

# Lending by Rural Banks Involved in Mergers

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## ABSTRACT

This paper employed a variety of sources of data and a number of methods to describe rural lending markets. Over the sample period, 1992 through 1998, there was a pronounced trend towards affiliation of banks, both urban and rural, with holding companies, although over this period there was little change in the concentration of banking offices in rural areas. Using data from the 1993 National Survey of Small Business Finances, the study found some evidence that rural small businesses were less likely to apply for a loan than urban small firms although those rural firms that did apply were more likely to have their application accepted.

**Key Words:** merger, rural banks

The purpose of this paper is to review data regarding banking consolidation with a particular focus on rural areas. The general theme of the paper is that rural markets and financial institutions may differ fundamentally from urban ones. Thus one should perhaps distinguish these markets when examining some of the effects of consolidation on the borrowers in a market area. For instance, the number and type of banks that operate in rural areas may differ significantly from the norm for urban markets. Also, rural borrowers may differ fundamentally from urban borrowers, and if this is true, the type of financial relationships that they maintain also might differ. I plan to carry out this examination of consolidation in rural banking markets by developing the three major themes outlined below.

In the first part of the paper I plan to document the incidence and character of structural changes in rural banking markets relative to their urban counterparts. Using data from the National Information Center (NIC) database,<sup>1</sup> I identified 3780 instances of structural change among commercial banks in the United States from January 1992 until September 1998 in which a banking charter disappeared. These changes encompassed structural changes among both urban and rural commercial banks and among independent banks as well as bank holding companies. The acquired institution may have become a branch of the purchasing bank or banking subsidiary or it may have been closed. Note that I included the closing of a banking office only when the closure was a part of the consolidation; that is, I did not include closing of branches that had been op-

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<sup>1</sup> A version of the National Information Center (NIC) database is available at [www.ffiec.gov/nic/deafult.htm](http://www.ffiec.gov/nic/deafult.htm). The FDIC also maintains structure information at [www2.fdic.gov/structur/search/](http://www2.fdic.gov/structur/search/) and [www2.fdic.gov/id/](http://www2.fdic.gov/id/).

erated for a time after the date of consolidation.

I also identified 3820 instances of change in the control of subsidiaries of bank holding companies. These changes can either reflect purchases of subsidiaries or independent banks by a top holding company or the purchase of one top holding company by another. Throughout the paper an urban bank or subsidiary is one that is located in a Metropolitan Statistical Area (MSA), and its market area is taken as the entire MSA. A rural bank or subsidiary has its headquarters outside a MSA, and its market area is the county of the headquarters of the bank or banking subsidiary.<sup>2</sup> I combine these cases of structural transactions with data from the quarterly reports of condition (Call reports) to characterize the financial condition of both the target and acquiring institutions.

In the second section of the paper I develop the notion that structural activity in a banking market need not necessarily lead to more concentration. For instance, if a bank holding company acquires banking entities in a market where previously it had not operated, then it is not immediately clear whether or not that market will become more concentrated. Indeed, immediately following such a transaction the most common measure of the competitiveness of a market, the Herfindahl-Hirshman Index (HHI), which is the sum of the squared market shares of all the competitors in the market, would remain unchanged. Similarly, the conversion of a bank or a banking subsidiary into a branch does not automatically increase the HHI, and, in a more intuitive sense, if the banking office remains open under the control of a bank that previously was not in the market it is not clear whether customers in the banking market have their choices restricted.

I plan to document the concentration arising from structural reorganization of banks by looking at changes in the HHI calculated from

the deposits originating in each banking market. In this part of the paper, rural banks, subsidiaries, or branches are those located outside MSAs, although I list as rural a rural subsidiary or branch that is controlled by an urban holding company. While it is almost tautologically true that rural markets have a higher HHI than urban markets, it does not follow that the degree of concentration given by this measure has risen significantly in recent years in rural markets.

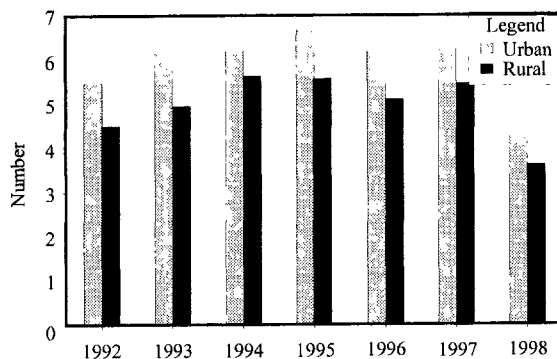
A final difference between urban and rural lending markets likely lies in the financial characteristics of the potential borrowers in each market. I use data from the Federal Reserve's 1993 Survey of Small Business Finances to examine differences between urban and rural small businesses and their financing. In this part of the paper, rural borrowers are taken to be those where the main offices of the business are outside a MSA.

