A Regional Perspective on the Credit View

by Katherine A. Samolyk

Katherine A. Samolyk is an economist at the Federal Reserve Bank of Cleveland. The author gratefully acknowledges helpful comments and suggestions from Ben Bernanke, Randall Eberts, William Gavin, Joseph Haubrich, and James Thomson. Rebecca Wetmore provided valuable research assistance.

Introduction

Although the last decade ushered in the longest peacetime expansion of the modern era, it also saw a precipitous rise in the number of bank failures. More than half of the banks that have been declared insolvent since the Federal Deposit Insurance Corporation was founded in 1933 failed during the 1980s. Given the current trend toward deregulation, the structure of the financial services industry has come under intense scrutiny. More recently, the Federal Reserve System has been concerned about how the poor health of the banking industry may be affecting the supply of credit and thereby depressing economic activity.

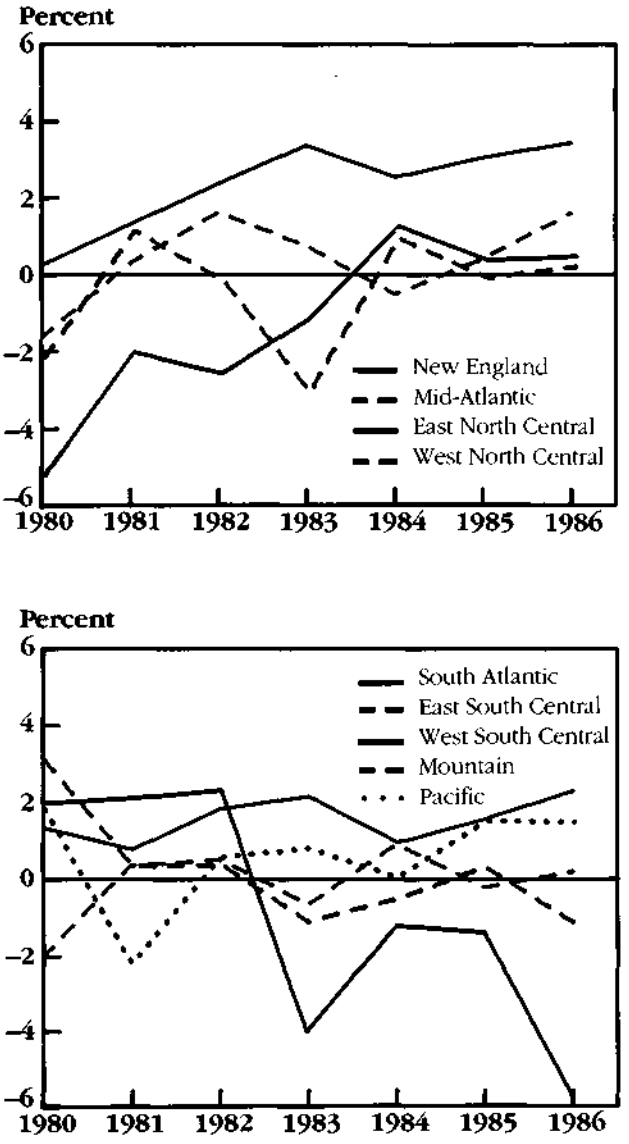
Concerns about a credit crunch are paralleled by macroeconomists' increasing interest in understanding the relationship between the financial sector and the real sector. The notion that credit-market activity may affect real economic activity has come to be known as the *credit view*. According to this view, credit markets are important in determining the allocation of resources in an economy for two simple reasons. First, individuals with profitable investment projects may not have the financial resources to fund their ventures themselves. Investors with financial capital do not have complete information about these investment projects and face costs associated with monitoring their performance. Consequently, investors will impose more stringent credit terms, such as higher interest rates or higher collateral requirements, on less creditworthy borrowers to compensate for expected monitoring costs.

Second, this view also posits that financial intermediaries (hereafter referred to as banks) improve the efficiency of credit markets by identifying, funding, and monitoring the performance of profitable investment projects. However, much of the information produced by banks is confidential, so they must be monitored as well. This implies that the ability to fund risky ventures is affected by the creditworthiness of banks, as measured by the financial health of their balance sheets. Because a less creditworthy bank is more likely to require monitoring, depositors will (and regulators should) impose more stringent credit requirements on the institution. Thus, the credit view posits that financial factors, such as the health of bank balance sheets, can affect the allocation of resources and the level of real economic activity.

The credit view may have important implications for nations that are characterized by

FIGURE 1

The Growth Rate of Real GSP Minus the Growth Rate of Real GNP



SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis.

diverse regional economies, such as the United States. When it is more costly to monitor the performance of risky ventures in regions outside the local sphere, credit markets may segment along regional dimensions. Thus, because local banks play an important role in funding local borrowers, the health of a region's banking sector may affect its ability to intermediate credit to local projects. In addition, features of state and federal financial regulatory systems, such as interstate banking restrictions, tend to magnify the effect of factors that impede the interregional flow of funds.

The regional dimensions of credit flows may be important in assessing the performance of regional economies. Credit markets may be a channel by which regional economic conditions can be propagated into the future. This credit view suggests that regional recessions may be prolonged because of the effect of poor economic performance on the creditworthiness of both local banks and nonbank borrowers and, hence, on the region's ability to attract the external finance needed to fund local investment activity. For example, capital-poor Boston banks may be unable to lend to a profitable-but-risky local biotechnology firm, while healthy Cleveland banks may choose not to invest in it because monitoring the firm is too costly. In the extreme case, the venture is not undertaken at all. Instead, resources in Cleveland are channeled to local investment projects with lower real returns—albeit projects with lower information costs.

Regional disparities in economic performance have been stark in recent years. Figure 1 depicts the difference between the growth rate of real gross state product (GSP) and the growth rate of real gross national product (GNP) for nine regions from 1980 to 1986. Likewise, credit problems, especially those impacting on the banking industry, have also varied considerably across regions. Failures of depository institutions have been concentrated in economically distressed areas. The most stark examples are the depressed farm belt and oil-producing regions in the mid-1980s, and more recently the Northeast. The credit view suggests that financial problems associated with regional recessions may make it more difficult for these areas to fund a recovery.

