

# The Economic Impact of Bank Structure: A Review of Recent Literature

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**T**he recent passage of the *Financial Services Modernization Act*, along with numerous bank mergers over the past few years, has focused attention on the banking system in general and on the sector's industrial organization in particular.

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Over the past decade the U.S. banking industry has undergone many changes, including the resolution of the savings and loan bailout, the rise of Internet banking, numerous mergers and acquisitions, and financial deregulation. Although all of these have had, or will have, a major impact on the banking sector, two of these factors could alter the underlying structure of the U.S. banking system. The first is the flurry of mergers and acquisitions that has occurred; the second is the passage of the Gramm–Leach–Bliley Financial Services Modernization Act (Senate Bill 900) on November 12, 1999.

Like much of the industrialized economy, in the past few years the U.S. banking sector has experienced numerous mergers and acquisitions. Several mergers involved the country's largest banks, most notably the combinations of Citicorp and Travelers Group, Banc One and First Chicago, and NationsBank and BankAmerica. This consolidation trend has not been confined to the United States; there have been numerous mergers in such countries as Japan, France, and Germany, as well as cross-country mergers such as that of Deutsche Bank and Bankers Trust (*Table 1*). Although in terms of dollar value mergers peaked in the United States in 1998, there continues to be considerable consolidation activity (*Table 2*). Its impact on the degree of competition and on the industry's structure both here and abroad is of concern to both economists and regulators.

The Financial Services Modernization Act, the other factor that could alter the industry's underlying structure, essentially repealed the Banking Act of 1933, more commonly called the Glass–Steagall Act. Glass–Steagall separated commercial banking, insurance, and investment banking into three distinct businesses that were prohibited from engaging in each other's activities. For example, banks could not offer insurance or underwrite securities. Although the legal barriers between these sectors had eroded over time, banks were still prevented from completely entering the other two businesses.<sup>1</sup> By lifting these statutory barriers, the new legislation could accelerate the merger of firms across the financial services industry (in contrast to the recent mergers within the banking sector). This could also lead to a less competitive financial and banking sector.

These two events, and the resulting consolidation, highlight the importance of understanding how this sector's structure (that is, the degree to which it is competitive) impacts various aspects of the economy and future economic

Table 1  
Recent Merger Activity of World's Largest Banks

	1998 assets (in billions of U.S. dollars)	Mergers and acquisitions
Mizuho Financial Group	1,342,351	Industrial Bank of Japan and Dai Ichi Kangyo and Fuji Bank*
Sumitomo Bank/Sakura Bank	877,977	Sumitomo Bank and Sakura Bank†
Mitsubishi Tokyo Financial Group	804,008	Bank of Tokyo and Mitsubishi Bank and Mitsubishi Trust and Bank†
Deutsche Bank	735,808	Deutsche Bank and Bankers Trust
Sanwa Bank/Tokai Bank	694,114	Sanwa Bank and Tokai Bank†
BNP Paribas	692,713	BNP and Paribas
United Bank of Switzerland	687,316	Union Bank of Switzerland and Swiss Bank
Citigroup	668,641	Citicorp and Travelers Group
Bank of America	617,679	NationsBank and BankAmerica
HypoVereinsbank	541,032	Hypo-Bank and Bayerische Vereinsbank

\* Scheduled for completion in 2002.

† Scheduled for completion in 2001.

SOURCES: 1999 Fortune Global 500; Dow Jones Interactive; Federal Reserve Board of Governors.

growth. This, along with recent empirical work showing the importance of financial market development for economic growth, has generated research aimed at determining the macroeconomic impact resulting from differences in the industrial organization of the banking system. There is no single, simple answer to this question. Thus, this article focuses on some of the theoretical research examining how the banking sector's underlying structure affects the economy and economic growth.

#### AN OVERVIEW OF THE LITERATURE

Economists have long recognized that financial markets in general, and banks in particular, play a vital role in the efficient functioning and development of any economy.<sup>2</sup> Some of the recent research examining the relationship between banks, financial markets, and the macroeconomy have their origins in early work by Cameron (1967), Goldsmith (1969), McKinnon (1973), and Shaw (1973).<sup>3</sup> These authors highlight the fact that financial markets affect, and in turn are affected by, economic growth. They argue that well-developed financial markets are necessary for the overall economic advancement of less developed countries.

Townsend (1979) and Stiglitz and Weiss (1981) represent the next major work in this area. They developed some of the first banking-

related models based on utility and profit maximization rather than on assumptions of the resulting behavior. Their models focus primarily on the part asymmetric information plays in the allocation of resources.<sup>4</sup> Much of the subsequent research in this area focuses on banks' and financial markets' role in helping overcome information gaps between borrowers and lenders.

With the work of Townsend and Stiglitz and Weiss as a foundation, Diamond (1984), Gale and Hellwig (1985), Boyd and Prescott (1986), and Williamson (1986, 1987) developed theoretical frameworks that model financial intermediaries more explicitly. Banks arise naturally in these models as a means for overcoming asymmetric information problems. The particular form of this problem is that it is costly for lenders (or banks) to obtain information about borrowers and their projects. In these models, banks possess economies of scale with respect to gathering information and monitoring firms and thus are more efficient (or more cost-effective) than individual investors could be.

Until the early 1990s, most of the research focused primarily on a theoretical understanding of the relationship between banks and borrowers and justifying the existence of banks within the framework examined—that is, what services a bank could provide that individuals could not accomplish for themselves. However, in the 1990s theoretical and empirical research returned to

Table 2  
**Value of Recent U.S. Mergers**

	Acquired banks	Assets of acquired banks (in billions of U.S. dollars)
<b>Total for 1998</b>		<b>1,016,565</b>
Largest mergers		
Travelers Group	Citicorp	310,897
NationsBank	BankAmerica and Barnett	304,164
Bank One	First Chicago and First Commerce	132,407
<b>Total for 1999</b>		<b>309,749</b>
Largest mergers		
Deutsche Bank	Bankers Trust	156,267
Fleet Financial	BankBoston and Matewan Bancshares	76,392
HSBC Holding	Republic New York	50,453

NOTES: 1999 total is for mergers completed as of November 30. The HSBC/Republic merger is pending.

