we see a cycle of innovation. Banks develop a complex new product, extract some rents for a while, and, eventually, the product becomes well understood and is offered by the market.¹⁷ Banks then move on to new products.

This means that it is not very useful to continue associating a bank with specific products such as demand deposits and commercial loans. Such terms describe small community banks and little else today. However, if we define banks as institutions that jointly provide liquidity and complicated funding, we capture much more of the essence of what banks really do and vastly expand the set of banks for which the definition has relevance.

Do We Really Need Banks?

With this broader definition, and the evidence that, according to reasonable measures, the relative impor-

tance of banks in the financial sector has not declined, we have to conclude that it is too early to write off banks. Given the market value that most banks command today, and the University of Chicago's traditional belief in efficient markets, I could not have reached a different conclusion. However, the private valuations may be at the public expense: Banks may be so valuable partly because they can dip periodically into the public till.

Unfortunately, absent much better financial markets than those that currently exist, the theory suggests we cannot get many of the good things banks do, such as liquidity creation, credit origination, and financial innovation, without banks issuing claims susceptible to runs and thus being financially fragile. In breaking up banks into finance companies and money market funds (the so-called "narrow" bank proposals), we risk throwing the baby out with the bath water. Thus part of the Faustian bargain that we have to live with is that periodic banking disasters will occur and public money will be used.¹⁸ Innovations in regulation and supervision can attempt to reduce the magnitude of the problem, but we should recognize that the alternative of doing away with the banks, at least in the foreseeable future, could be much worse.

1. See C. James and J. Houston, "Evolution or Extinction: Where Are Banks Headed?," *Bank of America Journal of Applied Corporate Finance*, 9, (1996), pp. 8–23.

2. See A. Berger, A.K. Kashyap, and J. Scalise, "The Transformation of the U.S. Banking Industry: What a Long Strange Trip It's Been," *Brookings Papers on Economic Activity*, 2, (1995), pp. 55–217.

3. Liquidity provision can take place in many ways. The bank can directly pay cash on demand to depositors (see J. Bryant, "A Model of Reserves, Bank Runs, and Deposit Insurance," *Journal of Banking and Finance*, 4, [1980], pp. 335–44); D. Diamond and P. Dybvig,

"Bank Runs, Deposit Insurance, and Liquidity," *Journal of Political Economy*, 91, [1983], pp. 401–19). Alternatively, it can provide a liquid medium of exchange to depositors through bank notes or check-writing facilities (see G.B. Gorton and G. Pennachi, "Financial Intermediaries and Liquidity Creation," *Journal of Finance*, 45, [1990], pp. 49–72).

4. See A.K. Kashyap, R.G. Rajan, and J.C. Stein, "Banks as Liquidity Providers: An Explanation for the Co-Existence of Lending and Deposit Taking," mimeo, University of Chicago, 1998. Also, there could be a rationale for offering lines of credit and demand deposits even if lines of credit are normally not taken down at substantially different times than deposits. It is sufficient that liquid assets be held by the firm against the possibility of a "sunspot" run by depositors. As there is no special reason for those who have lines to panic at the same time as the depositors, the possibility of more fully utilizing liquid assets that are held to protect against depositor runs may be reason enough to offer lines of credit. I should stress that the novel point in work that Kashyap, Rajan, and Stein (1998) have completed is the diversification across different categories of liquidity demands. Diamond and Dybvig (1983) stress that banks diversify across the liquidity demands of depositors and the fact that banks diversify across the liquidity needs of borrowing firms has been emphasized by B.R. Holmstrom and J. Tirole, "Private and Public Supply of Liquidity," *Journal of Political Economy*, 106, (1998), pp. 1–40.

5. Banks perform myriad functions. I focus only on the ones that are both important and serve to distinguish commercial banks from other financial institutions.

6. See B. Bernanke, "Non-Monetary Effects of the Financial Crisis in the Propagation of the Great Depression," *American Economic Review*, 73, (1983), pp. 257–76; S.A. Sharpe, "Asymmetric Information, Bank Lending and Implicit Contracts: A Stylized Model of Customer Relationships," *Journal of Finance*, 45, (1990), pp. 1069–88; R.G. Rajan, "Insiders and Outsiders: The Choice Between Informed and Arm's Length Debt," *Journal of Finance*, 47, (1992), pp. 1367–400; D. Diamond and R.G. Rajan, "Liquidity Risk, Liquidity Creation and Financial Fragility: A Theory of Banking," mimeo, University of Chicago, 1998.

