

R E V I E W

Vol. 76, No. 4

July/August 1994

Explanations for the Increased Riskiness of
Banks in the 1980s

Trade Between the United States
and Eastern Europe

The New Structure of the Housing
Finance System

The Inflation Tax and the Marginal Welfare
Cost in a World of Currency and Deposits





R E V I E W

President

Thomas C. Melzer

Director of Research

William G. Dewald

Associate Director of Research

Cletus C. Coughlin

Research Coordinator and
Review Editor

William T. Gavin

Banking

R. Alton Gilbert

David C. Wheelock

International

Christopher J. Neely

Michael R. Pakko

Patricia S. Pollard

Macroeconomics

Richard G. Anderson

James B. Bullard

Michael J. Dueker

Joseph A. Ritter

John A. Tatom

Daniel L. Thornton

Peter Yoo

Regional

Michelle A. Clark

Kevin L. Kliesen

Adam M. Zaretsky

Director of Editorial Services

Daniel P. Brennan

Managing Editor

Charles B. Henderson

Graphic Designer

Brian D. Ebert

Review is published six times per year by the Research Department of the Federal Reserve Bank of St. Louis. Single-copy subscriptions are available free of charge. Send requests for subscriptions, back issues or address changes to:

Federal Reserve Bank of St. Louis
Public Information Department
P.O. Box 442
St. Louis, Missouri 63166

The views expressed are those of the individual authors and do not necessarily reflect official positions of the Federal Reserve Bank of St. Louis, the Federal Reserve System, or the Board of Governors. Articles may be reprinted or reproduced only if the source is credited. Please provide the Public Information Department with a copy of the reprinted materials.

All nonproprietary and nonconfidential data and programs for the articles published in *Review* are available to our readers. This information can be obtained from three sources:

- 1. FRED (Federal Reserve Economic Data), an electronic bulletin board service.** You can access FRED by dialing 314-621-1824 through a modem-equipped personal computer. Parameters should be set to: no parity, word length = 8 bits, 1 stop bit, and the fastest baud rate the modem supports (up to 14,400 bps). Information will be in directory 11 under the file name ST. LOUIS REVIEW DATA. For a free brochure on FRED, please call 314-444-8809.
- 2. The Federal Reserve Bank of St. Louis.** You can request data and programs on either disk or hard copy by writing to: Research Department, Federal Reserve Bank of St. Louis, Post Office Box 442, St. Louis, MO 63166. Please include the author, title, issue date and page numbers with your request.
- 3. Intra-university Consortium for Political and Social Research (ICPSR).** Member institutions can request data through the CDNet Order facility. Nonmembers should write to: ICPSR, Institute for Social Research, P.O. Box 1248, Ann Arbor, Michigan 48106, or call 313-763-5010.

In This Issue . . .

3 Explanations for the Increased Riskiness of Banks in the 1980s

Sangkyun Park

In the 1980s, the number of bank failures increased sharply, and banks in general experienced increasing problem loans and dwindling capital. The main explanations for the deterioration of bank asset quality include increased incentives for risk-taking by bank stockholders, desperate risk-taking by bank managers to increase profits, and unexpected economic shocks. Sangkyun Park reviews the logic of the three explanations and examines their empirical significance. He finds that deliberate risk-taking by both stockholders and managers was consistent with the behavior of a sizable proportion, though not the majority, of banks. He also concludes that economic shocks were significant, but do not negate the effects of deliberate risk-taking.

25 Trade Between the United States and Eastern Europe

Patricia S. Pollard

Most of the trade between the United States and Eastern Europe since the end of World War II has been very small. While the United States has maintained high tariffs on imports from most Eastern European countries—and restricted its own exports to them as well, particularly high technology—Eastern Europe has maintained trade restrictions on imports from the United States. With the collapse of the Soviet system, however, Eastern Europe has begun to re-direct trade to the West as it initiates both political and economic reforms.

Patricia S. Pollard describes the recent changes in trade flows between the United States and the three Eastern European countries that have made the greatest progress in adopting market reforms: the Czech and Slovak Federal Republic (CSFR), Hungary and Poland. She concludes that increased trade between the East and the West benefits not only the United States' economy, but is also directly linked to Eastern Europe's efforts to establish and maintain political stability.

47 The New Structure of the Housing Finance System

John C. Weicher

The Financial Institutions Reform, Recovery and Enforcement Act of 1989 (FIRREA) marked both the culmination of a 20-year period of changes in the U.S. housing finance system and the beginning of a period of legislative reforms intended to forestall any recurrence of the savings-and-loan industry debacle that forced the enactment of FIRREA.

John C. Weicher describes the process of change in the housing finance system and its implications for the ability of the system to fulfill the purposes for which it was established. The new system is dominated by two large national institutions, chartered by the federal government and serving the secondary mortgage market, instead of thousands of small, local lenders who both make mortgage loans and hold them in portfolios. Legislation of the last five years has imposed higher capital requirements on nearly every institution involved with housing finance and changed the regulatory structure for every private institution in the system. In addition, these changes have created potential conflicts with the stated public objectives of the system: access to home mortgage funds for areas and groups that are “underserved” and support for the mortgage market during economic downturns.

67

The Inflation Tax and the Marginal Welfare Cost in a World of Currency and Deposits

Alvin L. Marty

Since inflation is the rate at which the purchasing power of money declines, it is a tax on real money balances. Alvin L. Marty provides an analysis that determines the optimal rate of inflation as an efficient tax rate. He explains the government’s revenue and the total cost associated with inflation and how each is affected by the level of the inflation rate. An efficient tax system minimizes the total cost of collecting a given tax revenue. For inflation to be chosen as a component of an efficient tax system, however, the inflation rate must be set so that the marginal cost per dollar of government revenue from inflation is equal to the marginal cost per dollar of other sources of revenue. Marty shows how the analysis of such an optimal rate of inflation is altered when there are two components of money—currency and deposits—one produced directly by the government, or its central bank, and the other provided by a competitive banking system.

Sangkyun Park

Sangkyun Park is a senior economist at the Federal Reserve Bank of St. Louis. Jonathan Ahlbrecht provided research assistance.

Explanations for the Increased Riskiness of Banks in the 1980s

INTEREST IN BANKING MATTERS surged in the 1980s, when the U.S. banking system experienced considerable difficulties after several decades of stability. During the decade, the number of bank failures increased sharply, and banks in general experienced increasing problem loans and dwindling capital. Most banks recovered their financial strength in the early 1990s thanks to improved economic conditions and low short-term interest rates that increased interest margins. With the recovery of the banking sector, public interest in bank failures is fading, but many questions remain unanswered. To effectively prevent repetition of the banking turmoil, it is important to study the fundamental causes of the sudden deterioration of the financial health of the banking system in the 1980s. Without recognizing the causes, future banking policies intended to improve the safety and soundness of the banking sector might produce more unintended effects than intended ones.

Numerous studies have proposed explanations for the deterioration of bank asset quality, but empirical evidence is sketchy. This study explores theoretical explanations for the financial problems of commercial banks in the 1980s and examines their empirical consistency. I focus on commercial banks because many previous studies have examined the financial problems of savings and loan associations (S&Ls). Three theoretical

possibilities for the increased riskiness of banks in the 1980s are considered: (1) increased incentives for risk-taking by bank stockholders; (2) desperate attempts of bank managers to increase profits by assuming additional risk; and (3) unexpected economic shocks.

To evaluate the empirical significance of the three hypotheses, the empirical section examines the effects of capital adequacy and earnings on the risk-taking behavior of banks and also looks at the relationship between regional economic conditions and bank performance. Capital ratios and earnings may be related to the risk-taking incentives of stockholders and managers, respectively. Regional economic conditions should largely explain bank performance if unexpected economic shocks are the main reason for the deterioration of bank asset quality. For selected years of the 1980s, I divide banks into several groups based on year-end capital ratios and earnings on assets. I then compare year-to-year changes in various risk measures across groups. Although deliberate risk-taking by stockholders and managers does not appear to apply to the majority of banks, it is found to be consistent with the behavior of a sizable proportion of banks. This result holds even after controlling for the effects of local economic conditions.

The next section describes the economic and institutional developments that are related to

the financial troubles in banking during the 1980s. The following section explores theoretical explanations for increased risk-taking and existing empirical evidence. Empirical results of this study follow. Lastly, the article's findings are summarized.

DEVELOPMENTS IN BANKING

The United States enjoyed stable banking during the four decades following the establishment of the Federal Deposit Insurance Corporation (FDIC) in 1934. The relatively high number of bank failures between 1934 and 1942, about 44 per year, may be regarded as an aftermath of the financial crisis of 1933 and the following years of depressed economic activity.¹ Between 1943 and 1974, only 121 banks failed. Bank failures began increasing in the second half of the 1970s and became notable in the second half of the 1980s. Between 1985 and 1990, the number of bank failures averaged 169 per year. To understand the dramatic increase in bank failures, we need to look at the economic and institutional developments that are relevant to the banking business.

Economic Developments

The banking industry encountered numerous unfavorable shocks in the 1970s and 1980s. These included sudden increases in interest rates, the collapse of many real estate investment trusts (REITs), the Latin American debt crises and sharp declines in real estate values. High inflation in the 1970s and the early 1980s raised interest rates. Unexpected increases in interest rates usually lower bank interest margins because the average maturity of bank liabilities is generally shorter than that of their assets. The mismatch of maturities means that lending rates adjust more slowly than funding rates. Increases in interest rates, hence, tend to lower bank profits.

REITs, which channel investors' money into the real estate, mortgage and construction markets, grew rapidly in the early 1970s. Banks were the major supplier of funds during the rapid expansion and often served as REIT advisors, whose functions included proposing investment projects and overseeing daily operations.² A slump in the construction and real estate industries in the

mid-1970s decreased the asset value of many REITs and the banks that extended credit to them.

After the oil shock of 1974, oil-exporting countries enjoyed large trade surpluses. U.S. banks took an active role in channeling the surpluses to developing countries. As a result, loans by U.S. banks to developing nations increased rapidly during the 1970s to exceed \$100 billion in the early 1980s, when sovereign debt problems emerged.³ Large developing-country debtors, including Brazil, Mexico and Argentina, failed to meet their debt obligations as they were strained by worldwide recession, high interest rates and the second oil shock in 1979. Their debt-servicing difficulties lowered the value of the loans and, hence, the value of lending banks' capital.

A real estate boom in the 1980s resulted in sharp increases in property prices and overbuilding of commercial properties in many parts of the United States. Banks financed the boom by expanding loans rapidly. Toward the end of the decade, the value of commercial properties plunged as vacancy rates surged. The price of residential properties also dropped in some regions, the Northeast and California in particular, where income growth substantially lagged behind increases in housing prices. Declining real estate prices placed many banks in financial trouble by increasing delinquency rates and lowering collateral values.

Institutional Developments

The Banking Act of 1933 transformed a relatively competitive banking system into a highly protected one. Before its enactment, the main barrier to competition was the prohibition of interstate branching. The Banking Act of 1933, however, insulated the banking business by preventing banks from engaging in other businesses, including the securities business, and vice versa. It also prohibited payment of interest on demand deposits and authorized the Federal Reserve Board to limit interest rates on time and savings deposits at member banks. Most notably, the act created the FDIC.

The above measures relieved banks from competitive pressure. The continued prohibition of interstate branching preserved some geographic

¹ The bank failure numbers do not include uninsured banks. See FDIC (1991).

² See Sinkey (1979) for a detailed discussion of REITs.

³ See Cline (1984) for a detailed discussion of sovereign debt crises.

monopoly power. The separation of banking from other industries bolstered monopoly power by deterring other businesses from making inroads into banking. With interest rate ceilings, banks were unable to bid up interest rates to attract deposits. Government-backed deposit insurance made it unnecessary for banks to prove their soundness to depositors. Protected from competition, banks enjoyed relatively stable market shares and profits.

Legislative and institutional developments in the 1970s and 1980s relaxed regulation and permitted greater competition. Many states relaxed their restrictions on bank ownership by out-of-state holding companies. This development lowered geographic entry barriers, despite the prohibition of interstate branching.⁴

The Depository Institutions Deregulation and Monetary Control Act of 1980 (DIDMCA), which phased out interest ceilings and permitted all depository institutions to offer NOW accounts, allowed greater competition for deposits among banks. This act, in combination with the Garn–St. Germain Depository Institutions Act of 1982, also increased competition between banks and S&Ls by expanding the realm of the S&L business.

Institutional developments also added competitive pressure on banks. The 1980s witnessed rapid growth of financial products that could substitute for banking products.⁵ For example, many large corporations with established credit records found it attractive to borrow directly by issuing commercial paper. Money market mutual funds began offering convenient features of bank deposits such as checking privileges, and purchases and redemptions without fees. The emergence of competing products offered by nonbank institutions eroded the profitability of banks.

In sum, the banking industry experienced unfavorable economic shocks and increased competition in the 1970s and 1980s. Slumps in real estate markets and sovereign debt crises impaired the financial health of many banks. Legislative changes lowered geographic entry barriers and restored the mechanism of price competition in the banking sector. In addition, increasing sophistication of financial markets

enabled nonbank institutions to circumvent industry barriers.

THEORETICAL EXPLANATIONS AND EXISTING EVIDENCE

Numerous studies have proposed explanations for the deterioration of bank asset quality during the 1980s, which can be broadly classified into three groups. First, “moral hazard” explanations argue that the changed economic and institutional environment in the 1980s increased the incentives of bank stockholders to take risk. A second explanation is increased risk-taking incentives of managers, rather than stockholders. A third possibility is that the quality of bank assets deteriorated mainly because of unexpected external events rather than deliberate risk-taking.

The three explanations are generally consistent with developments in the banking sector. Convincing conclusions require detailed empirical examination. Unfortunately, the difficulty of obtaining adequate risk measures has discouraged empirical examination. Furthermore, it is difficult to determine causality because the hypotheses are interrelated with one another. For example, a negative economic event that decreases bank capital may increase the incentive to take risk, and risk-taking may make banks more vulnerable to economic shocks.

Moral Hazard

Stockholders implicitly hold a put option, the right to sell their stocks at a prespecified price. With limited liability, stockholders of a corporation can walk away without incurring further losses when the net worth of the corporation falls below zero. Escaping from a firm with a negative net worth is economically equivalent to selling the firm for the price of zero. Stockholders can thus increase their expected wealth at the expense of debtholders by increasing the variance of the return from assets, that is, by taking more risk. With a larger variance, it is more likely that the return from assets will turn out to be very high. A larger variance also increases the possibility of an extremely low return and, hence, a substantially negative net worth. Limited liability, however, protects stockholders

⁴ According to unpublished data compiled by the Board of Governors, bank assets held by out-of-state bank holding companies totaled about \$470 billion as of June 30, 1990, which accounted for about 16 percent of total bank assets.

⁵ Wheelock (1993) discusses the increasing competition faced by banks both in lending and funding markets.

from incurring additional losses once net worth has fallen to zero. In other words, while improved upward potential of asset portfolios clearly benefits stockholders, downside risk mainly harms debtholders. Thus, limited liability gives stockholders an incentive to take higher risk than they otherwise would.

In general, market forces prevent stockholders from taking advantage of the put option value. Debtholders demand interest rates high enough to compensate for higher default risk when a corporation holds a risky portfolio. In addition, bond covenants and needs to refinance short-term debt restrict the portfolio selection of corporations. Thus, it is difficult for stockholders to exploit debtholders because the cost of debt increases with the riskiness of a corporation. The effectiveness of this market mechanism is limited in the banking sector, however, because of government-backed deposit insurance. In the 1980s, most deposits were insured either explicitly or implicitly.⁶ Thus, most depositors, who were the major debtholders of banks, were indifferent about the riskiness of individual banks and, hence, did not demand higher interest rates to riskier banks. Furthermore, the FDIC charged a fixed-rate insurance premium until the end of 1992. Therefore, banks enjoyed risk-insensitive funding costs and had greater incentives to take risk than they would have if deposits were not insured.⁷ Because of the risk-taking incentives created by deposit insurance, banking authorities need to limit the portfolio selection of banks.⁸ In other words, government action must substitute for market forces to prevent banks from taking excessive risk.

Proponents of the moral hazard view argue that banks had increased incentives to take risk in the 1980s for two main reasons: losses that impaired capital and reduced charter values due to greater competition.⁹ Poorly capitalized banks have a greater incentive to take risk. With smaller capital,

it is more likely that losses will be born ultimately by debtholders. Stockholders have less exposure to losses when capital is low and, hence, are less concerned about probable losses resulting from risk-taking.

In addition to tangible capital, firms have charter values, which may be defined as the economic value deriving from the opportunity to do business in the future. If a firm fails, it loses its charter value. Thus, firms with large charter values may refrain from taking risk and inject more tangible capital to avoid failure. Effective restrictions on competition raise charter values. When there is less competition, the opportunity to do business in the future is more valuable because firms can expect larger profits. Increased competition in the banking sector in the 1980s reduced the charter value of banks and, hence, increased their incentives to take risk.¹⁰

Empirical tests of the moral hazard hypothesis present mixed results. Gunther and Robinson (1990) examine the behavior of insured commercial banks in the Dallas and Houston metropolitan areas between 1983 and 1984 and find a negative relationship between capital growth and changes in loan-to-asset ratios. They interpret this result as a negative relationship between capital adequacy and risk-taking. Other studies examine S&L data.¹¹ Barth and others (1986) find that delay in closing insolvent S&Ls increased the resolution costs to the Federal Savings and Loan Insurance Corporation between 1981 and 1985. They suggest that desperate risk-taking by insolvent institutions was largely responsible for the increased costs. McKenzie and others (1992) compare returns of thrifts in 1987 and 1988 on traditional and non-traditional assets allowed by the DIDMCA and the Garn-St. Germain Act. They find that returns were generally lower on nontraditional assets, particularly on those held by capital-deficient institutions, than on traditional assets. They conclude that low-capital thrifts undertook

⁶ Studies on market discipline find that the presence of large deposits exceeding the FDIC insurance limit of \$100,000 was not an effective source of discipline on banks. Gilbert (1990), who surveys the market discipline literature, points out that uninsured depositors and holders of subordinated debt rarely absorbed losses of failed banks. In most cases, failed banks were merged with other banks, and the acquirers assumed all liabilities of the failed banks.

⁷ Merton (1977) makes theoretical arguments based on the option-pricing model.

⁸ Calomiris (1989) compares deposit insurance systems in U.S. history and concludes that a necessary condition for the success of deposit insurance systems is effective enforcements of regulations.

⁹ See Marcus (1984) and Keeley (1990). Relaxed portfolio restrictions are frequently cited as a main cause of the increased risk-taking by S&Ls. The increased risk-taking opportunities are relevant but not equally important to banks. The DIDMCA of 1980 and the Garn-St. Germain Act of 1982 substantially relaxed restrictions on S&L assets but did not notably loosen constraints on bank assets.

¹⁰ Keeley (1990) finds a relationship between risk-taking by banks and declining charter values during the 1980s.

¹¹ The risk-taking behavior of S&Ls may be similar to that of banks in many respects. Both banks and S&Ls benefited from deposit insurance and underwent economic shocks and regulatory reform in the 1970s and 1980s.

projects with low net present values to increase the variance of the return and, hence, took more active advantage of risk-taking opportunities opened by legislative changes.

While the studies discussed above support moral hazard theories, some others fail to find evidence of moral hazard. According to Benston and Carhill (1992), investment in nontraditional assets was a major cause of thrift failures that occurred between 1985 and 1991, but that investment was undertaken primarily by initially solvent thrifts. Thus, the shortage of capital was a result, rather than a cause, of increased risk. Gilbert (1991), who studies the behavior of undercapitalized banks between 1985 and 1989, shows that banks reduced their assets substantially while undercapitalized. This finding does not support a negative relationship between the capital ratio and risk-taking. In addition, recent studies on the credit crunch find a positive relationship between the capital ratio and loan growth in the early 1990s.¹²

Incentives of Managers

Moral hazard theories assume that managers maximize stockholder wealth. Some recent studies, however, suggest that the incentives of managers may differ from those of outside shareholders.¹³ Managers of failed banks may have difficulty finding comparable positions. Thus, bank failure reduces expected future earnings of the bank's managers. In this regard, bank managers are similar to stockholders with a large charter value who tend to refrain from taking risk. Furthermore, managers, whose compensation packages are predetermined in many cases, may not benefit as much from risk-taking as stockholders.¹⁴ In addition, it is difficult for stockholders to monitor managers due to the

problem of analyzing the quality of existing assets and investment opportunities. Many studies recognize that stockholders are not as well-informed as managers about the earnings prospects of firms.¹⁵ These arguments suggest that managers may not act in the best interest of stockholders.

In general, managers may prefer not to take as much risk as stockholders want because they face a larger cost and a smaller benefit from additional risk.¹⁶ Many managers, however, may adopt extremely risky strategies under certain conditions, namely, when a large proportion of managers are incompetent and profits are declining.¹⁷ The banking sector appears to have satisfied these conditions in the 1980s.

Incompetent managers, who cannot effectively control costs and make wise investment choices, may need to pursue more risky strategies to keep their jobs longer. Stockholders want managers to be competent and loyal to them. When stockholders are not accurately informed about the future earnings prospects of their banks, they may rely on some easily identifiable measures to judge the quality of management. Earnings records may reflect the quality of a bank's management. If a bank takes high risk as demanded by stockholders, it will occasionally suffer low earnings resulting from unlucky outcomes. Managers are not to blame in that case. Stockholders may fire managers, however, if earnings turn out to be consistently lower than the industry average. Of course, consistently below-average earnings may be a result of bad management. Since incompetent managers cannot do as well as competent ones on average, a conservative strategy by incompetent managers will consistently result in below-average earnings. One way they can occasionally have above-average earnings

¹² For example, Johnson (1991), Bernanke and Lown (1991) and Peek and Rosengren (1992). Since tightened capital requirements implemented in the early 1990s can partly explain the contraction by capital-deficient banks, the credit crunch does not necessarily contradict moral hazard. Nevertheless, their findings are still suggestive of the magnitude of moral hazard problems.

¹³ See Saunders and others (1990), Allen and Cebenoyan (1991) and Gorton and Rosen (1992).

¹⁴ Houston and James (1993) fail to find any evidence that the structure of management compensation in banking serves to reward managers for exploiting risk-taking opportunities.

¹⁵ See Myers and Majluf (1984), Miller and Rock (1985) and MacKie-Mason (1990).

¹⁶ Jensen (1986) argues that managers with large free cash flow may expand their firms beyond the optimal size to increase their power and perquisites. This argument does

not seem to apply to the banking industry of the 1980s, when banks suffered low profits.

¹⁷ Gorton and Rosen (1992) present a game-theoretic model showing that banks on average pursue risky strategies in these conditions.

is to take on high-variance projects. Occasional high earnings can confuse stockholders, making judgements about the quality of management difficult. Thus, taking risk may be a rational strategy for incompetent managers. Intuitively speaking, one has to take chances and hope for good luck if he or she cannot rely on ability.

In a tightly regulated industry, incompetent managers may be able to survive without taking excessive risk because stockholders do not observe much difference between competent and incompetent managers.¹⁸ Even incompetent ones can generate decent profits when there is little competition. Moreover, it is difficult for competent managers to excel if competition is limited by regulation. Considering that the banking business was tightly regulated until the early 1980s, the proportion of incompetent managers may have been higher in the banking sector than other industries. Deregulation increased competition, and the banking industry experienced declining market shares and profitability in the 1980s. When tight cost control and hard search for profit opportunities are called for, disparities between competent and incompetent managers become clear because managerial ability plays a significant role. The banking developments in the 1980s may have induced some incompetent bank managers to take excessive risks in a desperate attempt to preserve their jobs. Thus, it is possible that a change in managers' incentives may have been largely responsible for the increased riskiness of banks.

Evidence of risk-taking driven by the incentives of incompetent managers is indirect and limited. Gorton and Rosen (1992) show that "entrenched" managers made more risky loans between 1984 and 1990 and interpret the result as evidence that excessive risk-taking was driven largely by managers' incentives.¹⁹ Allen and Cebenoyan (1991) find that the most powerful managers actively acquired other banks between 1980 and 1987 and that those acquisitions were not value-enhancing.²⁰ Although the focus of their study is not risk-taking by banks, this result is consistent with that of Gorton and Rosen.

Unexpected Shocks

Given that banks experienced many external events that impaired their financial structure in the 1970s and 1980s, deliberate risk-taking is not required to explain the increased riskiness of banks. Banks may not have realized that certain categories of loans were particularly risky until many borrowers became unable to repay. Considering that geographic and portfolio restrictions limit the ability of banks to diversify, the financial strength of banks may greatly depend on the quality of major-category loans.

Before the establishment of the FDIC, banking distress was often triggered by the collapse of a major industry or a stock market crash. In the 19th century, it was not unusual for banks to finance the expansion of a booming sector such as cotton or railroads, only to experience financial difficulties when that sector went bust.²¹ In those cases, deterioration in the asset quality of banks could hardly be attributed to increased risk-taking incentives resulting from institutional changes because the banking sector was governed largely by market forces at that time. Thus, it is possible that realization of highly unlikely outcomes or judgement errors were largely responsible for the financial problems of banks in the 1980s. Banks became extremely unlucky, or they unknowingly, rather than deliberately, increased the variance and lowered the expected value of their asset portfolios because of inability to assess the soundness of investment opportunities. For example, banks might have expected that the real estate boom of the 1980s would continue for a long time and were surprised by the bust.

McKenzie and others (1992) and Emmons (1993) find that the condition of local economies significantly contributed to the earnings and failures of financial institutions. These results imply that external shocks had significant effects on the performance of banks, but does not disprove the role of deliberate risk-taking. Risk-taking generally makes banks more vulnerable to external shocks.

¹⁸ Flood (1993) also argues that incompetent managers can survive indefinitely in a protected industry.

¹⁹ By their definition, entrenched managers are the managers with enough shares to be protected from outside shareholders' pressure but not enough shares to have the same objective as that of outside shareholders.

²⁰ The power of managers increases with managerial stake and decreases with concentration of outsiders' shareholdings.

²¹ Park (1993) examines the economic environment that led to banking panics.

EMPIRICAL STUDY

To test the relevance of each hypothesis for explaining bank risk in the 1980s, we need to empirically examine the implications of each hypothesis using a consistent sample and comparable methodology. The application of rigorous econometric techniques to the risk-taking behavior of banks involves many problems, such as determining appropriate measures of risk and specifying a reasonable functional form. To avoid these difficulties, this study divides banks into several groups based on year-end capital ratios and earnings on assets for selected years, and compares changes in various risk measures such as loan growth, the proportions of risky loans and funding strategies during the following year across groups. By looking at the behavior of banks in following years, we can better determine causality. It is difficult to infer causality from contemporaneous relationships because risk measures interact with capital ratios and earnings. For example, a low capital ratio can be either a cause or a result of increased risk.

Aggressive risk-taking by poorly capitalized banks may be interpreted as evidence of moral hazard; stockholders more actively took advantage of deposit insurance when they did not have much of their own wealth to lose. The association of low earnings with more risk-taking can be an indication of desperate profit-seeking by incompetent managers. Incompetent managers, who are more likely to have low earnings, may have adopted risky strategies to obscure their incompetence with occasional high earnings. The hypothesis of unexpected economic shocks may be supported by insignificance of capital adequacy and earnings along with significance of the condition of local economies in explaining the performance of banks.

Data

This analysis uses the Consolidated Reports of Condition and Income (Call Reports) data. The sample consists of domestically chartered, FDIC-insured commercial banks. The sample excludes banks that were less than five years old at the

time of financial statements, and banks that were involved in mergers and acquisitions during the year analyzed. Relatively new banks may behave unusually. For example, they may expand rapidly despite low profits to cultivate a customer base. Mergers and acquisitions can dramatically change the financial characteristics of banks involved.²² In these cases, risk-taking may not have much to do with changed financial characteristics.

The time span covered by this analysis is 1984 to 1988. Changes in risk measures during 1985, 1986, 1987 and 1988 are examined based on capital ratios and earnings on assets at the end of 1984, 1985, 1986 and 1987, respectively. The deregulation of the early 1980s, which undermined the charter values of banks and opened more risk-taking opportunities for them, might have led to active risk-taking in the mid-1980s. Legislative changes in the late 1980s discouraged banks from taking risk. The Federal Reserve Board introduced risk-based capital guidelines in 1988 based on the 1987 Basle Accord, and the Financial Institutions Reform, Recovery and Enforcement Act of 1989 tightened bank and thrift regulation.²³ The FDIC Improvement Act of 1991 added more provisions designed to prevent risk-taking, such as risk-based deposit insurance premiums, prompt corrective action on undercapitalized banks, and more frequent bank examinations. Thus, risk-taking is likely to have been most active during the years examined by this study.

Capital Ratios

Banks are divided into four groups based on the year-end ratio of capital to assets: Group C1—less than 5 percent; Group C2—greater than or equal to 5 percent but less than 7 percent; Group C3—greater than or equal to 7 percent but less than 10 percent; and Group C4—greater than or equal to 10 percent.²⁴ According to moral hazard theories, the first group has the strongest incentive to take risk and the incentive decreases with the capital ratio. The incentive, however, may not translate into actual risk-taking because of regulatory constraints. The capital ratios of

²² Potential biases resulting from the exclusion of merged banks will be discussed below.

²³ For example, the act authorizes federal banking regulators to limit the growth of an institution and to remove any person causing harm to an insured financial institution.

²⁴ This analysis uses the book value of equity capital, consisting of common stock, perpetual preferred stock, surplus and retained earnings. The market value cannot be obtained,

since the stock market data are not available for most small banks. The book value may differ from the market value. The difference, however, may introduce merely a random noise rather than a systematic bias.

most banks in the first group fall short of the required minimum.²⁵ Thus, banks in the first group may have been subjected to tight supervision by regulators and unable to increase risk. Most aggressive risk-taking by the second group, therefore, is also consistent with the moral hazard theory.

Risk measures used here include: the rate of loan growth; the change in the ratio of commercial real estate loans (loans secured by construction and land development, multifamily residential properties and nonfarm, nonresidential properties) to total loans; the change in the ratio of loans to insiders (executive officers and principal shareholders) to total loans; the change in the ratio of large time deposits (time deposits of \$100,000 or more) to total assets; and the interest rate on large time deposits.²⁶ Since sound investment opportunities are limited, rapid loan growth generally increases the risk of banks. Commercial real estate loans are regarded as relatively risky loans, and some banks may apply lower lending standards to insiders. Thus, the riskiness of loan portfolios may increase with the proportions of commercial real estate loans and loans to insiders. Increases in the share of large time deposits and high interest rates on large time deposits may indicate the banks' desire to expand rapidly and to take risk. Bidding up interest rates on large time deposits is a fast way to raise funds for rapid expansion because large time deposits are more sensitive to interest rates than other deposits.

In comparing risk-taking behavior across the four groups, this analysis focuses mainly on the distribution of percentile ranks of each risk measure. The use of percentile ranks, instead of actual values, makes the analysis concise. Examination of the distribution, rather than summary statistics, enables more comprehensive analyses of bank behavior. Furthermore, summary statistics of ratios or growth rates can be seriously contaminated by outliers. This analysis somewhat sacrifices analytical rigor in that it does not rely on formal statistical tests. The lack of formal statistical tests may, however, be partly compen-

sated by the fact that the entire population of commercial banks is examined over an extensive time period.

Table 1 presents summary statistics and a condensed distribution of the percentile rank of loan growth, in which higher percentiles are associated with higher rates of loan growth. The table shows the lowest median rate of loan growth for Group C1 banks in all four years, but fails to show any apparent pattern among the remaining three groups. Although Group C2 generally had high median rates of loan growth, the group with the highest median differs across years. Thus, comparison of median loan growth rates fails to present clear evidence of moral hazard.

