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The “credit crunch” and the availability of credit to small business

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Abstract

We present estimates of how much bank loans and real activity in small businesses responded to changes in banks' capital conditions and other bank and aggregate economic conditions. Using data for 1989–1992 by state, we estimated the effects of those factors on employment, payrolls, and the number of firms by firm size, as well as on gross state product. In response to declines in their own bank capital, small banks shrank their loan portfolios considerably more than large banks did. Large banks tended to increase loans more when small banks were under increased capital pressure than vice versa. Real economic activity was reduced more by capital declines and by loan declines at small banks than at large banks. Small banks were making “high-powered loans” in that dollar-for-dollar loan declines in their loans had larger impacts on economic activity than loan declines at large banks did. Capital declines at small banks produced larger changes in economic activity dollar-for-dollar than capital declines at large banks did. Aggregate economic conditions had smaller effects on small firms than on large firms and smaller effects on small banks than on large banks. The evidence hinted that the volume of loans made under Small Business Administration (SBA) loan guarantee programs shrank less in response to declines in bank capital than the volume of loans not made under the SBA loan guarantee programs. © 1998 Published by Elsevier Science B.V. All rights reserved.

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1. Overview and review

Small businesses have long relied heavily on banks for credit. Brewer et al. (1996) document that the smaller firms in their sample are more “loan-dependent” than larger firms, which rely more heavily on equity finance. Newly-available data on small business finance document that banks have remained the primary source of credit for small businesses. Cole et al. (1996) reported that in 1993 about 60 percent of credit extended to small businesses came from banks.

Levonian and Soller (1996) and Peek and Rosengren (1995a) argued that smaller banks seemed to be the primary lenders to small businesses. Berger et al. (1995) also reported that smaller banks had larger proportions of their loans devoted to small businesses than larger banks. Berger and Udell (1996) noted that the type of lending to small businesses may also differ by bank size. They found that when large banks do issue credit to small businesses, they typically offer lower interest rates and fewer collateral requirements. They concluded that large banks’ lending to small business was less often relationship-based. Further empirical support for the hypothesis that small and large banks specialized in lending to different sizes and types of firms was offered by Berger et al. (1998). They reported that small business lending fell when large banks consolidated, while it rose when small banks consolidated.

Banks reduced the total supply of bank credit after loan losses around 1990 reduced their capital.¹ The apparently heavy dependence of small businesses on banks for credit suggests that such a “capital crunch” on banks might impinge with particular force on small business.

Real economic activity in small businesses did shrink relative to that of larger businesses in the years surrounding 1990. Fig. 1 shows that during 1989–1991, employment, payrolls, and the numbers of firms grew more slowly for businesses with less than 500 employees than they grew at large businesses. Figs. 1 and 2 show that those measures of economic activity grew slower particularly at the largest of firms classified as small businesses.

¹ See Bernanke and Lown (1991), Hall (1993), Hancock and Wilcox (1993, 1994a, b) and Peek and Rosengren (1995b). Bizer (1993) argued that regulators may have also raised the effective regulatory minimum amount of bank capital around this time.

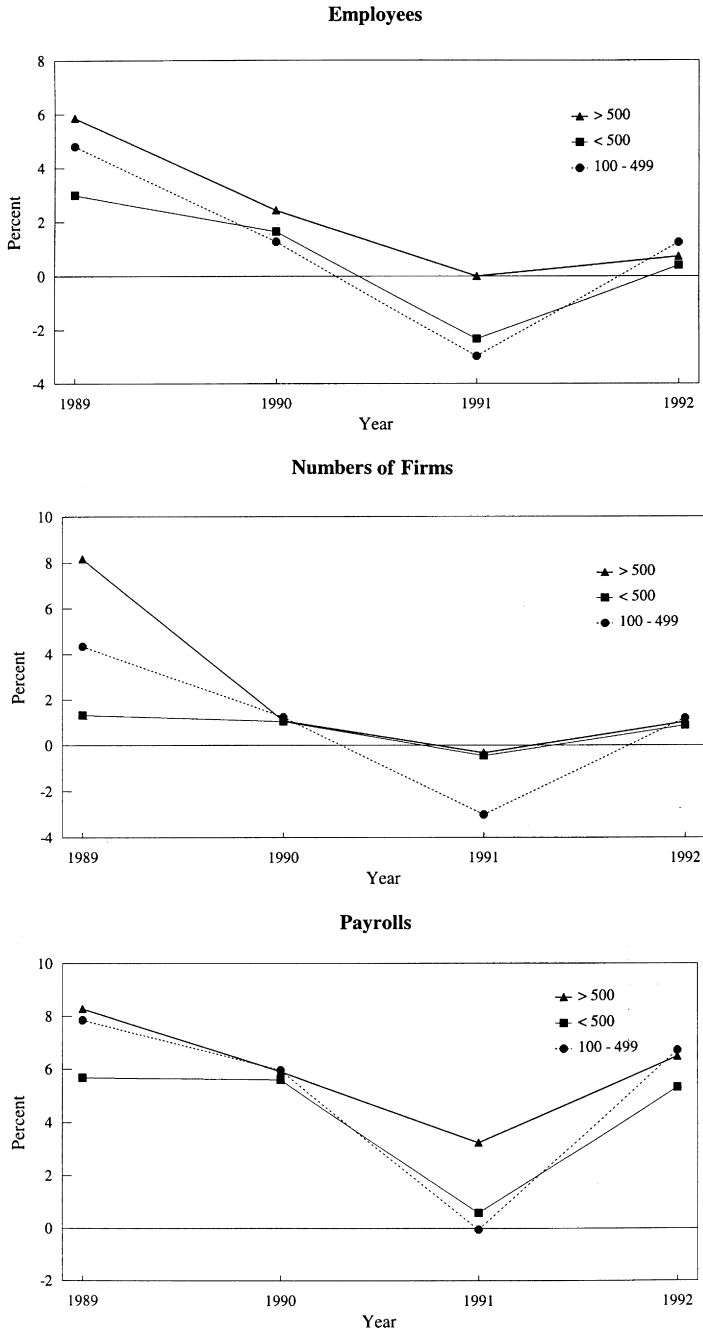


Fig. 1. The growth of employment, numbers of firms, and payrolls by firm size.