Despite the sharp disparities in regional economic conditions, most empirical studies have looked for a link between credit and economic activity at the national level. A significant credit channel at the regional level, however, may be obscured in tests that aggregate data across regions. Specifically, regional information costs may cause the relationship between financial-sector conditions and economic activity to be different for states experiencing economic difficulties than for those in an economic boom; thus, a cross-sectional approach may be better suited to testing for a credit channel in the United States.

This paper provides a first step in testing for whether there is a link between regional credit

markets and regional economic performance. State-level data between 1980 and 1986 are used to examine the relationship between state output growth (relative to national output growth) and several measures of regional credit health, including failed business liabilities, commercial bank loan-loss reserves, and the return on commercial bank equity. A pooled cross-sectional time-series approach is used to examine whether the relationship between financial conditions and economic performance differs for low-growth versus high-growth states.

The results yield evidence of a regional credit channel. Regional bank balance-sheet conditions are significantly related to the performance of regional economies. Moreover, there is a different relationship between credit health and economic growth in states experiencing slow output growth compared with those that are doing well.

I. A Regional Credit View

The regional credit view presented here examines the implications of an asymmetric distribution of information among investors and entrepreneurs for a regional economy.[1] It assumes that investors with financial capital do not have good information about entrepreneurs seeking funding. Thus, the creditworthiness of these borrowers — as measured by their collateral, the underlying project risks, and the costs of monitoring their contracts — affects the terms of credit and subsequently the mix of investments that are funded.[2] The credit view also assumes that banks improve the efficiency of capital markets by reducing the information costs associated with credit flows. Banks specialize in identifying and monitoring investment projects. They also diversify across many projects, thus reducing the costs that depositors must incur to monitor bank portfolios (in an unregulated financial system).[3] However, when banks cannot completely diversify portfolio risks that are costly to monitor, the creditworthiness of these institutions — as measured by their equity capital and the credit quality of their loan portfolios — affects their ability to fund risky investments.[4] An important implication of this view is that changes in bank creditworthiness can affect economic activity. Specifically, a deterioration of the internal wealth of banks (bank equity capital) can make it more costly for them to fund projects and thus can depress investment activity.

In a previous paper, Samolyk (1989), I present a formal model of how imperfect information can underlie a regional credit channel between local credit conditions and local investment activity. The model emphasizes the role of banks in funding investments and assumes that banks possess a specialized information technology that allows them to identify and monitor investment projects more efficiently than other individuals in credit markets. Unlike much theoretical literature that uses imperfect information to motivate financial structure, however, this analysis assumes that the economy is made up of regional economies that have different production technologies. The local production technologies have a random return, and the distribution of returns on local investment activity is assumed to exhibit diminishing marginal returns.

In each productive sector there are two types of individuals: bankers and lenders. Bankers possess an information technology for locating and monitoring specific real investment projects; lenders do not. Bankers obtain external finance to fund their portfolios of projects, produce information in locating and monitoring projects, and provide lenders with access to additional investment opportunities. As explained in Bernanke and Gertler (1987), local banks cannot perfectly diversify portfolio risk because the scale of an individual bank project is large relative to the size of a bank's portfolio. Therefore, the ability of banks to fund local investments is related to their financial health.

The model also assumes that monitoring costs are lower for local investments than for investments in other regions.[5] Thus, credit markets are regional because banks can use their technology most efficiently in making local investments. Banks can invest in other regions, but they face higher monitoring costs in doing so. These conditions imply that the cost of credit to local banks depends on their relative credit-

■ 1 See Gertler (1988) for a review of asymmetric information models of credit markets.

■ 2 The information costs associated with credit risks may even lead to the credit rationing of borrowers with profitable investment projects (see Williamson [1986]).

■ 3 In the extreme, when a bank can completely diversify individual credit risks, the amount of the bank's capital and the dispersion of its individual asset returns do not affect the ability to fund its portfolio (see Diamond [1984]).

■ 4 Bernanke and Gertler (1987) formally model the relationship between bank creditworthiness and the funding of specialized investment projects.

■ 5 These costs include the cost of monitoring both the ex ante distribution of investments and the ex post returns to projects undertaken.

worthiness as well as on the profitability of their investment projects.

Since expected monitoring costs rise as leveraged investment increases, while expected project returns exhibit diminishing marginal returns, an upper bound exists on the capacity of a region to fund risky investments externally, given its stock of internal financial capital. Regional balance-sheet conditions and the distribution of investment opportunities are therefore related to a region's financial capacity.

In this model, disparities in regional economic performance can be exacerbated by the impact of regional economic conditions on the creditworthiness of local banks. In areas experiencing a local recession, the resulting erosion in bank capital can prevent banks from funding profitable, albeit privately monitored, local projects that would be financed if information were costless. For example, consider an economy comprised of regions with independent but identical production possibilities. If half of the regions receive a poor investment return while the other half receive an above-average return, banks in ailing regions may find it more difficult to attract external finance to fund profitable new investment projects, even though banks in other regions are flush with funds. Thus, poor regional economic performance can be propagated into the future as the associated decline in creditworthiness hinders the ability of banks to fund a recovery.[6] This occurs because poor regional credit health precludes the use of local information about profitable investment opportunities.

Moreover, capital-rich sectors will invest in lower-yielding local projects as long as the return is greater than the cost-adjusted return associated with funding capital-poor regions. As a result, although national bank capital may not have changed, disparate regional credit health can cause the return from investment activity in the overall economy to be lower.[7] The impact of regional disparities in bank capital is greater than the impact of regional differences in other sources of funds because of banks' comparative efficiency in producing information about local investments.[8] Thus, this credit view also suggests that a link between credit conditions and economic activity at the regional level could be obscured in examining data aggregated at the national level.