The distribution of loan growth is more interesting. The table reports the percentage of banks in each group belonging in a certain percentile rank group of the entire population. For example, 28.6 percent of Group C1 banks in 1984 had loan growth rates ranking them in the 0-10 percentile in 1985. Thus, the proportion of Group C1 banks belonging in the 0-10 percentile group was almost three times as large as that of the entire population of banks. If the distribution of a group is roughly equal to the distribution of the entire population, about 10 percent of the group should belong in the 0-10 percentile group, another 10 percent in the 10-20 percentile group, about 30 percent in the 20-50 percentile group, and so on.

Many Group C1 and Group C2 banks grew very slowly (0-10 percentile ranks), while many other banks in the same groups grew very fast (90-100 percentile ranks). In contrast, well-capitalized banks belonged mostly in the middle percentile groups (20-50 percentile ranks and 50-80 percentile ranks). In 1987 and 1988, the proportion of Group C1 banks belonging in the 90-100 percent group decreased markedly, but remained larger than the proportion in the 80-90 percentile group. A possibility is that regulators more successfully prevented undercapitalized banks from expanding loans in those years, but that some undercapitalized banks continued to

²⁵ The minimum ratio of primary capital to total assets was set at 5.5 percent in 1985 and remained in effect until the end of 1990. Primary capital includes loan-loss provisions. Risk-taking incentives may be more closely related to stockholders' equity than primary capital.

²⁶ The interest rate is estimated by dividing interest expense on time certificates of deposit of \$100,000 or more by the average amount of the same deposit outstanding during the year.

Table 1
Rates of Loan Growth

1984-1985				
Percentile	C1	C2	C3	C4
0-10	28.6%	10.3%	8.6%	10.7%
10-20	11.9	8.0	10.0	12.3
20-50	19.8	22.9	32.6	33.7
50-80	16.7	31.9	31.0	26.8
80-90	10.7	12.7	9.5	7.7
90-100	12.3	14.0	8.4	8.5
Number of banks	318	3,190	6,224	2,620
Mean	0.0074	0.0832	0.0577	0.0548
Median	-0.0104	0.0782	0.0434	0.0249
1985-1986				
Percentile	C1	C2	C3	C4
0-10	34.5%	11.6%	8.4%	7.9%
10-20	12.6	9.6	9.6	11.0
20-50	20.3	24.5	31.6	34.5
50-80	16.8	29.4	31.4	29.5
80-90	4.7	11.4	10.3	8.4
90-100	11.1	13.4	8.8	8.7
Number of banks	380	3,119	6,050	2,541
Mean	-0.0276	0.0598	0.0449	0.0608
Median	-0.0777	0.0484	0.0299	0.0179
1986-1987				
Percentile	C1	C2	C3	C4
0-10	34.8%	12.6%	7.2%	7.1%
10-20	16.5	9.6	9.4	10.4
20-50	22.3	27.5	31.0	32.9
50-80	12.6	27.6	32.7	31.0
80-90	6.2	11.2	9.6	10.3
90-100	7.6	11.5	10.1	8.4
Number of banks	552	3,048	5,597	2,370
Mean	-0.0305	0.0648	0.0757	0.3530
Median	-0.0616	0.0523	0.0579	0.0492
1987-1988				
Percentile	C1	C2	C3	C4
0-10	38.0%	11.4%	7.5%	8.1%
10-20	15.7	10.1	9.4	10.0
20-50	20.4	27.6	31.6	30.8
50-80	15.0	29.5	31.4	30.6
80-90	3.8	9.9	10.7	9.8
90-100	7.1	11.5	9.3	10.7
Number of banks	521	2,550	5,557	2,526
Mean	-0.0170	0.0811	0.0874	0.1532
Median	-0.0356	0.0766	0.0774	0.0779

Notes: Group C1: Capital Ratio < 0.05; Group C2: 0.05 ≤ Capital Ratio < 0.07; Group C3: 0.07 ≤ Capital Ratio < 0.10; and Group C4: Capital Ratio ≥ 0.10.

Table 2
Changes in the Ratio of Commercial Real Estate Loans to Total Loans

1984-1985				
Percentile	C1	C2	C3	C4
0-10	13.5%	12.5%	9.2%	8.5%
10-20	9.1	10.7	10.5	8.1
20-50	20.7	24.2	30.4	37.0
50-80	29.0	28.4	30.9	30.2
80-90	11.6	11.7	9.4	9.1
90-100	16.0	12.5	9.6	7.1
Number of banks	318	3,190	6,224	2,620
Mean	0.0129	0.0092	0.0073	0.0049
Median	0.0052	0.0031	0.0011	0.0000
1985-1986				
Percentile	C1	C2	C3	C4
0-10	10.8%	10.5%	10.1%	9.0%
10-20	7.9	9.7	9.9	10.9
20-50	25.5	23.1	29.9	39.2
50-80	25.7	30.6	31.1	27.4
80-90	14.5	12.7	9.4	7.4
90-100	15.5	13.2	9.6	6.2
Number of banks	380	3,119	6,050	2,541
Mean	0.0215	0.0176	0.0122	0.0065
Median	0.0113	0.0102	0.0047	0.0000
1986-1987				
Percentile	C1	C2	C3	C4
0-10	11.1%	11.4%	9.4%	9.2%
10-20	10.7	10.2	10.2	9.2
20-50	25.5	25.1	29.7	38.1
50-80	24.6	29.2	31.4	29.2
80-90	11.4	11.4	10.2	7.4
90-100	16.7	12.8	9.1	6.9
Number of banks	552	3,048	5,597	2,370
Mean	0.0170	0.0128	0.0092	0.0048
Median	0.0050	0.0054	0.0034	0.0000
1987-1988				
Percentile	C1	C2	C3	C4
0-10	16.3%	10.7%	9.9%	8.2%
10-20	10.4	8.6	10.3	10.7
20-50	22.6	25.6	30.1	35.7
50-80	26.7	31.1	30.0	29.5
80-90	10.6	12.2	9.8	8.0
90-100	13.4	11.8	9.8	8.0
Number of banks	521	2,550	5,557	2,526
Mean	0.0061	0.0089	0.0055	0.0045
Median	0.0007	0.0035	0.0002	0.0000

grow extremely fast when they could circumvent supervision. The rapid loan growth of many poorly capitalized banks may have been motivated by moral hazard.

Tables 2 and 3 show changes in the ratio of commercial real estate loans to total loans, and changes in the ratio of loans to insiders to total loans. The changes in the ratio of commercial real estate loans display patterns similar to the rates of loan growth. While the ratio fell sharply for many Group C1 and Group C2 banks, it increased significantly for many others. Group C3 and Group C4 banks were concentrated in the middle percentile groups. The ratio for Group C1 banks in the highest percentile, however, did not decrease substantially in 1987 and 1988, unlike the rate of loan growth. In addition, the median change was inversely related to the capital ratio. These results may reflect the difficulty of regulating the riskiness of loan portfolios, compared with restricting the rate of loan expansion. In the case of loans to insiders, only Group C1 banks were distributed heavily toward both tails. It appears that only those banks facing the possibility of imminent failure relied on insider loans as a means of increasing risk. The median fails to show a clear pattern.

In general, large time deposits appear to have grown slower at poorly capitalized banks. Table 4 shows smaller changes in the ratio of large time deposits to total assets for many Group C1 and Group C2 banks. A sizable proportion of group C2 banks, however, showed relatively fast increases in the ratio. Furthermore, although a relatively small proportion of Group C1 banks belonged in the 90-100 percentile groups, the proportion was consistently higher than that belonging in the 80-90 percentile group.

Poorly capitalized banks generally paid higher interest rates on large time deposits, but the interest rates were not distributed heavily toward the tails (Table 5). It is complicated to interpret the behavior of large time deposits, which are not fully insured, and the interest rates on those deposits because demand and supply factors interact. In other words, the two variables reflect both the desire of low-capital banks to grow (demand) and the willingness of investors to

deposit at risky banks (supply). Nevertheless, the pattern of changes in the ratio of large deposits appears to be consistent with those of loan growth and shifts in loan portfolios.

In sum, the average behavior of poorly capitalized banks was not notably different from that of well-capitalized banks. A more interesting finding is that a higher proportion of low-capital banks adopted highly risky strategies. This effect might have been more pronounced if the behavior of banks that failed during the year were included in the sample. Failed banks, most of which had been poorly capitalized, might have pursued extremely risky strategies if they were given the opportunity.²⁷

Earnings on Assets

This section compares four groups of banks, representing each quartile of earnings on assets; Group E1 and Group E4 represent the lowest and highest quartiles. Managers of Group E1 banks, who were incompetent or had bad luck, may have had the strongest incentives to increase risk because they needed high earnings in the next period to preserve their jobs. Thus, the theory based on the managers' incentives predicts the most aggressive risk-taking by Group E1 banks and the most conservative strategies by Group E4 banks.

The same risk measures used in the previous section are analyzed. Table 6 shows a positive relationship between earnings on assets and the rate of loan growth. The median growth rate was generally higher for banks with higher earnings. This result suggests that the availability of profitable investment opportunities was the main determinant for loan growth; banks with high earnings, which might have more profitable lending opportunities, grew faster. A notable pattern in the table, however, is that the proportion of Group E1 banks belonging in the 90-100 percentile group consistently exceeded that belonging in the 80-90 percentile group. It is thus possible that the pattern of loan growth reflected the desperate attempts of some bank managers to increase profits.

The pattern of changes in loan portfolios for low-earnings banks is similar to that for

²⁷ Failed banks include FDIC-assisted mergers. Another source of potential bias is voluntary mergers. The proportion of poorly capitalized banks (Groups C1 and C2), however, was not significantly higher than the proportion of well-capitalized banks (Groups C3 and C4) among acquired banks.

Table 3
Changes in the Ratio of Loans to Insiders to Total Loans

1984-1985				
Percentile	C1	C2	C3	C4
0-10	16.0%	10.0%	9.4%	10.7%
10-20	8.0	9.9	10.0	10.4
20-50	26.2	30.1	30.7	28.7
50-80	29.8	31.4	30.0	28.2
80-90	7.6	9.1	10.4	10.6
90-100	12.4	9.6	9.5	11.4
Number of banks	275	2,758	5,379	2,015
Mean	-0.00027	0.00010	-0.00006	0.00088
Median	-0.00001	-0.00001	-0.00001	0.00000
1985-1986				
Percentile	C1	C2	C3	C4
0-10	15.8%	10.2%	9.2%	10.7%
10-20	9.7	8.3	10.9	9.9
20-50	23.5	32.4	29.5	29.0
50-80	27.8	31.7	30.4	27.0
80-90	10.6	8.5	9.9	12.3
90-100	12.6	8.9	10.0	11.1
Number of banks	341	2,665	5,276	1,952
Mean	0.00042	-0.00060	0.00049	-0.00003
Median	0.00000	-0.00002	-0.00001	0.00000
1986-1987				
Percentile	C1	C2	C3	C4
0-10	14.7%	9.8%	10.0%	9.0%
10-20	10.6	8.5	10.2	11.3
20-50	23.8	30.7	30.1	30.3
50-80	30.9	33.7	29.2	26.7
80-90	8.9	8.7	10.5	10.7
90-100	11.0	8.5	9.9	11.9
Number of banks	462	2,565	4,883	1,836
Mean	-0.00046	-0.00045	0.00017	0.00080
Median	-0.00002	-0.00002	-0.00004	-0.00006
1987-1988				
Percentile	C1	C2	C3	C4
0-10	13.6%	9.8%	9.6%	10.4%
10-20	13.6	8.8	10.1	10.3
20-50	19.5	27.8	31.2	32.0
50-80	31.0	33.7	29.9	26.0
80-90	9.0	10.0	9.8	10.5
90-100	13.3	9.9	9.5	10.7
Number of banks	435	2,202	4,858	1,944
Mean	-0.00133	0.00044	-0.00021	0.00001
Median	-0.00005	-0.00004	-0.00015	-0.00025

Table 4
Changes in the Ratio of Large Time Deposits to Assets

1984-1985				
Percentile	C1	C2	C3	C4
0-10	27.7%	14.4%	8.4%	6.1%
10-20	13.5	12.0	10.2	6.8
20-50	26.4	28.4	29.7	33.3
50-80	16.4	26.5	31.6	32.0
80-90	6.9	8.9	10.1	11.5
90-100	9.1	9.8	10.1	10.2
Number of banks	318	3,190	6,224	2,620
Mean	-0.0184	-0.0038	0.0018	0.0049
Median	-0.0128	-0.0024	0.0008	0.0019
1985-1986				
Percentile	C1	C2	C3	C4
0-10	29.5%	12.6%	9.1%	6.1%
10-20	11.8	12.9	9.6	7.0
20-50	26.6	29.8	31.2	28.2
50-80	17.9	25.2	30.2	37.2
80-90	6.3	8.6	10.1	11.9
90-100	7.9	11.1	9.8	9.6
Number of banks	380	3,119	6,050	2,541
Mean	-0.0256	-0.0058	-0.0039	0.0006
Median	-0.0177	-0.0061	-0.0031	-0.0002
1986-1987				
Percentile	C1	C2	C3	C4
0-10	22.6%	12.4%	8.7%	6.9%
10-20	10.7	10.4	9.9	9.4
20-50	26.2	24.4	30.5	37.2
50-80	20.8	29.0	31.1	31.0
80-90	6.9	11.1	10.3	8.6
90-100	12.9	12.6	9.5	7.0
Number of banks	552	3,048	5,597	2,370
Mean	-0.0027	0.0030	0.0038	0.0029
Median	-0.0017	0.0033	0.0024	0.0004
1987-1988				
Percentile	C1	C2	C3	C4
0-10	29.0%	12.8%	8.4%	6.5%
10-20	13.1	12.0	9.8	7.7
20-50	23.7	26.6	29.9	35.1
50-80	18.7	27.3	31.5	31.9
80-90	7.1	10.5	10.3	9.6
90-100	8.3	10.7	10.2	9.3
Number of banks	521	2,550	5,557	2,526
Mean	-0.0130	0.0022	0.0052	0.0066
Median	-0.0062	0.0029	0.0044	0.0040

Table 5
Interest Rates on Large Time Deposits

1985				
Percentile	C1	C2	C3	C4
0-10	7.7%	7.9%	10.1%	12.8%
10-20	8.0	8.6	10.3	11.3
20-50	27.6	34.4	29.6	25.6
50-80	32.8	32.1	30.0	26.9
80-90	12.2	9.1	10.0	11.0
90-100	11.6	8.0	10.0	12.4
Number of banks	311	3,143	6,014	2,360
Mean	0.0882	0.0871	0.0871	0.0868
Median	0.0876	0.0861	0.0863	0.0864
1986				
Percentile	C1	C2	C3	C4
0-10	8.5%	7.4%	10.1%	13.5%
10-20	7.9	9.0	10.2	11.3
20-50	23.5	33.9	29.8	26.6
50-80	35.9	31.8	29.7	27.6
80-90	10.4	9.3	10.4	9.9
90-100	13.7	8.5	10.0	11.2
Number of banks	365	3,067	5,846	2,333
Mean	0.0747	0.0736	0.0733	0.0726
Median	0.0745	0.0725	0.0725	0.0723
1987				
Percentile	C1	C2	C3	C4
0-10	9.7%	7.6%	10.2%	12.8%
10-20	9.8	8.1	9.9	12.8
20-50	24.1	28.5	31.2	30.4
50-80	34.8	35.8	28.9	23.6
80-90	9.8	10.5	9.8	9.9
90-100	11.8	9.5	9.9	10.5
Number of banks	518	2,968	5,407	2,180
Mean	0.0650	0.0654	0.0643	0.0634
Median	0.0658	0.0654	0.0643	0.0633
1988				
Percentile	C1	C2	C3	C4
0-10	8.6%	7.1%	10.0%	13.3%
10-20	10.0	7.4	9.5	13.9
20-50	25.8	26.7	30.7	32.7
50-80	32.6	36.2	30.4	22.0
80-90	12.6	12.1	9.7	7.9
90-100	10.6	10.5	9.6	10.3
Number of banks	501	2,492	5,419	2,357
Mean	0.0700	0.0711	0.0698	0.0684
Median	0.0713	0.0717	0.0703	0.0685

Table 6
Rates of Loan Growth

1984-1985				
Percentile	E1	E2	E3	E4
0-10	21.4%	6.7%	5.3%	6.8%
10-20	15.5	8.1	7.7	8.8
20-50	30.5	29.7	28.7	31.1
50-80	19.2	34.0	35.2	31.7
80-90	6.2	10.9	12.1	10.8
90-100	7.3	10.7	11.1	10.9
Number of banks	3,056	3,082	3,104	3,113
Mean	0.0059	0.0770	0.0835	0.0824
Median	-0.0148	0.0613	0.0721	0.0565
1985-1986				
Percentile	E1	E2	E3	E4
0-10	23.8%	7.3%	4.7%	4.7%
10-20	17.4	9.0	6.8	7.2
20-50	32.0	31.9	27.9	28.3
50-80	16.4	31.4	35.6	36.1
80-90	4.6	10.0	13.1	12.1
90-100	5.8	10.3	12.0	11.6
Number of banks	2,945	3,036	3,057	3,062
Mean	-0.0178	0.0541	0.0781	0.0819
Median	-0.0591	0.0354	0.0615	0.0611
1986-1987				
Percentile	E1	E2	E3	E4
0-10	25.6%	7.2%	4.3%	4.1%
10-20	18.1	9.1	7.3	6.2
20-50	30.7	33.4	29.0	26.8
50-80	15.1	31.0	35.3	37.5
80-90	4.3	9.5	12.7	13.0
90-100	6.2	9.7	11.4	12.3
Number of banks	2,722	2,924	2,956	2,975
Mean	0.2278	0.0720	0.0911	0.1143
Median	-0.0375	0.0521	0.0767	0.0863
1987-1988				
Percentile	E1	E2	E3	E4
0-10	25.4%	8.0%	3.8%	4.1%
10-20	16.0	9.7	7.9	6.9
20-50	28.2	32.7	30.8	28.2
50-80	16.8	29.6	35.3	36.9
80-90	4.8	10.2	12.2	12.4
90-100	8.7	9.6	10.0	11.5
Number of banks	2,603	2,845	2,838	2,878
Mean	0.0379	0.0852	0.1045	0.1498
Median	0.0011	0.0727	0.0916	0.1016

Notes: Each group represents a quartile of earnings on assets. During the four years, the cutoff points were about 0.005 between Groups E1 and E2, 0.011 between Groups E2 and E3, and 0.016 between Groups E3 and E4.

low-capital banks but somewhat less pronounced. While many Group E1 banks reduced the ratios of commercial real estate loans and loans to insiders to total loans, a large proportion of banks in the same group rapidly increased the portfolio shares of the risky loans (Tables 7 and 8). No apparent pattern is found for other groups. These findings suggest that a higher proportion of low-earnings banks pursued highly risky strategies.

The ratio of large time deposits to assets increased faster for banks with higher earnings (Table 9). Yet a sizable proportion of Group E1 banks increased the ratio of large time deposits very fast (90-100 percentile ranks). In addition, a relatively high proportion of Group E1 banks paid the highest interest rates on large time deposits (Table 10). Thus, many Group E1 banks appear to have bid up interest rates to attract large time deposits.

Examination of the effects of earnings on risk-taking presents findings similar to the ones derived from the relationship between capital adequacy and risk-taking behavior. Although the majority of banks with low earnings were comparatively conservative, many other banks with low earnings adopted extremely risky strategies. As in the case of low-capital banks, this result could have been strengthened if the behavior of banks that failed during the year were taken into consideration.²⁸ The divergent risk-taking behavior among low-earnings banks, however, is not as pronounced as that among low-capital banks. Thus, although this analysis supports the hypothesis that low earnings induced some banks to increase risk aggressively, evidence is somewhat weaker than that for moral hazard. In addition, the true motivation for risk-taking is not clear for some low-earnings banks because many low-earnings banks also had low capital.²⁹ This problem will be addressed below.

Conditions of Local Economies

If external shocks are the main factor affecting the condition of banks, the strength of local economies should largely explain behavior and performance differences across banks. Table 11 shows the results of two sets of regressions that examine the effects of employment growth in home states on earnings on assets and loan growth. The employment growth, which reflects the condition of local economies, is found to positively affect earnings and loan growth. Although they support the significance of local economic conditions, these results do not disprove the roles of other factors.

We may better assess the roles of stockholders' and managers' incentives by examining whether the behavior of banks that cannot be explained by the condition of local economies is systematically related to capital ratios or earnings on assets of the previous period. Thus, the residual rates of loan growth are examined.³⁰ Higher demand for bank loans generally follows improving economic conditions. Thus, the residuals reflect the loan growth that is unexplained by demand effects. Systematic differences in the residual loan growth across groups may be viewed as consequences of risk-taking in previous periods.

Tables 12 and 13 report the distribution of the residual rates of loan growth. The distribution of the residuals is similar to that of loan growth observed in Tables 1 and 6. Group C2 banks are distributed heavily toward both tails. For Group C1 and E1 banks, the percentage of banks belonging in the highest percentile group is not high, but consistently higher than that in the second highest percentile group. Thus, after considering the condition of local economies, systematic differences still exist in loan growth across the groups classified based on capital ratios and earnings on assets. Accordingly, the

²⁸ The majority of failed banks belonged in Group E1. Among acquired banks, the proportion of Group E1 banks was the highest in three of the four years. The proportion, however, was not overwhelming.

²⁹ The correlation coefficient between capital ratios and earnings on assets was 0.393 in 1984, 0.326 in 1985, 0.335 in 1986, and 0.432 in 1987. The correlation may become even higher if the market value, instead of book value, of capital is used. Banks with high-quality assets are more likely to have high earnings and high market values relative to book values.

³⁰ The residual changes in earnings for low-capital and low-earnings banks are found to be distributed heavily toward both tails. It is possible to interpret large variances in earnings changes as a result of risk-taking in previous periods. The large variances, however, can result from delayed

recognition of large loan loss provisions by banks with low-quality loans. For this reason, the residual changes in earnings are not discussed in detail.

Table 7
Changes in the Ratio of Real Estate Loans to Total Loans

1984-1985				
Percentile	E1	E2	E3	E4
0-10	12.4%	9.3%	8.8%	9.5%
10-20	10.0	10.9	10.6	8.5
20-50	28.2	29.2	31.6	31.0
50-80	28.9	30.6	29.5	31.2
80-90	9.8	10.7	9.9	9.6
90-100	10.7	9.5	9.5	10.2
Number of banks	3,056	3,082	3,104	3,113
Mean	0.0065	0.0078	0.0075	0.0079
Median	0.0010	0.0016	0.0009	0.0018
1985-1986				
Percentile	E1	E2	E3	E4
0-10	10.0%	9.8%	9.7%	10.5%
10-20	9.6	10.4	9.7	10.2
20-50	30.2	30.2	29.4	30.0
50-80	29.2	29.8	30.1	30.8
80-90	10.2	10.0	10.7	9.1
90-100	10.9	9.7	10.1	9.4
Number of banks	2,945	3,036	3,057	3,062
Mean	0.0135	0.0122	0.0130	0.0122
Median	0.0048	0.0046	0.0055	0.0043
1986-1987				
Percentile	E1	E2	E3	E4
0-10	12.2%	10.0%	9.0%	9.0%
10-20	10.9	9.8	9.6	9.7
20-50	28.8	29.9	30.3	30.8
50-80	28.3	31.3	30.6	29.7
80-90	8.7	9.4	11.4	10.4
90-100	10.9	9.6	9.1	10.4
Number of banks	2,722	2,924	2,956	2,975
Mean	0.0081	0.0096	0.0102	0.0106
Median	0.0018	0.0032	0.0036	0.0032
1987-1988				
Percentile	E1	E2	E3	E4
0-10	13.3%	10.0%	8.2%	8.7%
10-20	10.2	10.2	9.8	9.8
20-50	28.9	30.4	30.7	29.9
50-80	26.5	30.1	32.3	30.8
80-90	9.4	9.9	9.5	11.1
90-100	11.7	9.3	9.4	9.7
Number of banks	2,603	2,845	2,838	2,878
Mean	0.0046	0.0056	0.0068	0.0071
Median	0.0000	0.0000	0.0009	0.0013

Table 8
Changes in the Ratio of Loans to Insiders to Total Loans

1984-1985				
Percentile	E1	E2	E3	E4
0-10	13.1%	8.9%	7.6%	10.5%
10-20	10.2	9.2	9.7	10.9
20-50	25.0	31.4	32.7	30.8
50-80	27.9	31.7	31.9	28.3
80-90	11.9	9.4	8.9	9.8
90-100	11.9	9.2	9.2	9.7
Number of banks	2,641	2,694	2,630	2,465
Mean	0.00024	-0.00019	0.00058	-0.00001
Median	0.00003	0.00000	-0.00001	-0.00007
1985-1986				
Percentile	E1	E2	E3	E4
0-10	13.3%	9.4%	8.6%	8.7%
10-20	9.1	10.6	9.1	11.3
20-50	26.3	30.2	31.9	31.6
50-80	29.6	29.9	31.8	28.8
80-90	10.3	10.0	9.7	10.0
90-100	11.5	10.0	9.0	9.6
Number of banks	2,497	2,626	2,654	2,462
Mean	-0.00070	0.00043	0.00037	0.00029
Median	0.00001	-0.00001	0.00000	-0.00006
1986-1987				
Percentile	E1	E2	E3	E4
0-10	12.5%	10.0%	8.6%	9.0%
10-20	9.9	10.0	10.4	9.6
20-50	25.2	29.5	31.8	33.1
50-80	28.1	31.0	30.9	29.7
80-90	11.6	10.2	9.4	9.0
90-100	12.6	9.2	8.8	9.6
Number of banks	2,263	2,500	2,536	2,457
Mean	-0.00014	-0.00005	0.00024	0.00034
Median	0.00003	-0.00002	-0.00006	-0.00008
1987-1988				
Percentile	E1	E2	E3	E4
0-10	13.0%	9.8%	8.3%	9.2%
10-20	11.2	10.3	9.6	9.0
20-50	23.5	30.2	32.8	32.8
50-80	28.0	28.2	31.9	31.8
80-90	11.0	11.4	9.1	8.6
90-100	13.4	10.2	8.1	8.6
Number of banks	2,196	2,429	2,462	2,360
Mean	0.00021	-0.00001	-0.00014	-0.00031
Median	-0.00005	-0.00014	-0.00015	-0.00015

Table 9
Changes in the Ratio of Large Time Deposits to Assets

1984-1985				
Percentile	E1	E2	E3	E4
0-10	16.4%	8.7%	7.8%	7.2%
10-20	12.8	9.5	8.9	8.9
20-50	29.6	30.1	30.7	29.8
50-80	24.7	31.2	32.3	31.5
80-90	7.5	10.4	10.9	11.2
90-100	9.1	10.1	9.5	11.3
Number of banks	3,056	3,082	3,104	3,113
Mean	-0.0064	0.0017	0.0022	0.0043
Median	-0.0038	0.0009	0.0011	0.0021

1985-1986				
Percentile	E1	E2	E3	E4
0-10	17.6%	8.8%	7.3%	6.6%
10-20	11.8	11.2	9.3	7.7
20-50	28.5	32.4	31.3	27.9
50-80	25.0	28.8	31.7	34.2
80-90	8.3	9.5	10.3	11.9
90-100	8.8	9.2	10.1	11.9
Number of banks	2,945	3,036	3,057	3,062
Mean	-0.0123	-0.0044	-0.0021	0.0020
Median	-0.0078	-0.0045	-0.0022	-0.0001

1986-1987				
Percentile	E1	E2	E3	E4
0-10	17.2%	10.5%	6.3%	6.6%
10-20	12.6	10.3	8.9	8.4
20-50	30.7	29.1	29.7	30.6
50-80	23.1	29.4	33.4	33.4
80-90	6.8	10.1	11.2	11.7
90-100	9.7	10.5	10.6	9.2
Number of banks	2,722	2,924	2,956	2,975
Mean	-0.0035	0.0031	0.0068	0.0052
Median	-0.0010	0.0020	0.0042	0.0039

1987-1988				
Percentile	E1	E2	E3	E4
0-10	19.2%	8.9%	6.6%	6.2%
10-20	13.5	10.4	8.3	8.1
20-50	27.4	31.7	30.0	30.6
50-80	22.4	29.4	34.7	32.7
80-90	7.5	9.6	10.8	11.8
90-100	9.9	9.8	9.7	10.6
Number of banks	2,603	2,845	2,838	2,878
Mean	-0.0036	0.0039	0.0068	0.0079
Median	-0.0004	0.0033	0.0059	0.0057

Table 10
Interest Rates on Large Time Deposits

1984-1985				
Percentile	E1	E2	E3	E4
0-10	9.4%	8.8%	10.4%	11.4%
10-20	8.9	10.5	9.9	10.7
20-50	27.8	32.7	30.0	29.5
50-80	30.9	29.4	31.1	28.6
80-90	10.8	10.0	9.9	9.3
90-100	12.2	8.5	8.7	10.6
Number of banks	2,928	2,991	3,013	2,899
Mean	0.0886	0.0867	0.0864	0.0865
Median	0.0873	0.0859	0.0862	0.0860

1985-1986				
Percentile	E1	E2	E3	E4
0-10	9.5%	10.1%	9.2%	11.2%
10-20	9.8	9.9	10.1	10.2
20-50	28.0	31.0	31.1	29.8
50-80	29.8	30.4	30.4	29.3
80-90	10.4	9.6	10.0	10.0
90-100	12.5	8.9	9.2	9.5
Number of banks	2,804	2,948	2,972	2,896
Mean	0.0745	0.0728	0.0731	0.0728
Median	0.0732	0.0723	0.0725	0.0723

1986-1987				
Percentile	E1	E2	E3	E4
0-10	10.2%	10.1%	9.2%	10.5%
10-20	11.3	9.9	9.5	9.4
20-50	29.5	30.1	29.8	30.7
50-80	29.6	30.3	30.3	29.8
80-90	9.0	9.5	10.8	10.6
90-100	10.5	10.2	10.4	9.0
Number of banks	2,557	2,797	2,863	2,866
Mean	0.0644	0.0644	0.0649	0.0641
Median	0.0643	0.0645	0.0649	0.0645

1987-1988				
Percentile	E1	E2	E3	E4
0-10	9.4%	10.5%	9.4%	10.6%
10-20	10.8	10.6	8.9	9.8
20-50	30.5	30.8	30.0	28.8
50-80	29.8	28.6	31.6	30.1
80-90	9.7	9.3	10.2	10.7
90-100	9.8	10.1	10.0	10.0
Number of banks	2,487	2,742	2,763	2,786
Mean	0.0697	0.0696	0.0702	0.0696
Median	0.0702	0.0700	0.0707	0.0705

finding that local economic conditions were an important explanation of the performance of banks does not deny the roles of the risk-taking incentives of stockholders and managers.

Characteristics of Risk-Takers

We may better understand the motives for risk-taking by looking at other characteristics of the low-capital and low-earnings banks that took high risks. This section examines more closely the Groups C1, C2 and E1 banks that belonged in the 90-100 percentile group in loan growth (defined as “risky banks”).

The positive correlation between capital ratios and earnings mentioned above suggests the possibility that the risky low-capital (Groups C1 and C2) banks may also be low-earnings banks (Group E1). Then, the above analyses cannot distinguish between stockholders’ and managers’ incentives. Table 14 classifies risky low-capital banks based on earnings and risky low-earnings banks based on capital ratios. In general, the percentage of risky low-capital banks belonging in Group E1 was no higher than that of the entire population of banks. Compared with the composition of the population, a higher proportion of risky low-earnings banks belonged in Group C1 or C2. The proportion, however, was less than 50 percent in three of the four years. Thus, the overlap between risky low-capital and low-earnings banks suggests a more significant effect of moral hazard, but does not appear to be large enough to invalidate independent roles of stockholders’ and managers’ incentives.