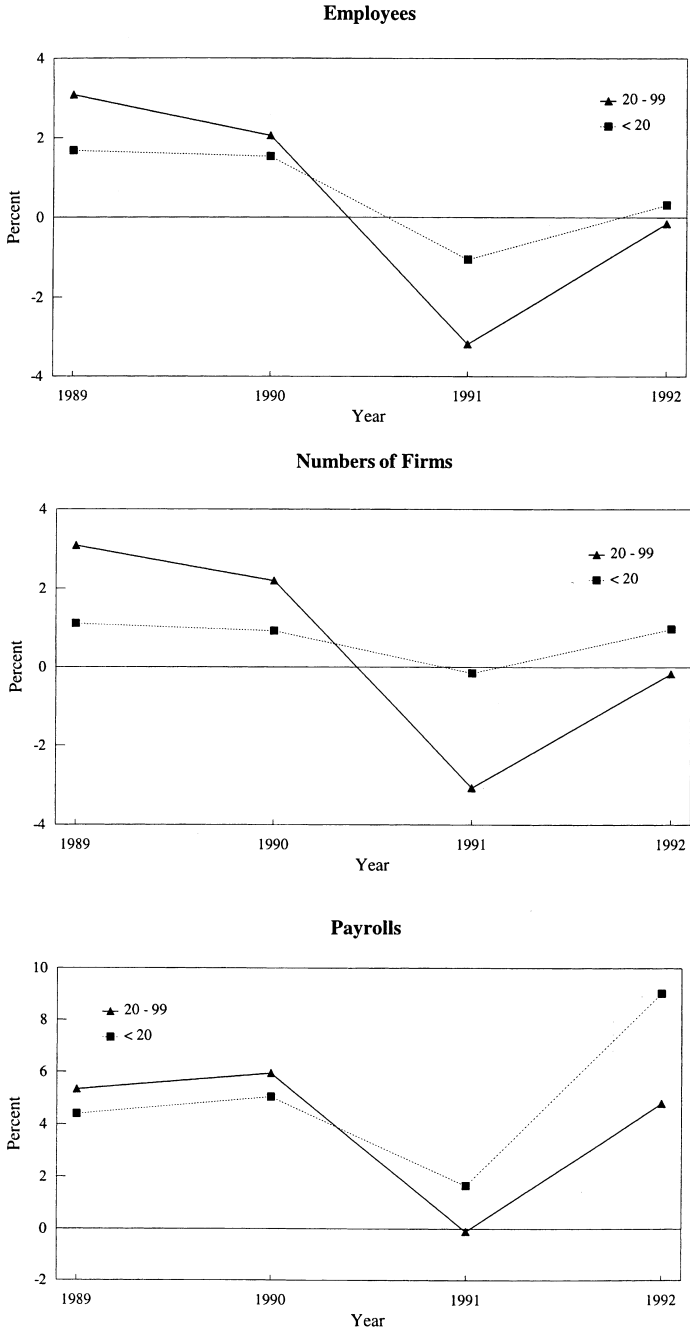


Fig. 2. The growth of employment, numbers of firms, and payrolls by firm size.

Most studies of the bank capital crunch have reported significant effects on banks' portfolios of various measures of pressure on bank capital.² Few studies, however, have detected clear signals that the capital crunch reduced real economic activity. Bernanke and Lown (1991), for example, found evidence that banks' loan portfolios responded, but found little evidence that employment growth responded, when banks lost capital. Hancock and Wilcox (1997) explicitly tested whether various aspects of real economic activity in the real estate sector were affected, *ceteris paribus*, by the capital crunch. They concluded that both commercial and residential real estate activity declined as a result of the bank capital crunch. Similarly, Peek and Rosengren (1997) found that the Japanese real estate collapse affected commercial real estate markets in the United States, particularly in local markets where Japanese banks had significant shares of the real estate loan market.

In this study, we directed our attention to the effects of bank capital pressures and of other banking and economic shocks on small businesses. We used as proxies for real economic activity a number of measures: employment, payroll, numbers of firms, numbers of businesses, numbers of business failures, and numbers of bankruptcies recorded. We were particularly interested in whether capital declines at small banks were associated with particularly large declines in the real economic activity of small businesses. To see whether small businesses differed appreciably from large businesses in their responses, we estimated the effects of bank capital pressures on the real economic activity of businesses of various sizes. Because smaller banks were thought to have special ties to smaller businesses and because we regarded smaller banks as having many of the same opportunities and constraints as other small businesses, we allowed smaller banks to have different responses to various shocks and to have different effects on businesses of all sizes than larger banks.³

More specifically, we addressed the following issues:

1. Was lending affected differently at large and small banks by capital and other shocks?
2. To what extent were capital pressures in one group of banks offset by increased lending at other banks?
3. Was real activity affected by the capital crunch?
4. Did businesses that were more "bank-dependent" respond more to the capital crunch?
5. Did Small Business Administration (SBA) programs accentuate or attenuate the capital crunch?

² See Berger and Udell (1994), Peek and Rosengren (1994, 1995a, b), Hancock and Wilcox (1993, 1994a, b, 1997) for estimates of the effects of bank capital pressures on bank portfolios.

³ See Kashyap and Stein (1995) and Hancock and Wilcox (1995).

Section 2 sketches out the justification for our empirical models of bank loans and real economic activity. Section 3 provides information about the data we used. Section 4 details the specifications of the variables and the regression equations and estimation methods that we used. Section 5 reports and discusses our empirical finding that the decline in total real economic activity per dollar decline in capital at small banks was larger than for capital declines at large banks. Among our conclusions in Section 6 are that small banks made “high-powered loans”, in the sense that dollar-for-dollar declines in small banks’ loan portfolios had larger impacts on economic activity than loan declines at larger banks did.

2. Models of bank loans and real economic activity

We began with the model of the bank supply of and borrower demand for bank credit presented in Hancock and Wilcox (1994a).⁴ That model posited that the bank supply of loans depended positively on the loan interest rate, negatively on perceived risks to the bank, positively on other factors that raised the expected return on loans, and positively on bank capital. Bank capital may have affected the supply of bank credit either because of an implicit regulatory floor on the capital-to-assets ratio or because the bank itself chose to impose one on itself.

Borrower demand for credit depended negatively on loan interest rates and on perceived risks to the borrower of undertaking projects with credit. Borrower demand did not depend on bank capital. All variables other than the bank capital variables appeared in both the supply and demand functions. Thus, in the reduced form, only the capital variable carries a coefficient amenable to a structural interpretation. The other coefficients represent an amalgam of supply and demand effects.

Our empirical implementation of the model for bank loans included the following explanatory variables. As indicators of risk to banks and borrowers, we included loan delinquency variables as well as two measures of economic conditions (consumer sentiment and the bank prime interest rate). During this period one could regard the interest rate as having been, in effect, set by monetary policy and thus predetermined in our model. Even so, because the interest rate would likely convey information to banks and borrowers not just about the cost of credit but also about the expected future returns and risks of credit, it is not straightforward to interpret the coefficients on the interest rate variable. We also included capital variables split by bank size and by time period.

⁴ We omitted the dynamics that Hancock and Wilcox (1994a) allowed for.

In our empirical models for real economic activity, we considered specifications that directly included measures of bank loans, as well as specifications that replaced the loan variables with bank capital variables, which were presumed to affect the supply of bank loans. We posited that the demand for output depended positively and directly on the supply of bank loans and positively and indirectly on bank capital.⁵ The demand for output also depended positively on consumer sentiment and depended negatively on loan delinquency rates and the interest rate. These variables had direct effects on spending and the demand for credit as well as indirect effects that operated through the supply of bank credit. Thus, we cannot put a structural interpretation on the reduced-form coefficients used to explain real economic activity. Consider the coefficient on consumer sentiment. It is very possible that increased consumer sentiment reflects optimism and increased demand for output and thus more jobs, firms, and payrolls. Increased consumer sentiment also likely translates into increased supply of bank credit because banks use it as an information variable. As a result, the estimated coefficient on consumer sentiment reflects both of these positive influences on demand for output.

3. Data

Our data measured various aspects of real economic activity at firms of various sizes, conditions at commercial banks, and national economic conditions. We collected data by state for each year from 1988 to 1992.⁶ We collected data for the loan holdings, loan delinquencies, and capital positions of individual banks. We also used some annual macroeconomic data. We collected data on total statewide economic activity and on statewide number of firms, employment, and payrolls by size of firm. We also collected data on the SBA's loan guarantee amounts outstanding and on the numbers of business failures and bankruptcies.

3.1. Construction of bank data by state

We obtained data for banks' dollar, book-value holdings of total loans, commercial and industrial loans, commercial real estate loans, and consumer loans from end-of-year Call Reports filed by roughly 11,000 individual

⁵ The demand for output determined real economic activity since we do not model the statewide supply of output here.

⁶ Following Hancock and Wilcox (1997), we omitted data for Alaska, Hawaii, and Nevada because their real economic activity seemed dominated by factors beyond our specification. Because its statewide bank data were dominated by the portfolios of credit-card banks, we also omitted Delaware from our sample.

commercial banks.⁷ Equity capital and loan delinquency data by bank also came from the Call Reports.

We classified each bank as operating either “locally” or “regionally” on the basis of the size of its asset portfolio. The local banks, defined to be banks with less than \$5 billion of assets, were assumed to be banks whose lending and other activities took place entirely within the state in which they were headquartered. The regional banks, defined to be banks with more than \$5 billion of assets, were assumed (for each year in which they held assets above that level) to operate across state lines but within one of the eight regions defined by the National Council of Real Estate Investment Fiduciaries (1992).