II. Identifying a Financial Transmission Mechanism through Disaggregation

The notion that the financial system propagates economic fluctuations depends on how financial structure affects the allocation of resources. The imperfect-information view of a credit channel suggests that changes in the costs of supplying credit-market services can affect investment expenditures and output; thus, financial-sector performance can feed back to the real sector and exacerbate output fluctuations. However, empirical tests for a macroeconomic link between financial structure and economic activity have yielded inconclusive evidence of the existence of such a channel.[9]

The mixed evidence of the importance of financial performance for business fluctuations in studies using national-level data may reflect the difficulties inherent in finding proxies for financial services associated with the information costs that underlie the credit view. Tests for a credit channel to output often use credit flows and interest-rate measures to proxy for financial performance. These measures, however, are a reflection of financial capacity as well as expectations about future economic activity and hence about the profitability of real investment opportunities. Expectations about the distribution of future investment opportunities would affect credit flows even in a world of perfect information, where financial structure is irrelevant to the level and mix of investment activity.

Thus, concluding that these variables help to predict economic activity does not imply that they also cause economic activity. For example, the determination that lower growth in bank lending tends to precede a decline in economic activity may merely reflect a decrease in the profitability of investment opportunities (and, hence, a decrease in loan demand). Likewise, evidence of an increase in perceived credit risks, in the

■ 6 See Bernanke and Gertler (1989) for a theoretical model in which credit effects are strongest in distressed economies.

■ 7 In Samolyk (1989), I demonstrate how, when there is short-run immobility in information technology, regional imbalances both in entrepreneurial wealth and in the distribution of investment opportunities can affect the aggregate allocation of credit and aggregate future output relative to the allocation that would be feasible if regional information asymmetries did not exist.

■ 8 This result generalizes to any firm that produces information in funding local ventures, including other types of financial intermediaries as well as local entrepreneurs who have access to direct credit markets.

■ 9 See Gertler (1988) for a survey of these studies.

form of larger default-risk premiums, is not unambiguously indicative of financial-market frictions, because it is difficult to identify whether the premium is associated with higher monitoring costs or with a change in the underlying distributions of returns on risky real investment projects.

In a previous paper (Samolyk [1990]), I argue that it is the higher cost of finance associated with credit failures and reduced internal capital for future financing that may "cause" real activity to the extent that it magnifies output fluctuations. Debt default, because it reduces the entrepreneurial capital of both primary borrowers and financial intermediaries, may be a relevant channel by which financial-market performance can feed back and affect economic activity. I find that, controlling for monetary conditions and lagged economic activity, past insolvencies are significantly related to real output.[10]

The regional credit view presented here has implications for empirically testing for a credit channel. First, because it implies that the allocation of credit is affected by a region's creditworthiness, it recommends the use of variables related to the health of regional financial balance sheets (such as debt in default) as financial proxies. In addition, because a region's relative creditworthiness can affect its access to funds, the regional credit view suggests that there may be an asymmetric relationship between credit conditions and economic activity for creditworthy regions versus those that are poor credit risks; regional credit problems may constrain regional growth more than healthy credit markets may stimulate it. Thus, regional credit conditions may be significantly related to differences in regional economic performance in a way that would be obscured in examining data aggregated at the national level. To the extent that credit markets may be regional—whether a vestige of regulation or a feature of optimal industrial organization—a cross-sectional time-series approach may be better suited in testing for a credit channel.[11]

The Empirical Model

I estimate two types of reduced-form models of relative state output growth using annual state-level data from 1979 to 1986 (which span the most recent business cycle). Relative state output growth, y_i, the difference between the growth rate of real GSP and that of real GNP, is regressed on its own lagged value and on various lagged measures of state credit conditions. The first type of model specifies a log-linear relationship between credit conditions and relative state output growth of the general form

$$(1) \quad y_{i,t} = B_o y_{i,t-1} + \sum_{i=1} B_i \, CREDIT_{i,t-1} + e,$$

where all explanatory variables are lagged one year and *CREDIT* is the set of proxies for state credit conditions included in the regression.

The second type of model includes interactive dummy variables for all explanatory variables to test whether there is a significantly different relationship between credit conditions and output in low-growth versus high-growth states. Regressions of this type are of the general form

$$\begin{aligned}(2) \quad y_{i,t} &= C_o(H_o)\, y_{i,t-1} \\ &+ \sum_{i=1} C_i\,(H_i)\, CREDIT_{i,t-1} \\ &+ D_o(L_o)\, y_{i,t-1} \\ &+ \sum_{i=1} D_i(L_i)\, CREDIT_{i,t-1} + e,\end{aligned}$$

where H_o and H_i are dummy variables that equal one when $y_{i,t}$ is positive, and D_o and D_i are dummy variables that equal one when $y_{i,t}$ is strictly negative. This specification effectively splits the pooled sample into low-growth and high-growth observations.