SOURCE: Federal Reserve Board of Governors.

the focus of the late 1960s and early 1970s, more closely examining the relationship between the financial sector and economic growth.

Recent empirical work on this relationship has established a strong, positive association between the development of a formal financial sector and an economy's level (or rate of growth) of real activity. King and Levine (1993b) establish that the banking sector's development is not only correlated with economic growth but is also a cause of long-term growth. Subsequent work has refined King and Levine and established that financial markets (defined more broadly than in their work) are a source of economic growth.<sup>5,6</sup>

In addition, a theoretical literature exploring the nature of the correlation between the banking sector and economic growth has developed. It suggests that the financial system could impact real economic performance by affecting the composition of savings (Bencivenga and Smith 1991), providing information (Greenwood and Jovanovic 1990), and affecting the scope for credit rationing (Bencivenga and Smith 1993; Boyd and Smith 1997, 1998).<sup>7</sup> However, most of the theoretical literature on the relationship between intermediation and growth considers an economy with a competitive banking system. As a practical matter, economies display substantial variation in the competitive environment of their banking systems.

Table 3 provides an approximate measure—concentration ratios—for the degree of competition within various countries' banking sectors. Ascertaining the actual level of competitive-

ness within the industry is extremely difficult. Consequently, concentration ratios (the fraction of the banking market served by the largest four or five banks) are often used as a proxy to measure competitiveness. It should be noted that these ratios are an imperfect measure, as even if the largest banks control most of the market, they still might compete fiercely among themselves.

As a result of these differences, more recent theoretical research has begun examining the banking sector's market structure along two lines. The first, characterized by Krasa and Villamil (1992) and Winton (1995), examines the optimal size, number, and capitalization of banks. Although these studies deal somewhat with bank structure, they focus primarily on the optimal size of banks when risk exists in the environment—that is, when portfolio risk cannot be completely diversified away.

The second line of research focuses on comparing economies that are identical except for the structure of the banking system. These models examine the impact bank structure has on some particular aspect of the economy. Thus, they assume a particular market structure (either competitive banks or a monopoly bank), as opposed to ascertaining the optimal bank size and number. It is this line of research that this article explores.

## **BANK STRUCTURE AND THE ECONOMY**

To examine the economic impact of a banking system's structure, most theoretical

Table 3  
**Structure of the Banking Industry  
 at Year-End 1998**

	<b>Concentration in the banking industry (percent)</b>
China	70
India	42
Hong Kong	29
Korea	50
Malaysia	40
Philippines	60
Singapore	39
Thailand	62
<hr/>	
Argentina	38
Brazil	52
Chile	47
Colombia	53
Mexico	68
Peru	67
Venezuela	56
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Czech Republic	66
Hungary	57
Poland	43
Russia	42
<hr/>	
Israel	87
Saudi Arabia	66
South Africa	81
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Australia	69
Germany	17
Japan	22
United States	35

NOTES: Concentrations are the five largest banks' assets as a percentage of total banking system assets, except for China, which is the four largest banks' assets. Poland rose to 51 percent on January 1, 1999.

SOURCE: Bank for International Settlements (1999).

models compare economies with competitive banking systems with those having monopolistic systems.<sup>8</sup> Although few, if any, banking systems are true monopolies, comparing these two extremes sheds light on how the degree of competition in the banking system affects the economy.

It is well understood that monopolies tend to reduce an economy's overall social welfare. They charge higher prices and produce less than optimal amounts of goods and services, they stifle invention and innovation, and they distort resource allocation, all of which reduce capital accumulation and growth. This characterization of the negative aspects of a monopoly

also applies to the banking sector. One would expect a monopoly bank to make fewer loans and to have higher service fees, higher interest rates on loans, and lower interest rates on deposits than a competitive bank. However, the idea that a monopoly is only detrimental to an economy is predicated on the existence of complete markets and complete information. In the real world neither markets nor information tends to be complete. This is especially true of financial markets and the banking industry.

Unlike many businesses, banks do not produce physical goods but, rather, provide the financial means for production. One of the biggest problems the banking sector faces is a lack of information about both the individuals requesting funds and the projects they propose to undertake with the loans. This asymmetric information leads to problems of adverse selection—choosing the most profitable borrowers—and moral hazard—convincing borrowers to use funds in less risky ways. These inherent problems, which are difficult for a competitive banking system to overcome, can be eased or eliminated by a monopolistic (or oligopolistic) banking system. However, for a complete comparison between economies with different banking system structures, the gains from a monopolistic system must be weighed against the losses mentioned above.

The recent literature can be divided into two groups, based on the economic framework used: partial equilibrium models and general equilibrium models. The partial equilibrium models focus on some particular aspect of the bank-borrower relationship and ascertain how the market structure of the banking system impacts it. Generally, these models do not take into account all major aspects of banks—in particular, they tend to ignore the deposit side of banking—nor are they concerned with the overall economic impact of the particular banking structure. However, they illustrate the point that a monopoly bank can be beneficial in that it helps overcome the problems associated with asymmetric information.

The general equilibrium models also focus on one particular aspect of the bank-borrower relationship. However, these models also consider the deposit side of banking and are concerned with the overall economic impact of the banking system. Thus, they are better for ascertaining whether the costs outweigh the benefits of a monopoly bank. One consequence of being able to examine both the costs and benefits is that the relationship between borrowers and banks is often modeled with less richness and

detail. The next sections describe six recent studies and detail some of the theoretical benefits and costs associated with a monopolistic banking system.<sup>9</sup>

### Partial Equilibrium Models

To illustrate the benefits of a monopoly bank, it is useful to begin with a review of recent partial equilibrium models. These models deal with the basic problem of asymmetric information between banks and borrowers—adverse selection and moral hazard—in several standard ways.