We apportioned the dollar amount of each category of loan holdings, of delinquencies, and of equity capital of a large bank among the states in its region according to the share of the total regional personal income that each state accounted for. Banks’ holdings of each loan category for each state were the sum of the dollar holdings of the loan category across the local banks and the dollar holdings of the loan category attributed to that state for the regional banks.

The Call Reports define equity capital as the sum of perpetual preferred stock (including related surplus), common stockholders’ equity, surplus, and undivided profits and capital reserves adjusted for net unrealized losses on marketable equity securities. We defined the volume of commercial real estate and commercial and industrial delinquent loans as the sum of the dollar amounts of loans that were past due more than thirty days but still accruing interest and loans that were in nonaccrual status. We constructed delinquency rates as the ratios of the loan delinquencies in each category divided by the total loans in each category.

3.2. Measures of aggregate real economic activity

As a measure of total economic activity in each state, we used annual gross state product. These data came from the US Department of Commerce (1994, 1995).

Our proxy for business owners’ (and presumably lenders’) views about current and future national economic conditions was the index of consumer sentiment produced by the Survey Research Center (1997) at the University of Michigan. We also used national average data for interest rates – the nominal prime interest rate – from the *Federal Reserve Bulletin*.

⁷ Call Report data pertained to both domestic and foreign offices of insured US-chartered commercial banks.

3.3. Measures of small business activity

We gauged the size of a business by the number of employees at the firm.⁸ For research purposes, the SBA's Office of Advocacy defines a small business as "an independently owned and operated firm with fewer than 500 employees".⁹ Thus, small businesses range from 499-employee manufacturing firms to 1-employee, part-time businesses. We present results for firms with 500 or more employees (large businesses), and for three sizes of small businesses: firms with less than 20 employees, firms with 20–99 employees, and firms with 100–499 employees.

Using 500 employees as the dividing line between small and large business means that the overwhelming majority of businesses by number are small. These small businesses employ a little more than half of all employees and account for a little less than half of total dollar payrolls. In our dataset, about 90 percent of all firms had less than 20 employees. About 20 percent of employees were in firms with less than 20 employees. Thus, like banks, most nonbank businesses were quite small. Also like banks, a relatively small number of firms account for at least half of employment.

No single annual data series available by state seemed adequate to summarize the real economic activity of small businesses. Therefore, we used data on the numbers of firms, on employment, and on the annual payrolls for businesses in several size categories.¹⁰

Because they seemed like candidates that could provide additional information about the economic conditions of small businesses, we collected data on indicators of business insolvency: the numbers of business failures and of bankruptcies. Data on business failures, defined as enterprises that cease operation with a loss to one or more creditors, were collected and published by the Dun and Bradstreet Corporation (1994) (D&B). These businesses were no longer on D&B's list of active businesses during their latest survey, either because of failure or because of the filing of a bankruptcy petition. Businesses

⁸ We aggregated small businesses into firm size categories of less than 20 employees, 20–99 employees, and less than 500 employees. We also used the data on the numbers of firms, numbers of employees, and annual payrolls for firms with more than 500 employees.

⁹ See US Small Business Administration (1997a).

¹⁰ Data were published in US Small Business Administration (1994b). These data were created for the SBA by the Census Bureau and were compiled from the Standard Establishment List as well as the Master Establishment List. All of the subsidiaries within a state that were affiliated with a particular company were considered part of one firm. Firms with operations in more than one state were counted more than once because firms are defined within states. Employment and annual payroll data depended on the location of the firm, not on the location of the residence of the employee.

that participated in the D&B survey tended to be established and it is likely that the survey under-represents very small and *de novo* businesses.

Business bankruptcy data were provided by the Reports Division of the Administrative Office of the US Courts (unpublished). These data were recorded when businesses filed bankruptcy petitions under Chapters 7, 11, or 12 of the bankruptcy laws. A business bankruptcy is a legal recognition that a business is insolvent and that it must restructure (Chapter 11) or completely liquidate (Chapter 7).¹¹ The SBA's Office of Advocacy (US Small Business Administration, 1994a) argued that business bankruptcy data were more likely to include self-employed persons and new, very small firms than were business failure data. An economic indicator particularly pertinent to the vitality of *de novo* businesses was the number of Chapter 7 bankruptcies.

3.4. SBA loan guaranty loan amounts

The section 7(a) Loan Guaranty Program is one of the SBA's primary vehicles for providing loans to small businesses that are unable to secure financing on reasonable terms through normal lending channels. This program guarantees loans provided by private-sector lenders to applicants that meet criteria with respect to (1) the type of business, (2) the size of the business, and (3) the use of the loan proceeds.¹² The vast majority of for-profit businesses with fewer than 500 employees are eligible for financial assistance through this program, and the loans can be used for most business purposes including the purchase of real estate to house the business operations, construction, renovation or leasehold improvements; acquisition of furniture, fixtures, machinery and equipment; purchase of inventory; and working capital. In each instance, the business must have reasonable equity invested and have used alternative financing sources (including personal assets) first.

Although the Loan Guaranty Program is generally intended to encourage longer-term small business financing, the actual loan maturities are based on the ability to repay, the purpose of the loan proceeds, and the useful life of the assets financed. Maximum loan maturities are twenty-five years for real estate and equipment and ten years for working capital. Interest rates are negotiated

¹¹ Farm businesses are liquidated under the provisions of Chapter 12.

¹² The proceeds of a loan guaranteed by the SBA cannot be used to finance floor plan needs, to purchase real estate that will be held for investment purposes, to make payments to owners or pay delinquent taxes, or to pay existing debt unless it can be shown that refinancing will benefit the small business and that the need to refinance is not indicative of imprudent management practices. Special considerations apply to franchises, recreational facilities and clubs, farms and agricultural business, fishing vessels, and holding companies. Applications are not accepted from firms where the principal is incarcerated, on parole, or on probation. Businesses with speculative or gambling purposes are ineligible. (See US Small Business Administration, 1997b.)

between the borrower and the lender, but are subject to maximum rates that are pegged to the prime rate of interest. For fixed rate loans, the maximum interest rate depends on the prime rate, the amount of the loan, and the maturity of the loan. Variable rate loans can be pegged either to the prime rate or to a weighted average of rates the Federal Government pays for loans with maturities similar to the average loan that is guaranteed by the SBA.

The SBA can guarantee up to eighty percent of loans of up to \$100,000, and up to seventy-five percent of loans above \$100,000. There is no legislated limit to the total amount of the loan that can be requested from the lender, but the maximum SBA guaranty amount is generally \$750,000.

Data on the dollar amount of the loans approved by lenders and the dollar amount of the guarantees approved by the SBA were available for each SBA office.¹³ These data were aggregated to form state level data on “gross loans” approved (i.e. the total amounts of the loans) and on guarantees approved by the SBA.¹⁴ These data are *not* the dollar amounts outstanding, but rather are the flows of newly approved and extended loans.

4. Econometric specification

In this section, we describe the empirical specification of the dependent and independent variables that we used in the regressions. We also describe the estimation methods that we used. In order to eliminate state-specific effects, the dependent variables were each specified as first-differences (and no intercept was included in the estimated specification). We regressed the first-differences of the bank loan variables, of statewide and small-business activity, of SBA loan guarantee extensions, and of business failures and bankruptcies on a list of right-hand-side variables that, with two exceptions, was the same for each table.¹⁵ Thus, in Table 1, the dependent variables are the first-differences of real loans per capita, and in Tables 2 and 3 the dependent variables are the

¹³ There are more than 80 SBA offices, with at least one in each state and the District of Columbia. Data are in US Small Business Administration (1991–1993), Office of Financial Assistance.

¹⁴ Dollars of gross loans and dollars of US Small Business Association guarantees at offices within a state were summed to obtain the state-level values of the variables.