Some researchers argue that the “too-big-to-fail” policy increased risk-taking incentives for large banks because the policy further reduced the expected loss to stockholders in the event of insolvency and weakened market discipline by uninsured depositors.³¹ Table 15 shows the size distribution of risky banks with low capital or low earnings. The percentage of the risky low-capital banks with \$5 billion or more in total assets (Size 3 or Size 4) was no higher in general than that of the population, and it was lower for risky low-earnings banks. Thus, this analysis does not support the too-big-to-fail hypothesis. This result, of course, does not disprove the hypothesis either. It may be difficult for large banks, which already have significant market shares, to expand rapidly. Thus, the selection

Table 11
Regression Results

(dependent variable: change in earnings on assets)				
	1985	1986	1987	1988
Intercept	-0.0031 (-12.44)	-0.0038 (-21.64)	-0.0004 (-1.69)	-0.0013 (-2.19)
State*	0.0789 (8.49)	0.1260 (16.17)	0.0532 (6.29)	0.0731 (3.89)
Adjusted R-Square	0.0057	0.0211	0.0033	0.0013

(dependent variable: rate of loan growth)				
	1985	1986	1987	1988
Intercept	0.0083 (2.04)	0.0195 (4.44)	0.0222 (0.27)	0.0252 (0.62)
State*	2.5195 (16.34)	3.1992 (16.51)	4.7001 (1.67)	2.2534 (1.78)
Adjusted R-Square	0.0211	0.0219	0.0002	0.0002

* State = Rate of employment growth in the home state.

Notes: Numbers in parenthesis are *t*-values. The statistical significance of regressions fluctuates widely across years mainly because of extreme values of dependent variables.

of the risk measure may be responsible for the result. Nevertheless, it indicates that large banks do not account for a large proportion of those driven by risk-taking incentives.

Table 16 classifies risky banks based on holding company status in an attempt to observe the relationship between the ownership structure and risk-taking. Compared with the composition of the entire population, risky banks were more likely to be owned by multi-bank holding companies, less likely to be owned by one-bank holding companies, and about equally likely to be independent. One possibility is that the ownership share of managers is greatest for independent banks and smallest for banks owned by multi-bank holding companies. Under this assumption, the above finding suggests that banks controlled by stockholders took more risk, and, hence, supports the moral hazard view. Another possibility is that stockholders of multi-bank holding companies are least able to monitor managers of member banks because of the complicated organizational structure. In

³¹ See Mishkin (1992) and Boyd and Gertler (1994).

Table 12
Residual Rates of Loan Growth

1984-1985				
Percentile	C1	C2	C3	C4
0-10	28.6%	10.8%	8.3%	10.7%
10-20	13.2	8.6	9.7	12.1
20-50	22.6	24.6	32.1	32.4
50-80	14.4	30.3	31.5	27.9
80-90	10.4	12.6	9.7	7.6
90-100	10.7	13.2	8.6	9.2
Number of banks	318	3,190	6,224	2,620
Mean	-0.0638	0.0137	-0.0021	-0.0038
Median	-0.0841	0.0061	-0.0152	-0.0301

1985-1986				
Percentile	C1	C2	C3	C4
0-10	30.8%	11.5%	8.4%	8.8%
10-20	14.7	9.1	9.9	10.6
20-50	20.5	26.8	30.9	33.1
50-80	17.2	28.5	31.6	30.0
80-90	7.1	11.3	10.2	8.3
90-100	9.7	12.8	8.9	9.2
Number of banks	380	3,119	6,050	2,541
Mean	-0.0673	0.0051	-0.0038	0.0135
Median	-0.0951	-0.0101	-0.0180	-0.0264

1986-1987				
Percentile	C1	C2	C3	C4
0-10	27.9%	11.3%	8.0%	8.8%
10-20	13.9	10.3	9.5	9.8
20-50	25.8	28.1	31.1	31.0
50-80	18.2	29.8	31.5	29.8
80-90	6.7	10.1	10.2	10.3
90-100	7.6	10.6	9.8	10.3
Number of banks	552	3,048	5,597	2,370
Mean	-0.1272	-0.0614	-0.0518	0.2315
Median	-0.1466	-0.0759	-0.0731	-0.0761

1987-1988				
Percentile	C1	C2	C3	C4
0-10	35.1%	12.0%	7.6%	7.9%
10-20	18.6	9.5	9.4	10.2
20-50	18.8	27.3	32.1	30.6
50-80	15.2	29.5	31.2	30.9
80-90	4.8	9.8	10.7	9.7
90-100	7.5	12.0	9.1	10.6
Number of banks	521	2,550	5,557	2,526
Mean	-0.1052	-0.0138	-0.0096	0.0577
Median	-0.1284	-0.0206	-0.0212	-0.0194

Table 13
Residual Rates of Loan Growth

1984-1985				
Percentile	E1	E2	E3	E4
0-10	20.8%	6.8%	5.3%	7.2%
10-20	15.4	8.9	7.6	8.3
20-50	30.0	30.0	29.4	30.6
50-80	19.7	32.6	34.7	33.0
80-90	6.4	11.4	12.1	10.0
90-100	7.8	10.4	10.8	11.0
Number of banks	3,056	3,082	3,104	3,113
Mean	-0.0520	0.0123	0.0201	0.0189
Median	-0.0717	-0.0009	0.0061	-0.0057

1985-1986				
Percentile	E1	E2	E3	E4
0-10	22.6%	8.2%	5.0%	4.7%
10-20	15.3	9.8	7.2	7.8
20-50	30.1	30.1	30.0	29.8
50-80	19.7	31.6	33.7	34.6
80-90	5.1	10.6	11.8	12.2
90-100	7.0	9.7	12.2	11.0
Number of banks	2,945	3,036	3,057	3,062
Mean	-0.0501	0.0017	0.0200	0.0266
Median	-0.0897	-0.0146	0.0033	0.0039

1986-1987				
Percentile	E1	E2	E3	E4
0-10	21.1%	8.1%	6.0%	5.7%
10-20	14.0	10.8	8.2	7.3
20-50	26.8	31.1	31.0	30.8
50-80	22.3	29.8	34.6	32.7
80-90	6.6	10.2	10.6	12.3
90-100	9.1	10.0	9.7	11.1
Number of banks	2,722	2,924	2,956	2,975
Mean	0.1395	-0.0554	-0.0481	-0.0254
Median	-0.1269	-0.0776	-0.0625	-0.0581

1987-1988				
Percentile	E1	E2	E3	E4
0-10	24.7%	8.0%	4.3%	4.2%
10-20	16.1	10.1	7.5	6.8
20-50	27.4	32.4	31.1	28.9
50-80	17.8	29.7	34.9	36.4
80-90	5.2	10.4	12.2	11.8
90-100	8.8	9.3	9.9	11.8
Number of banks	2,603	2,845	2,838	2,878
Mean	-0.0531	-0.0114	0.0069	0.0525
Median	-0.0883	-0.0250	-0.0071	0.0029

Table 14
Earnings on Assets and Capital Ratios of Risky Banks

1984					
	E1	E2	E3	E4	Total
Population	3,064	3,083	3,106	3,113	12,366
	(24.8%)	(24.9%)	(25.1%)	(25.2%)	
Low capital	107	178	135	66	486
	(22.0%)	(36.6%)	(27.8%)	(13.6%)	
1985					
Population	2,951	3,039	3,063	3,068	12,121
	(24.3%)	(25.1%)	(25.3%)	(25.3%)	
Low capital	75	154	155	76	460
	(16.3%)	(33.5%)	(33.7%)	(16.5%)	
1986					
Population	2,734	2,928	2,960	2,982	11,604
	(23.6%)	(25.2%)	(25.5%)	(25.7%)	
Low capital	85	115	122	69	391
	(21.7%)	(29.4%)	(31.2%)	(17.6%)	
1987					
Population	2,613	2,847	2,838	2,882	11,180
	(23.4%)	(25.5%)	(25.4%)	(25.8%)	
Low capital	104	87	81	59	331
	(31.4%)	(26.3%)	(24.5%)	(17.8%)	
1984					
	C1	C2	C3	C4	Total
Population	320	3,193	6,229	2,621	12,363
	(2.6%)	(25.8%)	(50.4%)	(21.2%)	
Low earnings	12	95	90	26	223
	(5.4%)	(42.6%)	(40.4%)	(11.7%)	
1985					
Population	383	3,126	6,056	2,546	12,111
	(3.2%)	(25.8%)	(50.0%)	(21.0%)	
Low earnings	17	58	68	29	172
	(9.9%)	(33.7%)	(39.5%)	(16.9%)	
1986					
Population	557	3,055	5,606	2,376	11,594
	(4.8%)	(26.3%)	(48.4%)	(20.5%)	
Low earnings	23	62	55	28	168
	(13.7%)	(36.9%)	(32.7%)	(16.7%)	
1987					
Population	528	2,554	5,559	2,529	11,170
	(4.7%)	(22.9%)	(49.8%)	(22.6%)	
Low earnings	26	78	81	41	226
	(11.5%)	(34.5%)	(35.8%)	(18.1%)	

Note: The numbers in parenthesis are percentages of the Total column.

Table 15
Size Distribution of Risky Banks

1984					
	Size 1	Size 2	Size 3	Size 4	Total
Population	11,736	576	45	9	12,366
	(94.9%)	(4.7%)	(0.4%)	(0.1%)	
Low capital	408	76	2	0	486
	(84.0%)	(15.6%)	(0.4%)	(0.0%)	
Low earnings	204	19	0	0	223
	(91.5%)	(8.5%)	(0.0%)	(0.0%)	
1985					
	Size 1	Size 2	Size 3	Size 4	Total
Population	11,453	611	47	10	12,121
	(94.5%)	(5.0%)	(0.4%)	(0.1%)	
Low capital	366	90	4	0	460
	(79.6%)	(19.6%)	(0.9%)	(0.0%)	
Low earnings	154	18	0	0	172
	(89.5%)	(10.5%)	(0.0%)	(0.0%)	
1986					
	Size 1	Size 2	Size 3	Size 4	Total
Population	10,935	609	51	9	11,604
	(94.2%)	(5.2%)	(0.4%)	(0.1%)	
Low capital	341	48	2	0	391
	(87.2%)	(12.3%)	(0.5%)	(0.0%)	
Low earnings	161	7	0	0	168
	(95.8%)	(4.2%)	(0.0%)	(0.0%)	
1987					
	Size 1	Size 2	Size 3	Size 4	Total
Population	10,489	629	54	8	11,180
	(93.8%)	(5.6%)	(0.5%)	(0.1%)	
Low capital	293	36	2	0	331
	(88.5%)	(10.9%)	(0.6%)	(0.0%)	
Low earnings	214	12	0	0	226
	(94.7%)	(5.3%)	(0.0%)	(0.0%)	

Size 1 - less than \$300 million in total assets.

Size 2 - between \$300 million and \$5 billion in total assets.

Size 3 - \$5 billion or more in total assets, excluding the 10 largest banks.

Size 4 - the 10 largest banks.

Note: The numbers in parenthesis are percentages of the Total column.

Table 16
Holding Company Structure of Risky Banks

	1984			Total
	Independent	One bank	Multi-bank	
Population	4,811 (38.9%)	4,567 (36.9%)	2,988 (24.2%)	12,366
Low capital	134 (27.6%)	150 (30.9%)	202 (41.6%)	486
Low earnings	69 (30.9%)	63 (28.3%)	91 (40.8%)	223

	1985			Total
	Independent	One bank	Multi-bank	
Population	4,215 (34.8%)	4,596 (37.9%)	3,310 (27.3%)	12,121
Low capital	138 (30.0%)	138 (30.0%)	184 (40.0%)	460
Low earnings	66 (38.4%)	52 (30.2%)	54 (31.4%)	172

	1986			Total
	Independent	One bank	Multi-bank	
Population	3,703 (31.9%)	4,445 (38.3%)	3,456 (29.8%)	11,604
Low capital	100 (25.6%)	109 (27.9%)	182 (46.5%)	391
Low earnings	53 (31.5%)	48 (28.6%)	67 (39.9%)	168

	1987			Total
	Independent	One bank	Multi-bank	
Population	3,478 (31.1%)	4,450 (39.8%)	3,252 (29.1%)	11,180
Low capital	101 (30.5%)	93 (28.1%)	137 (41.4%)	331
Low earnings	90 (39.8%)	49 (21.7%)	87 (38.5%)	226

Independent - banks not owned by a holding company.

One bank - banks owned by a holding company that owns one bank.

Multi-bank - banks owned by a holding company that owns more than one bank.

Note: The numbers in parenthesis are percentages of the Total column.

Table 17
Charter Types of Risky Banks

	1984			Total
	National	State Member	Nonmember	
Population	3,789 (30.6%)	830 (6.7%)	7,747 (62.6%)	12,366
Undercapitalized	22 (56.4%)	2 (5.1%)	15 (38.5%)	39
Low capital	186 (38.3%)	28 (5.8%)	272 (56.0%)	486
Low earnings	66 (29.6%)	12 (5.4%)	145 (65.0%)	223

	1985			Total
	National	State Member	Nonmember	
Population	3,733 (30.8%)	832 (6.9%)	7,556 (62.3%)	12,121
Undercapitalized	18 (42.9%)	5 (11.9%)	19 (45.2%)	42
Low capital	189 (41.1%)	32 (7.0%)	239 (52.0%)	460
Low earnings	48 (27.9%)	19 (11.0%)	105 (61.0%)	172

	1986			Total
	National	State Member	Nonmember	
Population	3,531 (30.4%)	825 (7.1%)	7,248 (62.5%)	11,604
Undercapitalized	19 (45.2%)	1 (2.4%)	22 (52.4%)	42
Low capital	146 (37.3%)	31 (7.9%)	214 (54.7%)	391
Low earnings	53 (31.5%)	12 (7.1%)	103 (61.3%)	168

	1987			Total
	National	State Member	Nonmember	
Population	3,401 (30.4%)	825 (7.4%)	6,954 (62.2%)	11,180
Undercapitalized	14 (37.8%)	2 (5.4%)	21 (56.8%)	37
Low capital	104 (31.4%)	24 (7.3%)	203 (61.3%)	331
Low earnings	57 (25.2%)	17 (7.5%)	152 (67.3%)	226

National - national banks.

State member - state banks that are members of the Federal Reserve System.

Nonmember - state banks that are not members of the Federal Reserve System.

Note: The numbers in parenthesis are percentages of the Total column.

this case, managerial incentives better explain aggressive risk-taking by banks owned by multi-bank holding companies. It will require more extensive study to draw a clear conclusion. Unfortunately, the scarcity of data on the ownership structure of the majority of banks makes the task difficult.

The enforcement of regulation may also affect risk-taking. Table 17 reports the number of risky banks for each type of charter. A notable pattern is that the proportions of risky undercapitalized (Group C1) and low-capital banks (Groups C1 and C2) were relatively high among national banks throughout the four years examined by this study. No apparent pattern is found for risky low-earnings banks.

SUMMARY

There are numerous explanations for the deterioration of the asset quality of banks during the 1980s. Moral hazard theories explain the problem on the basis of increased risk-taking incentives of bank stockholders, which arise from limited liability and the existence of deposit insurance. Deregulation in the early 1980s, which increased both intra- and interindustry competition, increased stockholders' incentives to take risk by reducing the charter values of banks. Another possible explanation for increased riskiness in banking is desperate profit-seeking by bank managers to preserve their jobs. Increased competition and dwindling profit opportunities sharply lowered profits of the banks managed by incompetent managers. To make profits acceptable to stockholders, incompetent managers needed to increase risks and hope for a good outcome. While these two explanations blame deliberate risk-taking, it is also possible that unexpected external events impaired the financial structure of banks. In other words, although banks did not change their behavior, a sequence of adverse economic events such as the collapse of real estate markets undermined the financial strength of banks.

This study indicates the presence of ex ante risk-taking by both bank stockholders and managers, but evidence is stronger for moral hazard. A main finding is that risk measures for banks with low capital or earnings are distributed heavily toward both tails. In other words, while many banks with low capital or earnings refrained from taking risk, many other banks with similar characteristics adopted highly risky strategies. These findings suggest that moral hazard and desperate profit seeking by incompetent managers are con-

sistent with the behavior of a subset of banks. Aggressive risk-taking may not have been a prevalent phenomenon. The finding that deliberate risk-taking was confined to a subset of banks, however, does not rule out the possibility that increased risk-taking was an important cause of a large number of bank failures in the 1980s.

The condition of local economies is found to have been important for explaining the performance of banks. This finding implies an important role for external economic events but does not disprove the role of deliberate risk-taking. Adverse economic conditions may have been largely responsible for the overall deterioration of the financial health of the banking industry during the 1980s. Yet deliberate risk-taking may have played a significant role in many bank failure cases. It appears that all of the three factors discussed by this article contributed to the banking problems of the 1980s.

REFERENCES

- Allen, Linda, and A. Sinan Cebenoyan. "Bank Acquisitions and Ownership Structure: Theory and Evidence," *Journal of Banking and Finance* (April 1991), pp. 425-48.
- Barth, James R., R. Dan Brumbaugh, Jr., and Daniel Sauerhaft. "Failure Costs of Government-Regulated Financial Firms: The Case of Thrift Institutions," *Federal Home Loan Bank Board Research Working Paper No. 123* (October 1986).
- Benston, George J., and Mike Carhill. "FSLIC Forbearance and the Thrift Debacle," *Proceedings of the 28th Annual Conference on Bank Structure and Competition* (Federal Reserve Bank of Chicago, 1992), pp. 121-50.
- Bernanke, Ben S., and Cara S. Lown. "The Credit Crunch," *Brookings Papers on Economic Activity* (1991, No. 2), pp. 205-47.
- Boyd, John H., and Mark Gertler. "The Role of Large Banks in the Recent U.S. Banking Crisis," *Federal Reserve Bank of Minneapolis Quarterly Review* (winter 1994), pp. 2-21.
- Calomiris, Charles W. "Deposit Insurance: Lessons from the Record," *Federal Reserve Bank of Chicago Economic Perspectives* (May/June 1989), pp. 10-30.
- Cline, William R. *International Debt: Systemic Risk and Policy Response*. MIT Press, 1984.
- Emmons, William R. "Increased Risk-Taking versus Local Economic Conditions as Causes of Bank Failures," *Proceedings of the 29th Annual Conference on Bank Structure and Competition* (Federal Reserve Bank of Chicago, 1993), pp. 189-209.
- Federal Deposit Insurance Corporation. *Annual Report* (1991).
- Flood, Mark D. "Deposit Insurance: Problems and Solutions," *this Review* (January/February 1993), pp. 28-34.
- Gilbert, R. Alton. "Market Discipline of Bank Risk: Theory and Evidence," *this Review* (January/February 1990), pp. 3-18.
- _____. "Supervision of Undercapitalized Banks: Is There a Case for Change?" *this Review* (May/June 1991), pp. 16-30.
- Gorton, Gary, and Richard Rosen. "Corporate Control, Portfolio Choice, and the Decline of Banking," *Federal Reserve Board Finance and Economic Discussion Series No. 215*, Division of Monetary Affairs (December 1992).

- Gunther, Jeffery W., and Kenneth J. Robinson. "Empirically Assessing the Role of Moral Hazard in Increasing the Risk Exposure of Texas Banks," *Financial Industry Studies Research Paper No. 4-90*, Federal Reserve Bank of Dallas (October 1990).
- Houston, Joel, and Christopher James. "Bank Compensation, Turnover and Risk-Taking," *MidAmerica Institute Research Paper* (January 1993).
- Jensen, Michael C. "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers," *The American Economic Review* (May 1986), pp. 323-9.
- Johnson, Ronald. "The Bank Credit Crumble," Federal Reserve Bank of New York *Quarterly Review* (summer 1991), pp. 40-51.
- Keeley, Michael C. "Deposit Insurance, Risk, and Market Power in Banking," *The American Economic Review* (December 1990), pp. 1183-200.
- MacKie-Mason, Jeffrey K. "Do Firms Care Who Provides Their Financing?" in Glenn R. Hubbard ed., *Asymmetric Information, Corporate Finance, and Investment*. University of Chicago Press, 1990, pp. 63-103.
- Marcus, Alan J. "Deregulation and Bank Financial Policy," *Journal of Banking and Finance* (December 1984), pp. 557-65.
- McKenzie, Joseph A., Rebel A. Cole, and Richard A. Brown. "Moral Hazard, Portfolio Allocation, and Asset Returns for Thrift Institutions," *Journal of Financial Services Research* (April 1992), pp. 315-39.
- Merton, Robert C. "An Analytic Derivation of the Cost of Deposit Insurance and Loan Guarantees," *Journal of Banking and Finance* (June 1977) pp. 3-11.
- Mishkin, Frederic S. "An Evaluation of the Treasury Plan for Banking Reform," *Journal of Economic Perspectives* (winter 1992), pp. 133-53.
- Miller, Merton H., and Kevin Rock. "Dividend Policy under Asymmetric Information," *Journal of Finance* (September 1985), pp. 1031-51.
- Myers, Stewart C., and Nicholas S. Majluf. "Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have," *Journal of Financial Economics* (June 1984), pp. 187-221.
- Park, Sangkyun. "Banking Panics in U.S. History: Causes and Policy Responses," in George Kaufman, ed., *Research in Financial Services: Private and Public Policy*. JAI Press, 1993.
- Peek, Joe, and Eric S. Rosengren. "The Capital Crunch in New England," Federal Reserve Bank of Boston *New England Economic Review* (May/June 1992), pp. 21-31.
- Saunders, Anthony, Elizabeth Strock, and Nikolaos G. Travlos. "Ownership Structure, Deregulation, and Bank Risk Taking," *Journal of Finance* (June 1990), pp. 643-54.
- Sinkey, Jr., Joseph F. *Problem and Failed Institutions in the Commercial Banking Industry*. JAI Press, 1979.
- Wheelock, David C. "Is the Banking Industry in Decline? Recent Trends and Future Prospects from a Historical Perspective," this *Review* (September/October 1993), pp. 3-22.

Patricia S. Pollard

Patricia S. Pollard is an economist at the Federal Reserve Bank of St. Louis. Richard D. Taylor provided research assistance.

Trade Between the United States and Eastern Europe

THROUGHOUT MOST OF THE post-World War II era, trade between the United States and Eastern Europe was minuscule. The United States maintained high tariff barriers on imports from most Eastern European countries and also restricted its own exports to these countries. In particular, the United States prohibited the export to these countries of high-technology goods related to national security interests. Eastern Europe also maintained various trade restrictions on imports from the United States. Most Eastern European trade was controlled by the state and conducted within the Council for Mutual Economic Assistance (CMEA), the trade organization of the Soviet bloc countries.

With the disintegration of the Soviet system and the collapse of the CMEA trading bloc, Eastern European countries began to re-orient their trade to the West. As these countries undertook political and economic reforms, the United States reduced its tariff restrictions on their products. Consequently, trade between the United States and Eastern Europe has expanded substantially since 1988. This paper examines the growth and pattern of trade between the United

States and the three Eastern European countries which have made the greatest progress in adopting market reforms: the Czech and Slovak Federal Republic (CSFR), Hungary and Poland.¹

Studies have shown that the U.S. economy is likely to be one of the principal beneficiaries of economic liberalization in Eastern Europe.² U.S. exports to, and investment in, the region should increase as the restructuring of the economies of Eastern Europe results in an increase in demand for capital goods and technology, and opens new markets for U.S. products. Such gains will be limited, however, if the Eastern European countries reverse the pattern of opening their markets and raise protectionist barriers against products from the United States.

Despite the initial steps taken to reduce trade barriers on Eastern European products, the United States maintains quantitative restrictions and other forms of protectionism on many products from Eastern Europe. Most significantly, the United States maintains a high degree of protection against the importation of textiles and apparel, chemicals, steel and agricultural products from Eastern Europe. These goods

¹ In January 1993, the Czech and Slovak Federal Republic split into two independent countries: the Czech Republic and the Slovak Republic. With the exception of total export and import data, the data used in this paper end before the split occurred.

² See, for example, Wang and Winters (1992).

Table 1
Growth in U.S. Trade 1988-93¹

	U.S. imports (\$ millions)			U.S. exports (\$ millions)		
	1988	1993	Growth	1988	1993	Growth
CSFR ²	\$87.6	\$341.5	289.9%	\$55.1	\$300.1	444.2%
Hungary	293.9	400.5	36.3	77.5	433.9	459.7
Poland	375.6	454.0	20.2	303.7	916.5	201.8
Combined CSFR, Hungary, Poland	759.0	1,196.0	57.6	436.3	1,650.5	278.3
World	441,282.4	580,054.4	31.6	322,718.3	464,767.2	44.0

¹ Based on nominal dollar values.

² The 1993 data for the CSFR were calculated by combining the data for the Czech Republic and the Slovak Republic.

SOURCE: U.S. Department of Commerce, Bureau of the Census

are produced by the sectors in which Eastern Europe is most competitive. The possibility exists for an increase in protectionism in Eastern Europe as these countries have become increasingly frustrated by the lack of progress in securing access to U.S. as well as other Western markets for their products. How the problems stemming from these trade barriers are handled will be an important determinant of future trade flows between the United States and the CSFR, Hungary and Poland.

This paper describes the recent changes in these trade flows and examines the restrictions facing Eastern Europe in its trade with the United States. The structure of the paper is as follows. Section two provides an overview of trade between the United States and the CSFR, Hungary, and Poland. The causes of the recent growth in trade between the United States and Eastern Europe are examined in section three. The product composition of this trade is discussed in section four. Section five examines U.S. restrictions on the products in which the CSFR, Hungary and Poland have their greatest comparative advantage. The conclusions are presented in section six.

OVERVIEW OF TRADE

Trade with the CSFR, Hungary and Poland has always comprised a low percentage of the total international trade of the United States. Neither U.S. exports to these countries nor imports from any of the three constitute more than 1 percent of total U.S. exports or imports. From the perspective of the CSFR, Hungary and Poland, however, trade with the United States constitutes a larger share of the international trade of each country.³

Despite its relatively small size, there has been a substantial expansion in trade between the United States and the CSFR, Hungary and Poland following the disintegration of the Soviet bloc. In dollar terms, U.S. imports from the three grew by 58 percent between 1988 and 1993 while U.S. exports to these three countries grew by 278 percent (see Table 1, and Figures 1 and 2).⁴ In comparison, total U.S. imports increased by 32 percent between 1988 and 1993 whereas total U.S. exports rose by 44 percent.

U.S. exports to the CSFR, Hungary and Poland have grown much faster than imports from these countries. Consequently, in 1988 the United

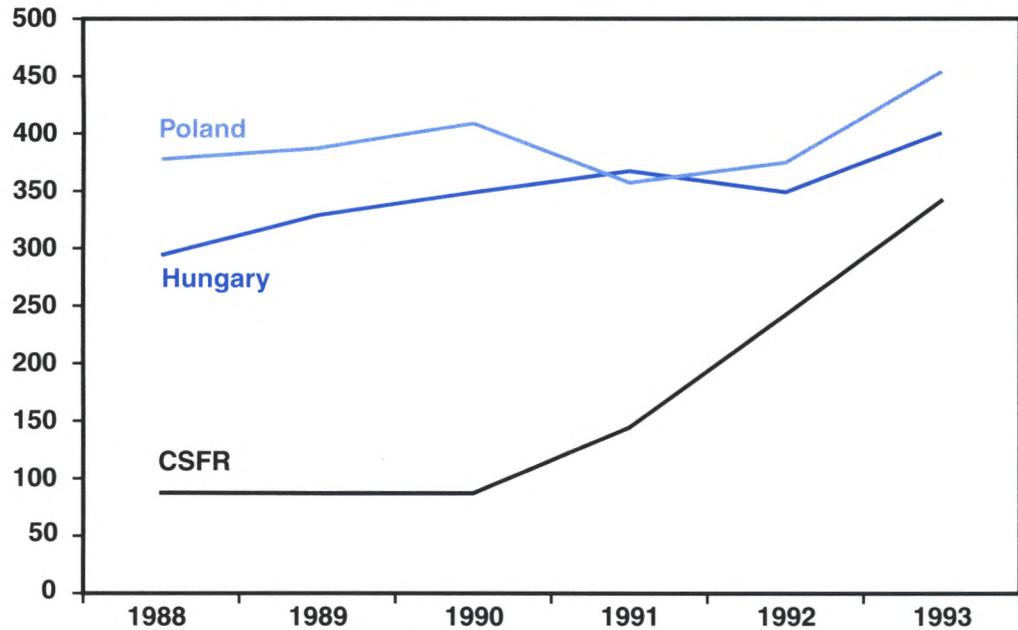
³ The European Union (Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain and the United Kingdom) remains the major trading partner for these three Eastern European countries, accounting for more than half of their exports and imports.

⁴ Exports from the United States to the three countries combined grew at a faster rate than exports from the European Union (208 percent compared to 180 percent) between 1988 and 1992 (the latest year for which data for the European

Union were available). U.S. imports from the three Eastern European countries, however, grew more slowly than European Union imports over the same time period (27 percent compared to 133 percent).

Figure 1
Total Annual U.S. Imports from Eastern Europe

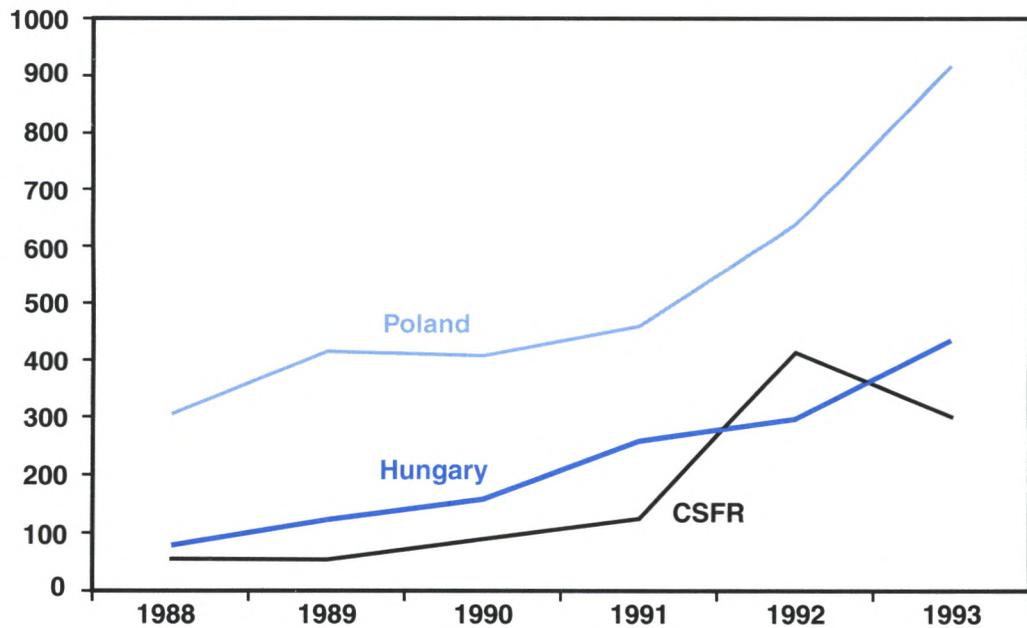
Millions of dollars



SOURCE: U.S. Department of Commerce, Bureau of the Census

Figure 2
Total Annual U.S. Exports to Eastern Europe

Millions of dollars



SOURCE: U.S. Department of Commerce, Bureau of the Census

The Jackson-Vanik Amendment to the Trade Act of 1974

The Trade Expansion Act of 1951 suspended the most-favored-nation (MFN) status of any country deemed to be “under the control of the world Communist movement.” Between 1951 and 1974, the MFN status of Poland and Yugoslavia was restored. The U.S. Trade Act of 1974 reasserted the determination of the United States to withhold MFN status from Communist countries. Section 402 of the Trade Act states that MFN status could not be granted to any nonmarket economy country which did not already have such status. The Act established two exceptions, however, through which MFN status would be granted: 1) the President reported to Congress that the country did not restrict the emigration of its citizens; and 2) the President waived compliance with the freedom of emigration requirement. The Jackson-Vanik amendment established the freedom-of-emigration requirement. This requirement could only be waived if the President determined that doing so would “promote the objective of the amendment.”¹ MFN status still could not be granted until the United States had concluded a bilateral trade agreement with the country in question. Furthermore, as is standard, the granting of MFN status was to be done on a reciprocal basis. Both the waiver of the Jackson-Vanik amendment and the trade agreement had to be approved by a congressional resolution.