7. For evidence, see C. James, "Some Evidence on the Uniqueness of Bank Loans," *Journal of Financial Economics*, 19, (1987), pp. 217–35; T. Hosbi, A.K.

Kashyap, and D.S. Scharfstein, "Bank Monitoring and Investment: Evidence from the Changing Structure of Japanese Corporate Banking Relationships," in *Asymmetric Information, Corporate Finance and Investment*, R.G. Hubbard, ed., Chicago: University of Chicago Press, 1990.

⁸ See M. Petersen and R.G. Rajan, "The Benefits of Lending Relationships: Evidence from Small Business Data," *Journal of Finance*, 49, (1994), pp. 3-37.

⁹ See Diamond and Rajan (1998).

¹⁰ See M. Petersen and R.G. Rajan, "The Effect of Credit Market Competition on Lending Relationships," *Quarterly Journal of Economics*, 110, (1995), pp. 407-43.

¹¹ This idea was initially proposed by C.J. Mayer, "New Issues in Corporate Finance," *European Economic Review*, 32, (1988), pp. 1167-89.

¹² See R.G. Rajan, "The Past and Future of Commercial Banking as Viewed

Through an Incomplete Contract Lens," *Journal of Money, Credit and Banking*, (1998), forthcoming.

¹³ See Diamond and Dybvig (1983).

¹⁴ Once the bank has offered credit, its specific skills are used largely in effecting transfers (from borrower to depositor) rather than in creating value. As a result, demand deposits can play some disciplinary role because a bank run will render the bank ineffectual and extinguish its rents. However, in an industrial firm, the entrepreneur's (or manager's) rents accrue largely from his or her specific skills in creating value. A run will be highly inefficient, and its effects will be mitigated by renegotiation. Earlier work by Calomiris and Kahn (1991) emphasizes the monitoring role of demandable debt but does not explain why its beneficial effects would be any different for industrial firms. Hence, the fact that industrial firms rarely use demand

deposits to finance is not explained by their work.

¹⁵ S.C. Myers and R.G. Rajan, "The Paradox of Liquidity," *Quarterly Journal of Economics*, (1998), forthcoming.

¹⁶ J. Boyd and M. Gertler, "Are Banks Dead? Or Are the Reports Greatly Exaggerated," *Federal Reserve Bank of Minneapolis working paper*, 1994.

¹⁷ See R.C. Merton, "Financial Innovation and the Management and Regulation of Financial Institutions," *Journal of Banking and Finance*, 19, (1995), pp. 461-82.

¹⁸ The theories described thus far do not explain why banks have the periodic collective urge to commit suicide by making bad loans. For one attempt at an explanation, see R.G. Rajan, "Why Bank Credit Policies Fluctuate: A Theory and Some Evidence," *Quarterly Journal of Economics*, 109, (1994), pp. 399-442.

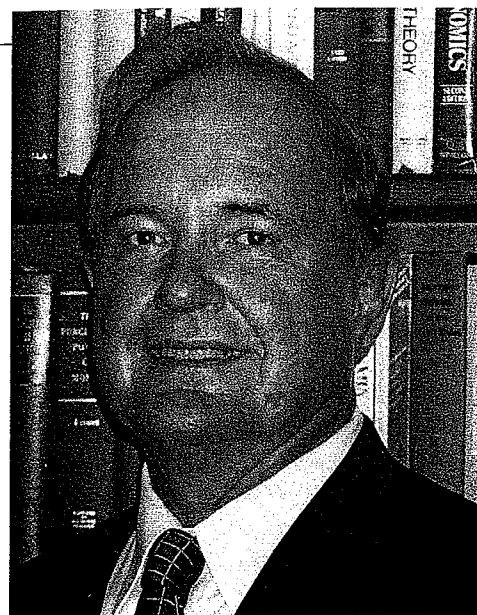
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Darby has written eight books and monographs and more than 100 other professional publications. From 1980 through 1986 he was Editor of the *Journal of International Money and Finance*, and he continues to serve on that Journal's Editorial Board. He also serves or served as a member of the editorial boards of the *American Economic Review*, *Contemporary Policy Issues*, *Contemporary Economic Policy*, and *International Reports*. Darby has received many honors including the Alexander Hamilton Award, the Treasury's highest honor, in 1989. He was elected Vice President and President-Elect of the Western Economic Association in 1998.

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