### **The Incidence of Structural Change in Banking Markets**

Structural changes were identified as a change in any one of several parts of the NIC database for a commercial bank. First, a banking charter can disappear as a result of a bank merger. Second, a bank holding company may purchase some of the subsidiaries of another bank holding company, changing the control of the subsidiary but otherwise leaving the charter unchanged. Finally, a bank or bank holding company may purchase a bank holding company (and all of its subsidiaries) changing only the holding company structure but not the character of individual subsidiary banks. Counting these three types of structural transactions, 7600 instances of structural change occurred during 1992 through September 1998, and 3488 of these transactions involved rural targets, either independent banks or subsidiaries. I consider only targets that were commercial banks, although acquirers may be other banks, thrifts, savings banks, bank holding companies, or nonbank holding companies.

Figure 1 shows the rate of structural change by year since 1992 broken out by urban and

<sup>2</sup> Keeton (1996) found that acquisitions by out-of-state bank holding companies reduced the levels of lending by the subsidiary that was acquired. Out-of-state acquisitions are not distinguished from others in the current paper.



\* Note that 1998 data covers only January through September

**Figure 1.** The incident of urban and rural consolidation\*

rural targets. Roughly 45 percent of all bank merger activity during this period has involved rural targets, and the proportion of mergers with rural targets has remained fairly constant over that period, even though rural banks account for only about one third of the number of commercial banks. Because rural banks tend to be more profitable than urban banks of a similar size, rural markets might be expected to attract entrants (as discussed in Rhoades 1995 and elsewhere), and some of this entry might manifest itself in a higher rate of consolidation as entrants buy up existing banking operations.

Table 1 displays the means of several characteristics of urban and rural targets of takeovers, as well as a simple t-test of the difference in the means of the characteristics.<sup>3</sup>

<sup>3</sup> Test for the equality of the variance for urban ver-

Roughly three fourths of both urban and rural targets were affiliated with a bank holding company before the merger, and although urban targets were slightly more likely to be in holding companies before the merger, the difference was statistically insignificant. Urban targets were significantly larger than rural targets. The return on assets (ROA) was significantly lower for urban targets than for rural ones over the sample period, although this result obscures a rather pronounced tendency early in the sample period (1992 to 1994) for rural banks to have significantly higher ROAs than urban banks, while in the last few years, the difference has been insignificant. This divergence over the period under study almost exactly mirrors the results for the delinquency rate, which is significantly lower for rural targets in 1992 through 1994. Finally, rural banks that were acquired held a significantly lower fraction of their assets as loans than urban banks that were acquired.

Although, as mentioned above, both urban and rural targets tended to be members of bank holding companies, the prevalence of this type of organizational structure has grown much more quickly for rural banks than for urban banks in recent years. Looking through the data from the Call reports, about 73 percent of commercial banks with headquarters in rural areas were members of holding compa-

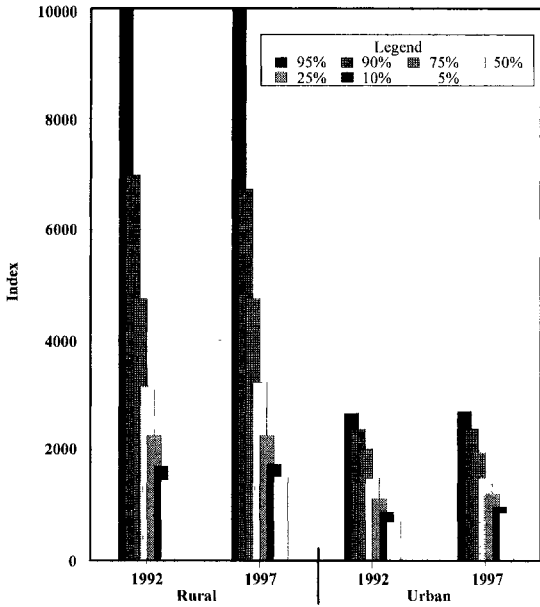
— sus rural targets indicated that some of the t-statistics were not strictly valid. Nevertheless, approximate t-tests on the differences between characteristics of urban and rural targets assuming that the variance differed between urban and rural targets were consistent with the regular t-tests.