Numerous theoretical models address the problems of adverse selection and the economic implications of banks' inability to distinguish between different classes of potential borrowers. Generally, there are two primary methods by which banks determine creditworthiness: screening of potential borrowers prior to making a loan and inducing borrowers to reveal the true nature of their investment project. In models where a bank screens potential borrowers, it gathers the information needed to determine (usually under the assumption of certainty) whether the borrower's investment project will produce a good or bad return. However, screening is costly in that it consumes resources and profits. Alternatively, the bank can induce borrowers to truthfully state whether their investment projects' returns are expected to be good or bad. This is usually accomplished by the choice of contract terms and the interest rates on loans or by rationing credit to their projects.<sup>10</sup>

Moral hazard is the other primary problem that arises between borrowers and lenders. When the borrower has several investment choices, it is in the bank's interest to induce the borrower to undertake the project that is less risky and more likely to have a positive return.

Of the three studies discussed in this section, Petersen and Rajan (1995) and Schnitzer (1998a) consider the problems of both adverse selection and moral hazard, whereas Caminal and Matutes (1997) make the moral hazard problem paramount. Petersen and Rajan rely on inducing borrowers to take appropriate actions, while Schnitzer relies on screening to overcome the asymmetric information problem. Caminal and Matutes use both techniques.

**Long-term Relationships, Credit Rationing, and Banks.** Petersen and Rajan (1995) are particularly interested in understanding the long-term relationships between banks and businesses. They ask two questions: Can firms facing competitive credit markets form strong ties with a particular creditor? And do the benefits from

forming such ties diminish as markets become more competitive? The questions arise from the idea established in the labor literature that competition and long-term relationships are incompatible.<sup>11</sup> The authors also empirically study the U.S. small business market, as bank finance and the degree of competition vary at the local level in this market. They find that less competition in the banking industry leads to more firms obtaining loans, and they obtain these loans at a lower cost.

Petersen and Rajan employ a static, three-period model, with two classes of borrowers—those with good project returns and those with bad project returns. Bad-return borrowers who borrow in the initial period (at date 0) will receive a return of zero in the following period (at date 1). Good-return borrowers have two projects in which they can invest, hence the moral hazard in the model. They have access to both a risky and a riskless technology. The risky project has a higher return than the riskless project with some given probability; otherwise it returns nothing. Any returns from the initial project are used to partially finance subsequent investment projects. However, in spite of possessing some initial capital, the good-return entrepreneur must also borrow to fully fund a project in the next period (at date 1).

Banks are the only source of funding in the economy. At date 0, banks are unable to differentiate between good- and bad-return borrowers. At the beginning of date 1, all borrowers' types are revealed, and thus loans at this date are only made to good-return borrowers. It is assumed contracts take the form of debt contracts. Finally, this model does not address how the deposits needed to make the loans are obtained.

In equilibrium banks will offer two sequential one-period loan contracts as opposed to one two-period contract. This stems from both the adverse selection problem experienced at date 0, as well as the moral hazard problem pertaining to good-return borrowers at both dates 0 and 1. If the bank offers a two-period contract, the result will be higher interest rates on loans, relative to two one-period contracts, at date 0 in an attempt to cover potential losses from loans to bad-return borrowers. This higher rate exacerbates the moral hazard problem, which can lead to credit rationing by the bank. The bank can minimize these problems by offering two sequential one-period debt contracts. In addition, good-return borrowers will borrow as little as possible at date 0 to differentiate themselves from bad-return borrowers. This will also reduce borrowing costs in the

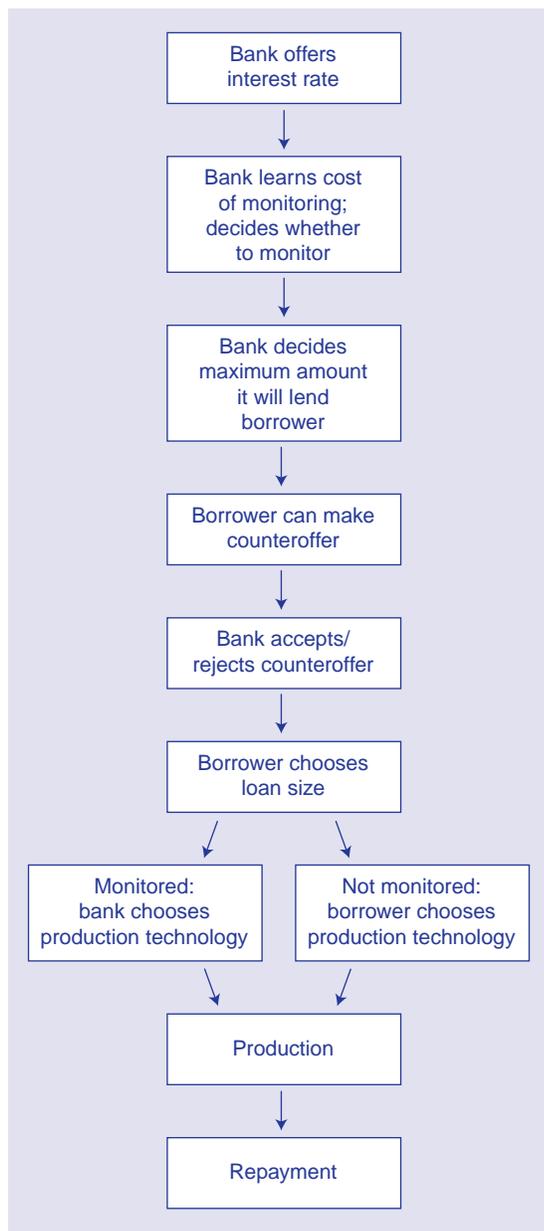
subsequent period. Finally, banks will structure loans and interest rates so that they induce the good-return borrowers to choose the less risky project and so that banks can recoup all costs associated with lending at all dates.