¹⁵ First, bank loan variables replaced bank capital variables as explanatory variables in Table 2. Second, the bank capital variables for the 1989–1990 period and the real estate loan delinquency variable were omitted from Table 4. Data availability for the flows of SBA loans granted restricted the sample period to the years 1991 and 1992. Thus, only the 1991–1992 capital variables were relevant. Considerable correlation over this short period between the two loan delinquency rate variables led us to omit the measure of real estate loan delinquencies.

first-differences of real per-capita gross state product, employment, firms, and payrolls, and so on.

Each dollar magnitude in Tables 1–5 was expressed in 1996 dollars per resident of each state. The bank capital variables entered as first-differences of the dollar amount of bank equity capital. Statewide totals were obtained by adding up these capital changes separately for each local bank and the apportioned amount of each regional bank in the state. We added up these capital changes for small (assets less than \$300 million) and for large banks.¹⁶ For each size bank, we calculated two bank capital variables to see if the responses to capital changes differed over time. The first had data for capital changes in the first half of the period (1989–1990) and zeros for the second half of the period (1991–1992). The second had data for capital changes in the second half of the sample period (1991–1992) and zeros for the first half of the sample period. Thus, we had available four bank capital variables as explanatory variables for each row of Table 1 (and of Tables 3–5). We followed the same procedure in calculating the four total bank loan variables that we used in Table 2 in place of the four capital variables.

The index of consumer sentiment was specified in levels. The nominal prime interest rate was specified in level of percentage points. Though our priors called for their first-differences to enter, the empirical estimates reveal strong level but not difference effects of sentiment and the interest rate.¹⁷ Each of these measures of economic conditions was lagged one year, which should ameliorate any simultaneity bias. Our specification does not allow for any other dynamics. (Fig. 3 plots both of these national measures of economic conditions.) The loan delinquency rates were each specified in levels of percentage points.

We judged the right-hand-side variables, such as the same-year capital and delinquency rates of banks or one-year-lagged national consumer sentiment or interest rate, would not be much affected by the loan variables used as dependent variables in Table 1. Since the extent of simultaneity bias in the ordinary least squares (OLS) estimates shown in Table 1 seemed likely to be small, we used OLS to obtain the estimates shown in Table 1.¹⁸

¹⁶ These small banks were 93 percent of banks by number and held 22 percent of total bank assets in 1988.

¹⁷ One reason that the level rather than the first-difference of the index of consumer sentiment empirically is related to the first-differences of the loan and output variables is that the index itself seems to be a better measure of the first-differences than of the levels of economic conditions. Several of the questions in the survey inquire about current conditions relative to past and expected future conditions.

¹⁸ Two-stage least squares estimates of the specification used for Table 1 did not differ markedly from the OLS estimates that we present here. In Tables 2–5, however, simultaneity may have been important to recognize and allow for since OLS estimates and two-stage least squares estimates differ considerably.

We presumed the potential for simultaneity bias was greater in specifications that linked the various measures of statewide real activity to the statewide measures of bank loans and bank capital. For example, not only might declines in bank capital reduce economic activity, but weaker economic conditions, regardless of their source, might reduce banks' capital. OLS regressions of economic activity on bank capital and other variables then might be importantly biased by this reverse causation. To reduce simultaneity bias, we used an instrumental variables (IV) technique to obtain the estimates shown in Tables 2–5. As instruments for the bank capital variables we used two-year-lagged and three-year-lagged values of each of the bank capital variables; contemporaneous, one-year-lagged, and two-year-lagged values of each of the loan delinquency variables; and the one-year-lagged values of the interest rate variable. Each of the instrumental variables was entered twice: once multiplied by a dummy variable that took the value 1 for the 1989–1990 period (and 0 otherwise) and once multiplied by a dummy variable that took the value 1 for the 1990–1991 period (and 0 otherwise). We also included as instruments the dummies for the 1989–1990 and 1991–1992 periods.¹⁹

5. Findings

This section discusses the estimation results presented in Tables 1–5. In each table, the first-differences of the annual values of statewide variables were regressed on the first-differences of the change in bank capital in each state (split both by bank size (small and large) and by time period (1989–1990 and 1991–1992)) and on the levels of the delinquency rates of commercial real estate loans and on commercial and industrial loans and on the one-year-lagged levels of the index of consumer sentiment and the (nominal prime) interest rate. The lone exception is found in Table 2, where bank loan variables were substituted for bank capital variables.

5.1. *Effects on bank loans*

Row 1 of Table 1 displays what has become conventional wisdom about bank loans: losses of bank capital in the period around 1990 reduced lending. The estimates in Table 1 also imply that higher loan delinquency rates and interest rates and reduced consumer sentiment reduced banks' total holdings of loans. Rows 2–4 of Table 1 apply commercial and industrial loans, commercial

¹⁹ We used the same procedure to instrument the loan variables in Table 2, substituting lags of the loan variables for lags of the capital variables.

Table 1
The effects on bank loans of bank capital, loan delinquencies, and economic conditions.
Estimation method: Ordinary least squares (1989-1992, by State, per capita, 1996 \$)

Dependent variables (Bank size and loan category)	Explanatory variables							R^2	RMSE	F-Statistic Prob > F	
	Bank capital		Loan delinquency rate		Economic conditions						
	Small banks 1989-90	1991-92	Large banks 1989-90	1991-92	Single-family and commer- cial real estate	Commer- cial and industrial	Consumer sentiment				Bank prime interest rate
<i>All banks</i>											
1. Total loans	7.67 (3.85)	0.92 (0.61)	6.47 (7.14)	1.44 (2.32)	-113.74 (6.10)	4.81 (0.17)	31.91 (5.73)	-270.59 (5.34)	0.6437	511	39.74 0.0001
2. Commercial and industrial	2.39 (3.41)	0.71 (1.34)	1.14 (3.58)	0.13 (0.58)	-50.40 (7.69)	4.88 (0.48)	12.42 (6.35)	-109.38 (6.21)	0.7420	180	63.29 0.0001
3. Commercial real estate	0.80 (1.38)	0.06 (0.13)	1.10 (4.18)	-0.35 (1.92)	-35.56 (6.54)	3.48 (0.41)	3.69 (2.28)	-18.34 (1.26)	0.5026	149	22.23 0.0001
4. Consumer	2.00 (2.19)	0.42 (0.61)	2.73 (6.62)	0.16 (0.55)	21.24 (2.50)	-15.17 (1.15)	13.95 (5.51)	-139.55 (6.12)	0.3553	233	12.13 0.0001
<i>Large banks</i>											
5. Total loans	-1.49 (0.75)	-4.87 (3.24)	6.80 (7.53)	2.20 (3.55)	-136.80 (7.36)	39.57 (1.37)	31.29 (5.64)	-255.28 (5.11)	0.6019	510	33.27 0.0001
6. Commercial and industrial	-0.03 (0.05)	-0.77 (1.48)	1.24 (3.97)	0.38 (1.75)	-62.39 (9.71)	23.78 (2.38)	10.64 (5.54)	-90.69 (5.25)	0.6842	176	47.67 0.0001
7. Commercial real estate	-0.54 (0.98)	-1.19 (2.86)	1.13 (4.49)	-0.23 (1.35)	-32.70 (6.34)	3.56 (0.44)	4.11 (2.66)	-22.42 (1.62)	0.4620	142	18.89 0.0001
8. Consumer	-0.50 (0.56)	-1.00 (1.47)	2.91 (7.18)	0.36 (1.31)	12.01 (1.44)	-9.49 (0.73)	13.86 (5.56)	-132.35 (5.89)	0.3392229		11.26 0.0001

Table 1 (Continued)