Waivers were granted for a one-year period, ending July 3, but could be renewed each year by the President. Following the renewal of the waiver, Congress was given 30 days to pass a resolution eliminating the waiver.

Between 1974 and 1988, no country was certified to have met the Jackson-Vanik requirement. Under a waiver of this amendment, however, three countries were granted MFN status: Romania in 1975, Hungary in 1978, and China in 1980. In October 1989, Hungary was accorded permanent MFN status following the passage of a freedom-of-emigration law. The Czech and Slovak Federal Republic was granted waiver status in November 1990, and permanent MFN status in October 1991 in accordance with the Jackson-Vanik amendment. Although such status was referred to as “permanent,” the Jackson-Vanik amendment required that the President report to Congress semiannually on a country’s compliance with the emigration criteria. Countries which were not subject to the Jackson-Vanik requirements (such as Poland) had unconditional MFN status. In 1992, President Bush asked Congress to remove Hungary and the CSFR from the Jackson-Vanik restrictions, and these countries were granted unconditional MFN status.

¹ United States International Trade Commission (June-July 1990, p. 7).

States ran a trade deficit with all three, but by 1993 the deficit had turned to a trade surplus with Hungary and Poland.

CAUSES OF GROWTH IN U.S.— EASTERN EUROPEAN TRADE

The recent growth in U.S. trade with Eastern Europe is due in part to a general increase in trade between the former nonmarket economy countries and the West. The collapse of intra-

CMEA trade due to a movement to market pricing and the settlement of accounts in convertible currencies rather than the system of official exchange rates tied to the Soviet ruble, also played a part in re-orienting trade to the West. As these countries sought to modernize their production processes, they looked to the West as a source of capital and technology. Exports to the West provided a source of foreign currency with which to purchase these capital goods and were also a source of economic growth following

the shrinkage of the domestic market resulting from the collapse of the old economic system.⁵

REDUCTION IN U.S. TRADE BARRIERS FACING EASTERN EUROPE

The growth in trade between the United States and the CSFR, Hungary and Poland also reflects the reduction of trade barriers by all parties. In the initial euphoria following the collapse of the Soviet bloc, the United States pledged to open its markets to Eastern European products in order to aid these countries in developing a market system. One of the first steps the United States took to encourage reform in Eastern Europe was to grant most-favored nation (MFN) status to these countries, leading to a substantial reduction in the tariff rates on imports from Eastern Europe.⁶ Poland was originally granted MFN status in 1960, but this status was suspended in January 1981, following the imposition of martial law. It was not until November 1989 that Poland regained its MFN standing. Hungary was granted MFN status in 1978 under the waiver provision to the Jackson-Vanik Amendment to the 1974 Trade Act (see shaded insert on the opposite page for more on this amendment). The CSFR was the last of the three countries to gain MFN status, in November 1990. The importance of MFN status can be illustrated with reference to the textile and apparel industry. The MFN tariff rates on U.S. imports of textile and apparel range from 20 percent to 35 percent. In contrast, non-MFN tariff rates range from 50 percent to over 100 percent.⁷

Additional changes in the U.S. treatment of imports from these countries have occurred as well. In November 1989, Hungary was designated as a "beneficiary developing country," making it eligible for tariff reductions granted under the

generalized system of preferences (GSP).⁸ In January 1990, Poland was deemed eligible for the GSP and in April 1991 the CSFR was deemed eligible. As part of the Trade Enhancement Initiative for Central and Eastern Europe (TEI) undertaken by the Bush administration in 1991, the United States expanded the list of products for which tariff reductions are granted to GSP countries to include products proposed by the CSFR, Hungary and Poland. The United States also concluded bilateral trade agreements with each country, increasing their import quotas on textiles and apparel.⁹

REDUCTIONS IN EASTERN EUROPEAN TRADE BARRIERS FACING THE UNITED STATES

The Eastern European countries also sharply reduced their barriers to imports. In the CSFR, most quantitative restrictions on imports were eliminated or converted into tariffs.¹⁰ The average unweighted tariff rate was 5 percent until January 1992, when the CSFR requested and received GATT approval to raise its average tariff rate to 6 percent.¹¹ Hungary has an average unweighted tariff rate of 13 percent on imports in addition to a 2 percent customs clearance fee, while the average tariff on imports in Poland is 13.6 percent. Both countries have also eliminated most quantitative restrictions, although Hungary does maintain quotas on some consumer goods, while Poland limits imports of some alcoholic beverages.¹² In comparison, the United States maintains a 6.8 percent average tariff rate on imports, while the tariff rate for the European Union and Japan is 6.5 percent.¹³ All of these entities also maintain nontariff barriers. Furthermore, the tariff rates in the CSFR, Hungary and Poland are lower than most countries at a comparable stage of development.¹⁴

⁵ Although output data for the former nonmarket economies are not totally reliable, estimates by the International Monetary Fund (1993) indicate that between 1988 and 1992, the economy of the CSFR shrank by 23 percent, the Hungarian economy shrank by 21 percent, and the Polish economy shrank by 16 percent.

⁶ MFN status guarantees that the tariffs imposed on a country's products will be no higher than those imposed on the imports of any other country. MFN tariff rates have been reduced substantially through successive trade rounds held under the General Agreement on Tariffs and Trade (GATT). For the period covered in this paper, the average MFN tariff rate on manufactured goods imported into the United States was 4 percent. In contrast, non-MFN tariff rates are set by the Smoot-Hawley Tariff Act of 1930.

⁷ Erzan and Holmes (1992, p. 4).

⁸ The Generalized System of Preferences is a program whereby developed countries grant preferential tariff rates to products from developing countries. It is allowed under GATT rules as an exception to the MFN principle. The United States first granted preferences as part of the Trade Reform Act of 1974. As noted in the text, not all products are covered under the GSP.

⁹ Quotas set a limit on the quantity of a product which a country can sell to another country.

¹⁰ OECD (1991, p. 84).

¹¹ Green (February 6, 1992).

¹² Rodrik (1992, pp. 3-4).

¹³ USITC (August 1991, p. 6).

¹⁴ Rodrik (1992, p. 2).

Tariff rates in the CSFR, Hungary and Poland also tend to be lowest on capital goods and raw materials, the major U.S. export products to these countries. In contrast, as discussed below, trade restrictions in the United States are highest on the goods for which the three Eastern European countries have a comparative advantage.

PRODUCT COMPOSITION OF TRADE

More than half of all U.S. merchandise exports to the CSFR and Hungary, and slightly less than one-half of U.S. exports to Poland, are capital goods (Table 2). Although capital goods were one of the largest categories of U.S. exports to the CSFR, Hungary and Poland in both 1988 and 1992, there was a clear shift during this period from industrial supplies and materials to capital goods. Put simply, there was an increase in the demand for capital due to industrial restructuring.

Another factor contributing to the shift toward imports of capital goods is the easing of the Coordinating Committee on Multilateral Export Controls (COCOM) restrictions. COCOM was created in 1949 to control the exportation to the Soviet bloc countries of products and technology which could be used for military purposes.¹⁵ The importance of the relaxation of COCOM restrictions is highlighted by the growth in U.S. exports of computers, semiconductors and telecommunications equipment—high-technology industries, relying heavily on research and development conducted by highly skilled workers. Such exports grew from 4.9 percent to 20.3 percent of total exports to the CSFR, from 4.4 percent to 12.4 percent for Hungary, and from 1.0 percent to 10.9 percent of total U.S. exports to Poland.

In contrast, the CSFR, Hungary and Poland are countries whose productive resources are characterized by relatively large amounts of semiskilled labor, and all suffer from a lack of up-to-date capital. These factors, in combination with their relatively low-wage rates, point to production cost advantages in products requiring large amounts of semiskilled labor. The product composition of U.S. imports from the CSFR, Hungary and Poland does fit this pattern (Table 3). In 1992, consumer goods, particularly apparel

Table 2

Major Product Composition of U.S. Exports, by End-Use Category (percent of total)

	CSFR		Hungary		Poland	
	1988	1992	1988	1992	1988	1992
Food & beverages	0.8	3.9	0.7	2.1	38.1	15.4
Industrial supplies	44.2	4.3	37.8	8.9	24.3	7.9
Capital goods	46.2	73.8	40.3	61.5	15.2	45.8
Automotive	0	2.7	11.4	7.0	1.3	2.7
Consumer goods	5.8	12.0	7.9	17.0	7.8	13.0
Exports, n.e.c.	3.1	3.3	1.9	3.4	13.4	15.2

and footwear, accounted for the largest category of U.S. imports from each country.

The CSFR and Poland have increased their exports of capital goods to the United States, although these goods are not high-technology products. For the CSFR and Poland, nearly all capital goods exported to the United States are nonelectrical machinery and parts. Within this group, industrial and agricultural machinery, and machine tools are the most important.

A more formal way to analyze the exports of a country is to calculate an index of relative comparative advantage (RCA). This index is calculated as follows:

$$(1) RCA^n = \frac{X_{ij}^n}{X_{ij}} \div \frac{X_{-ij}^n}{X_{-ij}}$$

where X^n are exports of commodity n ; i is the country of origin; j is the country of destination; and $-i$ is the rest of the world (all countries excluding country i). Equation 1 indicates that the relative comparative advantage of country i in any good n depends on the share of that good in country i 's exports to country j relative to the share of good n in the rest of the world's exports to country j . In general, if this ratio is greater than 1, then country i has a comparative advantage in producing that product relative to the rest of the world.¹⁶

¹⁵ COCOM was disbanded on April 1, 1994. The members of COCOM were Australia, Belgium, Canada, Denmark, France, Germany, Greece, Italy, Japan, Luxembourg, the Netherlands, Norway, Portugal, Spain, Turkey, the United Kingdom and the United States.

¹⁶ For more details on this index and its use in determining the comparative advantages of Eastern European countries, see Murrell (1990) and USITC (1991).

Table 3

Major Product Composition of U.S. Imports (percent of total)

	CSFR		Hungary		Poland	
	1988	1992	1988	1992	1988	1992
Food & beverages	5.6	4.1	20.5	17.0	35.9	15.0
Industrial supplies	21.6	23.2	20.4	17.2	26.9	29.3
Capital goods	16.6	22.2	6.3	13.5	10.5	18.3
Automotive	5.0	3.8	13.9	14.5	0.8	1.4
Consumer goods	49.3	43.1	38.2	36.8	24.7	33.9
Exports, n.e.c.	2.0	3.6	0.8	1.0	1.2	2.2

For example, in 1992 the CSFR exported \$242 million of merchandise to the United States, with shipments of footwear accounting for \$14 million of this total. In contrast, world merchandise exports to the United States totalled \$532 billion in 1992, and footwear exports accounted for \$7 billion of this total. Thus, whereas footwear comprised nearly 6 percent of the merchandise exports of the Czech and Slovak Federal Republic to the United States, it accounted for slightly more than 1 percent of world exports to the United States. Since the share of footwear in the CSFR's exports to the United States was larger than the share of footwear in world exports to the United States, the CSFR is said to have a relative comparative advantage in this product ($RCA^{\text{footwear}} > 1$).¹⁷ If the share of footwear in the CSFR's exports to the United States had been smaller than the share of footwear in world exports to the United States, the CSFR would have a relative comparative disadvantage in this product ($RCA^{\text{footwear}} < 1$).

Using the index of relative comparative advantage, it is possible to determine in which product

categories each of the three Eastern European countries has the greatest relative comparative advantage, and also to look at changes in each country's comparative advantage as each has initiated the transition to a market economy.¹⁸

Table 4 shows the relative comparative advantage indexes for each of the three Eastern European countries, by principal end-use category of exports in 1988 and 1992, based on U.S. Bureau of the Census data. Appendix tables provide the RCAs for each country using five-digit, end-use categories in each year from 1988 to 1992.

CHANGES IN RELATIVE COMPARATIVE ADVANTAGE

Two major developments occurred between 1988 and 1992 that may have affected the relative comparative advantages of the Eastern European countries. The first was the progress made in moving from a command system of production to a market-oriented one. Producer and consumer prices were decontrolled, government subsidies to industry were reduced or in many cases eliminated, and privatization programs were implemented. These measures should eventually result in more efficient production leading to an index of comparative advantage more directly related to market forces.

The second development was the easing of trade restrictions by the United States. As noted above, only Hungary enjoyed MFN status in its trade with the United States in 1988, and none of the three countries was considered eligible for GSP status.¹⁹ By 1992, all three had both MFN and GSP status, as well as increased quotas for textiles and apparel. The relaxation of these restrictions should allow the computed relative comparative advantage to more accurately reflect the true comparative advantage of each country.

Despite these two developments, the evidence presented in Table 4 and the Appendix does not

¹⁷ More precisely, the index of relative comparative advantage for footwear from the CSFR is

$$\frac{14,270,978}{242,077,791} \div \frac{7,294,287,012}{532,017,422,033} = .05895 \div .01371 = 4.3$$

¹⁸ Another standard method used is revealed comparative advantage, which is calculated by

$$\frac{X_i^n - M_i^n}{X_i^n + M_i^n}$$

the difference between country *i*'s exports of good *n* and its imports of good *n* divided by the sum of country *i*'s exports and imports of good *n*. This index was used by Fieleke

(1990) and Collins and Rodrik (1991) to calculate the comparative advantages of the Eastern European countries in trade with the West prior to economic liberalization. Both of these studies calculate the index of comparative advantage only for major product categories, but their results are similar to the results based on 1988 data used in this paper.

¹⁹ The United States did not extend GSP benefits to the Soviet bloc countries.

Table 4
Relative Comparative Advantage Indexes: By Principal End-Use Category

	Category	CSFR		Hungary		Poland	
		1988	1992	1988	1992	1988	1992
Foods, feeds & beverages	0	1.00	0.78	3.64	3.26	6.41	2.87
Agricultural	00	1.41	1.07	5.14	4.51	8.44	3.49
Nonagricultural	01	0.05	0.05	0.18	0.10	1.70	1.28
Industrial supplies & materials	1	0.81	0.89	0.76	0.66	1.01	1.13
Energy products	10	0.00	0.00	0.02	0.02	0.00	0.04
Paper & paper products	11	0.04	0.01	0.01	0.00	0.00	0.00
Textile supplies & related materials	12000 & 121	4.81	7.45	5.48	1.55	3.74	4.82
Chemicals, excluding medicinals	125	0.40	1.27	0.97	1.16	0.63	1.31
Building materials, except metals	13	0.52	0.20	0.02	0.00	0.08	0.39
Metals	14	2.19	0.73	0.64	0.39	1.89	0.75
Metallic products	15	0.81	0.80	2.50	4.07	2.54	4.75
Nonmetallic minerals & nonmetallic prods.	16	0.73	0.48	0.53	1.07	0.23	0.14
Capital goods except automotive	2	0.72	0.88	0.27	0.54	0.46	0.72
Electric generating machinery, electric apparatus & parts	20	0.31	0.07	0.31	1.29	0.12	0.79
Nonelectric incl. parts & attachments	21	0.93	1.11	0.30	0.50	0.48	0.74
Transportation equipment, except auto.	22	0.00	0.06	0.01	0.05	0.68	0.51
Automotive vehicles, parts & engines	3	0.25	0.22	0.70	0.84	0.04	0.08
Consumer goods (nonfood), except auto.	4	2.25	1.87	1.75	1.59	1.13	1.46
Consumer nondurables, manufactured	40	2.68	1.84	2.72	2.29	1.49	1.62
Consumer durables, manufactured	41	1.59	1.44	1.08	1.06	0.92	1.45
Unmanufactured consumer goods	42	4.68	6.17	0.01	0.02	0.12	0.08
Exports not elsewhere counted	50	0.68	1.09	0.26	0.31	0.43	0.65

show major shifts in relative comparative advantage between 1988 and 1992. In general, the product categories in which a country exhibited a relative comparative advantage ($RCA > 1$) in 1988 are the same as those in 1992, and vice versa.²⁰ Furthermore, Hungary, which had made the most progress toward reforming its economy at the start of 1988 and faced the lowest tariffs on its exports to the United States of the three countries, had no fewer shifts in its relative comparative advantage (movements from $RCA > 1$ to $RCA < 1$, and vice versa) between 1988 and 1992 than the CSFR or Poland.

The lack of major shifts in relative comparative advantage is not surprising given the years needed to restructure the production of the formerly command-based economies. Such restructuring could change the pattern of comparative advantage of the Eastern European countries. There is some evidence, however, that the estimates given in this paper may be close to reflecting the comparative advantage of each country which will prevail after the transition to a market-based system is completed within the CSFR, Hungary and Poland. The product composition of each country's trade with the West was different from

²⁰ Another method to determine changes in relative comparative advantage is to compute a rank correlation coefficient for each country. A rank correlation coefficient of 1 indicates no change in the ordering of industries by the RCA index between 1988 and 1992, zero indicates no relationship between the 1988 ordering and the 1992 ordering, and

-1 indicates a complete reversal in the ordering. The rank correlation coefficients are .74 for the CSFR, .77 for Hungary, and .63 for Poland, using the five-digit product categories.

its trade with the other CMEA members. As noted by Collins and Rodrik (1991), Eastern Europe's trade with the West was less distorted than its intra-CMEA trade and, thus, more likely to be reflective of its comparative advantage.²¹ With respect to intra-CMEA trade, the products traded and their prices were set through bilateral government agreements.²² In contrast, products exported to Western countries and the prices of these products were subject to international competition. An OECD study of Hungary found that even prior to 1989, Hungary based its trade with the West on its comparative advantage.²³ There is little evidence that the CSFR, Hungary or Poland have redirected their intra-CMEA sales to the West.²⁴

Relative Comparative Advantage in 1992

The one-digit, end-use categories show that the CSFR, Hungary and Poland exhibited a relative comparative advantage in consumer goods in 1992. The latter two countries also had a comparative advantage in foods, feeds and beverages.

On a more disaggregated basis, all three countries in 1992 exhibited a relative comparative advantage in agricultural goods, textile supplies & related materials, chemicals (excluding medicinals), and manufactured consumer goods. Among consumer goods, all three countries had a relative comparative advantage in some type of textile apparel & household goods made from textiles, and footwear.²⁵ In addition, Hungary and Poland had a relative comparative advantage in metallic products.

In summary, these three Eastern European countries exhibit a relative comparative advantage in agricultural products, chemicals, textiles, apparel and footwear, with the exception of the CSFR in metallic products.²⁶ This pattern of comparative advantage fits the typical pattern for developing countries.²⁷

If these sectors do indeed represent the comparative advantage of the CSFR, Hungary and Poland, one would expect to see further increases in the export to the United States of these products. Furthermore, as these countries become more adept at marketing and supplying goods for export, trade in these products should increase.

In actuality, however, the potential for increased exports to the United States of the products in which the three have a comparative advantage is limited by the fact that these goods fall into the "sensitive sectors" categorization. These are products typically produced by sectors in decline and are highly protected from international competition.

U.S. TRADE RESTRICTIONS ON EASTERN EUROPEAN PRODUCTS

The initial emphasis in the United States on opening its markets to Eastern European products has given way to protectionist sentiments as the CSFR, Hungary and Poland have shown that they can compete successfully with certain Western industries and, as a consequence, imports to the United States from these countries have expanded. As noted above, many sectors in which Eastern Europe is most competitive are highly protected in the United States. For example, the textile, apparel and footwear industries enjoy the highest level of tariff protection of all U.S. manufacturing industries. Tariff rates for textiles and apparel average 18 percent ad valorem, while tariffs on certain footwear products range as high as 40 percent.²⁸ The U.S. dairy industry also enjoys a high level of tariff protection, with rates ranging from 10 percent to 25 percent.²⁹ Furthermore, none of these products are eligible for GSP tariff reductions.

In addition to the tariff barriers facing Eastern Europe on the products in which it has a comparative advantage, most of these products are subject to nontariff barriers. For example, the

²¹ Collins and Rodrik (1991, p. 50).

²² OECD (1992, p. 83).

²³ OECD (1993, p. 91).

²⁴ See, for example, Rodrik (1992, p. 18) and OECD (1993, pp. 91-3).

²⁵ See the Appendix for details.

²⁶ These findings are supported by changes in prices relative to the overall producer price indexes in Hungary and Poland between 1989 and 1991. In conjunction with the liberalization of prices, reductions in subsidies, and the progress made in making their currencies convertible, Hungary and Poland both experienced a decline in the prices of textiles,

clothing, leather and metal products relative to their producer price indexes. Hungary also saw a drop in the relative price of food, while Poland experienced a fall in the relative price of chemicals. The decline in the relative prices of these products was due primarily to the availability of lower cost inputs and an increase in production efficiency. See the Organization for Economic Co-operation and Development (1993) for the details of the relative price changes.

²⁷ Bank for International Settlements (1993, p.70) and Collins (1991, p. 223).

²⁸ For a further discussion of U.S. tariff protection, see Finger (1992) and Ray (1991).

²⁹ U.S. Harmonized Tariff Schedule 1993.

United States maintains quotas on textiles, apparel and some agricultural products, most notably dairy products, a category in which the CSFR, Hungary and Poland have a relative comparative advantage. In addition, quotas on steel exports to the United States from these countries, as well as from many others, were in place during most of the period covered in this paper.

Although many of the quotas which apply to the CSFR, Hungary and Poland remain underutilized, they still may act as an effective restraint on trade. Quotas are not applied by major product category but to specific products. Thus, rather than setting a limit on the importation of wool clothing, the United States places limits on specific types of wool clothing—for example, men's and boy's wool suit-coats. The quota limit on a specific product may be so low that it is not profitable to export such a small quantity. Furthermore, the quota agreement may require that exports be spread out over each year, further limiting the profitability of trade. For example, the agreement limiting the export of Polish steel to the United States prohibited Poland from exporting more than 60 percent of its yearly quota allotment in any two consecutive quarters.³⁰ The 1992 textile agreement between the United States and the CSFR requires the latter to space its exports to the United States “within each category evenly throughout each agreement period.”³¹

The United States has restricted the flow of certain goods simply by threatening to place limits on their importation. For example, the most recent textile agreement between the United States and Poland lists products for which no quotas are set, but for which the United States reserves the right to “consult” with the government of Poland to restrain the trade of these products if the United States believes such products are causing “market disruption” or the “risk of market disruption.” The agreement even sets limits on imports of these products while consultations are in progress.³² Another method

used to restrict exports of sensitive products to the United States is anti-dumping regulations.³³

Tariff barriers, nontariff barriers and anti-dumping measures have all been used to restrict the flow of goods from the CSFR, Hungary and Poland to the United States. Although some relief has been granted to Eastern Europe in recent years, restrictions still prevail on the products in which these countries have a relative comparative advantage.³⁴ The importance of these restrictions for each sector are discussed below.

Steel

The granting of MFN status to the CSFR and Poland reduced the tariffs they faced on steel exports to the United States from an average of 20-25 percent to an average of less than 5 percent.³⁵ However, quota restrictions and anti-dumping measures act as limits on steel products. Until March 1992, steel from the CSFR, Hungary and Poland was subject to quantitative restrictions. These limits were raised in 1989 and 1991, and, as part of the Trade Enhancement Initiative for Central and Eastern Europe, the United States committed itself to adjusting the ceilings further, either through increased flexibility in the administration of the quotas, or increasing the actual quotas.³⁶ This commitment, however, was never acted upon. At the end of March 1992, the United States allowed all of the quantitative restrictions on steel to elapse.

The end of quantitative restrictions on U.S. steel imports did not open the U.S. market to steel products from Eastern Europe. Within two months of the elimination of quotas, the U.S. steel industry accused every significant foreign supplier of steel to the United States of dumping their product in the U.S. market. In the summer of 1993, the USITC ruled that steel producers in 19 countries had dumped their products in the U.S. market, and that this action had resulted in injury or the potential for injury to the U.S. steel industry. In accordance with this finding, the

³⁰ USITC (March 1990, p. 11-8).

³¹ United States Department of State (July 21, 1992, p. 4).

³² See U.S. Department of State (January 28, 1992, pp. 8-10).

³³ Dumping is the practice of selling a product in foreign markets at a lower price than in the home market, or at price below the cost of production. For an analysis of the use of anti-dumping regulations as a protectionist device, see Coughlin (1991).

³⁴ The United States is not alone in restricting access to products from Eastern Europe. The European Union, despite concluding association agreements with the CSFR, Hungary

and Poland, still maintains restrictions on many products, most notably, agricultural, chemicals, iron and steel, textiles and apparel, and footwear.

³⁵ See USITC (November 1991, p. 117).

³⁶ As noted in the text, not only did the United States place limits on each type of steel product but even in the amount which could be imported during subperiods of the year.

USITC imposed duties ranging from 18 percent to 109 percent of the value of the steel product on imports from the dumping countries. Dumping duties on Polish exports to the United States of carbon steel plate were levied at 62 percent, effectively eliminating Polish exports of this product to the U.S. market. Although no charges of dumping were filed against the CSFR and Hungary, the size and extent of the dumping duties is likely to limit the growth of steel exports to the United States from all countries.³⁷

Prior to the anti-dumping case, the CSFR, Hungary and Poland had begun programs to make their "steel enterprises more market-oriented, cost-conscious and perhaps more export oriented."³⁸ Use of anti-dumping measures by the United States is an indication to these countries that even if they follow the prescriptions of the West and develop an efficient industry, they still may be denied access to U.S. markets.

Textiles and Apparel

U.S. imports of textiles and apparel from the CSFR, Hungary and Poland are covered by quotas in accordance with the Multifiber Arrangement.³⁹ Before the granting of MFN status to the CSFR and Poland, quota utilization rates (which indicate how close a country comes to meeting the quota on a particular product) for these countries were very low, because the tariffs acted as an effective barrier to trade.⁴⁰ Even though MFN tariffs are high, utilization rates have increased since the granting of MFN status. Utilization rates rose even as the United States has negotiated new textile and apparel agreements with the CSFR, Hungary and Poland which have increased these quotas.

Under the Trade Enhancement Initiative for Central and Eastern Europe, the United States

pledged to take steps to increase its imports of textiles and apparel from Eastern Europe. In accordance with this initiative, the United States raised the quotas on some imports from the CSFR, Hungary and Poland. The United States also promised to consider setting quotas for more broadly defined product categories which would allow the countries more flexibility in meeting the quotas.⁴¹

Chemicals

Tariffs on industrial chemicals and fertilizers average only 2 percent ad valorem and, thus, since the granting of MFN privileges to all three countries, they do not represent a significant barrier to trade. According to the Organization for Economic Co-operation and Development (OECD), the main obstacle to the growth of Eastern European chemical exports has been the use of anti-dumping measures by the West.⁴² For example, the U.S. chemical industry filed dumping charges in 1992 against the imports of sulfanilic acid from Hungary.⁴³ The USITC found preliminary evidence that the Hungarian producers were dumping this product in the United States and causing harm to the U.S. chemical industry. Temporary duties equal to 58 percent of the value of Hungarian shipments of sulfanilic acid were assessed. These duties were rescinded when, in its final decision in February 1993, the USITC ruled that there was not sufficient evidence that these imports were injuring the domestic industry.

Agriculture

Agricultural exports from the CSFR, Hungary and Poland are affected both by U.S. agricultural subsidies and nontariff barriers. According to the USITC, the only nontariff barriers in agriculture that significantly affect the CSFR, Hungary and

³⁷ The imposition of duties which block certain producers from the U.S. market does not necessarily lead to an increase in imports from the "nondumping" producers. The U.S. industry is free to file charges of dumping against foreign competitors at any time. Thus, the finding of dumping may act as a deterrent to other producers to expand their exports to the United States.

³⁸ USITC (November 1991, p. 117).

³⁹ The Multifiber Arrangement (MFA) refers to the bilaterally negotiated quota restrictions on textiles and apparel, which are placed by developed countries on imports from developing countries. The MFA is negotiated under the auspices of the GATT committee on textiles. See Hamilton (1990).

If Congress approves the GATT Uruguay Round of multilateral trade agreements, the MFA will be phased out over a

10-year period beginning in July 1995. Quota restrictions on textiles and apparel are then to be replaced by GATT-negotiated tariffs.

⁴⁰ As noted in the text above, non-MFN tariffs in textiles range from 50 percent to 100 percent, while MFN tariffs range from 20 percent to 35 percent.

⁴¹ See USITC (November 1991, p. 46).

⁴² OECD (1992, p. 92).

⁴³ Sulfanilic acid is a gray-white to white crystalline solid. Its main uses are in the production of synthetic dyes that in turn are used in foods, drugs and cosmetics, and in the production of optical brightening agents. Sulfanilic acid is also used in concrete additives. (USITC, February 1993.)

Poland are the quantitative restrictions on cheese imports.⁴⁴ Most cheese products are covered by quotas and those which are not face high tariff barriers. Furthermore, as noted above, cheese products are not eligible for GSP treatment.

As part of the TEI, the United States committed itself to increasing the access of cheese products from these countries into the U.S. market. Nonetheless, no progress has been made on this proposal. For example, in 1991 Hungary petitioned the United States to allow GSP benefits for the importation of goya cheese, one of the few cheeses for which importation into the United States is not limited by quotas. Imports, however, are restricted by a 25 percent tariff. Hungary provided 25 percent of the total U.S. imports of goya cheese in 1990. Although no goya cheese is produced in the United States, the U.S. dairy industry opposed the extension of GSP benefits to goya cheese, arguing that this product was a substitute for domestically produced, hard, Italian-type cheeses.⁴⁵ Because of this opposition, the United States refused Hungary's request to add goya cheese to the list of GSP-eligible products.

CONCLUSION

Foreign trade is vitally important for the CSFR, Hungary and Poland to facilitate the re-structuring of their economies. These countries are dependent upon exports to ensure a supply of foreign currency to finance capital purchases (reducing the pressures to incur foreign debt), and to promote economic growth, which in turn is critical to their political stability.

The governments of the CSFR, Hungary and Poland have made great progress over the past few years in reforming their economies. The role of the state has been reduced substantially through the deregulation of prices, the privatization of industries, and the adoption of legislation aimed at fostering the market system. Furthermore, all of these countries have substantially liberalized their trading environments by eliminating quotas, harmonizing tariffs, and permitting the convertibility of their currencies. Officials in these countries cite the continuation of Western trade barriers as one of the primary hindrances to their successful transition to market democracies.⁴⁶

The United States' economic growth has benefited from the reforms undertaken by the Eastern European countries. Most notably, U.S. exports to these countries have expanded substantially. Despite these gains, the United States continues to restrict access to its markets to goods produced in Eastern Europe. As shown in this article, the products in which the CSFR, Hungary and Poland have the greatest comparative advantage are precisely those in which the United States maintains the greatest restrictions on trade. Reducing the trade barriers to these products will spur economic growth in Eastern Europe, and is an important step the West can take to ensure that the countries of Eastern Europe continue along the path of reform.