The authors demonstrate that as market power increases, firms with lower credit quality are able to obtain funding. The intuition is that as market power increases, it is easier for banks to extract more surplus from firms in subsequent periods. This can also be viewed as banks implicitly taking an equity stake in firms. Petersen and Rajan also show that as market power increases, the initial interest rate offered to the lowest-quality firms obtaining financing becomes lower than that in a purely competitive banking system. Thus, greater financing to more firms is achieved as the banking system becomes less competitive. The authors conclude by empirically investigating these theoretical results using U.S. small business data.<sup>12</sup>

**Bank Structure and Bank Solvency.** The second partial equilibrium model, Caminal and Matutes (1997), explores the relationship between market structure and the solvency of the banking sector. The authors' reason for investigating the linkage is the recent deregulation in the banking and financial markets. They note that one of the primary goals of this deregulation has been to improve the efficiency of banks by increasing competition between them. However, it is often argued that too much competition can jeopardize the solvency of the entire banking system.<sup>13</sup> Caminal and Matutes show that a monopoly bank will raise the volume of loans (and thus, the volume of risky loans) to certain borrowers while decreasing the volume of (risky) loans to other borrowers. Thus, they are unable to draw clear-cut conclusions about the relationship between market structure and solvency.

The basic model is static and incorporates market uncertainty, asymmetric information, and moral hazard. Moral hazard, the primary problem, arises because borrowers can choose from a range of production technologies. Caminal and Matutes incorporate asymmetric information and economic uncertainty into their theoretical framework in three ways. First, informational asymmetries can be reduced either by monitoring or by rationing credit. By monitoring, the authors mean the bank can choose and supervise the production technology the firm uses. Monitoring, therefore, is conducted prior to making the loan and has the flavor of the German banking system, in which banks have seats on the boards of businesses to which they

Figure 1  
Time Line of Contract Between Bank and Borrower



make loans. In addition, monitoring is costly and borrower-specific. Thus, monitoring is a costly way to eliminate the moral hazard problem inherent in this model.

In lieu of monitoring, a bank may ration credit by providing smaller loans than borrowers desire. However, credit rationing and monitoring are not perfect substitutes. If the bank monitors, there obviously is no reason to ration credit (and thus the loan size will be larger than without monitoring). When the bank rations

credit, it does so to induce borrowers to choose a less risky production technology.<sup>14</sup> The final aspect of the model relates the size of a loan to its level of riskiness. The larger the loan, the riskier it will be. This stems from the assumption that a borrower's return depends on both the size of the loan and a multiplicative aggregate shock.

The contract between the bank(s) and borrowers develops in stages (*Figure 1*). First, the bank offers an interest rate and the guarantee that neither it (nor the firm) will be forced to lend (or borrow) more than either party would like. Next, the bank learns the cost of monitoring and decides whether to monitor. The bank then offers a maximum loan amount. At this point, the firm can attempt to renegotiate the interest rate, the loan size, or both. After the success (or failure) of any renegotiations, the firm chooses the size of loan, given the agreed-upon interest rate. Finally, the production technology is chosen (by the bank if monitoring or by the borrower if not), production is undertaken, and repayment is made according to the contract. All contracts between banks and borrowers are assumed to be standard debt contracts. As with Petersen and Rajan, the deposit side is ignored and it is assumed a bank can obtain as much in deposits as needed to make loans, at a cost that is not prohibitive.

Caminal and Matutes show that market power in banking raises the interest rate on loans, which has two repercussions. First, for a given level of monitoring, the higher the interest rate, the worse the incentive problem. This, in turn, results in a tightening of credit and smaller loans to the credit-constrained group. However, higher interest rates will also lead the bank to increase monitoring, which will reduce the proportion of credit-constrained borrowers. Thus, the higher interest rate associated with a monopoly bank has two, opposite effects on the volume of loans. More borrowers (and more risky borrowers) will receive loans due to the increase in monitoring. This is offset by the fact that those who are credit-constrained receive smaller loans than they otherwise would.

This ambiguity about monopoly banking's impact on total loan volume leads to ambiguity about the relationship between market power and banking system solvency. The greater the volume and the larger each individual loan, the greater the probability of a bank failure. The number of loans to those who are not credit-rationed increases, implying that bank failure is more likely, while the size of the loans to those who are credit-rationed decreases, implying that

failure is less likely. Consequently, it is impossible to draw a clear-cut conclusion about the relationship between the structure and the solvency of the banking system.

**Screening Borrowers, Restructuring Firms, and Banks.** The partial equilibrium model by Schnitzer (1998a) examines how banks use screening in deciding loan disbursement.<sup>15</sup> Schnitzer evaluates the economic prospects of firms in transition economies, particularly those of Eastern Europe. Although not directly interested in how banking sector structure impacts the economy, she argues that banks in transition economies play a fundamental role in the financing, monitoring, and restructuring of firms.<sup>16</sup> Consequently, she addresses two questions. First, how does the market structure of the banking sector impact the screening process for obtaining financing? Second, how does banking structure affect the likelihood of restructuring by a firm's manager? Her results are mixed in that a competitive banking sector will result in too little screening but more restructuring than a monopolistic system.

There are two agents in Schnitzer's economy: a firm and either a monopoly bank or two banks acting as Bertrand competitors.<sup>17</sup> The firm has an investment project with uncertain return that must be financed with credit. The return to the investment is either good, with some given probability, or it is bad. There is no moral hazard problem with respect to the operation of the project. Banks, the only source of financing in the economy, must decide whether to screen borrowers and then to whom to give loans. Screening is costly but perfectly reveals whether the investment is good or bad. It is assumed the cost of screening is low enough that the returns from lending only for good projects exceed the costs of screening. Finally, how banks obtain the deposits necessary to make loans is not modeled. It is assumed that the banks can obtain sufficient deposits to fund all borrowers and that the cost of obtaining these funds is not prohibitive.