The Credit Variables

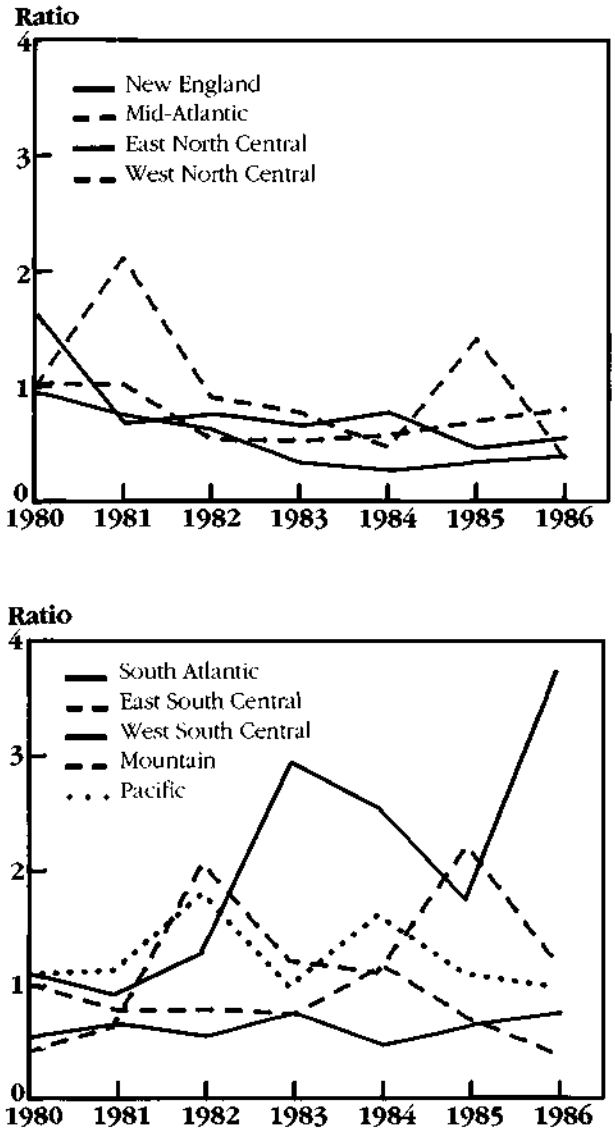
The credit view suggests that credit flows—while inherently reflecting expectations about the profitability of current real investment opportunities—may also be affected by the information costs associated with supplying external finance. I have not identified whether agency costs or underlying investment fundamentals drive financial flows. However, I attempt to control for expectations about future economic performance by including the growth rate of the constant-dollar volume of bank lending (*GLOAN*) as a credit proxy that is relatively forward-looking, as opposed to balance-sheet measures that capture the quality of existing credit. State-level data on the nominal stock of end-of-year bank loans outstanding were obtained from the Federal Finan-

■ **10** This study is related to Bernanke's (1983) study of the Great Depression.

■ **11** Although this asymmetry implies that regional credit imbalance could be a drag on aggregate economic growth, this paper tests for a regional credit channel rather than for whether regional credit imbalances can, in fact, help to explain aggregate economic activity.

FIGURE 2

Ratio of Failed Business Liabilities to GSP (Scaled by the National Ratio)



SOURCES: Dun and Bradstreet Corporation; and U.S. Department of Commerce, Bureau of Economic Analysis.

cial Institutions Examination Council's Reports of Condition and Income (call reports) and were deflated by the GSP deflator.

Other financial proxies, more directly related to the ex post creditworthiness of both bank and nonbank business borrowers as a result of past financial decisions, are included in each specification. I include these proxies to test whether, when controlling for real loan growth (expectations about the future) and past relative output growth, they significantly help to explain the relative growth of state output.

I use Dun and Bradstreet state-level annual data on the volume of failed liabilities associated with business failures to measure the overall creditworthiness of business borrowers. Business failures that occur in a given year are related to the flow of credit in default; thus, their numbers are related both to bankruptcy costs and to changes in the stock of entrepreneurial capital. The business failure series does not include firms that voluntarily discontinued operations with no loss to creditors, but only those that are legally insolvent.[12] A higher level of business liabilities in default should increase the cost of credit to entrepreneurs and reduce future economic activity.

To control for differences in the size of state economies, the volume of failed business liabilities was scaled by GSP.[13] The log of this ratio was included in all regressions. Figure 2 illustrates the regional differences in this variable, depicting the ratio of failed business liabilities to GSP (deflated by the national ratio) for nine regions. During the 1980s, the volume of bad credit relative to income increased for the U.S. economy as a whole. For regions such as the oil-producing states, however, credit problems were reflected in a substantially greater deterioration in business balance sheets.

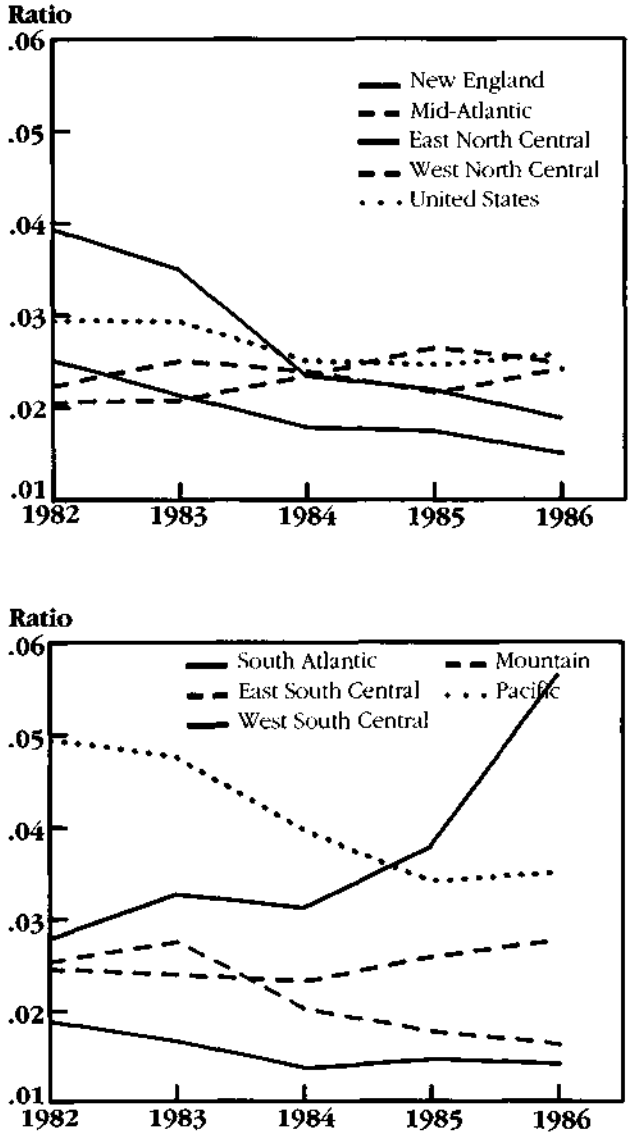
A regional credit view that emphasizes the role of banks in funding local projects implies that bank equity capital reflects bank creditworthiness because it is the buffer between the performance of bank loan portfolios and insolvency. However, bank equity capital is a poor proxy for bank creditworthiness because, like capital on any corporate balance sheet, it is not a market valuation of the present value of firm ownership. Such a valuation would reflect expectations about the quality of the current loan portfolio, including the return on the loan portfolio, the volume of loans in default, and the degree of default on bad loans. Instead, the measures of the creditworthiness of local banking sectors came from state-level call report data on loan quality and bank profitability. These include loan loss reserves, nonperforming loans (defined as loans 90 days past due and still accruing, plus nonaccruing loans) as a share of total loans, and the ratio of net income to bank equity

■ **12** It should be noted, however, that legal insolvency — the inability to service debt liabilities — may reflect balance-sheet illiquidity rather than economic insolvency. The inability to obtain credit may reflect expectations about the profitability of future local investment opportunities.