Dependent variables (Bank size and loan category)	Explanatory variables				Loan delinquency rate Single-family and Commercial real estate	Economic conditions		R ²	RMSE	F-Statistic Prob > F	
	Bank capital		Large banks			Consumer sentiment	Bank prime interest rate				
	Small banks 1989–90	1991–92	1989–90	1991–92							
<i>Small banks</i>											
9. Total loans	9.16 (15.09)	5.79 (12.60)	-0.33 (1.20)	-0.76 (4.01)	23.06 (4.06)	-34.75 (3.93)	0.62 (0.36)	-15.31 (1.00)	0.7728	156	74.83 0.0001
10. Commercial and industrial	2.42 (10.00)	1.48 (8.07)	-0.10 (0.93)	-0.25 (3.29)	11.99 (5.29)	-18.90 (5.36)	1.78 (2.63)	-18.70 (3.07)	0.6842	62	47.67 0.0001
11. Commercial real estate	1.34 (6.81)	1.25 (8.38)	-0.02 (0.23)	-0.12 (1.88)	-2.86 (1.55)	-0.08 (0.03)	-0.41 (0.75)	4.09 (0.82)	0.4967	51	21.71 0.0001
12. Consumer	2.49 (11.01)	1.41 (8.26)	-0.18 (1.80)	-0.21 (2.95)	9.23 (4.37)	-5.68 (1.73)	0.09 (0.15)	-7.21 (1.27)	0.6318	58	37.75 0.0001

Note: *t*-Statistics are in parentheses.

Table 2
The effects on economic activity of total bank loans, loan delinquencies, and economic conditions. Estimation method: Instrumental variables (1989-1992, by State, per capita, 1996 \$)

Dependent variables (Economic activity)	Explanatory variables				R ²	RMSE	F-Statistic Prob > F					
	Total bank loans		Loan delinquency rate					Economic conditions				
	Small banks 1989-90	1991-92	Single-family and commer- cial real estate	Commer- cial and industrial				Consumer sentiment	Bank prime interest rate			
1. Gross state product	1.74 (2.77)	0.54 (1.59)	-0.23 (1.11)	-0.09 (0.44)	-102.49 (3.02)	49.87 (1.56)	34.16 (3.41)	-258.92 (3.05)	0.2818	576	8.63	
<i>Employment by firm size (per million residents)</i>												
2. >499 Employees	-6.14 (1.25)	8.01 (3.01)	4.28 (2.65)	5.04 (3.22)	-94.66 (0.36)	202.14 (0.81)	129.78 (1.66)	-775.27 (1.17)	0.5181	4487	23.66	
3. 100-499 Employees	4.68 (2.16)	2.21 (1.88)	0.55 (0.77)	2.47 (3.58)	-243.14 (2.08)	268.20 (2.44)	115.66 (3.36)	-913.98 (3.13)	0.4962	1981	21.67	
4. 20-99 Employees	7.01 (2.41)	6.35 (4.02)	1.27 (1.33)	3.91 (4.21)	-284.24 (1.81)	369.59 (2.50)	31.62 (0.68)	-158.79 (0.41)	0.4582	2659	18.61	
5. <20 Employees	5.59 (2.71)	4.68 (4.19)	-0.12 (0.18)	2.55 (3.88)	-208.01 (1.87)	128.79 (1.23)	16.97 (0.52)	2.48 (0.01)	0.4069	1885	15.10	
<i>Number of firms by firm size (per million residents)</i>												
6. >499 Employees	0.02 (1.28)	0.01 (1.56)	0.00 (0.23)	0.00 (0.31)	-0.81 (1.16)	2.18 (3.32)	0.18 (0.87)	-1.06 (0.61)	0.4866	12	20.85	
7. 100-499 Employees	0.06 (2.87)	-0.01 (1.33)	-0.01 (1.03)	0.01 (1.74)	-1.43 (1.28)	-0.99 (0.94)	1.25 (3.80)	-8.85 (3.17)	0.3411	19	11.39	
8. 20-99 Employees	0.25 (3.22)	0.11 (2.68)	0.00 (0.03)	0.08 (3.28)	-8.32 (1.96)	6.43 (1.61)	2.49 (1.99)	-16.51 (1.56)	0.4139	72	15.54	
9. <20 Employees	1.10 (2.99)	0.76 (3.77)	-0.05 (0.43)	0.23 (1.94)	-47.02 (2.36)	19.74 (1.05)	1.17 (0.20)	20.37 (0.41)	0.3220	337	10.45	

Table 2 (Continued)

Dependent variables (Economic activity)	Explanatory variables						R^2	RMSE	F-Statistic	Prob > F			
	Total bank loans			Loan delinquency rate							Economic conditions		
	Small banks		Large banks	Single-family and commercial real estate	Commercial and industrial	Consumer sentiment					Bank prime interest rate		
	1989–90	1991–92	1989–90	1991–92									
<i>Real payroll by firm size</i>													
10. >499 Employees	0.24 (1.77)	0.07 (0.97)	-0.05 (1.04)	0.01 (0.22)	-6.28 (0.84)	-9.11 (1.30)	11.50 (5.25)	-87.70 (4.72)	0.3504	126	11.87		
11. 100–499 Employees	0.24 (3.16)	0.01 (0.30)	-0.03 (1.08)	0.04 (1.62)	-6.61 (1.63)	2.11 (0.55)	4.69 (3.94)	-37.37 (3.70)	0.2917	69	9.06		
12. 20–99 Employees	0.23 (3.18)	0.07 (1.85)	0.00 (0.04)	0.06 (2.48)	-8.00 (2.08)	3.68 (1.02)	1.79 (1.58)	-12.20 (1.27)	0.3612	65	12.44		
13. <20 Employees	0.20 (3.19)	0.04 (1.15)	-0.02 (0.78)	0.03 (1.52)	-5.73 (1.72)	-2.51 (0.80)	1.27 (1.30)	-6.92 (0.83)	0.3003	56	9.44		

Note: *t*-Statistics are in parentheses.

Table 3
The effects on economic activity of bank capital, loan delinquencies, and economic conditions. Estimation method: Instrumental variables (1989-1992, by State, per capita, 1996 \$)

Dependent variables (Economic activity)	Explanatory variables				R^2	RMSE	F-Statistic Prob > F		
	Bank capital		Loan delinquency rate					Economic conditions	
	Small banks 1989-90	1991-92	Large banks 1989-90	1991-92				Single-family and commer- cial real estate	Commer- cial and industrial
1. Gross state product	16.18 (4.07)	8.09 (2.32)	1.07 (0.66)	2.24 (2.97)	15.69 (0.46)	0.3674	531	-193.77 (3.66)	12.78 0.0001
<i>Employment by firm size (per million residents)</i>									
2. >499 Employees	24.88 (0.82)	-69.48 (2.61)	11.98 (0.97)	-22.86 (3.96)	-120.91 (0.46)	0.5748	4061	-2454.18 (6.07)	29.74 0.0001
3. 100-499 Employees	26.62 (2.06)	3.34 (0.29)	-2.50 (0.47)	-1.15 (0.47)	296.40 (2.67)	0.5441	1731	-1073.10 (6.22)	26.25 0.0001
4. 20-99 Employees	54.59 (3.20)	-10.00 (0.67)	3.09 (0.44)	-5.99 (1.85)	243.33 (1.66)	0.5098	2281	-709.87 (3.12)	22.88 0.0001
5. <20 Employees	36.06 (3.04)	-1.91 (0.18)	0.89 (0.18)	-6.80 (3.01)	52.99 (5.14)	0.4477	1588	-171.05 (1.08)	17.83 0.0001
<i>Number of firms by firm size (per million residents)</i>									
6. >499 Employees	0.27 (3.10)	-0.12 (1.63)	-0.01 (0.28)	-0.03 (1.97)	0.40 (0.54)	0.5183	12	-1.07 (0.93)	23.67 0.0001
7. 100-499 Employees	0.12 (1.23)	0.13 (1.52)	-0.06 (1.58)	0.08 (4.50)	0.68 (6.91)	0.5232	13	-5.26 (4.08)	24.14 0.0001
8. 20-99 Employees	1.44 (3.26)	0.15 (0.39)	0.09 (0.51)	0.08 (0.93)	5.88 (1.55)	0.4857	59	-19.89 (3.37)	20.78 0.0001
9. <20 Employees	7.00 (3.27)	2.65 (1.41)	0.84 (0.96)	0.09 (0.21)	8.00 (4.43)	0.3709	286	5.46 (0.48)	12.97 0.0001