REFERENCES

- Bank for International Settlements. 63rd Annual Report, June 1993.
- Burke, Justin. "Central European Countries Cite Obstacles to Economic Integration," *The Christian Science Monitor*, January 19, 1994, p. 9.
- Collins, Susan M., and Dani Rodrik. *Eastern Europe and the Soviet Union in the World Economy*. Institute for International Economics, May 1991.
- Collins, Susan M. "Policy Watch: U.S. Economic Policy Toward the Soviet Union and Eastern Europe," *The Journal of Economic Perspectives* (fall 1991), pp. 219-27.
- Coughlin, Cletus C. "U.S. Trade-Remedy Laws: Do They Facilitate or Hinder Free Trade?" this *Review* (July/August 1991), pp. 3-18.
- Erzan, Refik, and Christopher Holmes. "The Restrictiveness of the Multi-Fibre Arrangement on Eastern European Trade," Policy Research Working Papers, *WPS 860*, The World Bank (February 1992).
- Fieleke, Norman S. "Commerce With the Newly Liberalizing Countries: Promised Land, Quicksand, or What?" *New England Economic Review* (May/June 1990), pp. 19-33.
- Finger, Michael J. "Trade Policies in the United States," National Trade Policies, *Handbook of Comparative Economic Policies*, vol. 2. Greenwood Press, 1992, pp. 79-108.
- Green, Paula L. "U.S. Monitors EC Ties With Eastern Europe," *Journal of Commerce* (February 6, 1992).
- Hamilton, Carl B., editor. *Textiles Trade and the Developing Countries: Eliminating the Multi-Fibre Arrangement in the 1990s*. The World Bank, 1990.
- International Monetary Fund. *World Economic Outlook* (May 1993).
- Murrell, Peter. *The Nature of Socialist Economies: Lessons from Eastern European Foreign Trade*. Princeton University Press (1990).

⁴⁴ USITC (April 1992, p. 18).

⁴⁵ See USITC (March 1992) for details.

⁴⁶ Burke (January 19, 1994).

Organization for Economic Co-operation and Development. *Economic Surveys: Czech and Slovak Federal Republic*. OECD, December 1991.

_____. Reforming the Economies of Central and Eastern Europe. OECD, 1992.

_____. *Economic Surveys: Hungary*. OECD, 1993.

Ray, Edward J. "Protection of Manufacturers in the United States," in David Greenaway and others, eds., *Global Protectionism*. St. Martin's Press, 1991, pp. 12-39.

Rodrik, Dani. "Foreign Trade in Eastern Europe's Transition: Early Results," National Bureau of Economic Research *Working Paper Series No. 4064* (May 1992).

U.S. Department of State, Bureau of Economic and Business Affairs, Textiles Division. "United States and the Republic of Poland Sign New Textile Agreement" (Textiles Division, Public Release, January 28, 1992).

_____. "United States and the Czech and Slovak Federal Republic Amend Their Bilateral Textile Agreement" (Textiles Division, Public Release, July 21, 1992).

United States International Trade Commission. *U.S. Laws and U.S. and EC Trade Agreements Relating to Nonmarket Economies*. USITC, March 1990.

United States International Trade Commission, Office of Economics. "Legislation to Ensure Role for Congress in

Extending MFN Status to Nonmarket Economy Countries," *International Economic Review* (June-July 1990), pp. 7-8.

_____. "Liberalization of Foreign Trade in Czechoslovakia, Hungary, and Poland: Progress and Prospects," *International Economic Review* (August 1991), pp. 5-7.

United States International Trade Commission. Central and Eastern Europe: Export Competitiveness of Major Manufacturing and Services Sectors. *USITC Publication 2446* (November 1991).

_____. President's List of Articles Which May Be Designated Or Modified As Eligible Articles For Purposes of the U.S. Generalized System of Preferences. *USITC Publication 2491* (March 1992).

_____. Trade Between the United States and China, the Former Soviet Union, Central and Eastern Europe, the Baltic Nations, and Other Selected Countries During 1991. *USITC Publication 2503* (April 1992).

_____. Sulfanilic Acid from the Republic of Hungary and India. *USITC Publication 2603* (February 1993).

Wang, Z.K., and L. Alan Winters. "The Trading Potential of Eastern Europe," *Journal of Economic Integration* (autumn 1992), pp. 113-36.

Appendix

Index of Relative Comparative Advantage: CSFR

Product	1988	1989	1990	1991	1992
00100—Meat, poultry & other edible animals	3.692	3.938	3.597	1.072	0.031
00110—Dairy products & eggs	3.215	3.239	3.616	4.585	4.418
00120—Fruits & preparations	0.046	0.013	0.047	3.189	1.130
00130—Vegetables & preparations	0.034	0.000	0.000	0.017	0.495
00160—Bakery & confectionery products	0.360	0.151	0.231	0.731	0.270
00170—Tea, spices & preparations	0.000	0.000	1.184	0.000	0.000
00180—Other (soft beverages, processed coffee, etc.)	3.019	0.028	0.000	0.000	0.116
00190—Wine & related products	3.415	3.773	4.261	4.305	1.546
00200—Feedstuff and foodgrains	0.129	7.632	16.709	12.935	11.816
01000—Fish & shellfish	0.049	0.000	0.000	0.000	0.000
01010—Alcoholic beverages, except wine	0.010	0.944	0.077	0.038	0.126
01020—Other nonagricultural foods & food additives	0.133	0.595	0.885	0.468	0.530
10010—Fuel oil	0.000	0.004	0.000	0.000	0.000
10020—Other petroleum products	0.002	0.004	0.000	0.000	0.001
10030—Liquified petroleum gases	0.000	0.000	0.000	0.000	0.000
10100—Coal & other fuels, except gas	0.000	0.000	0.000	0.032	0.000
10300—Nuclear fuel materials & fuels	0.000	0.000	0.000	0.005	0.000
11000—Pulpwood and woodpulp	0.000	0.080	0.000	0.000	0.000
11100—Newsprint	0.038	2.309	0.000	0.000	0.000
11110—Paper & paper products, n.e.s.	0.080	0.000	0.000	0.017	0.041
12000—Cotton, wool & other natural fibers	0.000	3.923	0.000	0.000	0.000
12030—Hides & skins, & fur skins-raw	0.417	0.000	0.000	0.000	0.000
12060—Farming materials, including farm animals	0.000	0.031	0.125	0.410	0.366
12070—Other (tobacco, waxes, nonfood oils)	0.004	6.477	14.058	8.566	8.418
12100—Cotton cloth & fabrics, thread & cordage	3.268	4.971	2.902	1.812	3.902
12110—Wool, silk & other vegetable fabric	7.372	14.032	17.173	19.819	23.339
12135—Synthetic cloth & fabric, thread	0.528	5.618	5.218	9.048	10.218
12140—Other materials (hair, synthetics, etc.)	67.477	12.076	0.000	0.200	0.000
12150—Finished textile industrial supplies	11.145	3.257	1.468	1.555	0.776
12160—Leather & furs-unmanufactured	0.000	0.012	0.341	0.000	0.932
12320—Other materials, except chemicals	1.637	0.070	0.040	0.068	0.000
12500—Plastic materials	0.100	0.278	0.276	0.091	0.090
12510—Fertilizers, pesticides, and insecticides	0.007	0.000	0.023	0.000	0.000
12530—Industrial inorganic chemicals	0.863	3.117	0.736	1.282	2.610
12540—Industrial organic chemicals	0.732	0.075	0.114	0.439	0.500
12550—Other chemicals (coloring agents, print inks, paint)	0.026	0.418	0.100	1.726	4.199
13000—Lumber & wood in the rough	0.074	0.428	0.040	0.000	0.005
13010—Plywood & veneers	0.000	0.000	0.015	0.000	0.000
13020—Stone, sand, cement & lime	0.000	0.859	0.266	0.077	0.225
13100—Glass-plate, sheet, etc. (excluding automotive)	5.740	5.540	6.474	2.646	8.581
13110—Other-finished (shingles, molding, etc.)	1.676	0.280	0.302	0.140	0.089
13120—Nontextile floor & wall tiles and other covering	0.000	0.338	0.045	0.000	0.052
14000—Steelmaking & ferroalloying material	0.000	0.000	0.000	1.882	1.462
14100—Iron & steel mill products-semifinished	6.779	5.233	1.603	1.936	1.828
14200—Bauxite & aluminum	0.000	0.000	0.000	0.000	0.000

Product	1988	1989	1990	1991	1992
14220—Copper	0.000	0.000	0.000	0.000	0.013
14240—Nickel	0.736	0.000	0.000	0.000	0.010
14280—Other precious metals	0.000	0.000	0.000	0.000	0.000
14290—Miscellaneous nonferrous	0.050	0.000	0.000	0.550	0.346
15000—Iron and steel products, except advanced	1.911	2.256	0.664	3.417	1.730
15100—Iron and steel manufactured, advanced	0.044	0.008	0.014	0.285	0.834
15200—Finished metal shapes, except steel	0.006	0.004	0.042	0.042	0.098
16040—Sulfur & nonmetallic minerals	5.051	0.037	0.000	0.000	0.016
16050—Other (synthetic rubber, wood, cork, gums, etc.)	0.000	0.000	0.000	0.000	0.120
16120—Other (boxes, belting, glass, abrasives, etc.)	0.370	0.160	0.355	0.484	0.735
20000—Generators, transformers & accessories	0.977	0.019	0.000	0.074	0.103
20005—Electric apparatus & parts, n.e.c	0.008	0.049	0.002	0.065	0.061
21000—Drilling & oil field equipment	10.966	10.488	5.828	5.448	0.000
21010—Specialized mining & oil processing equipment	0.000	0.000	0.000	0.434	1.833
21030—Excavating, paving & construction	0.040	0.016	0.000	0.350	0.863
21040—Nonfarm tractors & parts	1.440	4.487	3.207	0.434	0.797
21100—Industrial engines, pumps, compressors & generators	0.000	0.002	0.081	0.115	0.093
21110—Food & tobacco processing machinery	0.000	0.000	0.000	0.118	0.483
21120—Machine tools, metal working	3.611	2.725	3.775	2.599	4.361
21130—Industrial textiles, sewing, & leather working machinery	2.023	3.872	3.845	6.689	6.092
21140—Woodworking, glass working, and plastic machinery	0.014	0.004	1.492	1.125	0.308
21150—Pulp & paper machinery	2.249	3.725	5.315	1.998	2.347
21160—Measuring, testing & control instruments	0.000	0.036	0.343	0.197	0.363
21170—Materials handling equipment	0.000	0.006	0.437	1.331	0.838
21180—Other industrial machinery	0.158	0.454	1.461	4.629	5.436
21190—Photo & other service industry machinery	0.076	0.138	0.019	0.221	0.179
21200—Agricultural machinery and equipment	13.782	14.761	22.738	11.487	9.580
21300—Computers	0.000	0.000	0.000	0.004	0.006
21301—Computer accessories, peripherals	0.001	0.105	0.025	0.003	0.062
21320—Semiconductors	0.000	0.000	0.000	0.014	0.009
21400—Telecommunications equipment	0.033	0.777	0.318	0.698	0.697
21500—Business machinery & equipment, except computers	0.283	0.121	0.183	0.070	0.050
21600—Laboratory, testing & control instruments	0.000	0.000	0.165	0.079	0.335
21610—Other scientific, medical & hospital equipment	0.000	0.000	0.045	0.016	0.085
22000—Civilian aircraft, complete - all	0.000	0.000	0.127	0.023	0.086
22010—Parts for civilian aircraft	0.002	0.006	0.000	0.070	0.161
22020—Engines for civilian aircraft	0.000	0.000	0.000	0.037	0.007
22220—Marine engines & parts	0.000	0.000	0.000	0.000	0.000
30000—Complete & assembled-new & used	0.001	0.000	0.000	0.000	0.000
30100—Complete & assembled	0.004	0.478	0.000	0.000	0.016
30200—Engines & engine parts	0.000	0.008	0.020	0.085	0.114
30220—Automotive tires & tubes	10.637	9.019	12.498	13.744	9.249
30230—Other parts & accessories	0.000	0.023	0.005	0.011	0.049
40000—Apparel & household goods-cotton	0.689	0.398	0.398	0.709	1.023
40010—Apparel & household goods-wool	20.882	13.846	14.072	20.096	10.616
40020—Apparel & household goods-other textiles	0.042	0.542	0.436	0.894	0.974
40030—Nontextile apparel & household goods	0.804	1.142	0.820	0.418	0.427
40040—Footwear of leather, rubber, or other materials	4.939	8.644	8.741	5.845	4.306
40050—Sporting & camping apparel and footwear & gear	9.108	0.942	0.392	2.958	2.179
40100—Medicinal, dental & pharmaceutical preparations	2.254	0.116	0.249	0.369	1.367

Product	1988	1989	1990	1991	1992
40110—Books, magazines & other printed material	3.030	5.387	3.712	1.521	1.906
40120—Toiletries & cosmetics	0.000	0.000	2.034	0.000	0.367
40140—Other products (notions, writing & art supplies)	1.579	1.194	1.538	1.601	1.598
41000—Furniture, household items, baskets	1.898	2.914	3.516	3.304	2.699
41010—Glassware and porcelain	19.451	19.780	20.002	13.120	16.421
41020—Cookware, chinaware, cutlery, house & garden wares	0.402	0.210	0.419	1.202	0.719
41030—Household & kitchen appliances	0.004	0.000	0.000	0.009	0.007
41040—Rugs & other textile floor covering	0.108	0.060	0.417	1.404	0.743
41050—Other (clocks, portable typewriters, other goods)	0.236	1.614	1.064	0.751	1.020
41100—Motorcycles & parts	2.011	1.968	1.052	2.383	1.825
41110—Pleasure boats & motors	0.000	0.000	0.064	0.011	0.000
41120—Toys, shooting & sporting goods & bicycles	1.734	0.499	0.535	0.676	1.337
41130—Photo & optical equipment	0.005	0.000	0.000	0.026	0.013
41140—Musical instruments & other recreational equipment	2.628	7.830	9.132	14.905	12.279
41210—Radios, phonographs, tape decks & other stereo	0.000	0.000	0.000	0.000	0.000
41220—Records, tapes & disks	0.580	2.122	6.494	2.147	1.460
41300—Numismatic coins	0.096	0.273	0.293	0.186	0.033
41310—Jewelry (watches, rings, etc.)	1.239	0.306	0.163	0.251	0.685
41320—Artwork, antiques, stamps and other collectibles	1.527	1.866	2.124	1.877	3.018
42000—Nursery stocks, cut flowers, Christmas trees	24.705	0.055	0.000	0.000	0.000
42100—Gem diamonds-uncut or unset	0.000	0.000	0.000	0.011	0.000
42110—Other gem stones-precious, semiprecious, & imitations	18.437	28.459	29.001	26.076	28.718
50000—Military aircraft & parts	0.000	0.000	0.000	0.072	0.223
50010—Other military equipment	0.000	1.168	2.261	2.980	3.917
50020—U.S. goods returned, & reimports	0.083	0.238	0.068	0.243	0.224
50030—Minimum value shipments	3.031	2.657	2.932	2.595	2.258
50040—Other (movies, miscellaneous imports & special transactions)	0.401	2.284	1.511	5.017	7.577

Index of Relative Comparative Advantage: Hungary

Product	1988	1989	1990	1991	1992
00000—Green coffee	0.000	0.097	0.000	0.000	0.000
00100—Meat, poultry & other edible animals	14.591	9.405	12.703	13.159	8.179
00110—Dairy products & eggs	11.418	19.675	14.758	19.731	21.707
00120—Fruits & preparations	6.771	10.356	10.951	12.691	8.122
00130—Vegetables & preparations	4.861	9.420	4.692	3.826	2.697
00140—Nuts & preparations	0.096	0.069	0.000	0.000	0.050
00150—Food oils & oilseeds	0.057	0.000	0.418	0.000	0.614
00160—Bakery & confectionery products	0.144	0.814	1.713	1.816	1.361
00170—Tea, spices & preparations	4.940	6.259	5.211	5.039	3.535
00180—Other (soft beverages, processed coffee, etc.)	2.051	2.679	1.673	1.157	0.271
00190—Wine & related products	1.393	1.778	1.993	2.197	2.516
00200—Feedstuff and foodgrains	0.819	1.749	1.310	1.441	5.223
01000—Fish & shellfish	0.000	0.001	0.026	0.000	0.000
01010—Alcoholic beverages, except wine	0.016	0.044	0.066	0.104	0.150
01020—Other nonagricultural foods & food additives	2.170	1.416	1.667	1.439	1.268
10010—Fuel oil	0.000	0.000	0.000	0.001	0.000
10020—Other petroleum products	0.179	0.303	0.177	0.190	0.234
10300—Nuclear fuel materials & fuels	0.000	0.000	0.056	0.069	0.014

Product	1988	1989	1990	1991	1992
11000—Pulpwood and woodpulp	0.004	0.000	0.000	0.000	0.000
11110—Paper & paper products, n.e.s.	0.021	0.027	0.004	0.000	0.010
12000—Cotton, wool & other natural fibers	1.253	2.597	0.465	1.331	1.180
12030—Hides & skins, & fur skins-raw	0.159	0.067	0.099	0.026	0.000
12060—Farming materials, including farm animals	11.475	25.183	5.298	0.403	3.101
12070—Other (tobacco, waxes, nonfood oils)	1.093	2.792	3.089	5.543	3.044
12100—Cotton cloth & fabrics, thread & cordage	9.846	6.120	4.046	1.343	1.325
12110—Wool, silk & other vegetable fabric	6.299	8.118	4.086	4.559	3.813
12135—Synthetic cloth & fabric, thread & cordage	6.093	4.726	2.439	1.953	1.364
12140—Other materials (hair, synthetics, etc.)	2.417	2.933	5.336	0.758	0.047
12150—Finished textile industrial supplies	5.273	2.070	3.206	1.927	2.001
12160—Leather & furs-unmanufactured	0.143	1.307	0.611	2.222	0.000
12320—Other materials, except chemicals	0.293	0.029	0.740	1.006	1.140
12500—Plastic materials	0.049	0.541	2.453	1.372	1.371
12510—Fertilizers, pesticides, and insecticides	0.000	0.007	0.000	0.789	1.679
12530—Industrial inorganic chemicals	2.253	1.391	1.542	1.481	1.621
12540—Industrial organic chemicals	0.476	1.137	1.234	0.750	1.171
12550—Other chemicals (coloring agents, print inks, paint)	3.683	0.737	0.653	0.575	0.203
13000—Lumber & wood in the rough	0.000	0.000	0.000	0.001	0.001
13010—Plywood & veneers	0.000	0.013	0.009	0.000	0.000
13020—Stone, sand, cement & lime	0.095	0.006	0.000	0.000	0.000
13100—Glass-plate, sheet, etc. (excluding automotive)	0.033	0.154	0.000	0.128	0.033
13110—Other-finished (shingles, molding, wallboard, etc.)	0.000	0.001	0.002	0.004	0.009
13120—Nontextile floor & wall tiles and other covering	0.000	0.000	0.012	0.088	0.000
14000—Steelmaking & ferroalloying materials	0.046	0.000	0.003	0.000	0.000
14100—Iron & steel mill products-semifinished	1.917	1.957	2.083	1.162	0.988
14200—Bauxite & aluminum	0.154	0.010	0.000	0.086	0.000
14220—Copper	0.000	0.000	0.000	0.000	0.040
14240—Nickel	0.000	0.296	0.145	0.000	0.000
14270—Nonmonetary gold	0.032	0.029	0.034	0.007	0.000
14280—Other precious metals	0.000	0.000	0.000	0.000	0.000
14290—Miscellaneous nonferrous	0.063	0.042	0.069	0.645	1.095
15000—Iron and steel products, except advanced manufacturers	0.076	0.238	0.003	0.003	0.138
15100—Iron and steel manufacturers, advanced	0.148	0.011	0.017	0.026	0.055
15200—Finished metal shapes, except steel	6.805	7.929	6.608	5.552	9.806
16040—Sulfur & nonmetallic minerals	0.549	0.205	0.203	0.091	0.000
16050—Other (synthetic rubber, wood, cork, gums, resins, etc.)	0.022	0.000	0.065	0.136	0.066
16110—Audio & visual tapes & other media	0.000	0.008	0.001	0.000	0.000
16120—Other (boxes, belting, glass, abrasives, etc.)	1.040	1.426	3.016	2.535	1.666
20000—Generators, transformers & accessories	0.003	0.075	0.180	0.522	1.268
20005—Electric apparatus & parts, n.e.c	0.449	0.787	0.640	0.897	1.295
21000—Drilling & oil field equipment & platforms	0.467	0.000	0.000	0.000	0.000
21010—Specialized mining & oil processing equipment	0.000	0.000	0.000	0.000	0.024
21030—Excavating, paving & construction machinery	0.202	0.014	0.191	1.150	0.113
21040—Nonfarm tractors & parts	0.639	1.689	0.340	0.025	3.454
21100—Industrial engines, pumps, compressors & generators	0.054	0.174	0.325	0.610	0.635
21110—Food & tobacco processing machinery	0.089	0.087	0.079	0.009	0.006
21120—Machine tools, metal working, molding & rolling	0.183	1.046	0.531	0.949	0.292
21130—Industrial textiles, sewing, & leather working machinery	0.031	0.000	0.010	0.016	0.176
21140—Woodworking, glass working, & plastic & rubber machinery	0.029	0.012	0.119	0.152	3.631

Product	1988	1989	1990	1991	1992
21150—Pulp & paper machinery	0.002	0.015	0.010	0.600	0.371
21160—Measuring, testing & control instruments	0.254	0.314	0.212	0.193	0.671
21170—Materials handling equipment	0.138	0.332	0.289	0.514	0.322
21180—Other industrial machinery	1.301	1.588	1.846	0.908	0.963
21190—Photo & other service industry machinery	0.225	0.290	0.176	0.144	0.122
21200—Agricultural machinery and equipment	3.852	7.856	7.170	8.139	10.255
21300—Computers	0.000	0.001	0.003	0.002	0.001
21301—Computer accessories, peripherals & parts	0.000	0.007	0.004	0.013	0.006
21320—Semiconductors	0.007	0.001	0.009	0.003	0.030
21400—Telecommunications equipment	0.191	0.014	0.012	0.026	0.014
21500—Business machinery & equipment, except computers	0.010	0.290	0.141	0.079	0.030
21600—Laboratory, testing & control instruments	0.013	0.078	0.060	0.432	1.204
21610—Other scientific, medical & hospital equipment	0.071	0.172	0.075	0.113	0.163
22000—Civilian aircraft, complete - all	0.009	0.003	0.009	0.004	0.011
22010—Parts for civilian aircraft	0.000	0.005	0.019	0.033	0.010
22020—Engines for civilian aircraft	0.000	0.000	0.000	0.000	0.096
22100—Railway transportation equipment	0.086	0.000	0.174	0.512	0.010
22210—Other commercial vessels, new and used	0.000	0.000	0.000	0.698	0.000
22220—Marine engines & parts	0.000	0.000	0.000	0.000	0.011
30100—Trucks, buses, & special purpose vehicles	0.000	0.005	0.000	0.095	0.001
30110—Bodies & chassis for trucks & buses	0.001	2.774	15.454	29.076	9.517
30200—Engines & engine parts	0.026	0.002	0.004	0.001	0.001
30220—Automotive tires & tubes	5.801	5.468	4.798	1.667	0.643
30230—Other parts & accessories	2.261	2.303	2.417	2.601	2.921
40000—Apparel & household goods-cotton	1.245	1.688	1.715	1.646	1.972
40010—Apparel & household goods-wool	17.527	18.727	14.530	13.901	21.349
40020—Apparel & household goods-other textiles	2.414	2.043	1.512	1.472	1.920
40030—Nontextile apparel & household goods	1.054	1.365	1.937	0.293	0.333
40040—Footwear of leather, rubber, or other materials	4.334	2.658	4.401	3.076	2.342
40050—Sporting & camping apparel, footwear & gear	0.467	0.364	0.448	0.614	0.516
40100—Medicinal, dental & pharmaceutical preparations	5.698	5.677	6.617	4.566	3.644
40110—Books, magazines & other printed material	0.586	0.458	0.303	0.741	0.153
40120—Toiletries & cosmetics	0.059	0.039	0.016	0.172	0.060
40140—Other products (notions, writing & art supplies)	0.071	0.583	0.375	0.323	0.258
41000—Furniture, household items, baskets	2.028	2.181	1.558	1.816	0.929
41010—Glassware and porcelain	4.854	6.253	6.242	7.284	9.624
41020—Cookware, chinaware, cutlery, & other household goods	0.919	1.953	1.018	1.209	1.365
41030—Household & kitchen appliances	0.011	0.000	0.006	0.028	0.005
41040—Rugs & other textile floor covering	0.652	0.557	0.914	0.709	0.704
41050—Other (clocks, portable typewriters, other household goods)	6.246	2.651	2.073	2.936	1.817
41100—Motorcycles & parts	0.000	0.054	0.000	0.000	0.000
41110—Pleasure boats & motors	0.164	0.588	0.174	0.007	0.123
41120—Toys, shooting & sporting goods, & bicycles	0.100	0.086	0.137	0.965	1.794
41130—Photo & optical equipment	0.000	0.253	0.215	0.159	0.149
41140—Musical instruments & other recreational equipment	0.102	0.318	0.315	0.300	0.352
41200—Television receivers, vcrs & other video equipment	0.000	0.000	0.000	0.000	0.000
41210—Radios, phonographs, tape decks & other stereo	0.000	0.000	0.001	0.003	0.000
41220—Records, tapes & disks	2.405	1.617	2.066	1.810	1.391
41300—Numismatic coins	0.059	0.078	6.805	0.668	0.223
41310—Jewelry (watches, rings, etc.)	0.108	0.070	0.048	0.007	0.000

Product	1988	1989	1990	1991	1992
41320—Artwork, antiques, stamps and other collectibles	0.664	0.695	1.063	4.373	1.429
42000—Nursery stocks, cut flowers, Christmas trees	0.000	0.003	0.055	0.205	0.246
42100—Gem diamonds-uncut or unset	0.017	0.000	0.000	0.000	0.000
42110—Other gem stones-precious, semiprecious & imitation	0.000	0.016	0.004	0.000	0.000
50000—Military aircraft & parts	0.000	0.000	0.000	0.000	0.008
50010—Other military equipment	3.655	3.570	2.698	2.423	4.116
50020—U.S. goods returned, & reimports	0.106	0.090	0.070	0.224	0.129
50030—Minimum value shipments	0.511	0.364	0.380	0.401	0.378
50040—Other (movies, miscellaneous imports & special transactions)	0.603	0.577	3.002	0.050	1.433

Index of Relative Comparative Advantage: Poland

Product	1988	1989	1990	1991	1992
00000—Green coffee	0.000	0.025	0.000	0.000	0.000
00020—Cane and beet sugar	0.000	0.072	0.000	0.000	0.000
00100—Meat, poultry & other edible animals	38.943	37.600	25.330	11.456	8.119
00110—Dairy products & eggs	6.980	13.598	7.710	11.218	21.245
00120—Fruits & preparations	1.227	2.234	2.184	4.453	3.546
00130—Vegetables & preparations	0.803	1.038	1.214	1.788	1.298
00150—Food oils & oilseeds	0.490	2.364	18.895	0.677	0.548
00160—Bakery & confectionery products	1.024	1.522	1.335	2.500	3.081
00170—Tea, spices & preparations	0.941	0.104	0.509	0.014	0.192
00180—Other (soft beverages, processed coffee, etc.)	0.905	0.957	1.090	0.570	2.039
00190—Wine & related products	0.096	0.122	0.074	0.193	0.296
00200—Feedstuff and foodgrains	7.577	0.153	0.024	4.586	4.428
01000—Fish & shellfish	2.261	2.057	4.079	3.731	1.579
01010—Alcoholic beverages, except wine	0.151	0.263	1.560	1.573	0.623
01020—Other nonagricultural foods & food additives	0.612	0.000	0.000	0.000	0.000
10010—Fuel oil	0.000	0.000	0.000	0.000	0.408
10020—Other petroleum products	0.000	0.000	0.000	0.000	0.000
10100—Coal & other fuels, except gas	0.000	36.870	0.000	0.000	0.139
10300—Nuclear fuel materials & fuels	0.000	0.000	0.000	0.023	0.000
11000—Pulpwood and woodpulp	0.000	0.000	0.000	0.000	0.000
11110—Paper & paper products, n.e.s.	0.002	0.047	0.002	0.000	0.001
12030—Hides & skins, & fur skins-raw	0.566	0.795	0.593	1.845	2.689
12050—Natural rubber & similar gums	0.000	0.000	0.000	0.000	0.000
12060—Farming materials, including farm animals	9.954	2.174	2.867	1.913	2.326
12070—Other (tobacco, waxes, nonfood oils)	14.229	8.507	9.420	10.847	14.617
12100—Cotton cloth & fabrics, thread & cordage	2.222	0.634	1.167	1.794	0.672
12110—Wool, silk & other vegetable fabric	12.146	15.070	19.067	27.927	34.972
12135—Synthetic cloth & fabric, thread & cordage	1.011	1.782	2.071	2.919	2.880
12140—Other materials (hair, synthetics, etc.)	44.130	0.559	0.000	0.000	0.000
12150—Finished textile industrial supplies	0.001	0.676	0.051	0.010	0.000
12160—Leather & furs-unmanufactured	0.000	0.094	0.324	0.092	0.104
12320—Other materials, except chemicals	0.028	2.298	0.000	0.002	0.016
12500—Plastic materials	0.016	0.016	0.034	0.015	0.148
12510—Fertilizers, pesticides, and insecticides	0.002	0.131	0.000	1.959	2.332
12530—Industrial inorganic chemicals	0.624	0.470	1.738	2.921	0.974
12540—Industrial organic chemicals	0.445	0.731	0.263	0.513	0.250