■ **13** This ratio measures the flow of bad debt relative to the flow of income available for debt service.

FIGURE 3

Ratio of Nonperforming Loans to Total Loans



SOURCE: Board of Governors of the Federal Reserve System.

capital. The latter measure — the ex post return on bank equity (*ROE*) — is positively related to bank creditworthiness, as it represents the potential growth of internally generated bank capital.[14]

Provisions for loan loss reserves should reflect assessments of the degree of default on the current portfolio and thus on the credit quality of current loans outstanding. Given the promised yields on existing loans, larger loan loss reserves correspond to a lower return on existing assets. Therefore, the growth rate of loan loss reserves deflated by the GSP deflator (*GLOANLOSS*) was included in the regressions as a proxy for expected default losses on existing loan portfolios.

Nonperforming loans should reflect the share of the loan portfolio that is currently in default, but do not necessarily indicate the degree of default. Nonperforming loans, like failed business liabilities, reflect realizations of credit performance rather than expectations about future loan performance. The log of the ratio of nonperforming loans to total loans (*SNONPERF*) was included in some specifications as a proxy for the default rate on bank loans. Unfortunately, data on nonperforming loans are available only after 1981, so regressions using this series span only 1983 to 1986.

These problem-loan variables are important because they are related to the market values of both bank assets and bank capital—and hence to the creditworthiness of banks as borrowers today. The credit view presented here suggests that these variables may affect the characteristics of future credit extended and the use of intermediation technology in making new loans. In addition, bad loans can also cause banks to abrogate existing credit relationships; therefore, banks must expend resources in seeking out new investment opportunities. The disparities in bank-credit problems across regions are shown in figure 3, which depicts the share of nonperforming loans to total loans by region, as well as the national share. Although the national share was flat over the sample period of 1983 to 1986, there were substantial differences in both the level and the trend across regions.

III. Empirical Evidence

Results were derived from pooled regressions using cross-sectional state data over the sample period of 1980 to 1986. Regressions including the nonperforming loan series had a sample period of 1983 to 1986.[15] The variables are

■ **14** In choosing measures of financial distress for a state's banking sector, obvious choices are data on the number of and liabilities of failed banks. However, because many failed banks are merged, their balance sheets are included in call report data. Data on bank failures will be included in future extensions of this study.

■ **15** The pooled cross-sectional time-series regressions were estimated using the Shazam statistical package, with the autocorrelation coefficient, *rho*, constrained to be zero for all states. Pooled regressions that did not restrict the autocorrelation coefficient to be zero (but also did not adjust estimates for the inclusion of lagged dependent variables) yielded near-zero estimates of *rho* and no significant difference in the results.

BOX 1

Notes on Statistical Tables[a]

GSPDIF: The growth rate of real gross state product minus the growth rate of real gross national product.
LGSPDIF: *GSPDIF*(–1) if *GSPDIF* < 0.
HGSPDIF: *GSPDIF*(–1) if *GSPDIF* ≥ 0.

GLOAN: The growth rate of commercial bank loans deflated by the GSP deflator.
LGLOAN: *GLOAN*(–1) if *GSPDIF* < 0.
HGLOAN: *GLOAN*(–1) if *GSPDIF* ≥ 0.

FLIAB: The log of the ratio of failed business liabilities to GSP.
LFLIAB: *FLIAB*(–1) if *GSPDIF* < 0.
HFLIAB: *FLIAB*(–1) if *GSPDIF* ≥ 0.

GLOANLOSS: The growth rate of loan loss reserves deflated by the GSP deflator.
LGLOANLOSS: *GLOANLOSS*(–1) if *GSPDIF* < 0.
HGLOANLOSS: *GLOANLOSS*(–1) if *GSPDIF* ≥ 0.

ROE: The ratio of net income to equity capital of commercial banks.
LROE: *ROE*(–1) if *GSPDIF* < 0.
HROE: *ROE*(–1) if *GSPDIF* ≥ 0.

SNONPERF: The log of the ratio of nonperforming loans to total loans for commercial banks.
LSNONPERF: *SNONPERF*(–1) if *GSPDIF* < 0.
HSNONPERF: *SNONPERF*(–1) if *GSPDIF* ≥ 0.

a. The term (–1) indicates a one-year lag.

defined in box 1. The relative growth rate of real GSP was regressed on its own lagged value and on the lagged values of the proxies for state balance-sheet conditions. To control somewhat for expectations about the profitability of local investment opportunities, all regressions include the lagged value of the growth rate of bank loans. Also, dummy variables testing for economywide fixed effects by year were included in each regression specification.

Estimates of equation (1) are presented in panel A of table 1. In these regressions, the relationship between credit conditions and output is restricted to be the same for low-growth and high-growth observations.

Panel B of table 1 presents the results for symmetric regressions including interactive dummies that allow the coefficients on the explanatory variables to be different for states experiencing low growth and high growth. These dummies split the sample and help to determine whether there is a structurally different relationship between lagged credit conditions and current relative output growth for low-growth and high-growth observations.

In all regressions, the lagged dependent variable explains most of the current relative growth of state output. Interestingly, controlling for lagged credit conditions, the relationship is not significantly different for low-growth versus high-growth observations in any of the specifications estimated.