Table 3 (Continued)

Dependent variables (Economic activity)	Explanatory variables						R^2	RMSE	F-Statistic	Prob > F		
	Bank capital		Large banks		Loan delinquency rate						Economic conditions	
	Small banks		1989–90	1991–92	Single-family and commer- cial real estate	Commer- cial and industrial					Consumer sentiment	Bank prime interest rate
	1989–90	1991–92	1989–90	1991–92								
<i>Real payroll by firm size</i>												
10. >499 Employees	1.36 (1.62)	1.50 (2.04)	0.21 (0.62)	0.54 (3.37)	-5.58 (1.27)	-5.12 (0.71)	9.81 (7.82)	-80.27 (7.18)	0.4280	112	16.46 0.0001	
11. 100–499 Employees	0.64 (1.82)	0.78 (2.55)	-0.09 (0.60)	0.26 (3.93)	-12.01 (6.53)	7.02 (2.34)	3.36 (6.42)	-27.88 (5.98)	0.4668	47	19.26 0.0001	
12. 20–99 Employees	1.02 (2.47)	0.79 (2.18)	0.31 (1.82)	0.33 (4.18)	-13.35 (6.12)	6.96 (1.96)	1.65 (2.67)	-14.43 (2.61)	0.4575	55	18.56 0.0001	
13. <20 Employees	0.68 (2.04)	1.02 (3.49)	0.23 (1.70)	0.31 (4.92)	-8.68 (4.97)	1.68 (0.59)	0.39 (0.78)	-3.19 (0.72)	0.4482	44	17.87 0.0001	

Note: *t*-Statistics are in parentheses.

Table 4
 The effects on small business administration lending of bank capital, loan delinquencies, and economic conditions. Estimation method: Instrumental variables (1991-1992, by State, per capita, 1996 \$)

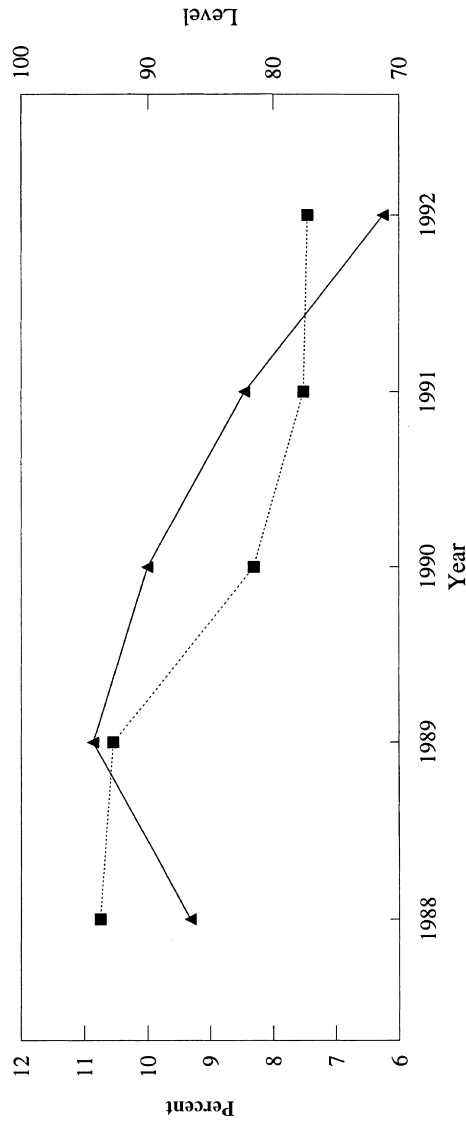
Dependent variables (Small business administration (SBA) guaranteed loans originated)	Explanatory variables				R^2	RMSEF	F-Statistic Prob > F		
	Bank capital		Loan delinquency rate					Economic conditions	
	Small banks	Large banks	Single-family and commercial real estate	Commercial and industrial				Consumer Sentiment	Bank prime interest rate
1. Gross loan amount	-0.08 (0.70)	0.06 (1.33)	-	-1.67 (1.18)	0.91 (1.75)	-7.20 (1.67)	0.2868 11	7.00 0.0001	
2. SBA 7(a) guaranty amount	-0.07 (0.77)	0.05 (1.29)	-	-1.34 (1.15)	0.78 (1.81)	-6.16 (1.73)	0.2884 9	7.05 0.0001	

Note: *t*-Statistics are in parentheses.

Table 5
The effects on the number of business failures and bankruptcies of bank capital, loan delinquencies, and economic conditions. Estimation method:
Instrumental variables (1989–1992, by State, per capita, 1996 \$)

Dependent variables (Number of business failures and bankruptcies)	Explanatory variables				R^2	RMSE	F-Statistic prob > F				
	Bank capital	Large banks 1989–90 1991–92	Loan delinquency rate	Economic conditions							
	Small banks 1989–90 1991–92	Single-family and com- mercial real estate	Consumer sentiment	Bank prime interest rate							
1. Business failures (per million residents)	0.79 (1.27)	-1.01 (1.85)	-0.20 (0.78)	0.07 (0.57)	11.75 (3.57)	-10.78 (2.01)	-5.87 (6.28)	54.60 (6.55)	0.3919	84	14.18 0.0001
2. Total business bankruptcies (per million residents)	0.12 (0.17)	-0.15 (0.23)	-0.39 (1.30)	-0.32 (2.33)	10.53 (2.74)	-17.98 (2.87)	-0.31 (0.28)	7.80 (0.80)	0.1004	98	2.46 0.0152
3. Total business bankruptcies (per million firms)	-0.00 (0.13)	-0.01 (0.22)	-0.02 (1.20)	-0.01 (2.29)	0.46 (2.72)	-0.71 (2.56)	-0.03 (0.61)	0.44 (1.02)	0.1047	4400	2.57 0.0112
4. Chapter 7 business bankruptcies (per million residents)	-0.35 (0.53)	-0.10 (0.18)	-0.12 (0.44)	-0.15 (1.25)	5.98 (1.75)	-10.26 (1.84)	0.72 (0.74)	-4.02 (0.47)	0.0566	87	1.32 0.2368
5. Chapter 7 business bankruptcies (per million firms)	-0.02 (0.77)	-0.00 (0.12)	-0.00 (0.33)	-0.01 (1.26)	0.27 (1.79)	-0.40 (1.63)	0.02 (0.42)	-0.09 (0.24)	0.0613	3850	1.44 0.1839

Note: *t*-Statistics are in parentheses.



▲ Average Prime Rate (left scale) ■ Michigan Survey of Consumer Sentiment (right scale)

Fig. 3. The nominal prime interest rate and the Michigan index of consumer sentiment.

real estate loans, and consumer loans to the same specification of explanatory variables. The results across loan categories do not differ markedly.

Row 1 of Table 1 demonstrates that on balance total loan holdings responded by similar amounts per dollar of capital change at small and large banks. It also indicates that the response of loans tended to be much smaller in the later period than in the earlier period. One reason may be that capital increases in the later period partially reflected higher minimum effective capital requirements, so that capital coefficients on capital increases in the later period reflect a combination of increased capital pressure from raised requirements and eased capital pressure associated with increased holdings of capital. In the early period, capital increases probably resulted less from increased capital requirements, and thus the coefficients associated with the capital variables for the earlier period may be better estimates of the effect on loans of a change in capital not associated with a change in regulatory standards. Row 1 suggests that the effects on loans might well be twice as large as those reported by Peek and Rosengren (1995b).