Product	1988	1989	1990	1991	1992
12550—Other chemicals (coloring agents, print inks, paint)	2.636	1.089	1.319	4.231	4.385
13000—Lumber & wood in the rough	0.000	0.000	0.000	0.000	0.000
13010—Plywood & veneers	0.734	0.000	0.090	0.741	3.899
13020—Stone, sand, cement & lime	0.000	0.000	0.000	0.021	0.000
13100—Glass-plate, sheet, etc. (excluding automotive)	0.084	0.000	1.746	1.788	0.931
13110—Other-finished (shingles, molding, wallboard, etc.)	0.000	1.413	0.387	0.000	0.005
13120—Nontextile floor & wall tiles and other covering	0.000	0.002	0.000	0.000	0.000
14000—Steelmaking & ferroalloying materials	0.000	0.000	0.194	0.000	0.580
14100—Iron & steel mill products-semifinished	3.339	3.309	2.773	4.461	1.915
14200—Bauxite & aluminum	0.151	0.090	0.088	0.178	0.000
14220—Copper	6.709	13.997	0.000	0.000	0.018
14240—Nickel	0.550	0.000	0.637	0.000	0.000
14260—Zinc	6.233	0.017	1.277	0.020	1.756
14270—Nonmonetary gold	0.000	0.000	0.000	0.030	0.000
14280—Other precious metals	0.000	0.000	0.000	0.002	0.000
14290—Miscellaneous nonferrous	0.099	0.000	0.006	0.187	0.000
15000—Iron and steel products, except advanced manufacturers	3.122	2.625	2.380	2.249	1.404
15100—Iron and steel manufacturers, advanced	1.122	1.831	1.563	2.255	1.311
15200—Finished metal shapes, except steel	2.742	4.467	6.841	8.239	9.644
16040—Sulfur & nonmetallic minerals	0.164	0.054	0.026	0.004	0.018
16050—Other (synthetic rubber, wood, cork, gums, resins, etc.)	0.084	0.010	0.549	0.328	0.163
16110—Audio & visual tapes & other media	0.000	0.000	0.020	0.000	0.000
16120—Other (boxes, belting, glass, abrasives, etc.)	0.430	0.120	0.182	0.401	0.199
20000—Generators, transformers & accessories	0.375	0.647	0.527	1.216	0.443
20005—Electric apparatus & parts, n.e.c.	0.008	0.276	0.433	0.544	0.892
21000—Drilling & oil field equipment & platforms	0.772	0.052	0.017	0.057	0.202
21010—Specialized mining & oil processing equipment	0.000	0.000	0.000	0.219	0.291
21030—Excavating, paving & construction machinery	0.284	0.191	0.168	0.078	0.520
21040—Nonfarm tractors & parts	34.255	15.577	22.543	27.693	12.064
21100—Industrial engines, pumps, compressors & generators	0.497	0.168	0.318	0.490	0.773
21110—Food & tobacco processing machinery	0.054	0.186	0.292	0.400	1.063
21120—Machine tools, metal working, molding & rolling	3.013	3.118	4.097	4.574	4.903
21130—Industrial textiles, sewing, & leather working machinery	0.011	0.103	0.024	0.074	0.000
21140—Woodworking, glass working, & plastic & rubber machinery	0.148	0.319	0.742	0.710	0.570
21150—Pulp & paper machinery	0.034	0.122	0.032	0.056	0.148
21160—Measuring, testing & control instruments	0.151	0.461	0.631	0.686	0.632
21170—Materials handling equipment	1.264	0.922	0.526	0.674	0.140
21180—Other industrial machinery	0.249	0.936	1.224	1.311	2.106
21190—Photo & other service industry machinery	0.757	0.687	0.841	0.709	0.739
21200—Agricultural machinery and equipment	2.403	4.637	7.728	7.220	10.719
21300—Computers	0.000	0.000	0.001	0.013	0.000
21301—Computer accessories, peripherals & parts	0.006	0.000	0.005	0.018	0.011
21320—Semiconductors	0.000	0.000	0.024	0.050	0.043
21400—Telecommunications equipment	0.010	0.010	0.069	0.028	0.010
21500—Business machines & equipment, except computers	0.025	0.142	0.093	0.189	0.076
21600—Laboratory, testing & control instruments	0.197	0.209	0.138	0.120	0.342
21610—Other scientific, medical & hospital equipment	0.095	0.103	0.037	0.083	0.226
22000—Civilian aircraft, complete - all	0.858	0.678	0.610	0.362	0.210
22010—Parts for civilian aircraft	0.334	0.154	0.146	0.223	0.008
22020—Engines for civilian aircraft	1.080	0.815	0.883	0.665	0.583

Product	1988	1989	1990	1991	1992
22100—Railway transportation equipment	0.000	0.107	0.753	2.995	4.603
22210—Other commercial vessels, new and used	0.000	0.000	0.198	0.000	0.000
22220—Marine engines & parts	0.000	0.007	0.000	0.021	0.000
30000—Passenger cars complete & assembled (new and used)	0.001	0.000	0.000	0.000	0.000
30100—Trucks, buses, & special purpose vehicles	0.349	0.357	0.376	0.335	0.214
30110—Bodies & chassis for trucks & buses	0.000	0.000	0.000	0.094	0.000
30200—Engines & engine parts	0.014	0.159	0.233	0.177	0.212
30220—Automotive tires & tubes	0.000	0.000	0.125	0.855	0.660
30230—Other parts & accessories	0.023	0.035	0.028	0.040	0.096
40000—Apparel & household goods-cotton	2.692	2.802	3.593	2.109	1.981
40010—Apparel & household goods-wool	7.677	7.618	7.535	8.635	14.474
40020—Apparel & household goods-other textiles	1.284	0.952	1.330	1.527	1.384
40030—Nontextile apparel & household goods	0.176	0.098	0.301	0.074	0.040
40040—Footwear of leather, rubber, or other materials	1.138	1.699	1.178	1.891	2.439
40050—Sporting & camping apparel, footwear & gear	0.571	0.253	0.151	0.187	0.456
40100—Medicinal, dental & pharmaceutical preparations	1.728	1.006	0.293	0.485	0.435
40110—Books, magazines & other printed material	0.122	0.118	0.150	0.059	0.174
40120—Toiletries & cosmetics	0.055	0.025	0.032	0.012	0.046
40140—Other products (notions, writing & art supplies)	0.010	0.014	0.069	0.094	0.078
41000—Furniture, household items, baskets	2.617	2.883	3.681	3.452	2.989
41010—Glassware and porcelain	5.992	14.285	19.087	25.244	28.039
41020—Cookware, chinaware, cutlery, & other household goods	0.745	0.489	0.720	0.437	0.330
41030—Household & kitchen appliances	0.120	0.116	0.553	1.337	1.084
41040—Rugs & other textile floor covering	0.295	0.053	0.170	0.135	0.166
41050—Other (clocks, portable typewriters, other household goods)	2.462	1.848	2.991	3.058	2.453
41100—Motorcycles & parts	0.000	0.002	0.000	0.000	0.071
41110—Pleasure boats & motors	0.048	0.076	0.297	0.000	0.009
41120—Toys, shooting & sporting goods, & bicycles	0.448	0.488	0.507	0.316	0.385
41130—Photo & optical equipment	0.000	0.044	0.052	0.043	0.052
41140—Musical instruments & other recreational equipment	0.015	0.007	0.071	0.407	0.160
41200—Television receivers, vcrs & other video equipment	0.000	0.000	0.000	0.000	0.029
41210—Radios, phonographs, tape decks & other stereo	0.000	0.000	0.007	0.007	0.014
41220—Records, tapes & disks	0.160	0.066	0.125	0.380	0.505
41300—Numismatic coins	6.560	1.878	0.112	0.807	0.975
41310—Jewelry (watches, rings, etc.)	0.014	0.034	0.092	0.112	0.144
41320—Artwork, antiques, stamps and other collectibles	0.084	0.674	0.234	0.309	0.365
42000—Nursery stocks, cut flowers, Christmas trees	1.269	0.000	0.061	0.042	0.380
42100—Gem diamonds-uncut or unset	0.000	0.000	0.024	0.000	0.000
42110—Other gem stones-precious, semiprecious & imitation	0.050	0.022	0.044	0.103	0.191
50000—Military aircraft & parts	0.004	0.000	0.163	0.221	1.420
50010—Other military equipment	0.105	0.000	0.130	0.311	0.373
50020—U.S. goods returned, & reimports	0.422	0.462	0.332	0.412	0.515
50030—Minimum value shipments	0.727	0.567	0.535	0.535	0.728
50040—Other (movies, miscellaneous imports & special transactions)	0.372	0.170	0.728	0.246	1.640

John C. Weicher

John C. Weicher is a senior fellow at the Hudson Institute and a visiting scholar at the Federal Reserve Bank of St. Louis. Heidi L. Beyer provided research assistance.

The New Structure of the Housing Finance System

AFTER 25 YEARS OF ECONOMIC evolution and 15 years of political turmoil, the U.S. housing finance system has changed in fundamental ways, and the structure of the new system is becoming apparent. The system is still intended to allocate credit to housing and hold mortgage rates below their free-market level, but this subsidy is provided through different institutional arrangements. The dominant institutions are now extremely large government-sponsored enterprises (GSEs) which operate in the secondary mortgage market, issuing securities that are backed by mortgages and buying mortgages originated by other institutions. They have taken the place of small local savings and loan associations which make loans directly to homebuyers and hold the mortgages in their own portfolios. The cost of the subsidy falls on taxpayers who bear the risk of failure by the GSEs.

The public purpose of government intervention in the housing finance system has always been to promote homeownership, giving force to a social preference that derives from a widely held but rarely analyzed belief that homeowners are better citizens, because they “have a stake in society.” Subsidies are appropriate because families will not take this social benefit into account in deciding whether to buy a home. The system also has two subsidiary goals: (1) countercyclical support for housing production; and (2) geographic equity (as defined by public policy) in the mortgage

market. The latter is more directly related to the purpose of promoting homeownership.

Achieving these purposes is the responsibility mainly of privately owned institutions which are supposed to meet them while maximizing profit and avoiding direct cost to taxpayers. This is also true of the major housing finance agencies within the federal government; they do not normally receive funds from the U.S. Treasury. The private as well as public institutions operate under statutes which define their powers, limitations and privileges, and delineate what they can hold as assets and liabilities. To some extent, they compete against each other.

The home mortgage market consists of some \$3 trillion of household debt, nearly all of it held by private institutions, of which more than \$1 trillion is explicitly or implicitly guaranteed by the federal government (not counting deposit insurance). There is continuing tension between the public purposes of the system and the safety and soundness—and profits—of the privately owned institutions that predominate in it.

This paper first describes the present structure of the housing finance system, contrasting it with the traditional system and explaining why the system has changed. It concludes with a discussion of the major issues that will face public policy over the next few years.

THE CURRENT SYSTEM

Mortgage and Housing Markets

The mortgage market has traditionally been separate from other capital markets, because mortgages differ in key respects from other debt instruments. A home mortgage is a loan to an individual or couple for the purpose of buying a particular house. The amount the lender is willing to loan depends on the value of the property. The mortgagor promises to repay the loan over time. If he or she fails to do so, thus defaulting on the mortgage, the lender can foreclose, take title to the property, and sell it to someone else. The default risk (also termed credit risk) depends on changes in the value of the property and in the circumstances of the owner, such as job loss, divorce, or the death of a husband or wife. The extent of loss in the event of default depends on changes in property values. Real estate markets are local markets, so evaluating a particular piece of property requires local expertise. For these reasons, mortgages have traditionally been illiquid; investors have been willing to buy them only if they have the knowledge required to evaluate them.

The standard mortgage instrument—until the 1980s, almost the only mortgage instrument—is a fixed-rate, level-payment, long-term, self-amortizing loan. The term usually runs for 30 years. Such mortgages carry prepayment risk as well as default risk. The term can be shortened only at the option of the borrower, by prepaying the loan. If market interest rates fall, as happened most recently during 1993-94, mortgagors are likely to prepay their loans and refinance their homes at a lower interest rate. If rates rise, mortgagors are unlikely to prepay unless they are moving, and lenders will find themselves earning below-market rates on their mortgage portfolios. Thus, lenders bear the risk of adverse movements in interest rates. This was a particular problem during the inflation of the late 1970s. As a result, mortgages with adjustable rates (ARMs) were authorized and became common in the early 1980s. A variety of other new instruments also have come into existence, such as balloon mortgages, which are not fully amortized over their term, and graduated payment mortgages, which carry fixed interest rates but have lower payments in the early years. The traditional standard mortgage remains the most common, although its popularity relative to ARMs has varied as interest rates have fluctuated. Fixed-rate mortgages are more popular among borrowers when

the general level of interest rates is low and ARMs are more popular when the level is high.

The dominant position of the standard mortgage developed under the auspices of the federal government, specifically the Federal Housing Administration (FHA), which was created in the 1930s to insure home mortgages. Buyers pay a mortgage insurance premium to FHA, and in return FHA guarantees that lenders will receive payment of the outstanding principal balance on the mortgage in the event of default and foreclosure. FHA is required by law to operate on an actuarially sound basis; its insurance premiums are supposed to cover its losses and operating costs. Once FHA demonstrated the viability and profitability of such mortgages, the “FHA mortgage” also became the norm for conventional mortgages (those not insured or guaranteed by a government agency).

Primary Lenders

The local nature of real estate markets has meant that mortgage lenders have traditionally been local institutions. The most important have been the savings and loan associations (S&Ls), both in terms of their share of the mortgage market and the share of mortgages in their portfolios. The S&Ls started as local specialized mortgage portfolio lenders, obtaining deposits from “small savers” within their locality and making mortgage loans there also. Until 1983 their lending areas were geographically limited by statutes and regulation. Typically, their deposits have been locally generated as well, though there has been no geographic limitation on liabilities. Mutual savings banks, concentrated in the Northeast, are similar to S&Ls as specialized mortgage portfolio lenders, but they developed independently and started with a different purpose: to provide a range of financial services to households. Savings banks and S&Ls together are usually termed “thrifts.” They have access to the national capital markets through the Federal Home Loan Bank System, a set of 12 regional Federal Home Loan Banks which they own. Chartered and regulated by the federal government, the Home Loan Banks are able to borrow at preferential rates in the capital markets. Commercial banks also hold a significant share of home mortgages, but mortgages comprise a minor fraction of their assets. Until 1989 they could not belong to the Home Loan Bank System; they now can if their mortgage holdings are large enough.

S&Ls, mutual savings banks and commercial banks are primary lenders; they originate mortgages which they hold in their own portfolios. A large number of mortgages, however, are originated by mortgage bankers, for immediate sale in the secondary market to an investor who expects to hold them. Mortgage bankers make their money from fees for originating mortgages and often for servicing them, collecting the monthly payments and transmitting them to the investor. Mortgage banking developed as an important component of the housing finance system when FHA began to insure mortgages. FHA insurance and its uniform national underwriting standards meant that specialized knowledge of local housing markets was less important for investors. Mortgage bankers have since developed the skills necessary to originate conventional mortgages and now originate just under half of all home mortgages.

Securitization and the Government-Sponsored Enterprises

The limitations of mortgages as investment vehicles led to the creation of mortgage-backed securities (MBSs) beginning in 1970. Mortgage securitization consists of combining a group of mortgages into a pool and selling shares in the pool to investors. This spreads the risk of default over a number of mortgages and allows investors to calculate the probability of default for the mortgages in the pool with more accuracy than for any individual mortgage. The earliest and simplest MBSs are known as pass-through securities; the servicer collects principal and interest payments and passes them through, without taxation, to the investor.

The pass-through security does not reduce prepayment risk. More recent forms, the Collateralized Mortgage Obligation (CMO) and the Real Estate Mortgage Investment Conduit (REMIC), partition the principal cash flow from a pool of mortgages or MBSs into maturity classes, or tranches. Each investor receives a proportionate share of all interest payments. Principal payments are allocated in full as they occur to each tranche in turn, starting with the shortest-maturity tranche. Tranches are separately priced and sold to investors with different time horizons. Investors in the longer-term tranches

incur greater interest rate risk, but have some protection against prepayment. They are not, however, protected in the event of a protracted decline in interest rates; if mortgagors prepay in large numbers, the securities will be redeemed. This type of security was developed in 1983 and it now accounts for about half of all mortgages that are securitized.¹

Securitization has broadened the mortgage market by creating instruments that appeal to investors without special knowledge of local housing markets. The payment streams are similar to bonds, and the consequences of default and prepayment are minimized.

Until the last few years, the market for MBSs has generally required a government guarantee on the mortgages, the securities, or both. Securitization was developed by a government agency, the Government National Mortgage Association (GNMA or Ginnie Mae). GNMA issued pass-through securities based on pools of FHA-insured mortgages, and added its own guarantee of timely payment of principal and interest to the FHA guarantee of principal payment in case of default. (GNMA also issues securities backed by pools of mortgages guaranteed by VA, originally the Veterans Administration and now the Department of Veterans Affairs, in a program created after World War II and modeled on FHA.)

The other major MBS guarantors are the housing GSEs: the Federal National Mortgage Association (FNMA or Fannie Mae) and the Federal Home Loan Mortgage Corporation (FHLMC or Freddie Mac).² Both also buy and hold mortgages in their own portfolios, financing them by issuing debt securities in the capital markets, and in fact they have the first- and fourth-largest mortgage portfolios, respectively, of all mortgage lenders in the United States. They are secondary market agencies; they do not originate mortgages but buy loans from primary lenders or mortgage bankers.

FNMA and FHLMC are privately owned institutions with stockholders and private boards, but they are federally chartered corporations with a variety of special privileges, and the President appoints five members out of 18 to the board of each one. The most important of the privileges are exemption from state and local

¹ The collateral for CMOs and REMICs can be either whole mortgages or MBSs. Thus, the ratio of CMOs and REMICs to all MBSs does not represent either their share of all MBSs or their share of all securitized mortgages.

² GNMA can also be considered a GSE, but it is fully owned by the federal government and operates as an agency within HUD, as is FHA.

income taxes, exemption from Securities and Exchange Commission registration and state securities laws, the ability to borrow \$2.25 billion from the U.S. Treasury in an emergency, and the fact that their debt securities are “qualified investments” for regulated financial institutions. Their securities are also issuable and payable through Federal Reserve Banks.³

These privileges give them “agency status” in the capital markets, a general perception that the government will stand behind them. This perception is reinforced by the fact that both are very large financial institutions, “too big to fail.” Agency status allows them to borrow at relatively low rates and to issue or guarantee payment on securities based on pools of conventional mortgages. The market treats their guarantees of timely payment of principal and interest as equivalent to a government guarantee.⁴

The Role of the Federal Government

It should be clear that the federal government has a large role in the housing finance system. It insures some mortgages; it issues securities backed by pools of those mortgages; and it has chartered corporations which are believed in the capital markets to have an implicit government guarantee behind their debt securities and their mortgage securities. In addition, it regulates and insures the deposits of primary lenders, and has chartered institutions which provide them with access to the capital markets. The federal government is generally credited with conducting three successful social experiments in the mortgage market: demonstrating the feasibility of long-term, self-amortizing loans; mortgage insurance; and securitization. In all three cases, the private sector has successfully copied the federal models. The FHA mortgage became the standard for conventional mortgages, and a private mortgage insurance industry has developed to insure them. The private sector now accounts for more business than the federal government in both instances. The demonstration that securitization is feasible has been followed by a sub-

stantial volume of private MBS activity only since about 1990, however, and private securities are still a small part of the total market.

The Dividing Lines

The federal government also demarcates the market segments of the various institutions by means of two statutory numerical concepts: the FHA ceiling and the conforming loan limit.

The FHA ceiling is the maximum principal balance on a mortgage that FHA can insure. The ceiling is set in law in nominal dollars; since 1980 higher amounts have been allowed in areas with higher housing costs. The present ceiling is \$67,500, or 95 percent of the area median home price if that is higher, up to a maximum of \$151,725. The maximum is still less than 95 percent of the area median home price in a number of large markets, among them New York and the largest metropolitan areas on the West Coast, and it is raised every few years.

FHA insurance is intended for the first-time homebuyer who can only afford a relatively small down payment, and who thus poses a greater risk of default to the lender. Most FHA buyers make a down payment of five percent or less.⁵ Below the ceiling, nearly all low down payment loans are insured by FHA and securitized by GNMA.

The conforming loan limit is the maximum principal amount of a mortgage that FNMA and FHLMC can buy. Before 1974, they were restricted to mortgages with principal amounts below the FHA ceiling. A higher limit was set by statute in that year. In 1977 the limit was set at 25 percent above the maximum mortgage amount for S&Ls, and both were raised in 1979. After the S&L maximum was abolished in 1980, the conforming loan limit was set by statute at its then-current value of \$93,750, and indexed on the basis of the annual percentage change in the mean price of homes bought with conventional mortgages. Since 1980, the limit has been about 37 percent above the mean price. In 1993

³ Most of these privileges date back in some form to the FNMA Charter Act of 1954 or its initial 1938 charter. In 1970 the same privileges were extended to FHLMC when it was created.

⁴ The securities may be issued directly by a GSE or alternatively by a subsidiary of a private entity such as a Wall Street firm, with the GSE guaranteeing the timely payment of principal and interest.

⁵ These statements are based on unpublished tabulations of FHA-insured loans between 1989 and 1992. The tabula-

tions differ from published data because FHA allows part (before 1991, all) of the closing costs to be financed in the mortgage, as is discussed in Price Waterhouse (1990, pp. 18-19). The published data do not adjust the loan-to-value ratios to reflect financing of closing costs, and therefore show somewhat lower loan-to-value ratios. For example, Price Waterhouse (1990, p. 17), reports that in 1988-89 slightly less than half of FHA-insured mortgagors had loan-to-value ratios above 95 percent.

the conforming loan limit was \$203,150, while the mean price was \$144,000.⁶

Because of their agency status and the perception that they are too big to fail, the GSEs can offer lower interest rates than the S&Ls and therefore dominate the market below the conforming loan limit. Estimates of their cost advantage are in the range of 20 to 35 basis points.⁷

The S&Ls remain as portfolio lenders above the conforming loan limit. Below the limit, they operate largely as mortgage bankers. They originate mortgages not for their own portfolios but for sale to the GSEs, although they may buy back the securities issued on a pool of the mortgages that they have sold. Regulations issued under the Financial Institutions Reform, Recovery and Enforcement Act of 1989 (FIRREA) gave the S&Ls an incentive to move away from portfolio lending by setting capital requirements only 40 percent as high against MBSs issued by the GSEs as against whole mortgages. Other thrifts and commercial banks have a similar role.

The mortgage market, therefore, can be divided into the FHA/ GNMA submarket, for low down payment loans below the FHA ceiling; the GSE submarket, for most other loans below the conforming loan limit; and the "jumbo" submarket, occupied by S&Ls, other thrifts and commercial banks, for loans above the conforming loan limit.

Actual market segmentation, however, is less clear-cut than the dollar demarcations suggest. The FHA ceiling only applies to FHA. The GSEs, the S&Ls and any other lender can originate mortgages below the ceiling, and some such loans are made. To some extent, the private mortgage insurers compete with FHA by offering insurance on loans with low down payments, though they do not insure a large share of these mortgages.

Similarly, the conforming loan limit applies only to the GSEs. The S&Ls and other primary lenders can make loans below the limit. But the conforming loan limit is much less restrictive on the GSEs than the FHA ceiling is on FHA. Since house prices in most years rise at least modestly,

mortgages that were above the limit when issued may be below it a few years later. Thus, the share of the market open to the GSEs is larger when measured in terms of all outstanding mortgages than it is when measured in terms of mortgages originated in the current year. Primary lenders do make loans below the conforming loan limit. Some are nonstandard loans which the GSEs do not choose to purchase, but mortgages above as well as below the limit are likely to be underwritten to the guidelines of the GSEs, to keep open the option of selling them in the secondary market.

In addition, the conforming loan limit apparently only adjusts in one direction. Declining house prices during 1993 resulted in a reduction of \$6,050 in the calculated conforming loan limit for 1994, as reported by the Federal Housing Finance Board. FNMA and FHLMC announced that they would not lower the limit, because the 1980 statute referred only to "increases," and not to "decreases" or "changes."⁸ HUD Secretary Henry Cisneros, as GSE regulator, first challenged this action and then accepted it.

THE GROWING DOMINANCE OF THE GSEs

The GSEs have been the thriving and expanding institutions in the system. In 1992, the latest year for which full data are available, FHA and VA loans were about 10 percent of the total dollar volume of all home mortgages issued, non-conforming loans about 20 percent, and conventional conforming loans about 70 percent. The dominant role of FNMA and FHLMC in the conforming loan market is reflected by the fact that they securitized over half of these loans and added to their mortgage portfolios as well.

The growth of the GSEs is shown in Table 1, which depicts the mortgage market in terms of the total dollar volume of loans outstanding at various dates. The GSEs now hold or securitize about 30 percent of the total, compared to about 7 percent in 1980. Since 1980 they have accounted

⁶ The annual adjustment is based on the percentage change in prices of homes sold during the last five business days in October.

⁷ See, for example, ICF (1990) and Hendershott and Shilling (1989). The former estimates a differential of 23 basis points as of 1987, the latter 30 to 35 basis points as of 1986. Both apply to loans that are at least 15 percent above the conforming loan limit and, therefore, unlikely to be sold in the secondary market when they are seasoned. These are apparently the most recent analyses.

⁸ The staff director of the Senate Housing Subcommittee as of 1980 has stated that the intent of the statute was that the limit should move in accord with house prices in both directions, but prices had risen so long and so much by 1980 that nobody remembered the possibility of a decrease when the bill was written.

Table 1
Single-Family Mortgage Debt Outstanding, 1968-92 (end-of-year values)

Dollar Values (billions of current dollars)					Percent Shares				
	1968	1980	1989	1992		1968	1980	1989	1992
Portfolio lending					Portfolio lending				
FNMA portfolio	7	52	91	124	FNMA portfolio	2.6	5.4	3.8	4.2
FHLMC portfolio	0	4	18	31	FHLMC portfolio	0.0	0.4	0.7	1.0
S&Ls	110	411	512	375	S&Ls	41.5	42.6	21.3	12.7
Commercial banks	39	160	336	452	Commercial banks	14.7	16.6	14.0	15.3
Others*	109	229	529	591	Others*	41.1	23.7	22.0	20.0
Subtotal	265	856	1486	1573	Subtotal	100.0	88.7	61.7	53.3
Security holdings**					Security holdings**				
S&Ls	0	27	200	159	S&Ls	0.0	2.8	8.3	5.4
Commercial banks	0	20	129	307	Commercial banks	0.0	1.9	5.4	10.4
Others*	0	63	592	914	Others*	0.0	6.5	24.6	31.0
Subtotal	0	110	921	1380	Subtotal	0.0	11.4	38.2	46.7
Securities issued**					Securities issued**				
FNMA MBSs	0	0	220	436	FNMA MBSs	0.0	0.0	9.1	14.8
FHLMC PCs	0	14	266	402	FHLMC PCs	0.0	1.5	11.1	13.6
GNMA MBSs	0	92	358	411	GNMA MBSs	0.0	9.5	14.9	13.9
Private pools	0	4	77	132	Private pools	0.0	0.4	3.2	4.5
Subtotal	0	110	921	1380	Subtotal	0.0	11.4	38.2	46.7
Total	265	965	2408	2954					

* Others include mutual savings banks, life insurance companies, finance companies, the Farmers Home Administration, the Federal Housing Administration, the Veterans Administration (Department of Veterans Affairs in 1989 and later), mortgage companies, real estate investment trusts, state and local credit agencies, state and local retirement funds, noninsured pension funds, credit unions, other U.S. government agencies, and individuals.

** Security holdings show the distribution of securities issued. Either can be added to portfolio lending data to obtain the totals; both cannot be added without double counting. Security holdings can be added to data on portfolio lending to show mortgage market activity of thrifts, banks and other institutions; securities issued can be added to data on portfolio lending to show mortgage market activity of the GSEs.

SOURCES: Board of Governors; U.S. Department of Housing and Urban Development; *Inside Mortgage Capital Markets*; *Inside Mortgage Securities*; *Savings and Loan Fact Book*.

for over 40 percent of the net increase; since 1989, over 70 percent. This is nearly the entire conventional conforming loan market. The new interpretation of the conforming loan limit allows them to further increase their market share.

FHA and VA insure or guarantee a gradually declining share of home mortgages, as Table 2 shows. It is not feasible to calculate nonconforming loans as a fraction of the outstanding stock of mortgages at any given time. The nonconforming market has been stable at about 20 to 22 percent of all conventional mortgages originated in a given year, measured in terms of dollar volume, but there has been a fairly steady shrinkage when measured in terms of the number of mortgages, from 11.6 percent in 1984 to 6.4 per-

cent in 1993. Even the stable dollar share of annual originations implies a declining share of all mortgages outstanding, as the conforming loan limit rises from year to year.

The housing finance system is an emerging duopoly, dominated by the two large GSEs. Other institutions are increasingly limited to segments of the market which are effectively barred to the GSEs by statute, and which are declining in importance.

The dominant position of the GSEs is reinforced by their relationship to other market institutions. Thrifts and banks are both their competitors and their customers. They compete as portfolio lenders, but at the same time they sell

Table 2
Government-Guaranteed and
Conventional Mortgages, 1968-92

	1968	1980	1989	1992
Dollar Values (billions of current dollars)				
FHA	51	94	283	326
VA	34	102	157	164
Conventional	180	770	1968	2464
Total	265	965	2408	2954
Percent Shares				
FHA	19.2	9.7	11.8	11.0
VA	12.8	10.6	6.5	5.6
Conventional	67.9	79.8	81.7	83.4

Source: Dept. of Housing & Urban Development, *Survey of Mortgage Lending Activity*.

mortgages to the GSEs and buy mortgage securities from them, and also buy the debt securities that the GSEs use to finance their portfolios.

THE TRADITIONAL SYSTEM: A COMPARISON

This is very different from the housing finance system as it existed about 25 years ago. In 1968 it was still recognizably the New Deal system. It was dominated by the S&Ls, which gathered deposits locally, borrowed from the Home Loan Banks during recessions or when rates were high, and made long-term, fixed-rate loans (up to a maximum of \$40,000) on homes located within 50 miles of their home offices (100 miles after 1964). The Federal Home Loan Bank Board (the Bank Board) regulated and supervised both the S&Ls and the Home Loan Banks, and insured the S&Ls through the Federal Savings and Loan Insurance Corporation (the FSLIC).

FHA was losing business to the S&Ls, and at the same time taking on greater credit risk, because of the growing private mortgage insurance industry. FHA had a single premium for

all loans; on the "principle of cross-subsidization," profits on the less risky loans were supposed to subsidize losses on those with higher loan-to-value ratios. The outcome was that FHA lost the better loans to the conventional market, because private mortgage insurers could charge a lower premium on the less risky loans.⁹

The only secondary market agency was FNMA, established in 1938 as a fully governmental agency and limited to FHA and VA mortgages. Its purpose was to smooth out the flow of mortgage credit, over time and between places. Securitization had not yet been invented; FNMA issued bonds and bought mortgages from primary lenders and mortgage bankers. It was supposed to be a dealer, selling as well as buying mortgages. It had begun to operate as a portfolio lender in the post-war period, however, buying VA mortgages in particular, until directed to liquidate its portfolio by the 1954 FNMA Charter Act. Its portfolio then fluctuated between \$2 billion and \$3 billion until 1965. At that point it again began to buy mortgages in large volume. Its portfolio reached \$7 billion in 1968, less than 3 percent of the total market.

This system was considered a success in terms of its policy objectives. Housing production reached unprecedented levels in the post-war period; the pre-war peak of 937,000 housing starts in 1925 was eclipsed in 1946 and indeed in all later years. There was also a remarkable increase in homeownership, from 44 percent of all households in 1940 to 55 percent in 1950 and 62 percent by 1960. Total home mortgage debt doubled in the first five years after the war and doubled again in the next five years. Not all the goals were met; regional differences in mortgage rates probably did not diminish, but this was a secondary concern.¹⁰ Contemporary economists were divided over whether the housing finance system was a major contributor to these outcomes, or whether the same results could have been reached some other way, but as a policy matter the system was credited with the successes that occurred.¹¹

⁹ This paragraph is based on Kaserman (1977).

¹⁰ See Fredrikson (1971) and the data and literature therein cited on changes in regional differentials. Actual average mortgage rates varied by about 1 percentage point between the Northeast at the low end and the South and West at the high end, and may have risen slightly between 1940 and 1963. These rates are not risk-adjusted, but Fredrikson makes adjustments for loan-to-value ratio and term, and finds they have little effect on the regional differentials.

¹¹ Grebler, Blank and Winnick (1956) argue that the changes in the housing finance system were important; Saulnier, Halcrow and Jacoby (1958) conclude they were not.

Several problems were inherent in this system, and by the late 1960s it was already starting to break down. The S&Ls were expected to incur interest rate risk routinely. They borrowed short and they had to lend long. If interest rates rose, their cost of funds would rise faster than the earnings on their long-term mortgage portfolios. Second, they operated under a kind of one-way Glass-Steagall Act. They had no protection from competition on either side of the balance sheet. They could issue only time deposits and had to specialize in home mortgages. Commercial banks could, however, also issue time deposits and make mortgage loans. Third, the geographic lending restrictions meant that S&Ls incurred credit risk from local as well as national economic changes. This had already occurred on a large scale when the Florida land boom collapsed in the late 1920s.¹²

CHANGES IN THE SYSTEM

All these potential problems became real ones after 1965 and forced changes in the system. The disintegration that began with the onset of inflation in the late 1960s has been described and analyzed by many economists.¹³ In this paper only a brief review of the process of change is necessary. Table 1 traces its course. It shows the importance of different institutions in the mortgage market in 1968, as the New Deal system was starting to unravel: in 1980, when policy-makers were forced to recognize that the S&Ls could no longer function as portfolio lenders in an inflationary world; in 1989, when FIRREA was passed to address the losses of the S&Ls and the insolvency of the FSLIC; and in 1992, the latest year for which information is available.