Alternatively, there is a significantly different relationship between lagged credit conditions and current relative output growth in every specification. This indicates that the financial balance-sheet conditions inherited from the past are related to real economic activity differently for states experiencing a relative boom than for those experiencing relatively low growth. Thus, comparing the results in panel A with those in panel B indicates that restricting the relationship between financial factors and economic activity to be the same across states independent of relative conditions — a restriction implicitly imposed in tests using macroeconomic data — may obscure a significant link between credit and output.

The split sample results yield some evidence that financial factors matter in a way that is consistent with the credit view discussed here. The structural differences are in the relationship of output to the lagged variables that proxy for inherited financial balance-sheet conditions.

The ratio of failed business liabilities to state output is a significant predictor of negative output growth primarily in low-growth states (table 1, specifications 2.A and 2.A′). However, when nonperforming loans and the return on bank equity capital are included, this asymmetric relationship is no longer evident. At the same time, reverse causality tests (table 2) indicate that there is a different relationship among failed business liabilities, the return on bank equity capital, and nonperforming loans in low- versus high-growth states. These results suggest that bank credit quality and bank earnings may reflect the impact of broader business financial conditions in low-growth states.

Lagged loan loss reserves are negatively related to output growth only in low-growth states. The coefficients on loan loss reserves are generally insignificant in high-growth states. This can be interpreted to indicate that past provisions for loan losses may be constraining credit availability in states experiencing low relative growth. Interestingly, reverse causality tests between loan loss reserves and the return on

TABLE 1

Results for Regressions Explaining Relative State Output Growth—Dependent Variable: *GSPDIF*

Panel A: Pooled Sample Results

	(1.A)	(1.B)	(1.A′)	(1.B′)	(1.C)	(1.D)
No. of observations	336	336	192	192	192	192
R^2	.3705	.3744	.4345	.4296	.3864	.3882
Log of likelihood function	846.925	847.081	500.824	500.479	497.797	498.195
GSPDIF(−1)	.515 (11.06)[a]	.513 (10.82)[a]	.429 (8.09)[a]	.433 (7.98)[a]	.449 (7.92)[a]	.442 (7.73)[a]
GLOAN(−1)	.008 (2.29)[b]	.008 (2.18)[b]	.013 (2.65)[a]	.013 (2.42)[a]	.013 (1.83)[b]	.012 (1.64)
FLIAB(−1)	−.006 (−4.97)[a]	−.006 (−4.86)[a]	−.006 (−6.99)[a]	−.005 (−5.81)[a]	−.005 (−4.55)[a]	−.005 (−4.49)[a]
GLOANLOSS(−1)	.003 (0.37)	.002 (0.30)	−.006 (−1.38)	−.007 (−1.45)	−.006 (−0.80)	−.006 (−0.71)
ROE(−1)	—	.011 (0.58)	—	.022 (0.89)	—	.027 (0.87)
SNONPERF(−1)	—	—	—	—	−.001 (−0.36)	−.0003 (−0.01)
Year dummies	Y80–Y86[a]	Y80–Y86[a]	Y83–Y86[a]	Y83–Y86[a]	Y83–Y86[a]	Y83–Y86[a]

Panel B: Split Sample Results

	(2.A)	(2.B)	(2.A′)	(2.B′)	(2.C)	(2.D)
No. of observations	336	336	192	192	192	192
R^2	.5096	.6960	.6255	.7388	.7310	.7392
Log of likelihood function	886.669	946.573	537.563	554.651	560.402	560.040
HGSPDIF	.476 (8.81)[a]	.293 (6.55)[a]	.349 (5.73)[a]	.252 (4.81)[a]	.270 (5.28)[a]	.260 (5.03)[a]
HGLOAN	−.001 (−0.30)	.002 (0.57)	−.004 (−0.33)	−.009 (−0.70)	−.027 (−2.02)[b]	−.023 (−1.72)[b]
HFLIAB	.0003 (0.09)	−.003 (−2.45)[a]	.001 (1.06)	−.001 (−0.45)	−.001 (−1.14)	−.001 (−1.08)
HGLOANLOSS	.025 (2.84)[a]	.0005 (0.06)	.011 (1.29)	.001 (0.07)	−.003 (−0.47)	.003 (0.45)
HROE	—	.081 (4.48)[a]	—	.133 (5.23)[a]	—	.026 (0.76)
HSNONPERF	—	—	—	—	−.010 (−3.81)[a]	−.009 (−2.80)[a]
LGSPDIF	.349 (4.87)[a]	.272 (4.63)[a]	.349 (4.06)[a]	.419 (5.69)[a,d]	.429 (5.66)[a,d]	.432 (5.73)[a,d]
LGLOAN	−.005 (−0.59)	−.008 (−0.96)	−.021 (−3.46)[a]	−.004 (−0.54)	.005 (0.70)[d]	.004 (0.53)[d]
LFLIAB	−.008 (−5.46)[a,c]	−.005 (−3.52)[a]	−.010 (−6.10)[a,c]	−.002 (−0.87)	.003 (1.64)[d]	.003 (1.33)[d]
LGLOANLOSS	−.048 (−3.05)[a,c]	−.018 (−1.40)	−.040 (−3.40)[a,c]	−.022 (−1.87)[b]	−.016 (−1.40)	−.021 (−1.75)[b]
LROE	—	−.114 (−6.01)[a,c]	—	−.082 (−3.94)[a,c]	—	−.037 (−1.42)
LSNONPERF	—	—	—	—	.001 (0.46)[c]	−.001 (−0.28)[c]
Year dummies	Y80–Y86[a]	Y80–Y86[b]	Y83–Y86[a]	Y83–Y86[b]	Y83–Y86[a]	Y83–Y86[a]

a. Coefficient (or sum of coefficients) is significant at the 1 percent level.
b. Coefficient (or sum of coefficients) is significant at the 5 percent level.
c. Slope coefficients are significantly different for $GSPDIF < 0$ and $GSPDIF \geq 0$ at the 1 percent significance level.
d. Slope coefficients are significantly different for $GSPDIF < 0$ and $GSPDIF \geq 0$ at the 5 percent significance level.
NOTE: *T*-statistics are in parentheses. The sample period is indicated by the year dummies. The means of the dependent variable are .003 and −.002 for the sample periods 1980–86 and 1983–86, respectively.
SOURCE: Author's calculations.