A monopoly bank in this economy always screens. The cost of screening is assumed to be less than the expected losses from making loans for bad-return projects; thus, the bank will only make loans for good-return projects. The bank will set the interest rate sufficiently high that it extracts all surplus from the investment projects.

These results are compared with those from an economy with two banks engaged in Bertrand competition. The competitive banking scenario is further divided into two cases: one where screening produces informational spill-

overs and one where it does not. In the first case, because of the informational spillovers, if either bank screens and ascertains the borrower's particular project return, this information becomes public knowledge. In this case, neither bank will engage in screening because there exists a classic free rider problem. Thus, in equilibrium both good- and bad-return borrowers will obtain financing as banks randomly make loans. This is inferior to the equilibrium with a monopoly bank because, by assumption, the losses associated with loans to bad projects exceed the costs of screening.

In the second case, informational spillovers do not exist—that is, screening produces private information. Under this condition three equilibria exist. One is an (unique, mixed strategy) equilibrium where both banks screen with some positive probability. There are also two (symmetric, pure strategy) equilibria where one bank screens and the other does not. All of these equilibria are less efficient than the monopoly bank because either banks duplicate screening costs or, as before, losses from lending without screening exceed the costs of screening. Thus, screening technology is most efficiently used in an economy with a monopolistic banking system.

Schnitzer also shows that a competitive system is more likely to lead to firms restructuring. In her model, restructuring is defined as the manager spending some unobservable effort attempting to make the project more profitable and results in one of two outcomes. Either the effort, which is decided upon before credit offers or screening, can raise the probability that the project will generate a good return, or it can increase the project's return. In either case, restructuring only occurs when the banking system is competitive. This is because under a competitive system, the manager is able to keep part of the increased returns resulting from his or her efforts. With a monopoly bank, the bank confiscates any extra return (by choice of interest rate), and thus, the manager lacks the incentive to undertake restructuring.

**Remarks.** Although each of the three studies discussed examines different aspects of the bank–borrower relationship, all find that monopoly in banking may be economically beneficial because of the bank's ability to overcome problems related to adverse selection and moral hazard. However, there are two important caveats. First and foremost, since these are partial equilibrium models, they do not take into account all the economic effects of bank structure. Their conclusion—that monopoly may be beneficial—is limited to the specific problem

each study examines and does not imply the benefits from a monopoly outweigh *all* the costs. In addition, all the models focus only on the bank–borrower relationship and ignore the deposit side of banking—an important omission that may affect the results.

### General Equilibrium Models

The remaining three models—Cetorelli (1997), Smith (1998), and Guzman (forthcoming)—are general equilibrium (and overlapping generations) models. As a result, they allow for an exploration of the deposit side of banking and its potential constraint on the lending side, as well as for an examination of monopoly's detrimental impact on capital accumulation and growth. However, as a trade-off for a general equilibrium framework, they do not model the interaction of banks and borrowers with as much richness as some of the partial equilibrium models. For example, they all ignore the possibility of moral hazard and deal only with the problem of adverse selection.

**Screening and Banks Revisited.** Like Schnitzer, Cetorelli (1997) investigates how the structure of the banking system affects the screening process.<sup>18</sup> However, unlike the first three models discussed, the equilibrium achieved with a monopolistic banking system is not necessarily superior to (Pareto dominates) the equilibrium from a competitive system. Cetorelli's results differ from Schnitzer's because he employs a general equilibrium model that takes into account monopoly profits' negative impact on capital accumulation.

Cetorelli notes that many countries—such as the United States during the Civil War, postwar Japan, and European countries in the nineteenth century—seem to have experienced enhanced growth in periods during which the financial sector was less competitive and more concentrated. This observation forms the basis for the question Cetorelli investigates: How does credit market competitiveness impact economic growth?

The basic economic model Cetorelli uses is a standard Diamond (1965) overlapping-generations model with production. However, production is a two-stage process, where in the first stage, potential entrepreneurs attempt to set up a project. If they succeed, in the next stage they produce goods after renting capital and labor. To set up a project, entrepreneurs are required to borrow funds from banks. At the beginning of each period, every young individual is a potential entrepreneur. The young can further be divided into two groups: those entrepreneurs with good project returns—who will

succeed with some given probability—and those with bad project returns—who will be unsuccessful. If unsuccessful in starting a project, the individual provides labor in the second stage of production.

Banks are the only entities that provide credit for stage one of production. It is argued that banks will naturally arise due to economies of scale with respect to both diversification across borrowers and with respect to the screening process. As with Schnitzer, screening is costly, but it does provide perfect information about an entrepreneur's type (either good or bad project returns). Cetorelli further assumes that once an individual is screened, there are perfect informational spillovers and all banks in the economy know his or her type. Finally, screening costs are not constant and are, in fact, proportional to the amount of saving.

Cetorelli compares two economies—one with Bertrand competitors and the other with a monopoly bank—in terms of capital accumulation and steady-state levels of the capital stock. Bertrand competition, in conjunction with the perfect informational spillovers associated with screening, renders screening economically infeasible; as before, a free rider problem exists. A monopoly bank, in contrast, will always screen as screening costs are lower than the losses from lending to bad-return entrepreneurs. Consequently, because a monopoly bank screens and is thus more efficient in the loans it makes, capital accumulation will be greater.

However, there is also a downside to the monopoly bank. It is assumed bank profits are consumed by the bank and not rebated to any individuals in the economy. Thus, instead of these profits being used to create future capital, as is the case with a competitive banking system, they are lost to the economy. It is not obvious which of these forces—efficiency gains from screening or production losses from profits—will dominate and, consequently, whether a monopoly bank benefits the economy.