Rows 5–8 of Table 1 use the uniform specification to estimate the responses of loans held by large (\$300 million or more in assets) banks. Since these large banks hold more than three-fourths of total bank assets, the estimated responses are generally similar to those reported for total loans. Rows 9–12 of Table 1 display the results for small banks (less than \$300 million in assets). Both large and small banks reduced their loans when they lost capital.

Another similarity between large and small banks was their tendency to respond *inversely* to capital changes at other banks. Large banks' loans, taken together and by category, showed some tendency to rise when capital fell at small banks: Each of the estimated coefficients associated with capital at small banks was negative in the equations that accounted for loans at large banks. Rows 9–12 of Table 1 show that the converse was also true. Thus, borrowers denied loans because their banks were under capital pressure seem to have been able to offset partially those effects by going to banks under less capital pressure. This result is similar to one presented in Hancock and Wilcox (1994b), where loans rose at banks whose neighboring banks had suffered increased loan delinquencies.²⁰ Note also that the offsetting, or indirect, effects were smaller than the direct effects on lending of changes in bank capital. The estimated increases in bank loans at *large* banks per dollar reduction in capital at *small* banks was smaller than the reduction in loans at *small* banks. Thus, as suggested by Row 1 of Table 1, total lending declined when bank capital fell.

The responses of large banks did differ somewhat from those of small banks. One of the more noticeable differences was that loans at large banks responded significantly to changes in consumer sentiment and the interest rate, whereas

²⁰ See also Berger et al. (1998).

loans at small banks typically did not. This might reflect differences in the typical borrowers at banks of different sizes. Larger banks may well have borrowers, such as manufacturers, who are more tightly linked to the durable goods sector where consumer sentiment and interest rates may be more important.

Another difference was that loans contracted more at small banks per dollar of capital pressure than they did at large banks. The responses at small banks were about half again as large as they were at large banks. The difference seemed concentrated in commercial and industrial loans at small banks. In contrast, the large banks responded much more to small banks' loss of capital than the other way around. In response to capital reductions at small banks (and reductions in loans at small banks), large banks increased their lending (row 5 of Table 1). This partially offsetting increase in lending meant that total lending declined by the same amount regardless of whether capital declined at large or small banks.

One possible reason that loans at large banks expanded when small banks had capital reductions was that large businesses may have taken out loans from large banks to fund trade credit for their small business customers.²¹ Another reason for the differential response to others' capital pressures is that, while large banks may be able to handle all the borrowing demands of many small businesses, a small bank may not have the capacity to fund the borrowings typical of even one large firm. Consider an example: Suppose that the smallest large firm has 500 employees who each produce \$100,000 in annual gross output, so that the firm has \$50 million in annual sales. With an inventory to monthly sales ratio of two, the firm has over \$8 million in inventory. Suppose the largest small bank has \$300 million in assets, a 10 percent capital ratio, and is prohibited by regulations from making a loan equal to more than 10 percent of its capital to any one borrower. That makes its maximum loan size equal to \$3 million. In this example, the largest small bank could not fund half of the inventory being carried by the smallest large firm. It is of course possible that large firms will sometimes have smaller financing needs than that calculated in this example, but it is also readily seen that many small banks are not likely to be able to provide sufficiently large loans for many large businesses.

5.2. Effects on real economic activity

The results in Table 1 focus on the responses of bank loans to bank capital and other factors. As we noted above, bank loans generally responded to these factors in the expected direction and differences in the magnitudes of the responses generally corresponded to our priors. Our specification also accounted

²¹ See Calomiris et al. (1995) and Petersen and Rajan (1994).

for a good deal of the variance in our pooled sample of changes in bank loans *in toto* and by category.

Our primary concern, however, was the response of real economic activity to changes in bank loans, in bank capital, and in other factors. If borrowers had close substitutes for bank credit, real economic activity might have been little affected by banks' problems. In that case, the health of the banking sector might have been of little importance and received little attention by policy-makers.

To the extent that firms were not able to easily replace the supply of credit that had come from banks, however, we would expect the coefficients (obtained by our IV technique) in Tables 2 and 3 to be consistent with those in Table 1. Indeed, we might regard Table 3, which relates bank capital to output, as being akin to the "reduced form" of Tables 1 and 2, which relate bank capital to bank loans and bank loans to output.

Table 2 shows the IV-estimated effects on our measures of real economic activity of bank loans, loan delinquencies, and economic conditions. The bank loan variables were split by bank size and by time period, in the same way that the bank capital was split in Table 1. Rows 2–13 in Table 2 show in three blocks of four rows each the responses across firm size of employment, numbers of firms, and payrolls. (Though firms with more than 500 employees are not typically considered to be small businesses, their responses are shown for completeness and for comparison purposes.)

Reading across the rows of Table 2 shows that dollar-for-dollar reductions in loans made by small banks generally depressed all measures of economic activity by noticeably larger amounts than reductions in loans made by large banks did. In seven of the eight comparisons in rows 2–5 for the two time periods, the point estimates for the effects on employment of a decline in loans at small banks exceeded the point estimates associated with large banks. In that sense, small banks were supplying "high-powered loans". Per dollar of loan, loans supplied by small banks apparently had a larger effect on total economic activity than loans supplied by large banks.

Some care is required to interpret Table 2 further. (The same caution applies to Table 3.) To compare the effects of changes in bank loans on small businesses (e.g., those with less than 500 employees) to their effects on large businesses (e.g., those with 500 or more employees), compare the sum the coefficients for the three components of total small business (rows 3–5) with the coefficient in row 2. As we noted above, under this criterion for small business, about half of all employees work in small businesses. We also note that there are many fewer larger firms, which makes comparing the effects on the numbers of firms across rows problematic.

Not surprisingly, the sums of the coefficients across rows indicates that changes in small bank lending had much less effect on employment at large businesses than at the sum of all small businesses, especially in the 1989–1990

period. In contrast, during the same period lending at large banks seems to have had more effect on large businesses than on small businesses. The nonloan variables affected output in the expected way: Higher loan delinquency and interest rates tended to reduce output, while higher consumer sentiment tended to raise output.

The specification in Table 3 substitutes the bank capital variables for the bank loan variables used in Table 2. Row 1 of Table 3 shows that gross state product declined when bank capital did.²² The effects on gross state product of per dollar of capital loss at small banks were much larger than those associated with large banks.

Although the numbers of employees and firms provide independent information about activity, we focus our discussion of Table 3 on the real-dollar payroll results, which we regard as largely though not completely encompassing and representative of the results based on employee and firm data. In general, firms of all sizes reduced their payrolls, though not always by statistically significant amounts, when bank capital declined. As in Table 2, the estimated effects on payrolls of capital losses at small banks were larger than those of capital losses at large banks in each of the eight comparisons possible in rows 10–13.

Consistent with the results of Table 2, the sum of the small business responses (rows 11–13) to capital changes at small banks considerably exceeded the responses of large businesses (row 10). The estimates shown in Table 1 imply that a loss of \$1 million of bank capital at small banks during 1989 or 1990 reduced total loans at small banks by \$9 million (row 9) and raised total loans at large banks by \$1.5 million (row 5). Row 1 of Table 3 implies that a \$1 million decline in bank capital reduced gross state product by \$16 million, or about double the \$7.7 million decline in total bank loans. Further, Table 3 implies that employment fell by 142 jobs (calculated by summing the first column coefficients in rows 2–5) and that payrolls fell by nearly \$4 million (calculated by summing the coefficients in rows 10–13). These declines were fairly evenly spread over businesses of various sizes.