TABLE 2

Reverse Causality Tests for Credit Variables

	(3.A)	(3.B)	(4.A)	(4.B)	(5.A)	(5.B)	(6.A)
No. of observations	336	192	336	192	336	192	192
R^2	.6660	.6663	.6249	.3578	.7810	.8671	.9219
Log of likelihood function	–293.820	–149.546	417.654	225.174	834.776	470.437	111.726
Dependent variable	*FLIAB*	*FLIAB*	*GLOANLOSS*	*GLOANLOSS*	*ROE*	*ROE*	*SNONPERF*
HGSPDIF	–5.332 (–3.67)[a]	–2.651 (–1.54)	–.199 (–1.11)	–.471 (–2.20)[b]	.131 (2.49)[a]	.156 (2.09)[b]	–1.235 (–2.58)[a]
HGLOAN	–.397 (–1.84)[b]	.827 (1.31)	.020 (0.62)	.039 (0.55)	.010 (0.96)	–.022 (–0.89)	.333 (1.79)[b]
HFLIAB	.599 (11.49)[a]	.528 (6.79)[a]	–.001 (–0.24)	.005 (0.61)	–.001 (–1.07)	–.002 (–0.91)	–.009 (–0.60)
HGLOANLOSS	.174 (0.62)	–.118 (–0.26)	.222 (3.44)[a]	.341 (4.20)[a]	–.044 (–3.78)[a]	–.048 (–3.17)[a]	.188 (1.84)[b]
HROE	–.974 (–1.49)	–4.231 (–2.95)[a]	.228 (2.54)[a]	.541 (3.14)[a]	.860 (26.14)[a]	.824 (13.76)[a]	–.083 (–0.24)
HSNONPERF	—	.180 (1.16)	—	.023 (1.00)	—	–.027 (–5.56)[a]	1.009 (26.39)[a]
LGSPDIF	–1.228 (–0.61)[d]	–3.589 (–1.94)[b]	.292 (1.55)[d]	.188 (0.65)[d]	.151 (2.46)[a]	.126 (2.29)[b]	–1.211 (–3.18)[a]
LGLOAN	.264 (0.51)	.644 (1.02)	–.066 (–1.79)[b,d]	–.109 (–2.99)[a,d]	–.020 (–1.47)[d]	.016 (0.82)	–.140 (–1.15)[d]
LFLIAB	.580 (10.27)[a]	.676 (8.98)[a]	–.0001 (–0.01)	–.001 (–0.06)	–.006 (–3.43)[a,c]	–.011 (–4.15)[a,c]	.041 (2.79)[a,c]
LGLOANLOSS	.339 (0.70)	.610 (1.07)	.375 (4.56)[a,d]	.317 (2.80)[a]	.012 (0.74)[c]	–.003 (–0.13)	.183 (1.62)
LROE	–1.044 (–1.70)[b]	–.475 (–0.47)[d]	.157 (1.62)	.363 (1.78)[b]	.803 (22.90)[a,c]	.652 (7.92)[a,d]	.961 (3.87)[a,c]
RSNONPERF	—	.383 (2.64)[a,c]	—	.011 (0.49)	—	–0.33 (–6.22)[a]	1.037 (29.76)[a]
Year dummies	Y80–Y86[a]	Y83–Y86[a]	Y80–Y86[a]	Y83–Y86[a]	Y80–Y86[a]	Y83–Y86[a]	Y83–Y86[a]

a. Coefficient (or sum of coefficients) is significant at the 1 percent level.
b. Coefficient (or sum of coefficients) is significant at the 5 percent level.
c. Slope coefficients are significantly different for $GSPDIF < 0$ and $GSPDIF \geq 0$ at the 1 percent significance level.
d. Slope coefficients are significantly different for $GSPDIF < 0$ and $GSPDIF \geq 0$ at the 5 percent significance level.
NOTE: *T*-statistics are in parentheses. The sample period is indicated by the year dummies.
SOURCE: Author's calculations.

bank equity capital (table 2) yield evidence that banks in high-growth states may be using loan loss reserves to smooth income. These results are consistent with the notion that financial capacity is more important for ailing economies than for healthy ones.

A somewhat puzzling result is that, in the regressions that exclude nonperforming loans, the lagged return on bank equity capital is positively related to output growth in high-growth states, but negatively related to output growth in low-growth states. The credit-health view implies that if the return on bank capital merely captures the potential flow of internally generated funds and hence increased financial capacity, it should be positively related to local relative growth. Alternatively, there is evidence that the negative relationship between bank profitability and output may be capturing tighter lending practices by loan officers. Thus, the asymmetry

between low- and high-growth states is consistent with the notion that creditworthiness may affect credit availability and economic activity.[16] When nonperforming loans are included (table 1, specification 2.D), the lagged return on equity is no longer significantly related to output growth for either group. In addition, reverse causality tests (table 2, specification 6.A) yield evidence in favor of the tighter-lending interpretation of the asymmetry; in states experiencing low growth, the lagged return on equity is positively related to the share of nonperforming loans, while this credit-quality variable negatively impacts future profitability.

Finally, although lagged loan growth is significantly related to relative output growth in the pooled sample regressions (table 1, panel A), the split sample regressions (table 1, panel B) yield little evidence that real loan growth is positively related to output growth when state financial balance-sheet conditions are included as explanatory variables.

These results are not meant to be interpreted as identifying the exact nature or magnitude of a regional credit channel. As with all tests of whether financial variables cause real variables, the fact that lagged financial variables "Granger cause" economic activity does not mean that inherently forward-looking financial decisions do not reflect expectations about future economic conditions. Thus, decisions to extend credit as well as to default or to mark down the valuation of bank assets reflect, to some degree, the present valuation of the expected payoff on financial claims as related to expectations about future economic conditions. The evidence that financial factors may exacerbate output fluctuations is the significantly different relationship between inherited credit conditions and economic performance in healthy regions versus those experiencing poor relative economic growth.