Cetorelli also examines the model's comparative statics to ascertain the conditions under which a monopoly bank would definitely lead to greater capital accumulation than a competitive system would. He finds that given a sufficiently low proportion of high-quality entrepreneurs and other conditions—such as low screening costs, high savings elasticity, and low loan-demand elasticity—capital accumulation and growth will be greater with a monopoly bank. Finally, Cetorelli also discusses in what types of countries these conditions are likely to prevail.

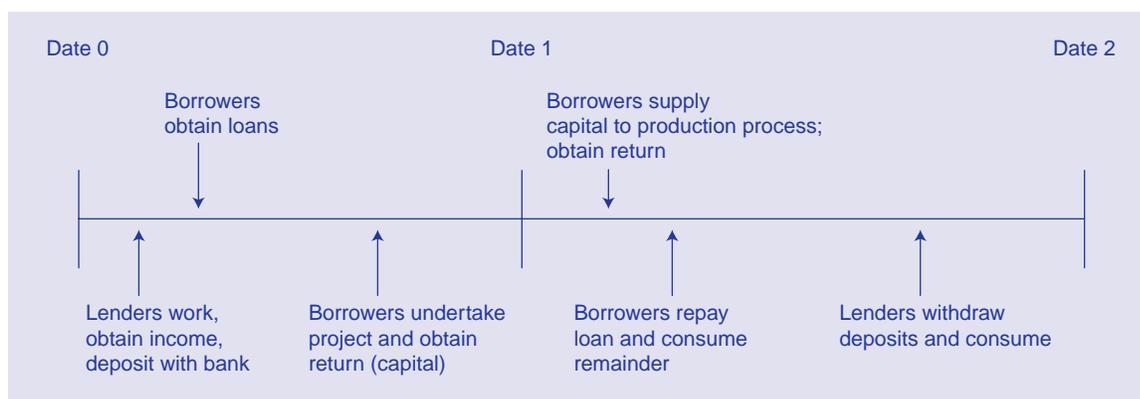
**Bank Solvency Revisited.** Smith (1998) focuses on how monopoly in banking affects both income levels and the likelihood of dramatic swings in the business cycle. His impetus is similar to that of Caminal and Matutes; he observes that the stability of the banking industry appears to be enhanced when only a limited number of banks exert significant market power. This market power is often the result of regulatory barriers enacted by various governmental bodies. Smith shows that a competitive banking system will result in a higher level of income and output and in a reduction in the severity of the business cycle.

Like Cetorelli, Smith uses a standard Diamond (1965) overlapping-generations model with production. In addition, production is subject to stochastic shocks. There are two types of individuals in the economy: lenders and entrepreneurs. Lenders have three ways to save for old age. They can allocate their wage income to direct, bilateral loans to an entrepreneur, to deposits at a bank, or to investments in a storage technology. Entrepreneurs can either save their income by one of these means, or they can invest it in a risky project.<sup>19</sup> Entrepreneurs fall into three categories: those who do not need to borrow to fund a project, those who need to borrow less than half the start-up cost of the project, and those who need to borrow more than half the project's start-up cost.

Borrowers have two sources of financing: banks and direct, bilateral (unintermediated) loans.<sup>20</sup> Banks and individual lenders are assumed to act as Bertrand competitors. Although the model allows for bilateral contracts, in equilibrium they are not chosen. However, they are important to the model in that they limit a monopoly bank's power to impose any interest rate it chooses—that is, they place an upper bound on interest rates. Consequently, banks are the only channel for transferring funds from lenders to borrowers. Although banks in this model do not screen, they can monitor borrowers' returns after the investment project is completed. The decision to monitor is made prior to making the loan (as in Diamond 1984), and monitoring is costly.<sup>21</sup> Finally, it is assumed there are sufficient deposits for a bank to fund any number of borrowers it chooses.<sup>22</sup>

Smith shows that a competitive banking system is better than a monopoly system in that it allows for higher incomes and reduces the severity of the business cycle. Banks in general benefit the economy because their monitoring costs are lower than those incurred with bilat-

Figure 2  
Time Line of Events for Individuals Born at Date 0



eral lending. With a competitive system, these savings are used for additional loans, resulting in increases in production and income. When there is a monopoly bank, the savings are appropriated (by means of higher interest rates on loans) by the bank in the form of profits (and consumed by the owners). Thus, less productive investment is possible.

Higher interest rates have a second detrimental impact on the economy: they raise the opportunity cost of obtaining funds for all borrowers—even those who are good risks. The intuition is that higher interest rates on loans increase the return on bank liabilities. The higher opportunity cost of funds filters through to borrowing rates in all markets for loans, regardless of the type of borrower, and this results in more firms needing to borrow to finance their projects. Finally, Smith also shows that adverse shocks to the economy are less pervasive in a system with competitive banks.

**Credit Rationing and Bank Structure Revisited.** Like Cetorelli, and to a lesser degree Smith, Guzman (forthcoming) is interested in the impact the banking system's market structure has on capital accumulation and economic growth. Guzman also examines how market structure affects the quantity and the likelihood of credit rationing to arise. Most of the recent theoretical literature that explores the relationship between growth and banking and includes credit rationing as a possibility considers only economies with competitive banking systems. As a practical matter though, banking systems' industrial organization varies widely across countries. Thus, the relationship between banks and the economy is unclear when a country's banking system is not competitive. This is the

impetus for Guzman's work. He shows that monopoly in banking tends to be detrimental to the economy because it decreases capital accumulation and growth and exacerbates the problems associated with credit rationing.

As with the other two general equilibrium models, Guzman uses a variant of the Diamond (1965) overlapping-generations model with production. Two types of individuals populate the economy: lenders and borrowers. Lenders, who earn wage income when young, have two options for allocating this income: they can deposit it with a bank or use it in their own investment project.<sup>23</sup> Borrowers have no income when young but do have investment projects, which, on average, are more productive than those of lenders. Borrowers must obtain financing to operate projects, and all borrowers are identical (*ex ante*) since project returns are drawn from the same random distribution (*Figure 2*). The return to a borrower's project is private information available to anyone for a fixed cost.