Inflation and the Decline of the S&Ls

The S&Ls remained the dominant institutions in the mortgage market during the 1970s. They held over 40 percent of all home mortgages in

1980 as they did in 1968, and they accounted for almost half of the net increase in mortgages outstanding over the period. But this was increasingly against their will. Once inflation began to accelerate, they could not finance their portfolios of fixed-rate long-term mortgages with short-term deposits, unless depositors would accept below-market rates. The small saver proved unwilling to subsidize the homebuyer, if alternative investments paying market rates were available. Money market mutual funds (MMMFs) were such an investment. Beginning in 1972 the S&Ls' cost of funds began to rise relative to short-term Treasury rates.¹⁴ By 1980 the net income of the S&Ls as a whole was approaching zero, tangible net worth was starting to fall, and the industry had a net worth in market value terms variously calculated to be between -8 and -19 percent of its assets.¹⁵

Major legislation was enacted in 1980 and 1982 that liberalized both the asset and liability sides of S&L balance sheets. The goal of saving them as institutions took precedence over the goal of promoting housing. They were allowed to make loans and direct investments outside of housing altogether, up to 40 percent of their assets. Between 1980 and 1989, they accounted for less than a quarter of the increase in outstanding mortgages, and more than half of their growth took the form of security purchases rather than portfolio lending. By 1989 they held only about 30 percent of outstanding mortgages either in portfolio or as securities. Since the passage of FIRREA, closure of failed S&Ls has reduced the total portfolio of the industry by over \$175 billion, and their share of the market is now under 20 percent.

The Evolution of the Secondary Market

The dates in Table 1 also represent stages in the evolution of the secondary market. Between

¹² Between 1927 and 1929, 40 percent of the S&Ls in Florida, with almost half of the assets, went out of business, while S&Ls in the rest of the country were expanding. See Bodfish (1931) for these data.

¹³ For analyses of the problems of the S&Ls during the 1970s and 1980s, see Barth (1991) and White (1991); White was a member of the Federal Home Loan Bank Board and Barth was chief economist there during the late 1980s. Jones (1979) describes the policy process during the 1970s. The most extensive analysis of the secondary market is U.S. Department of Housing and Urban Development (1987). Weicher (1988) describes the changes in the system as a whole and the developing problems that led to the passage of FIRREA.

¹⁴ The Eleventh District Cost of Funds rose from 9 basis points below the three-month Treasury rate in 1972 to 61 basis points above it in 1987. (The Eleventh District Federal Home Loan Bank is located in San Francisco and the district includes the states of Arizona, California and Nevada. Its Cost of Funds, measuring the interest rate on deposits paid by S&Ls in the district, is one of the common indices for ARMs.)

¹⁵ See, for example, Brewer (1989), Brumbaugh (1988) and Kane (1985). Brewer's estimate is the lowest, Kane's the highest. Brumbaugh's is -12.5 percent.

1968 and 1980, the secondary market took on its present institutional structure, securitization was invented, and the first mortgage securities won market acceptance.

Two legislative changes—one in 1954 requiring FNMA to buy mortgages on privately owned low-income housing projects subsidized by the government, and the other in 1967 treating the purchases as a federal budget outlay—resulted in splitting FNMA into two agencies in 1968 and changing its role.¹⁶ GNMA was created to take responsibility for the low-income mortgages, and FNMA went off-budget as a federally chartered corporation with agency status in the capital markets.

In 1970, amid concerns about rising interest rates and a new “credit crunch” in the primary mortgage market as a result of Reg Q, policymakers responded by turning to the secondary market. In the Emergency Home Finance Act of 1970, FNMA was given authority to buy conventional mortgages as well as those guaranteed or insured by the federal government. At the same time, the S&Ls acquired their own federally chartered secondary market facility, the Federal Home Loan Mortgage Corporation (FHLMC). FHLMC was supposed to buy the S&Ls’ current conventional mortgage portfolios to “free up” funds for new loans—in effect trying to shift the consequences of monetary policy to other sectors of the economy. Like the Home Loan Banks, FHLMC was wholly owned by the S&Ls.¹⁷

Thus, where there had been one secondary market agency in 1967, there were three in 1970. They had different ownership and they acted in different ways.

GNMA operated as a secondary market agency very much in the original intent of the New Deal system. It did not buy and sell mortgages, but it achieved the same result by issuing securities.

It created the first MBSs in 1970; by 1980 it was securitizing virtually all new FHA and VA loans, and its MBSs accounted for almost 10 percent of all outstanding mortgages. FHLMC followed GNMA into the securities business on a much smaller scale and became primarily an issuer of MBSs backed by conventional mortgages. FNMA took a different route. During the 1970s, it turned itself into the largest conventional mortgage portfolio lender and thus, in effect, the largest S&L in the country, albeit with different sources of funds. Its experience paralleled that of the S&Ls. It did not foresee the inflation of the 1970s, so that its net worth also turned negative in the late 1970s: its 1980 value of -16 percent was similar to the S&L industry.¹⁸

During the 1980s, securitization accounted for over half the growth in the total volume of mortgage credit. In 1981 both FNMA and FHLMC initiated mortgage swap programs, buying S&L portfolios and issuing pass-through securities on exactly the same mortgages in return. This brought FNMA into the business of issuing securities, rather belatedly. Since then, both its portfolio and its MBS volume have grown rapidly. Its outstanding MBSs are now 3.5 times the size of its portfolio, but it remains the largest portfolio lender. Besides issuing pass-throughs to S&Ls, FHLMC created the CMO in 1983 and expanded its securities business almost twentyfold.

FIRREA marks a further stage in the evolution of the secondary market. It turned FHLMC into nearly a carbon copy of FNMA, giving it exactly the same kind of board of directors and a very similar charter. After FIRREA, the secondary market institutions assumed a dominant position in the mortgage market. Between 1968 and 1980, about 80 percent of the net increase in mortgages was held in portfolio and 20 percent was securitized; since 1989 the proportions have been

¹⁶ Under the 1967 federal budget reform, purchases of subsidized mortgages were raising outlays on a dollar-for-dollar basis, even though part of the principal and interest on the mortgage would be paid to the government by the borrower. Subsequent budget reforms have changed this accounting practice. Under current law, the entire principal amount of a mortgage purchased or insured by the federal government is counted in the credit budget, but only the anticipated subsidy is included as a outlay in the administrative budget.

¹⁷ Opposition to allowing FNMA to buy conventional mortgages was stated by Federal Reserve Chairman Martin in 1969 and opposition to creating FHLMC was stated by Federal Reserve Chairman Burns in 1970. Martin expressed concern that FNMA’s conventional mortgage portfolio would be illiquid and, therefore, might ultimately displace FNMA’s

holdings of FHA and VA mortgages, and also that FNMA’s debt issuances would drive up interest rates and raise the cost of funds to the S&Ls and other primary mortgage lenders. Burns raised the issue of illiquidity and expressed concern that FHLMC would drive up interest rates on FHA and VA mortgages. See U.S. Department of Housing and Urban Development (1987).

¹⁸ U.S. Department of Housing and Urban Development (1987), based on Kane and Foster (1986).

reversed. GSE portfolios also continued to grow as a share of the market.

Did the System “Work” After 1965?

Housing advocates opposed many of the policy changes for fear they would weaken the ability of the system to allocate credit to housing, regardless of the consequences for the financial system or the economy. This was the key concern preventing financial reform in the 1970s: If the S&Ls were allowed to diversify, who would “fill the gap” in the mortgage market? This concern proved to be unfounded. The secondary market agencies filled the gap, as Table 1 shows, and the volume of outstanding mortgages almost tripled between 1980 and 1989.

A second concern was the cost of mortgage credit. This too has proved to be largely unfounded. The spreads between mortgage and bond rates may have widened during the 1970s and early 1980s, but by the late 1980s the conventional mortgage market may have become fully integrated with the capital markets.¹⁹ Here also, the growing role of the GSEs offset the declining presence of the S&Ls, holding down the mortgage rate in the conforming loan market.

Regional differences in mortgage rates probably disappeared by the mid-1980s, as a result of securitization and deregulation. Available data on interregional flows of mortgage funds suggest that securitization resulted in transfers from the Northeast and Midwest to the South and West, where population and housing demand were growing, and, as already noted, in 1983 the S&Ls were allowed to make mortgage loans anywhere in the country.²⁰ The developing S&L crisis in the 1980s also helped create a national mortgage market. One way in which the Bank Board

handled failing S&Ls was to sell them for their franchise value to other S&Ls—at first in the same market, then in the same state, then in other states, as the number and severity of failures rose and the financial resources of the FSLIC were increasingly inadequate.

The system had less success in achieving its other purposes. Since 1965 the homeownership rate has fluctuated in a fairly narrow range, between 62 and 66 percent of all households.²¹ There was a notable increase among young families during the 1970s, but this was simply a result of inflation. Young families bought homes as soon as they could because owning a home was the best inflation hedge available, especially as inflation pushed them into higher marginal tax brackets. In the 1980s disinflation and reductions in marginal tax rates caused their homeownership rate to drop quickly back to its 1970 level.

Housing cycles, like economic cycles in general, became more pronounced. Record years of over 2 million housing starts annually in 1971-73 were followed by a postwar low in 1975; another year of 2 million in 1978 was followed by new lows in 1981 and 1982. The housing finance system could not have been expected to offset completely the effects of the oil shocks and other macroeconomic changes, but it is doubtful if it achieved its stated more modest objective of mitigating their impact on housing and shifting part of the consequences to other sectors. The S&Ls used advances from the Home Loan Banks to offset deposit outflows, and this may have had some effect. FNMA may also have mitigated the cycles to a lesser extent through the late 1970s, but it was not aggressively countercyclical, and it may have had no effect in the recessions of 1980

¹⁹ Hendershott and Van Order (1989) conclude that the interest rate on conventional, fixed-rate mortgages rose by about 100 basis points between the late 1970s and the mid-1980s, compared to the rate that would have prevailed in a perfect market; then it fell by about 50 basis points between 1986 and 1988 to the market rate. Other studies covering a shorter period and comparing the mortgage and bond rates also find that the conventional mortgage rate began rising in relative terms sometime in the 1970s, before deregulation of the S&Ls. See, for example, Kaufman (1981), Tuccillo, Van Order and Villani (1982) and Hendershott, Shilling and Villani (1983). The Hendershott and Van Order study ends in 1988, and there does not appear to be any more recent analysis of the spread; given the year-to-year fluctuations in the spread which they calculate, it would be desirable to see more recent data before concluding that the actual conventional conforming loan rate is the same as the rate in a perfectly competitive market. Cotterman (1994) notes that the spread between the MBS and Treasury rates fluctuated between 1984 and 1990, and was at its lowest level in 1988 and 1990.

²⁰ Rudolph, Zumpano and Karson (1982) find that interregional interest rate differences still existed in the mid-1970s, while Karson, Rudolph and Zumpano (1986) conclude that they did not exist by the mid-1980s. King and Andrukonis (1984) report that FHLMC securities generated a gross transfer of over \$5 billion during their first decade. Information on net interregional flows of mortgage funds is not available, but the existence of substantial gross flows suggests that securitization played a significant role in eliminating regional rate differentials.

²¹ The difference in the trend after 1960 may be partly attributable to demographic changes, especially the increasing proportion of households in categories in which homeownership is less common, such as single individuals and single parents.

and 1981-82.²² FNMA's purchases of conventional mortgages dropped by about one-third from 1979 to 1981, which does not suggest that it tried to act countercyclically.

Thus, even during this period of institutional change and upheaval, the system continued to allocate credit to housing, albeit at somewhat higher mortgage rates, and a fully national mortgage market developed. But cyclical fluctuations in housing were severe and the homeownership rate stopped rising, raising the question of whether the system was still achieving its basic purpose.

POLICY ISSUES: SAFETY AND SOUNDNESS VS. PUBLIC PURPOSE

The housing finance system continues to evolve. Congress has enacted three major laws in the last five years, affecting every institution in the system, and may consider further legislation for the Federal Home Loan Bank System.²³ Some important provisions of these laws have not yet been implemented; when they are, they may in turn provoke further changes. The laws have addressed two kinds of issues: policy matters—what purposes the system will serve and how it will achieve them; and regulatory matters—what powers different institutions will have and how they will be regulated.

In the policy area, all three new laws represent a balancing of public purpose against "safety and soundness," the implicit objective that the system not impose direct costs on taxpayers that must be met by legislated appropriations. In the wake of the S&Ls' problems, there has been a much stronger emphasis on safety and soundness; new capital requirements have been imposed on most institutions within the system. But there are elements in each law that concern the public purposes, and there is some evidence that the pendulum may be swinging back toward a renewed emphasis on

these purposes. At the same time, some provisions of the new laws may make it more difficult to achieve them.

Safety and Soundness

The new laws raise capital standards and take account of risk differentials among assets for virtually all institutions within the housing finance system. FIRREA imposed more stringent capital requirements on the S&Ls. They must have 1.5 percent tangible capital relative to assets and must meet the same risk-based capital standards as national banks. The tangible net worth of the S&Ls as a whole was only 0.7 percent in 1989.

Both FHA and the GSEs are required to hold more capital than they had when the laws were passed. The existing standards were not raised so much as they were changed conceptually. FHA had no specific capital standard, beyond the legislative requirement that it be actuarially sound, which was undefined. FNMA's capital requirement, established in its Charter Act, was calculated as a debt-to-capital ratio. This meant that it was only required to hold capital against its portfolio. Because it did not need to issue debt to finance its MBSs, FNMA's capital-to-asset ratio (including MBSs) was 1.1 percent in 1990. Prior to FIRREA, FHLMC had no statutory capital requirement; the Bank Board determined it as a policy matter. FIRREA gave FHLMC the same debt-to-capital standard as FNMA. With its larger proportion of MBSs, its capital-to-asset ratio was 0.8 percent in 1990. These are quite low levels of capital; had the GSEs been required to meet the risk-based capital standards set for the S&Ls in FIRREA, FNMA would have needed 2.5 times as much capital as it actually had in 1990, and FHLMC more than three times as much.²⁴

Both the FHA and GSE standards are established by "stress tests." In other words, the entity must

²² See Grebler (1977) and Jaffee and Rosen (1979) for the earlier cycles, and Kaufman (1985) for the 1980-82 recessions. Grebler analyzes both Home Loan Bank advances and FNMA purchases.

²³ The three laws are: FIRREA, concerning the S&Ls, the Federal Home Loan Bank Board (which it abolished), FHLMC, and to a lesser extent the Federal Home Loan Banks; Title 5 of the National Affordable Housing Act of 1990, concerning FHA; and the Federal Housing Enterprises Financial Safety and Soundness Act of 1992, enacted as Title 13 of the Housing and Community Development Act of 1992, concerning FNMA and FHLMC. In addition, Congress in 1992 required five separate studies of the Federal Home Loan Bank System as the precursor to future legislation. Four of these studies appeared during 1993, and the fifth in April 1994. (The GSE legislation in 1992 was enacted after

Congress required and received nine separate reports from various federal government agencies.)

²⁴ The calculations of these various capital ratios are reported in U.S. Department of Housing and Urban Development (1990a, 1990b). The published debt-to-capital ratios in the reports include only stockholders' equity; on that basis, the ratios are 0.8 percent for FNMA and 0.6 percent for FHLMC. Regulatory capital is defined in the Charter Acts to include retained earnings and subordinated debt. Subordinated debt is not counted as equity under Generally Accepted Accounting Principles because it takes precedence during bankruptcy over ownership interests. The subordinated debt of the GSEs is due and payable in the event of bankruptcy or insolvency, which appears to limit the government's ability to rely on it as capital.

have enough capital to survive a recession, with the amount determined in advance by econometric analysis. Both are risk-adjusted capital standards; riskier loans are more likely to default and more capital is required against them.

The FHA standard was set on the basis of an actuarial study by Price Waterhouse during 1989-90. Price Waterhouse recommended that FHA should at a minimum have a net worth of 1.25 percent against insurance in force, instead of the then-current level of about 1.0 percent. The purpose was to ensure that FHA would have positive net worth in the event of a typical post-war recession. This standard was enacted in 1990, to be effective in 1992, with a higher standard of 2.0 percent in the year 2000. To reach these targets, the insurance premium was raised by about 70 percent, in present value terms, and risk-related premiums were established for the first time. Minimum equity requirements for FHA homebuyers were also raised, to reduce defaults and strengthen the insurance fund; this increase, however, was partly rolled back in 1992.²⁵

The GSE stress test is based on their worst actual regional experience, which for both has been Texas in the mid-1980s. They are supposed to have enough capital to withstand such a recession if it occurred on the national level, and also to survive large (600 basis points) upward or downward changes in interest rates occurring within a period of one year and lasting for 10 years. Both mortgages held in portfolio and MBSs are included.

The GSE capital standard includes more than the stress test. It also defines two lower levels of capital, in the form of ratios against mortgages held in portfolio and MBSs. The authority of the regulator varies depending on the GSE's actual capital relative to the levels defined in the statute. The "minimum" capital level is 2.5 percent against mortgages held in portfolio and 0.45 percent against MBSs, which matched FNMA's

actual capital position as of 1991, and was slightly more than FHLMC's capital. (FHLMC was given 18 months to meet the minimum level without incurring any regulatory sanctions, and it now does.) The "critical" capital level is half of the minimum level; if capital falls below it, the regulator can immediately put the GSE into receivership.

The GSEs' risk-based capital standard is almost certainly less stringent than the standard for thrifts and banks, and the minimum standard clearly is lower. Depository institutions must have 4 percent capital against a mortgage in their portfolio, while the GSEs must only have 2.5 percent. If a mortgage is securitized by the GSEs and the security is held by a thrift or bank, total capital is still less: 2.05 percent, consisting of 1.6 percent for the depository institution to protect against interest rate risk and 0.45 percent for the GSE to protect against credit risk.

The FHA and GSE standards were established in very different ways. In the case of FHA, an econometric analysis was conducted and the results were known before legislation was passed. The law set new parameters for FHA insurance partly on the basis of whether they would enable FHA to achieve the standard. In the case of the GSEs, the stress test is prescribed as much as possible in the statute, but it was not performed before the bill was passed. Instead, it was negotiated between the Bush Administration and the GSEs and written into law by Congress without analysis of how much capital will be required to meet it. The test must be formally stated in regulations by November 1994, and does not become effective for another year.

Capital standards for the Federal Home Loan Banks may be the subject of legislation in the near future. Their capital now consists only of the stock that S&Ls and other institutions have had to buy in order to be members of the Home Loan Bank System and to obtain advances. Members can withdraw from the System and sell

²⁵ The 1990 legislation required FHA mortgagors to have at least 2.25 percent equity in their home when they bought it (1.25 percent for mortgages under \$50,000). Previously, it was possible to buy a home with no real equity, because buyers were allowed to finance the closing costs in their mortgage. On loans below \$50,000, the minimum down payment is 3 percent; on loans over \$50,000, it is 3 percent of the first \$25,000 and 5 percent over \$25,000. Closing costs average 2 to 3 percent, ranging up to 6 percent in a few states. The down payment in effect paid the closing costs for a substantial number of FHA-insured homebuyers. For analysis of the relationship between defaults and initial

loan-to-value ratios, showing a strong positive correlation, see Price Waterhouse (1990) and Hendershott and Schultz (1993), and the literature cited therein. For a more detailed discussion of the 1990 FHA legislation, see Weicher (1992).

their stock back to their Home Loan Bank, subject to an advance notice requirement of six months. Thus, it is problematic whether the capital would be available if individual Home Loan Banks began to incur losses. The members have an incentive, and a right, to withdraw their capital just when it is most needed.

But the Home Loan Banks have so little capital because of public policy. They had \$2 billion in retained earnings until FIRREA took that money to cover part of the cost of S&L failures. FIRREA also required them to contribute \$300 million per year out of their future earnings. That is why the only capital they now have is the stock owned by the members. It is going to be difficult to build capital through new retained earnings. Even if Congress were to repeal the \$300 million annual contribution, the S&Ls and probably the newer members are likely to prefer having this money passed through as dividends rather than remaining as retained earnings, which could be taken away again. In their studies of the Home Loan Banks, both the General Accounting Office and the Clinton Administration have argued that they need more capital, but neither has offered a specific proposal for raising it.

Countercyclical Support for Housing Construction

The emphasis on safety and soundness creates a clear potential conflict with the traditional countercyclical objective of the housing finance system. This is most obvious with respect to the GSEs, where it was explicitly discussed in evaluating the adequacy of their present capital. In its annual reports as regulator of FNMA and FHLMC prior to legislative consideration of a new capital standard, HUD used a Depression scenario to assess capital adequacy, based on one used by Moody's to rate private mortgage insurers. HUD concluded that neither GSE could survive 10 years of the Depression scenario, but

both could last six years.²⁶ This analysis assumed that they continued to be active in the mortgage market during the Depression to the same extent as previously; FNMA and FHLMC could survive a full 10 years of the Depression scenario, if they immediately suspended operations at the beginning of the Depression. In response, the GSEs stated that they would in fact cease buying mortgages immediately.²⁷ This, of course, raises the question of whether they could recognize the onset of a depression immediately (a delay of two years would be enough to cut the period of survival from 10 to six years for both GSEs). The 1992 legislation accepted the GSE position on at least an interim basis. The stress test must assume that the GSEs accept no new business until the General Accounting Office and Congressional Budget Office complete studies of the appropriate new business assumptions. The studies are due in November 1995. The GSEs have also said they would increase their guarantee fees if necessary to remain solvent, but it is not easy to raise prices during a recession.

It should be possible for a GSE to buy mortgages in periods of high interest rates, earn a profit if rates decline, and perhaps moderate fluctuations in housing production in the process. The opportunity to profit from interest rate declines is limited, but not eliminated, by the prepayment option. On the other hand, countercyclical behavior may result in credit risk. If the quality distribution of loans offered in a recession is the same as during an expansion, then it is necessary to buy lower quality mortgages in order to be actively countercyclical.

The potential conflict has been discussed in every downturn. The legislative changes probably heighten it. The GSEs still have Charter Act responsibilities to "provide ongoing support to the mortgage market," but a capital standard that assumes they do not.

²⁶ These results are for 1991, as reported in U.S. Department of Housing and Urban Development (1992a, 1992b). Similar tests for 1990 show that FHLMC could survive six years and FNMA seven (U.S. Department of Housing and Urban Development, 1991b). The 1991 test is more detailed and sophisticated. The test is stringent: It includes a 10 percent decline in house prices for four straight years, for example. It is necessary to survive 10 years of the Moody's Depression scenario to qualify for an AAA rating; very few financial institutions are rated AAA. The HUD stress test is not identical to the Moody's scenario, although it is closely modeled on the scenario. Thus, it cannot be said that the GSEs would or would not receive an AAA rating from Moody's, or conversely that any other financial institution would or would not survive 10 years of the HUD stress test.

An AAA rating is not likely, however. In 1991 Standard and Poor's evaluated both GSEs at the request of the Treasury, rating FHLMC as A+ and FNMA as A- on the assumption that the GSEs did not have agency status, which in fact they do.

²⁷ The reaction of the GSEs appears in U.S. Department of Housing and Urban Development (1991b).

At present these issues are hypothetical, but in a severe downturn they would become real. They would then attract policymakers' attention and perhaps result in further changes.

“Underserved” Areas and Groups

The traditional goal of making mortgage credit equally available across the country has taken new forms in FIRREA and the GSE legislation. The focus of concern has shifted from regions to communities, particularly low-income urban neighborhoods and those with predominantly minority residents, and also to individuals.

Explicit subsidies through the housing finance system are being provided and proposed to meet this goal. FIRREA required the Home Loan Banks to subsidize low-income housing directly by allocating 20 percent of their profits to a new Affordable Housing Program, with a minimum annual amount starting at \$50 million and increasing to \$100 million by 1995. This is essentially another tax on the Home Loan Banks and through them the S&Ls. The Clinton Administration's report on the Home Loan Bank System goes further and proposes a specific mandate to facilitate mortgage lending to lower-income families and targeted populations. This would be a new role for the Home Loan Banks.

Support for low- and moderate-income housing has been one of the purposes of FNMA and FHLMC, as stated in their Charter Acts.²⁸ This became the major Congressional concern in 1992, once the Administration and the GSEs agreed on a capital standard. The law sets two general goals that certain percentages (to be determined by the HUD Secretary) should be for units occupied by families with incomes below median, and for housing in central cities. Both goals include rental housing as well as homes.²⁹ The law allows a number of acceptable reasons for not meeting any goal in a given year, and a multi-year regulatory process before any sanctions could be imposed for falling short.

The law also sets transition goals. Each GSE is to have at least 30 percent of its purchases for housing occupied by families below median income by 1994, rising in two steps from their 1992 levels. This is about the share of the conventional conforming loan market consisting of buyers in this income range. The GSEs have not come very close to this percentage in the past for single-family houses; both were below 25 percent in 1991. Nearly all apartments, however, are affordable by families of median income by the rules of thumb set forth in the legislation. Both GSEs met the 1993 targets established by HUD.

Similar transition goals were established for central cities, and in this case neither GSE met the 1993 goal. Under HUD's regulations they are now required to file housing plans to describe how they will meet them in the future.

These housing goals pose another potential conflict between the safety and soundness of the housing finance system (and also the financial interests of the private and quasi-private housing finance institutions) and a public purpose which is becoming increasingly prominent. Both the GSEs and the Home Loan Banks have pointed out the conflict. The issue is more serious for the Home Loan Banks because they must fund the Affordable Housing Program. This requirement, like the \$300 million contribution to the cost of S&L resolutions, has been used by the Home Loan Banks to justify making investments with the funds that they borrow on the capital markets as the demand for advances has fallen, and thus perhaps to undertake new types of risk.

FNMA and FHLMC are required only to buy loans for moderate-income housing, not to provide subsidies, and they need not lower their underwriting standards. The general conclusion of the mortgage default literature is that default is largely a function of the loan-to-value ratio on the mortgage and not closely related to either the value of a home or the income of the buyer.³⁰ But even if moderate-income housing turned out

²⁸ Both GSEs are required “to provide ongoing assistance to the secondary market for residential mortgages (including activities relating to mortgages on housing for low- and moderate-income families involving a reasonable economic return that may be less than the return earned on other activities)...” See 12 U.S.C. § 1716.

²⁹ The law also sets a special affordable housing goal that 1 percent of each GSE's purchases should be for housing affordable to low-income families or located in low-income neighborhoods, with allocated shares for single-family and multifamily housing.

³⁰ See Hendershott and Schultz (1993) and the literature cited therein. Hendershott and Schultz do find that foreclosures on FHA-insured loans are inversely related to loan size, which they attribute to differential underwriting standards or house price appreciation rates. The latter explanation might indicate greater risk for small loans.

to be riskier, it would be possible for the GSEs to take more risk than the S&Ls, given their lower cost of funds. The charter acts and the legislation seem to expect that the GSEs will use their agency status to make loans to moderate-income buyers, without jeopardizing their safety and soundness. The Administration's proposed lower-income mandate for the Home Loan Banks takes a similar view, stating that collateral requirements should not be relaxed to meet the mandate.

REGULATORY ISSUES

The Structure of Regulation

At the same time that capital standards were being raised for most entities within the system, all of the private institutions were given new regulators. The Bank Board was abolished and its duties parcelled out among several agencies.

Some of the potential conflicts between public purpose and safety and soundness are reflected in the new regulatory structure. The 1992 GSE legislation divided authority between the Secretary of HUD and the Director of a new Office of Federal Housing Enterprise Oversight (OFHEO), which is formally part of HUD but is effectively independent of the Secretary. The Director regulates for safety and soundness; the Secretary establishes, monitors, and enforces the housing goals and regulates the GSEs in all areas other than safety and soundness. For example, the Secretary rather than the Director approves new programs, and the Secretary rather than the Director raised the issue of whether the GSEs had to reduce their maximum mortgage amount when the conforming loan limit declined last year. The effectiveness of this relationship has not yet been tested, since the Office is still in the formative stage and has not yet had to issue any of the regulations required by the law.

Both the GAO and the Administration studies of the Home Loan Banks have recommended

that they be regulated by OFHEO. At present they are regulated by the Federal Housing Finance Board, created in FIRREA as an after-thought for that sole purpose. The ostensible reason for abolishing the Bank Board was that it acted as an advocate for the industry it was supposed to regulate. The risk that the regulated entities would capture the regulator would seem to be still greater for the Federal Housing Finance Board, with nothing to do but regulate the 12 Home Loan Banks, and for OFHEO, regulating only the two GSEs. It is probably preferable to have one regulator for all 14 institutions, rather than two, although FNMA and FHLMC do not favor sharing their regulator. Whether that proposal is adopted, it seems likely that the regulatory structure of the system will be revised again.

Is There A Future for Specialized Portfolio Lenders?

Public policy has wrestled for two decades with the question of whether specialized mortgage portfolio lenders can exist. In the 1970s policymakers decided they could and tried to keep the S&Ls operating as they always had in the face of inflation and new competition. In the 1980s policy reversed itself, and S&Ls were given broad new asset powers. In the 1990s policy has reversed itself again. FIRREA adopted the premise that deregulation caused the S&L failures, a view not shared by most economists.³¹ It explicitly took away some of the powers granted in 1980-82 and required S&Ls to put a higher percentage of their assets in mortgages and housing investments to keep their tax advantages, although the latter restriction was somewhat relaxed in 1991.³² S&Ls are not forced to be specialized housing portfolio lenders, however; the new capital rules give them an incentive to move away from portfolio lending by requiring only 40 percent as much capital against MBSs issued by the GSEs as against whole mortgages.

³¹ White (1991) favors deregulation, but says it came 15 years too late and should have been accompanied by stronger safety and soundness regulation, and by risk-adjusted deposit insurance premiums. He reviews the literature showing that losses were positively related to use of the new powers. Barth (1991) favors deregulation but says that it contributed to the problems of some S&Ls. Kane (1989) argues that deregulation did not cause the problems of S&Ls and re-regulation would not solve them, but goes on to say that deregulation expanded opportunities for poorly managed S&Ls to fail, as well as allowing well-managed ones to rebuild their net worth. Rudolph (1989) analyzed the subsequent behavior of S&Ls that were insolvent in 1982 and found that traditional housing lenders were more likely to be

insolvent in 1982-83, but less likely in 1986, which suggests that among insolvent S&Ls, at least, those taking advantage of the new powers were less successful than those which "stayed in housing."

³² White (1991) notes, however, that at the same time these provisions were enacted, many members of Congress were saying that S&Ls should be more like commercial banks.

Meanwhile, the GSEs are thriving in part because they are specialized lenders—very large S&Ls, in that sense—as well as secondary market agencies. Their portfolio operations are quite profitable: Almost three-quarters of FNMA's revenue, and almost half of FHLMC's, came from their portfolios in 1992. FHLMC has recognized this since FIRREA gave it the same powers and incentives as FNMA; it is behaving similarly, expanding its portfolio by 70 percent and announcing a business objective of further rapid growth. FHLMC was already the fourth largest portfolio lender in the United States, although its portfolio always has been small relative to its securities volume. The specialized portfolio lender is alive and functioning to a greater extent than is generally recognized.

Several factors contribute to the GSEs' success as portfolio lenders. A number of recent studies conclude that the 20 to 35 basis point difference between the conforming market and the jumbo market is the margin between profit and loss for S&Ls, on average. The cost advantage of the GSEs is attributed to the lower capital requirements they face, the tax exemptions and smaller regulatory burdens granted them by their federal charters, the fact that they do not have to pay deposit insurance premiums or help to fund the resolution of failed S&Ls, and economies of scale.³³ The first two factors are benefits conferred explicitly by act of Congress.