**Table 1.** Average of Financial Variables and Characteristics of Targets of Acquisitions 1992–1998

Variable	Urban Banks	Rural Banks	T-statistic for difference
BHC Member (percent)	74.3	73.5	0.8
Assets (million dollars)	732	87	9.1**
ROA (percent)	0.75	1.00	-2.2*
Delinquent/Total Loans (percent)	3.5	3.1	4.8**
Total Loans/Assets (percent)	58.1	54.7	9.4**

\*\* Statistically significant at the 1-percent level.

\* Statistically significant at the 5-percent level.



**Figure 2.** Percentiles of the Herfindahl-Hirschman Index for rural and urban banks, 1992 and 1997

nies in June of 1992, compared with about 61 percent of banks located in urban areas. By June of 1998, almost 80 percent of rural banks were members of holding companies, while the comparable figure for urban banks was about 63 percent. This simple look at bank structure does not distinguish membership in smaller bank holding companies from membership in large, multi-state organizations, and it may reflect lingering effects of older state laws against bank branching that have been removed in recent years. Nevertheless, the difference between the typical organizational structure of rural versus urban banks and its increasing magnitude is notable.

**Changing Concentration in Urban and Rural Banking Markets**

Rural areas, by their very nature, often offer fewer alternative sources of goods and services than urban areas. It seems likely that financial services also flow to rural areas through fewer outlets. Indeed as may be seen in the second bar in Figure 2, in mid-1997 (the most recent period for which the data are available) the HHI, which for these banking data is taken

as the sum of the squared share of total deposits in each banking market,<sup>4</sup> was 10,000 for more than five percent of rural counties (about 110 counties). Furthermore, some rural counties contained no banking institution, and thus were excluded from this analysis. In 1997, the median HHI for rural markets was 3231, or on a numbers-equivalent basis,<sup>5</sup> the median was roughly three commercial banks that operated in each rural market. Only five percent of rural banking markets had an HHI less than 1524 (six and a half commercial banks). The most concentrated rural markets (taken arbitrarily as the top 25 percent of the HHI distribution) had an HHI greater than 4766, or fewer than two commercial banks per market.

One way of gaining perspective on the relative degree of concentration in rural banking markets is to contrast them with their urban counterparts. As may be seen in the far-right column, in mid 1997, the median HHI in urban markets was 1510, or about six and a half bank institutions per market. The maximum HHI in urban markets in 1997 was 3227, which was, coincidentally, roughly equal to the median value for rural banking markets.

Another perhaps more relevant way of thinking about the concentration in rural markets is to look at changes over time in the HHI. To this end, I chose 1992 as the initial period for two reasons. First, I hoped that by this time some of the turmoil arising from adjustments in the thrift part of banking markets might have subsided. Also, this time period was convenient for a few of the market variables that I used in the next section with the

<sup>4</sup> Market shares were calculated by including 100 percent of deposits at commercial banks and mutual savings banks and 50 percent of the deposits of S&Ls and federal savings banks. This convention matches other figures published by the Federal Reserve.

<sup>5</sup> The numbers-equivalent version of the HHI in this paper is a rough rule of thumb that represents the number of equal-sized firms required to yield a given HHI (Adelman, 1969). It is given by  $1/(HHI/1000)$ . The 50-percent weighting of S&Ls and federal savings banks obscures a bit this interpretation of the HHI. Also, the assumption of equal-sized firms may cloud the true picture. For instance, if there are two banks in a market, the HHI could range from 5000 (equal shares) to 9802 (one bank having 99 percent of deposits and another with one percent).

1993 NSSBF data. I considered two types of changes over this five-year period: First, I compared the distribution of the level of the HHI in rural markets in 1992 to the distribution of rural markets in 1997, and I compared it to changes in the HHI in urban markets over the same interval. Then I compared the distribution of the changes in the HHI within each market over the 1992–1995 interval. One should note that neither of these comparisons takes account of migration of counties from urban to rural over the period. This migration appears to be small and I have assumed that its effect is negligible.

Comparing the medians in the first and second columns of Figure 2, one can see that the HHI in rural banking markets increased from 3170 to 3231 over this five-year period. Also, the dispersion, taken here to be the range spanned by the 10th to the 90th percentiles, shrank—this range was 1709 to 6984 in 1992, while it was 1747 to 6726 in 1997. Taken together these figures suggest that rural banking markets became a bit more concentrated from 1992 to 1997, although counties towards the concentrated end of the range saw some improvement in the HHI measure of competition. As may be seen below each column, the mean HHI in rural markets fell slightly and the standard deviation decreased as well.