Large banks may have suffered the largest capital depletions during this period, but per dollar of capital loss, the effects of losses of capital at small banks were considerably larger. One reason may be that many of the customers of large banks can obtain credit from other large banks or even from nonbank sources, such as finance companies and the commercial paper market. Small banks' customers may not be able as quickly to arrange for credit through other small banks, through large banks, or through nonbank sources. This may

²² The estimates based on the broader measure of economic activity used here, gross state product, supplements the Hancock and Wilcox (1997) finding that real activity in the real estate sector was hampered by declines in bank capital in the years around 1990.

occur because other lenders may be more informed about the capital condition of larger banks. If so, borrowers denied renewing their credits at a large bank may be better able to convince their next lender that the denial resulted from the bank's capital depletion rather than the condition and prospects of the borrower. In contrast, borrowers denied credit at small banks whose conditions are less well known may require more time and effort to convince their next lender that they are creditworthy.

Dunkelberg and Dennis (1992) and Cole and Wolken (1995) reported that the fraction of small businesses that uses bank credit rises with firm size. It is also generally agreed that very large firms, which may have direct access to commercial paper, bond, and equity markets, use banks less for credit than small firms do. If we equate the extent of bank-dependency to the share of firms' credit that they obtain from banks, bank-dependency traces out an inverted-U shape with respect to firm size. That suggests that the pattern across firm sizes of responses to banking sector shocks might also trace out an inverted-U-shaped pattern.

The coefficients on capital in Table 3 do not mirror that pattern across firm sizes of bank-dependency. For example, the capital coefficients on payrolls shown in rows 10–13 for both time periods for both small and large banks oscillate across firm size. Thus, the hypothesis that responses to capital changes across firm sizes would follow an inverted-U-shaped pattern received little support.

5.3. Effects of SBA loan guaranty program

One socially useful role that a government loan guaranty program could play is to increase its supply of loans when private-sector banks are hit by shocks, either economic or regulatory, that inefficiently reduce the current supply of bank credit. That inefficiency might arise, for example, when a bank's economic net worth became negative as a result of past decisions and shocks and the bank could not raise sufficient capital to persuade the capital regulators to allow it to fund a positive net present value project. Given the capital pressures that banks were under through the early 1990s, we sought information about the extent to which SBA-guaranteed lending rose or fell with bank capital pressures and other conditions.

Table 4 presents the results of regressing the first-differences of the flows of the gross and of the guaranteed amounts of SBA section 7(a) loans on some of the explanatory variables that we used in Tables 1–3. The difference between these two dependent variables is the amount of the loan for which the bank is not guaranteed repayment, i.e., the amount at risk. Because that amount tends to be a fairly steady proportion of the gross loan amount, the results shown in rows 1 and 2 of Table 4 are virtually identical to each other. Because we had data only for years 1990–1992 and thus first-differences of the flows of

lending only for 1991 and 1992, coefficients for the large and small bank capital change variables for 1988–1990 could not be estimated. Because the loan delinquency variables were highly correlated with each other during this short time period, we omitted the real estate loan delinquency rate.

Although the F-statistics point toward a significant overall relation, none of the individual coefficients in Table 4 were statistically significant. Not too surprisingly, SBA lending fell with interest rates and rose with consumer sentiment. Of course, demand effects alone might account for that perhaps-desirable reaction. Higher loan delinquency rates also showed some tendency to reduce SBA lending.

Losses of capital at large banks produced barely perceptible declines in SBA loan originations, while losses of capital at small banks hinted weakly that SBA loans would rise. Compared with their vigorous estimated reductions in lending generally shown in Table 1, these changes are noteworthy for being so (statistically) negligible. In that regard, SBA lending programs might be regarded as a credit market stabilizer in that SBA lending slowed far less than total lending and may have even risen in response to adverse bank capital shocks.

5.4. Effects on business failures and bankruptcies

Table 5 presents the results of applying the specification we used in Tables 1 and 3 to data on business failures and bankruptcies. Since failures of large businesses account for only a very small proportion of the total number of business failures, we interpret the results in Table 5 as applicable to small businesses. In contrast to the continuous dependent variables used above, business failure and bankruptcy are more discrete events. As such they may contain information about responses to bank capital and other shocks that is independent of the measures we used above.

The results in Table 5 are generally weak. For example, there is not a detectable relation between the number of Chapter 7 bankruptcies and the list of explanatory variables we used, individually or taken together. Few of the coefficients in rows 2 or 3 significantly drive total business bankruptcies. One reason may be that during this period changes in bankruptcy laws fundamentally altered the relation between bankruptcy filings and economic conditions. Another reason may be that bankruptcy responds with longer lags than our specification allowed.

Row 1 of Table 5, however, does reveal some statistically significant effects on business failures. There we see that higher real estate loan delinquency rates and higher interest rates and lower consumer sentiment raised the number of business failures. Those results fit our priors. The estimated effects of changes in bank capital were mixed, signs on the capital variables being positive as often as they were negative and never significant. Thus, these results are too weak to conclude that bank capital changes affected business failures and bankruptcies.

6. Conclusions

A number of empirical studies have demonstrated that declines in bank capital, loan delinquencies, and local economic conditions help explain the declines in bank loans in the period around 1990. Less well documented have been the real economic repercussions, if any, of the shocks that struck banks at that time. We have presented estimates of how much bank loans and how much real activity at businesses of all sizes declined when bank capital and loans declined and other bank portfolio and aggregate economic conditions deteriorated.

Using data for 1989–1992 by state, we estimated the effects on banks' business and consumer loans as well as on employment, payrolls, and the numbers of firms by firm size and on gross state product. In response to capital declines at their own banks, small banks reduced their loan holdings by larger amounts than did large banks; the responses at small banks were about half again as large as those at large banks; the responses of commercial and industrial loans were particularly large. Supporting the hypothesis that bank customers have alternative sources of credit, banks, and in particular large banks, raised their loan holdings when other banks reduced loans in response to capital pressures. Thus, other banks *partially* offset reductions in the supply of credit from banks that lost capital. This does not imply that the same borrowers that were denied credit at their small banks were the beneficiaries of the increased credit provided by the large banks. Losses of capital at smaller banks then produced larger direct declines in loans at small banks and larger offsetting, increases in loans at large banks; both the direct and indirect effects on loans of capital losses at small banks were larger than those for capital losses at large banks. The offsetting increases in lending by large banks in response to capital pressures at small banks were large enough that the change in total loans was about the same, regardless of whether a large or small bank lost capital. On balance, however, reductions in bank capital at either small or large banks led to reduced bank lending. Not surprisingly, factors like loan delinquency rates and macroeconomic conditions also affected banks' loan holdings.

We estimated that real economic activity was reduced by declines in bank capital. Even though the net effect on total loans was similar regardless of which size bank lost capital, gross state product declined *more* when small banks lost capital than when large banks lost capital. Payrolls, employment, and the numbers of firms also declined more in response to capital losses at small banks than to capital losses at large banks. The results in Table 2 provide some insight into the mechanism by which this occurs in showing directly that, dollar-for-dollar, loans made by small banks affected output more than loans made by large banks. In that sense, small banks made "high-powered loans".

The estimates hinted that economic activity at (the aggregate of) small firms was affected more per dollar of bank capital loss than economic activity at

large firms, regardless of whether the loss was incurred by small or large banks, but the statistical case for this hypothesis was not very strong.

Small firms may have had fewer close substitutes for bank loans (and perhaps more significant complements) available than did large firms. To the extent that small firms tended to have lower debt-equity ratios than larger firms, loans to small business may have a larger “multiplier” effect on total financial resources available to the firm. Such a multiplier effect might arise if equity investors, such as angel financiers or seed money funds, were enticed to participate in the firm when a lender like a bank committed to take on the firm’s debt.²³ Similarly, if the ability of small businesses to obtain credit from nonbank sources is affected more by obtaining bank credit than is the ability of large firms to get nonbank credit when they obtain bank credit, bank loans to small businesses may have a larger financial, and therefore real activity, multiplier than bank loans to large businesses. Thus loans to small business may also be “high-powered” loans.

The combination of the larger effects of small banks with the larger effects on small business may render small firms associated with small banks the most vulnerable to banking sector adjustments.

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²³ See, for example, James (1987), Lummer and McConnell (1989), and Petersen and Rajan (1994).

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