IV. Conclusion

Current concerns about financial-market fragility are forcing policymakers to face the issue of whether monetary policy should be used to confront credit-quality problems in the financial sector. However, opinions and interpretations differ on what the evidence of a credit channel implies for policymakers. The regional dimension of current financial conditions further complicates the problem, because its solution depends on what is causing credit markets to be regional, as well as on the sources of regional credit disparities.

This paper presents evidence that regional economic performance is related to regional creditworthiness. State financial balance-sheet conditions, inherited from the past, have a significant relationship to current state output growth for states that are experiencing low relative growth; the relationship is consistent with the credit-health view and is significantly different from the relationship in states experiencing high growth. The empirical tests presented here, however, are a joint test of whether banking markets are regional and whether there is a credit link between these markets and the relative performance of state economies. Thus, the implications of these results for policymakers depend on why credit markets are regional.

The model of regional credit markets discussed here captures some of the features of banking in an economy that is regional because of information costs. To the extent that entrepreneurs must rely on regional credit markets to originate specialized investments, the health of these borrowers and of the local banking sector that provides intermediation services can affect regional economic activity when there is asymmetric information between borrowers and investors supplying external finance.

The regional nature of U.S. credit markets may also be a reflection of the historically unique regulatory structure of the banking industry. Regulations, such as interstate branching restrictions, limit the ability of banks to diversify across regions. If credit markets are regional because regulations are binding, then the benefits of regulation should be weighed against the costs of less diversification. When it is costly to monitor borrowers — whether financial or nonfinancial — the ability to diversify is related to the ability to avoid bad outcomes that can make it more costly to obtain credit in the future. Likewise, limits on the scale of banks that impede their ability to raise capital may exacerbate regional output fluctuations, as poor bank profitability may constrain future lending when local real economic conditions improve.

Because the regional dimensions of credit markets in an economy that is inherently regional are not likely to be merely artifacts of regulatory policies, the implications of a regional credit view for the conduct of stabilization policy will not disappear with deregulation. Thus, even in a deregulated environment, it is likely that financial flows will be sensitive to the health of regional entrepreneurs to the degree

■ **16** In addition, states with a lower capital-to-asset ratio (and hence lower bank creditworthiness) will have higher returns on equity, all else being equal.

that these borrowers write contracts that are not fully contingent on the random return on their investments. But the credit view recognizes that this financial structure may also be the most efficient way of dealing with information costs inherent in financial contracts. Currently, we do not observe large banks divesting themselves of what can be defined as "aggregate risks." This may be the result of disincentives in the current regulatory environment. Alternatively, bank contracting may reflect the highly specialized characteristics of bank investments that make these risks difficult to assess, but at the same time may reflect one reason that financial intermediaries exist: to fund portfolios of specialized investment opportunities (Fama [1980, 1985]).

To the extent that information costs make financial markets inherently regional, financial conditions may be an unavoidable propagation mechanism to relative regional performance. In this scenario, it is hard to argue from a pure efficiency criterion that policymakers should "do anything" in response to a regional credit imbalance, such as that plaguing New England, because the malaise may be an unavoidable outcome of the market mechanism, however information intensive. General stabilization policies aimed at alleviating a regional credit problem are likely to have redistributional effects that are not justifiable according to a pure efficiency standard. Indeed, an expectation of this policy response — to the extent that it amounts to a monetary bailout — may distort the incentives to diversify ex ante and may exacerbate the potential problem.

In assessing the policy implications of the events of the past decade, it is therefore important to distinguish between microeconomic policies affecting financial market structure and macroeconomic policies aimed at promoting economic stability and growth. The interdependence of structural policies and stabilization policies allows the distinction to be easily blurred. The unfortunate outcome is often that macroeconomic tools are used to try to remedy the ills that result from microeconomic banking regulations and structural changes in the financial sector. If the current regional financial crisis is to some degree the result of regulatory policies, then the crisis represents an opportunity to foster a sentiment for regulatory change. To use regional financial fragility as a rationale for a general macroeconomic easing without addressing whether regulatory policies are part of the problem may mean losing an opportunity for structural reform that could ameliorate the problem in the long run.

References

Bernanke, Ben S. "Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression," *American Economic Review*, vol. 73, no. 3 (June 1983), pp. 257–76.

_____, and Mark Gertler. "Banking and Macroeconomic Equilibrium," in William A. Barnett and Kenneth J. Singleton, eds., *New Approaches to Monetary Economics*. New York: Cambridge University Press, 1987, pp. 89–111.

_____, and _____. "Agency Costs, Net Worth, and Business Fluctuations," *American Economic Review*, vol. 79, no. 1 (March 1989), pp. 14–31.

Diamond, Douglas W. "Financial Intermediation and Delegated Monitoring," *Review of Economic Studies*, vol. 51, no. 3 (July 1984), pp. 393–414.

Fama, Eugene F. "Banking in the Theory of Finance," *Journal of Monetary Economics*, vol. 6 (1980), pp. 39–57.

_____. "What's Different about Banks?" *Journal of Monetary Economics*, vol. 15 (1985), pp. 29–39.

Gertler, Mark. "Financial Structure and Aggregate Economic Activity: An Overview," *Journal of Money, Credit and Banking*, vol. 20, no. 3 (August 1988), pp. 559–88.

Samolyk, Katherine A. "The Role of Banks in Influencing Regional Flows of Funds," Federal Reserve Bank of Cleveland, Working Paper 8914, November 1989.

_____. "In Search of the Elusive Credit View: Testing for a Credit Channel in Modern Great Britain," Federal Reserve Bank of Cleveland, *Economic Review*, vol. 26, no. 2 (1990 Quarter 2), pp. 16–28.

Williamson, Stephen D. "Costly Monitoring, Financial Intermediation, and Equilibrium Credit Rationing," *Journal of Monetary Economics*, vol. 18, no. 2 (September 1986), pp. 159–79.