Macroeconomic conditions may also contribute to the GSEs' recent success. If inflation is erratic and unanticipated, it is probably not possible to survive as a specialized portfolio lender, as FNMA and the S&Ls showed during the 1970s and early 1980s. If inflation is low and stable, it is apparently still possible to be a specialized portfolio lender, as the same institutions showed when inflation receded after 1982 and both FNMA and a large number of S&Ls became profitable once again. FNMA especially was saved by disinflation. It gambled on a decline in interest rates (there was not much to lose from such a gamble, from the stockholders' point of view), buying mortgages in large volume, and it benefitted greatly when rates fell. Its net worth became positive in 1985. It has tried to prevent a similar problem in the future. A HUD analysis in 1991 concluded that it has

effectively hedged against interest rate risk by changing the duration of its liabilities, even though most of its portfolio consists of fixed-rate mortgages.

It is doubtful if S&Ls could do the same thing, given their higher costs. They may be able to prosper as portfolio lenders specializing to some extent in fixed-rate mortgages by accepting interest rate risk, if inflation remains low and if the yield curve remains upward sloping. They may also survive as ARM lenders.

The broader geographic authority of the GSEs may have been important in the 1980s. S&L failures since deregulation have been concentrated in states which suffered severe recessions, notably Texas but also other energy and farm states. The decline in domestic crude oil prices between 1982 and 1989 precipitated a regional recession in which commercial real estate values in the Southwest fell by one-third. (Over the same period, they rose nationally by about 10 percent.) Defaults on home mortgages and other real estate rose rapidly. The geographic restrictions on S&L portfolios meant that the bad investments and loans were held in the portfolios of institutions in those states. One-fifth of the S&Ls which failed during the 1980s were located in Texas and they accounted for half of the losses. Deposit insurance turned the regional failures into a national problem.

It is now possible for an S&L, like a GSE, to make or buy loans anywhere in the country. This may be significant. Both FNMA and FHA survived the Texas recession and other regional problems during the mid-1980s. Both sustained losses, but neither was driven to a negative net worth position. Their experience suggests that national portfolio lenders—in effect, national S&Ls—could be viable. But the cost advantages of the GSEs would remain.

GSE Powers

The competitive advantages conferred on the GSEs by agency status raise the question of their role as potential competitors in markets beyond their current activities. This has been a recurring issue for FNMA since it was privatized, when the Secretary of HUD was given new program approval authority. It has become an issue for FHLMC

³³ See Cotterman (1994) and McNulty and Pearce (1994) for discussions of the literature. Goodman and Passmore (1992) calculate that the difference in capital requirements alone lowers the GSEs' costs by about 35 basis points.

since FIRREA. Typically, FNMA has sought legislative authority from Congress if the Secretary has denied or deferred approval. Usually, but not always, Congress has given approval.

The most contentious instance is REMICs. The Tax Reform Act of 1986 created these securities and authorized FNMA and FHLMC to issue REMICs backed by conventional mortgages, subject to the approval of their regulators.³⁴ Both agencies sought approval, over the strong objections of Wall Street securities issuers, who argued that they could enter this market if the agencies did not, but could not compete with them. The Federal Home Loan Bank Board originally decided not to allow FHLMC to issue REMICs, but HUD (under pressure from Congress) eventually allowed FNMA to issue them on a temporary basis, which became permanent in 1988, and FHLMC was allowed to issue them in 1988.

FNMA has also sought to move beyond mortgage purchase and securitization, with less success. In 1985 it proposed to buy bonds collateralized by mortgages that would be issued by financing subsidiaries of financial institutions. In 1990 it requested approval of a program to buy debt obligations secured by conventional mortgages, or securities backed by such mortgages. The former proposal brought objections from investment bankers and the Senate Banking Committee chairman and ranking minority member, as being financing transactions rather than mortgage purchases, and HUD did not approve it. The latter would have placed FNMA in competition with the Home Loan Banks by letting it issue advances against mortgage collateral, and HUD again denied approval.³⁵

FNMA has also undertaken or considered activities that are ancillary to its secondary market operations but that are already provided by private firms. In the mid-1980s, it raised the possibility of establishing a mortgage insurance subsidiary, in competition with the private mortgage insurance industry. In 1985 it acquired a computer software firm with the intent of producing and selling a loan origination and servicing program.³⁶

The GSEs have strongly opposed any regulatory limitation on their powers. This was a major issue in the 1992 legislation. Ultimately, the HUD Secretary retained the authority to deny approval for a new program if he or she determines that the program is "not in the public interest," but the Secretary has to act within 45 days, and the law prescribes an appeals process which is heavily weighted toward the GSEs. The law also gives the GSEs broad authority to buy any kind of home mortgage, limiting the Secretary's regulatory discretion.³⁷ There is no reason to think that the GSEs will not attempt to extend their activities in the future, so the demarcation of authority between different institutions will probably continue to be a recurring issue.

CONCLUSION

One public policy issue which appears to be resolved is the desirability of a housing finance system to allocate credit to housing. This is a change from recent years. For about a decade beginning in the late 1970s, there was extensive public discussion about dismantling the system on the grounds that it was becoming too expensive for society to continue allocating credit to housing, in two senses. Household investment in housing was growing rapidly in response to

³⁴ REMICs have tax advantages over CMOs and were expected to be a major innovation in mortgage securities.

³⁵ HUD also denied approval on grounds that the program involved significant risks to all parties, including the federal government, and could adversely affect FNMA's safety and soundness since it could affect FNMA's needs for capital. The transactions would have allowed financial institutions to defer recognition of economic losses and encourage leveraging, possibly increasing the risk of bankruptcy by the institution. Denial of new programs on safety and soundness grounds has been relatively infrequent.

³⁶ The regulatory issues raised by new activities between 1980 and 1985 are described in U.S. Department of Housing and Urban Development (1987), the proposal to purchase debt obligations secured by conventional mortgages in U.S. Department of Housing and Urban Development (1991a).

³⁷ In 1970 FNMA sought and received regulatory approval from Secretary George Romney to begin a program of buying conventional first mortgages on single-family homes. At the

time, virtually the only conventional mortgages issued were standard mortgages. As new instruments were developed in the 1980s, FNMA claimed the authority to buy any kind of conventional first mortgage under the "Romney letter," such as ARMs and balloon mortgages with different risk characteristics than the standard mortgage. Proposed HUD regulations issued in 1990 would have revoked this broad interpretation. FNMA objected to the regulations, and they were superseded by the 1992 legislation.

inflation in the late 1970s, with concomitant underinvestment in productive capacity, and the growing problems of the S&Ls were threatening to impose direct costs on taxpayers.

A number of proposals were offered to address these concerns. The Financial Reform Act considered by the House of Representatives in 1976 would have turned the S&Ls into commercial banks. The Reagan Administration offered budget proposals to levy fees on the GSEs, which could have been set at a level to cover the market value of agency status. There were several studies of privatizing one or both of them in the mid-1980s.

But interest has faded since then. During consideration of FHA reform, no one (including its competitors) made any suggestion to close FHA down or turn it over to the private sector. Most importantly, there was no real interest in privatizing either GSE in the extended process of writing the 1992 legislation. The closest thing to it was an amendment offered by Rep. Jim Leach (R-Iowa) on the floor of the House of Representatives, which would have set higher capital standards and eliminated some of the GSEs' privileges. The amendment lost on a 298-119 vote. No comparable proposal was mentioned in the Senate.

Five years after FIRREA and 15 years after public recognition that the New Deal housing finance system was no longer viable, the United States has a very different system. But the new system still has the same purposes as the old one, broadly speaking, and if anything the inherent conflicts between the purposes of the system and the safety and soundness of the individual institutions in it are more sharply drawn. While the spectacular problems of the S&Ls have attracted most of the recent attention, their role has sharply diminished, and the important issues in the future are likely to involve the GSEs.

REFERENCES

- Barth, James R. *The Great Savings and Loan Debacle*. American Enterprise Institute, 1991.
- Bodfish, Morton. *History of Building and Loan in the United States*. United States Building and Loan League, 1931.
- Brewer, Elijah, III. "Full-Blown Crisis, Half-Measure Cure," *Economic Perspectives* (November/December 1989), pp. 2-17.
- Brumbaugh, R. Dan, Jr. *Thriffts Under Siege: Restoring Order to American Banking*. Ballinger, 1988.
- Cotterman, Robert F. "The Effects of FHLMC's and FNMA's Mortgage Activities," in U.S. Department of Housing and Urban Development, *Report to Congress on the Federal Home Loan Bank System, vol. 2: Analytical Studies*. U.S. Department of Housing and Urban Development, 1994.
- Fredrikson, E. Bruce. "The Geographic Structure of Residential Mortgage Yields," in Jack M. Guttentag, ed., *Essays on Interest Rates, vol. II*. Columbia University Press, 1971.
- Goodman, John L., Jr., and S. Wayne Passmore. "Market Power and the Pricing of Mortgage Securitization." Federal Reserve Board Finance and Economics *Discussion Paper No. 187* (March 1992).
- Grebler, Leo. "An Assessment of the Performance of the Public Sector in the Residential Housing Market: 1955-1974," in Robert M. Buckley, John A. Tuccillo, and Kevin E. Villani, eds., *Capital Markets and the Housing Sector*. Ballinger, 1977.
- _____, David M. Blank, and Louis Winnick. *Capital Formation in Residential Real Estate*. Princeton University Press, 1956.
- Hendershott, Patric H., and William R. Schultz. "Equity and Nonequity Determinants of FHA Single-Family Mortgage Foreclosures in the 1980s." *Journal of the American Real Estate and Urban Economics Association* (winter 1993), pp. 405-30.
- _____, and James D. Shilling. "The Impact of the Agencies on Conventional Fixed-Rate Mortgage Yields," *Journal of Real Estate Finance and Economics* (June, 1989), pp. 101-15.
- _____, _____, and Kevin E. Villani. "Measurement of the Spreads between Yields on Various Mortgage Contracts and Treasury Securities," *AREUEA Journal* (winter 1983), pp. 476-89.
- _____, and Robert Van Order. "Integration of Mortgage and Capital Markets and the Accumulation of Residential Capital," *Regional Science & Urban Economics* (May 1989), pp. 189-210.
- ICF, Incorporated. *Effects of the Conforming Loan Limit on Mortgage Markets*. U.S. Department of Housing and Urban Development, March 1990.
- Jaffee, Dwight M., and Kenneth T. Rosen. "Mortgage Credit Availability and Residential Construction," *Brookings Papers on Economic Activity* (1979, No. 2), pp. 333-76.
- Jones, Sidney L. *The Development of Economic Policy: Financial Institution Reform*. Graduate School of Business Administration, University of Michigan, 1979.
- Kane, Edward J. *The Gathering Crisis in Federal Deposit Insurance*. MIT Press, 1985.
- _____. "The Looting of FSLIC: What Went Wrong?" Ohio State University College of Business *Working Paper 89-3* (January 1989).
- _____, and Chester Foster. "Valuing and Eliminating Subsidies Associated With Conjectural Government Guarantees of FNMA Liabilities," College of Administrative Sciences *Working Paper 86-71*, Ohio State University (1986).
- Karson, Marvin J., Patricia M. Rudolph, and Leonard V. Zumpano. "Inter-Regional Differences in Conventional Mortgage Terms: A Test of the Efficiency of the Residential Mortgage Market," paper presented at the American Real Estate and Urban Economics Association, 1986.

- Kaserman, David L. "An Econometric Analysis of the Decline in Federal Mortgage Default Insurance," in Robert M. Buckley, John A. Tuccillo, and Kevin E. Villani, eds., *Capital Markets and the Housing Sector*. Ballinger, 1977.
- Kaufman, George. "Impact of Deregulation on the Mortgage Market," in *Housing Finance in the Eighties: Issues and Options*. Federal National Mortgage Association, 1981.
- Kaufman, Herbert. "FNMA and the Housing Cycle: Its Recent Contribution and Its Future Role in a Deregulated Environment," in U.S. General Accounting Office, *The Federal National Mortgage Association in a Changing Economic Environment*. U.S. General Accounting Office, 1985.
- King, A. Thomas, and David Andrukonis. "Who Holds PCs?" *Secondary Mortgage Markets* (February 1984), pp. 12-17.
- McNulty, James E., and James Pearce. "An Economic Evaluation of Specialized Housing Lenders and the Qualified Thrift Lender Test: A Review of the Literature," in U.S. Department of Housing and Urban Development, *Report to Congress on the Federal Home Loan Bank System, vol. 2: Analytical Studies*. U.S. Department of Housing and Urban Development, 1994.
- Morton, J.E. *Urban Mortgage Lending: Comparative Markets and Experience*. Princeton University Press, 1956.
- Price Waterhouse. *An Actuarial Review of the Federal Housing Administration's Mutual Mortgage Insurance Fund*. Price Waterhouse, 1990.
- Rudolph, Patricia M. "The Insolvent Thrifts of 1982: Where Are They Now?" *AREUEA Journal* (winter 1989), pp. 450-62.
- _____, Leonard V. Zumpano, and Marvin J. Karson. "Mortgage Markets and Inter-Regional Differences in Conventional Mortgage Terms," *AREUEA Journal* (spring 1982), pp. 94-110.
- Saulnier, R.J., Harold G. Halcrow and Neil H. Jacoby. *Federal Lending and Loan Insurance*. Princeton University Press, 1958.
- Tuccillo, John A., Robert Van Order, and Kevin E. Villani. "Homeownership Policies and Mortgage Markets, 1960 to 1980," *Housing Finance Review* (January 1982), pp. 1-21.
- U.S. Department of Housing and Urban Development. *1991 Report to Congress on the Federal Home Loan Mortgage Corporation*. HUD, 1992a.
- _____. *1991 Report to Congress on the Federal National Mortgage Association*. HUD, 1992b.
- _____. *1990 Report to Congress on the Federal National Mortgage Association*. HUD, 1991a.
- _____. *Capitalization Study of the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation*. HUD, 1991b.
- _____. *1989 Report to Congress on the Federal Home Loan Mortgage Corporation*. HUD, 1990a.
- _____. *1988-89 Report to Congress on the Federal National Mortgage Association*. HUD, 1990b.
- _____. *1986 Report to Congress on the Federal National Mortgage Association*. HUD, 1987.
- U.S. General Accounting Office. *Federal Home Loan Bank System: Reforms Needed to Promote Its Safety, Soundness, and Effectiveness*. U.S. General Accounting Office, GAO/GGD-94-38, December 1993.
- Weicher, John C. "The Future Structure of the Housing Finance System," in William S. Haraf and Rose Marie Kushmeider, eds., *Restructuring Banking and Financial Services in America*. American Enterprise Institute, 1988.
- _____. "FHA Reform: Balancing Public Purpose and Financial Soundness," *Journal of Real Estate Finance and Economics* (March 1992), pp. 133-50.
- White, Lawrence J. *The S & L Debacle*. Oxford University Press, 1991.

Alvin L. Marty

Alvin L. Marty is professor of economics and finance at the Center for Business and Government, Baruch College, City University of New York. The author is indebted to Philip Cagan, Barry Ma and John Tatom for helpful comments and suggestions. Li Li provided research assistance. The paper was written while the author was a visiting scholar at the Federal Reserve Bank of St. Louis.

The Inflation Tax and the Marginal Welfare Cost in a World of Currency and Deposits

HOW HIGH IS THE OPTIMAL rate of inflation? The answer depends on the range of benefits and costs associated with inflation that are considered by the monetary authority in choosing the inflation rate. For example, if one considers the effects of inflation on the distributions of income and wealth, its interactions with the tax code or the transition cost of changing the expected rate of inflation, or if one adopts the alternative perspectives of different economic agents, the benefits and costs can be relatively large and difficult to assess. This article abstracts from transitory and largely avoidable aspects of inflation, and focuses instead on the fundamental public finance aspects of the monetary authority's problem. In this case, the net benefits and costs are those associated with an inflation rate that is perfectly anticipated; the benefit of inflation that accrues to the monetary authority (typically the government) is the revenue from inflationary money creation. This benefit is analogous to the revenue arising from a specific tax on any other good or service.

Inflation imposes a tax on money holdings because it is the rate at which individuals lose the purchasing power of a dollar. To lower the total cost of holding money, individuals change their holdings and their use of money when inflation rises. Their efforts to do so, however,

reduce their total services from real money balances, thereby lowering individuals' real income. This loss is the welfare cost of inflation. The optimal rate of inflation is found by comparing the marginal welfare cost of revenue from inflation with the marginal cost of alternative sources of revenue. An efficient system of tax collection minimizes the welfare cost of a given flow of tax revenue; this requires that the inflation rate must be chosen so that the marginal cost per dollar of revenue from inflation is the same as the marginal cost of alternative sources of revenue.

In the analysis below, these concepts are developed for models involving a money stock made up of currency only, competitively priced bank deposits only, and a mix of both. The differences in each case clarify the analysis as well as provide some insight into the implications of the analysis for the optimal inflation rate.

THE MARGINAL WELFARE COST OF REVENUE FROM MONEY CREATION: THE CURRENCY CASE

Almost two decades ago, it was shown that a simple formula provides a method of calculating the additional welfare cost of collecting a dollar of revenue from money creation. This measure is the ratio of the marginal welfare cost of inflation

to the marginal revenue from a change in anticipated inflation.¹ To derive this formula, assume the only money is currency and that the demand for real money balances depends only on the nominal rate of interest, holding other influences constant:

$$(1) m = \varphi(i)$$

The welfare loss, W , is

$$(2) W = \int_0^i \varphi(x) dx - i\varphi(i),$$

and the marginal welfare loss from a rise in inflation, π , is reflected in the incremental loss from a rise in the nominal interest rate:

$$(3) \frac{dW}{di} = -i\varphi'(i).$$

Using the Phelps-Auernheimer (Phelps, 1973; Auernheimer, 1974) definition of the revenue, R , we have

$$(4) R = \varphi(i)i,$$

and the marginal revenue is

$$(5) \frac{dR}{di} = \varphi(i) + i\varphi'(i).$$

Since the elasticity of demand for real balances is

$$(6) N_i = -\frac{i\varphi'(i)}{\varphi(i)},$$

the marginal welfare cost per unit of revenue, the ratio of equations 3 and 5, is

$$(7) \frac{dW}{dR} = \frac{N_i}{1 - N_i}.$$

Equation 7 is a variant of the well-known Ramsey tax rule (tax more heavily goods in inelastic demand) and assumes, as does the Ramsey rule, cross effects absent within the taxed sector. The formula is useful in answering the question: What rate of inflation (money rate of interest) would equalize the marginal welfare cost per dollar revenue accruing to inflation tax with an index of such costs due to other distortionary taxes?

The analysis we are conducting is in the realm of balanced budget incidence. We raise the inflation tax on real balances until the marginal

welfare cost per dollar of revenue is equal to an index of these per dollar distortions for other taxes. The increase in revenue is used by the government for exhaustive expenditures rather than rebated to consumers directly, or indirectly through reduced taxes.

Another observation is in order. Although I have illustrated the use of these formulas by plugging in estimates of the marginal welfare cost, the main contribution of the paper lies in the provision of the formulas themselves. If these formulas pass muster, other empirical observations can be plugged in.

Assume the demand for real cash balances follows the Cagan semi-log form $M/P = A \exp(-bi)$. Friedman (1971) uses three alternative values of b , 5, 10 or 20. Laidler (1986) cites .15 as the typical interest elasticity of demand for M1. If we assume the real rate is 1.5 percent, which equals the money rate at zero inflation, the value of b is .15/.015 or 10 percent. To err on the side of charity to inflationary finance, we use a value of 5 for b . Tower (1971) cites 10 percent as the upper limit to the index of the marginal welfare cost per dollar revenue for other distorting taxes. This estimate is considerably lower than those of Ballard, Shoven and Whally (1985), which range from 17 to 56. We assume 10 percent as the marginal welfare cost per dollar of revenue for other distortionary taxes. Using the Cagan function, we have in a currency-only world

$$(8) \frac{dW}{dR} = \frac{ib}{1 - ib},$$

where $dW/dR = 5i/(1-5i) = .1$ and $i^* = .018$. With the real rate = 0.015, the "optimal" inflation rate is approximately zero. Given the parameter values we have assumed, a very modest tax on real balances equalizes the marginal welfare cost per dollar of revenue to an index of distortions due to other taxes.

THE MARGINAL WELFARE COST OF REVENUE: COMPETITIVELY PRICED DEPOSITS ONLY

A variant of the above formula holds for a large number of competitive banks subject to a sterile legal reserve requirement, f , (Marty and Chaloupka, 1988). An individual bank would be forced by competition to pay $(1-f)i$ on its

¹ The real rate of interest is held constant as the money rate of interest, i , varies in such an analysis (Marty, 1976).

deposits where i is the yield on its assets. The opportunity cost of holding deposits is then fi . In a deposit-only world, the welfare cost becomes

$$(9) W = \int_0^{if} \varphi(x) dx - if\varphi(if).$$

The marginal change to welfare due to inflation is

$$(10) \frac{dW}{di} = f\varphi(if) - [if\varphi'(if)f + \varphi(if)f] = -if\varphi'(if)f.$$

In this case, revenue is

$$(11) R = fi\varphi(if).$$

The marginal increment to revenue as the interest rate changes, dR/di , is the bracketed term in equation 10. Since the elasticity of demand for deposits is

$$(12) N_{if} = -\frac{fi\varphi'(if)}{\varphi(if)},$$

the marginal welfare cost per dollar increment to revenue is

$$(13) \frac{dW/di}{dR/di} = \frac{N_{if}}{1 - N_{if}}.$$

The authorities in a bank-only world can set a money rate of interest equal to that in the currency-only world divided by the reciprocal of the reserve ratio, f . If the optimal money rate in the currency world were 10 percent, that rate can be set at 40 percent in a world of deposits (assuming the reserve ratio is 25 percent). Both the welfare loss and the tax revenue, however, are the same as in a currency-only world. Although the tax rate (the money rate of interest) is higher by the reciprocal of the reserve ratio, the tax base is reduced by the share of high powered money in the total money supply $f(M/P)$.

Assume initially that the demand for deposits has the same functional form as that for currency, that the marginal welfare costs per dollar of revenue for other distortionary taxes is the same as in the world of currency, and that the reserve ratio is 13 percent (realistic for the United States). Since $dW/dR = ifb/(1-ifb)$, we have $.1 = i(.13)5/[1 - i(.13)(5)]$ then $i^* = 13.8$ percent, which is equal to the money rate in a world of currency, 1.8 percent, divided by the reserve ratio, 13 percent.

With the real rate equal to 1.5 percent, the "optimal" rate of inflation is 12.3 percent.

THE MARGINAL WELFARE COST OF REVENUE FROM INFLATION: CURRENCY AND COMPETITIVELY PRICED DEPOSITS

We now show that the above analysis can be extended to a world of both currency and deposits. The demand function for each component is still referred to as φ , but they are potentially different and the different measure of cost, i or if , is used to indicate this. The counterpart measures are

$$(14) W = \left(\int_0^i \varphi(x) dx - i\varphi(i) \right) + \left(\int_0^{if} \varphi(x) dx - if\varphi(if) \right),$$

$$(15) \frac{dW}{di} = -i\varphi'(i) - if\varphi'(if)f,$$

$$(16) R = i\varphi(i) + if\varphi(if),$$

$$(17) \frac{dR}{di} = i\varphi'(i) + \varphi(i) + if\varphi'(if)f + \varphi(if)f$$

and

$$(18) \frac{dW}{dR} = \frac{-i\varphi'(i) - iff\varphi'(if)}{\varphi(i) + i\varphi'(i) + iff\varphi'(if) + f\varphi(if)}.$$

Since

$$(19) N_{if} = \frac{-i\varphi'(if)f}{\varphi(if)},$$

we obtain

$$(20) \frac{dW}{dR} = \frac{\frac{C}{M} N_i + \frac{D}{M} f N_{if}}{\frac{C}{M} (1 - N_i) + \frac{D}{M} f (1 - N_{if})},$$

where C is currency, $\varphi(i)$, and D is deposits, $\varphi(if)$.

Once again, set the index of the marginal welfare costs per dollar increment to revenue for other distorting taxes equal to 0.1. Let the reserve ratio be 13 percent and ratio of currency to the money supply be 30 percent (the ratio of bank deposits to money is then 70 percent). These figures correspond broadly to ratios in place in the United States for the early 1990s. Again set the semi-log slope of the Cagan function equal to 5. Then we have $dW/dR = [(.3)(.5i) + .7(.65i)(-13)] / [(.3 - 1.5i) + .091[1 - (.13)(5i)]] = 0.1$. Then $i^* = 2.28$ percent. It should be noted

that, although the formula is a weighted average of currency and deposits, the currency weight dominates the solution. While demand deposits are 70 percent of the money supply, the tax base is only the ratio of reserves to the money supply—that is, 9 percent. Given this low reserve ratio, currency commands dominate weight.

The formula makes intuitive sense. If the revenue ratio equals 100 percent, so that demand deposits pay no interest and, assuming for simplicity, that the demand function (φ) for deposits is the same as that for currency, the formula reduces to

$$(21) \frac{dW}{dR} = \frac{\frac{C}{M}N_i + \frac{D}{M}N_i}{\frac{C}{M}(1-N_i) + \frac{D}{M}(1-N_i)} = \frac{N_i}{1-N_i}.$$

In effect, currency and deposits are of the same stuff.

On the other hand, if the reserve ratio is zero, deposits produce neither seignorage nor a welfare loss; we are, in effect, in a currency-only world because the monetary authority receives no revenue from deposits. In this case, the formula reduces to

$$(22) \frac{dW}{dR} = \frac{N_i}{1-N_i}.$$

This again makes intuitive sense since only currency is taxable.

Variants of the above formulas can be derived. Consider, for example, a world in which an effective prohibition on the payment of interest on deposits is in effect. Then

$$(23) W = \int_0^i \varphi(x) dx - i\varphi(i) + \int_0^i \varphi(x) dx - i\varphi(i)$$

and

$$(24) R = i\varphi(i) + i\varphi(i).$$

It follows that

$$(25) \frac{dW}{dR} = \frac{\frac{C}{M}N_i + \frac{D}{M}N_i}{\frac{C}{M}(1-N_i) + \frac{D}{M}f(1-N_i)}.$$

This is similar to the formula in equation 20, where deposits pay interest, but without the

reserve ratio, f , in the second term of the numerator. If the reserve ratio equals zero and there is no interest paid on deposits, bank deposits yield no government revenue, but a welfare loss accrues to both currency and deposits. If the reserve ratio equals 100 percent, the interest prohibition on deposits is unnecessary, but both currency and deposits incur a welfare loss and both provide seignorage. Once again, the formulas make intuitive sense.

CONCLUSIONS AND COMMENTARY

The above analysis has imposed the zero-profit condition that the return on interest-bearing assets is paid out in interest on deposits. This condition ignores the bank's intermediation function, which has a necessary supply price. If the marginal costs of intermediation are constant, the interest paid on deposits is reduced by a given proportion. Since the tax base (reserves) is independent of intermediation costs, but deposits pay less interest, it follows that we have underestimated somewhat the marginal welfare costs and have erred on the side of overestimating the optimal rate of inflation.

Although for purposes of exposition, the analysis has in the main assumed that the demand schedule for deposits is the same as that for currency, all the formulas hold if the demand schedule for deposits differs from that for currency. All one needs to do is change the form of the function and plug in the relevant interest elasticities. The formulas are general and can be applied to economies with different indexes of marginal distortions and varying interest elasticities.

A potential problem in using these formulas to predict dW/dR is that the ratio of currency to deposits may change with the rate of inflation. As an empirical matter, the currency-deposit ratio has remained remarkably stable in the United States since the period of financial deregulation in the late '80s, when deposits began paying explicit interest. Moreover, a theoretical argument that the currency-deposit ratio is independent of the money rate of interest has been made by Dwyer and Saving (1986). As we have seen the opportunity cost of holding currency is the rate of interest, i , and the opportunity cost of holding deposits is a fraction of the interest rate, if . Assuming the indifference curve between currency and deposits are homothetic, and that the ratio of these opportunity costs is the appropriate measure (by analogy with price theory)

determining the currency deposit ratio, this ratio is independent of the money rate of interest.²

Although these formulas have been used to assess dW/dR at hypothetical inflation rates, which requires predicting the currency deposit ratio, the formulas also can be used to calculate the ex post measure dW/dR at a prevailing money rate. All that is required is to observe the prevailing currency-deposit ratio.

Finally, some caveats are in order. The analysis deals with alternative positions of steady-state inflation. It does not handle the welfare costs of variable inflation—costs which may well be more significant than those associated with steady-state inflation. Moreover, our analysis has treated real balances as part of an optimal tax menu; this usual assumption is not without its critics (Lucas, 1986).

REFERENCES

- Auernheimer, Leonardo. "The Honest Government's Guide to the Revenue from the Creation of Money," *Journal of Political Economy* (May/June 1974), pp. 598-606.
- Ballard, Charles L., John B. Shoven, and John Whalley. "General Equilibrium Computations of the Marginal Welfare Costs of Taxes in the United States," *The American Economic Review* (March 1985), pp. 128-38.
- Dwyer, Gerald P. Jr., and Thomas R. Saving. "Government Revenue from Money Creation with Government and Private Money," *Journal of Monetary Economics* (March 1986), pp. 239-49.
- Friedman, Milton. "Government Revenue from Inflation," *Journal of Political Economy* (July/August 1971), pp. 846-56.
- Lucas, Robert E., Jr. "Principles of Fiscal and Monetary Policy," *Journal of Monetary Economics* (January 1986), pp. 117-34.
- Marty, Alvin L. "A Note on the Welfare Cost of Money Creation," *Journal of Monetary Economics* (January 1976), pp. 121-4.
- _____, and Frank J. Chaloupka. "Optimal Inflation Rates: A Generalization," *Journal of Money, Credit and Banking* (February 1988), pp. 141-4.
- Phelps, Edmund S. "Inflation in the Theory of Public Finance," *Swedish Journal of Economics* (March 1973), pp. 67-82.
- Ramsey, Frank P. "A Contribution to the Theory of Taxation," *Economic Journal* (March 1927), pp. 47-61.
- Tatom, John A. "The Marginal Welfare Cost of the Revenue from Money Creation and the 'Optimal' Rate of Inflation," *The Manchester School of Economic and Social Studies* (December 1979), pp. 359-68.
- Tower, Edward. "More on the Welfare Cost of Inflationary Finance," *Journal of Money, Credit and Banking* (November 1971), pp. 850-60.

² This reasoning, however, is not fully compelling. The ratio of the price of sowbellies to that of caviar has the dimensionality of sowbellies to caviar and is independent of proportionate changes which leave the relative price ratio unchanged. The ratio of the opportunity cost of currency to that of deposits is a dimensionless number and taking the ratio of the opportunity costs (by analogy with commodities) implies that one's choice of currency and deposits is independent of the difference in their opportunity costs.

Tatom (1979) makes an early attempt to determine the marginal welfare costs per dollar of revenue in a world of both currency and deposits. He takes the ratio of the opportunity costs combined with homothetic indifference curves as

a compelling reason to treat the currency-deposits ratio as independent of the inflation rate. More importantly, Tatom does not build up his welfare costs from an explicit consideration of the integral for currency and deposits separately, but conflates the two using a single integral running from zero to the money rate of interest. In fact, the integral for competitively priced deposits should run from zero to *if*. Interestingly enough, Tatom's analysis, although not general, applies to a world in which an effective prohibition on the payment of interest on deposits exists, and in which the form of the demand schedule is the same for currency and deposits. This is a special case of my analysis, and I am indebted to John Tatom for this reference and discussion.