The basic contract between banks and borrowers is a standard debt contract. If feasible, the borrower repays principal plus interest on the loan. Otherwise, the borrower defaults on the loan and the bank verifies the borrower's return and retains all proceeds from the investment project. Guzman shows that monopoly in banking tends to reduce capital accumulation and growth in the economy. Monopoly is also more likely to lead to credit rationing, and when rationing occurs, it tends to be more severe under a monopoly than under a competitive system.<sup>24</sup>

The intuition behind these results is best understood by looking at the differences between the interest rate charged on loans and

paid on deposits in each type of banking system. When credit rationing exists, the interest rate on loans is the same under both systems because the shortage of funds results in borrowers bidding up the price of funds to the same level. The monopoly bank pays a lower return on deposits (the source of the bank's profits), which results in less funding being available for borrowers. This leads to a greater likelihood of credit rationing and less growth as fewer borrowers undertake productive investment projects.

When credit is not rationed and all borrowers are funded, the interest rate on deposits is the same under both systems. Because the same number of borrowers is funded under either system, the same amount of funds must be deposited in the banks. The quantity of deposits depends only on the deposit interest rate, and thus the same interest rate on deposits prevails independent of the banking system. A monopoly charges a higher interest rate on loans (its source of profits). This leads to more monitoring of borrowers than with a competitive system, as the likelihood of default rises with the interest rate. Thus, a monopoly uses more resources to operate and directs fewer resources to productive investment, resulting in lower growth and capital accumulation. Finally, in some instances the monopoly bank will both charge a higher interest rate on loans and pay a lower rate on deposits. This results in more severe credit rationing, more monitoring, fewer borrowers undertaking investment projects, and ultimately less capital accumulation and economic growth.

**Remarks.** As with the partial equilibrium models, there is a common theme with the general equilibrium models: monopoly in banking will generally be detrimental to the economy as it results in less capital accumulation and lower economic growth. This is in stark contrast to the results from the partial equilibrium models. This difference in conclusions results from the fact that the general equilibrium models take into account the detrimental effects that accrue from a monopoly bank—particularly that monopolies consume productive resources by maintaining profits at a higher level than competitive systems. However, it should be noted that one of the drawbacks to the general equilibrium models is that to be able to draw conclusions from these models, they sometimes have to sacrifice richness in terms of how individuals are modeled—especially the lack of moral hazard connected with choosing more or less risky investment projects.

## CONCLUSION

Recent events have drawn attention to the banking industry, one of the most important and vital sectors needed for an efficient market economy. It is important to understand how the various aspects of the banking system in general and the underlying structure of the banking sector in particular affect economic growth and development. Only recently have economists begun researching and better understanding the economic impact of the banking sector's market structure.

Although this article describes only a few studies, they are representative of the most recent research and allow for some general conclusions about how a monopoly bank is modeled and about bank structure's importance to the macroeconomy. The research also suggests some possibilities for future work.

One result drawn from these studies is that monopoly in banking benefits certain aspects of the economy. In particular, a monopoly bank can help overcome, or at least mitigate, some of the problems inherent in the bank-borrower relationship. As long as informational asymmetries exist and complete information is not easily and costlessly obtainable by all parties, the problems of adverse selection and moral hazard remain. A monopoly bank can partially overcome these problems by screening prospective borrowers, by using the choice of interest rates and credit rationing to induce self-selection and less risky behavior, or by relying on the development of long-term relationships. Using these techniques to address the problems related to a lack of full information is often more effectively and efficiently accomplished by a monopoly bank.

However, when ascertaining the overall economic impact, it is noteworthy that partial equilibrium models find either that monopoly is beneficial or that it is unclear whether a monopoly is beneficial or detrimental. General equilibrium models find just the opposite. Either monopoly is detrimental to the economy, or, at best, the impact is ambiguous. This clearly indicates that how completely the banking sector and the economy are modeled is crucial to the results obtained. A comparison of the results of Schnitzer (a partial equilibrium model) and Cetorelli (a general equilibrium model) highlights this as both models use screening to overcome the problem of adverse selection. Both find that a monopoly bank screens more efficiently than competitive banks. However, Cetorelli also takes into account the full effects

of a monopoly's redistribution of resources away from productive purposes (that is, profits) and finds the overall impact of a monopoly is ambiguous. This suggests that to determine the macroeconomic impact of a less competitive banking system, it is important to model more than just the bank–borrower relationship.

It is interesting, however, that Cetorelli does describe conditions under which monopoly would benefit the economy even under a general equilibrium framework. Cetorelli argues that the conditions under which monopoly would be beneficial are most relevant to developing countries, which are plagued by asymmetric information, problems with writing and enforcing contracts, and a lower average quality of productive capital than their developed counterparts. He indicates that these problems may be overcome, and result in greater capital accumulation, with a monopolistic banking system. This is in stark contrast to Smith and Guzman, who find that monopoly is never beneficial. This contrast indicates that even in the general equilibrium framework, more research is needed to understand under exactly what conditions and in what types of countries having a less competitive banking system might be beneficial.

The research this article reviews also suggests other areas for future work. One of the major drawbacks to the existing studies is that most of them focus solely on one aspect of the bank–borrower relationship or the bank–depositor relationship. The partial equilibrium models ignore the deposit side and assume that sufficient funds can be costlessly obtained. While the general equilibrium models consider the deposit side, they do not provide a robust treatment of how banks raise the funds needed to make loans. Most of these models, with Caminal and Matutes' the exception, allow banks the options of only screening before making the loan or only rationing credit or only monitoring after the investment project has concluded. Banks often use a number of tools to obtain information about prospective clients.<sup>25</sup>

It is also important to realize that real-world financial markets are often heavily regulated and significantly affected by government policy. For example, the stock and bond markets often react sharply to government policy announcements. Yet none of the models analyzed has scope for examining the economic impact of monetary or fiscal policy.<sup>26</sup> Thus, it will be important to develop models that not only are better able to mimic the actual relationships between banks, borrowers, and depositors but that also allow the impact of gov-

ernment policy on the banking system and economy to be explicitly analyzed.

## NOTES

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- <sup>1</sup> For example, although Citicorp and Travelers Group merged in 1998, without this legislation Citigroup would have been required to divest itself of the insurance underwriting business in the next couple of years.
- <sup>2</sup> This article uses the terms *banks*, *financial intermediaries*, *banking system*, and *financial system* interchangeably. The term *financial market* differs from these terms in that it includes not only banks but also the stock market, insurance companies, brokers, and any other industry that provides financial capital to entrepreneurs and businesses.
- <sup>3</sup> For a more detailed overview of the earlier literature, see Gertler (1988). Much of this section is merely a condensed version of this work.
- <sup>4</sup> Asymmetric information occurs when not all individuals have the same information about the profitability of current or future investment projects.
- <sup>5</sup> See, for example, Fernandez and Galetovic (1995) and De Gregorio and Guidotti (1995). They qualify King and Levine's results by showing growth rates in developed and less developed countries differ as financial markets are established and mature.
- <sup>6</sup> See, for instance, Atje and Jovanovic (1993), King and Levine (1993a), Demirguc-Kunt and Levine (1996), Levine and Zervos (1996), and Levine (1999).
- <sup>7</sup> See Pagano (1993), Levine (1996), and Greenwood and Smith (1997) for an overview of some of this literature.
- <sup>8</sup> Most of the studies this article discusses assume banks are entrepreneurs' only source of financing. Thus, these works deal not only with monopoly in banking but, more generally, with monopoly in the financial sector.
- <sup>9</sup> The work reviewed here is representative (but not comprehensive) of the recent theoretical literature comparing the impact of different banking structures on various aspects of the economy.
- <sup>10</sup> Credit rationing usually takes one of two forms. Either borrowers are denied loans, or they are unable to obtain as large a loan as they would like. In most cases, credit rationing is an equilibrium outcome and not necessarily the result of market failures.  
When credit rationing exists, borrowers with good project returns will try to distinguish themselves from those whose projects have bad returns. This is usually accomplished through contract terms.
- <sup>11</sup> The authors build on the ideas that Becker (1975) establishes. He examines the issue of companies providing training for employees when competitive labor

markets allow employees to sever their relationship with a firm after receiving training and before the firm can recoup its training costs.

<sup>12</sup> Since this article focuses on theoretical models, Petersen and Rajan's empirical results are not discussed in detail. The empirical results are consistent with the theoretical implications of their model.

<sup>13</sup> The basic idea behind this statement is that banks that compete fiercely with each other often take on risky loans and investments in an effort to obtain higher profits. If these risky loans go bad (as was the case with the savings and loan failures in the 1980s), the result can be widespread failure in the banking sector.

<sup>14</sup> Borrowers choose more efficient (less risky) projects if the expected marginal return on the investment is sufficiently greater than the interest rate (cost of funds). The return from the project depends on the marginal productivity of capital, which is inversely related to the quantity of capital. Thus, credit rationing results in a smaller amount of capital being obtained from the bank. The smaller the amount of capital, the higher the return from the investment and the more likely the entrepreneur will choose the less risky project.

<sup>15</sup> See, for example, Broecker (1990), Riordan (1993), and Schnitzer (1998b) for other research examining how bank structure affects the screening process.

<sup>16</sup> Banks' importance in firm financing is much greater in transition and developing economies than in developed economies because capital markets (and property rights) are usually not as well developed. See Buch (1998) for a discussion of banks' role in transition economies.

<sup>17</sup> Bertrand competition occurs when firms compete only on the price they charge for a good or service. Generally, the firm with the lowest price will make all the sales. Consequently, with this type of competition firms ultimately charge the same low price.

<sup>18</sup> Cetorelli (1995) also examines the impact of bank structure on the macroeconomy. However, the focus of that paper is on how bank structure impacts the adoption of higher quality technology.

<sup>19</sup> If borrowers invest in the risky project, their return is drawn from an identical random distribution. Thus, prior to operating their investment project all borrowers are identical with respect to the expected return on their project.

<sup>20</sup> Contracts between lenders and borrowers are assumed to be bilateral to make lenders functionally different from banks, which are merely groups of lenders pooling their resources.

<sup>21</sup> Economies of scale in monitoring loans give bank loans another advantage over bilateral lender contracts. Such economies are another reason only banks exist in equilibrium.

<sup>22</sup> Unlike the partial equilibrium models, this model's assumption is more binding in that it constrains the level of capital stock needed for lending to be undertaken.

<sup>23</sup> The latter option gives rise to a more robust method for understanding the restrictions the deposit side places on banks' ability to make loans. Although banks face an upward-sloping supply of loanable funds, the link between deposits and loans is significantly weakened by the fact that borrowers' demand for loans is modeled as being interest inelastic.

<sup>24</sup> Credit rationing can occur for two reasons in this model. First, it occurs if total lender income is not high enough to meet all borrowers' demands; this can happen whether banking is competitive or monopolistic. Second, even if lender income is sufficient to meet all borrowers' needs, loan demand may be greater than the funds banks obtain from deposits. If banks do not offer a sufficiently high interest rate on deposits, they may not entice enough lenders to deposit with the bank—resulting in a shortage of funds for borrowers.

<sup>25</sup> Bose and Cothren (1996) model banks as having the option to both screen and ration credit to potential borrowers. However, they do not compare the economic impact of different banking structures when banks have access to both options.

<sup>26</sup> Siegel (1981) is an early article that compares monetary policy's impact on certain aspects of the economy when the banking system is competitive and when it is monopolistic.

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