The median HHI for urban markets rose from 1487 to 1510 during 1992–1995 (third and fourth column of Figure 2), less than half the increase seen in rural markets. Although the range spanned by the 10th to the 90th percentiles shrank (as it did for the distribution of rural banks), almost all of this tightening reflected an increase in the HHI in more competitive markets—the range was 882 to 2386 in 1992 compared with 978 to 2394 in 1997. Thus, the more competitive urban banking markets saw some increase in concentration, and, indeed, the average HHI in urban banking markets rose from 1595 to 1642 from 1992 to 1995. This increase in average concentration in urban banking markets, which amounts to 0.2 banks on a numbers-equivalent basis, stands in contrast to the slight decrease in concentration in rural banking markets. Furthermore, the degree of concentration in the upper

**Table 2.** Percentiles of the Distribution of the Percent Change in the Herfindahl–Hirschman Index

	Rural 1992 to 1997	Urban 1992 to 1997
95%	27	52
90%	16	37
75%	5	16
50%	0	0
25%	-7	-9
10%	-16	-19
5%	-22	-27

end of the range of urban HHIs edged up a touch, compared with the considerable decline in the HHI seen in the most concentrated rural markets.

A final way of parsing the changes in the HHI in rural versus urban areas is to examine the distribution of *changes* in the HHI in each banking market. Table 2 gives some percentiles of the percentage changes from 1992 to 1997 in both rural and urban banking markets. Although the median change for both rural and urban banking markets was zero, the 95th percentile of changes in the HHI was almost twice as large in urban banking markets as in rural banking markets. By contrast, the degree of improvement in banking markets where the HHI fell was roughly the same at each percentile that is listed. Articulated another way, changes in the HHI for rural markets were fairly evenly distributed about the mean, while changes in the HHI for urban banking markets seemed to be skewed towards more concentration.

The NIC database provides an alternative related way to measure the number of choices that rural borrowers face. On June 30, 1997, the average *number* of commercial banks, thrifts, and savings banks plus branch offices of any of these types of financial institution was 9.9 in non metropolitan markets. Thus, the typical rural borrower had almost 10 banking offices where he or she might seek some type of credit. On average, seven of these banking offices were branches of another institution and although the head office was usually in another county (roughly nine times out

of 10) the head office was within the same state as the branch. Not surprisingly, urban banking markets had many more banks and branches—the average number was 1030, although this average was lifted substantially by the largest cities.

As was the case when the HHI values for 1997 were compared with those from 1992, there was little substantial change in the complexion of rural banking markets when one compares the number of offices in 1992 and 1997. On average, there were 9.3 banking offices in each rural banking market in 1992, and about six of these offices were branches. The head office of these branches was again usually in the same state as the branch, and almost half of the branches had head offices in the same county as the branch.

### Characteristics of Rural Small Business Borrowers

The preceding sections of the paper have focused on the characteristics of rural banking markets relative to their urban counterparts. I have documented a number of differences in the nature of the market itself and of the banks that are targets of acquisitions. In this section I compare rural versus urban small business firms, using data from the Federal Reserve's 1993 Survey of Small Business Finances (NSSBF), which was co-sponsored and co-funded by the Federal Reserve Board and the U.S. Small Business Administration.<sup>6</sup> firms surveyed constitute a nationally representative sample of small businesses operating in the United States as of year-end 1992, where a *small business* is defined as a non-financial, non-farm business employing fewer than 500 full-time equivalent employees. The sample was stratified by nine Census regions, urban or rural location,<sup>7</sup> employment size, race, and

ethnicity. Data from the 1993 NSSBF are broadly representative of approximately 5.0 million firms operating in the U.S. as of year-end 1992.

The 1993 NSSBF provides information on each firm's balance sheet, income statement, and credit history. The survey also collected other characteristics of the firm—including standard industrial classification, organizational form, and age—as well as demographic characteristics of each firm's primary owner, including age, education, experience, and credit history.

The survey also provides detailed information about each firm's most recent borrowing experience (the experience may have occurred from 1991–1994.), including whether or not the firm applied for credit, the identity and characteristics of the potential lender to which the firm applied, what other financial services (if any) the firm obtained from that potential lender, whether the potential lender denied or extended credit to the firm, and, if the lender extended credit, the terms of the loan.

In total, there are 4637 firms in the 1993 NSSBF. Businesses located in rural areas accounted for about 20 percent of respondents. Table 3 contains a simple comparison of the means of the sample, and I plan to discuss only those differences between urban and rural small businesses that seem likely to influence the subsequent estimations. The subsequent estimations take account of the sampling weights from the survey, and thus they provide a more accurate comparison of the characteristics of urban and rural borrowers.

As may be seen in the first few lines of Table 3, owners of rural small businesses in the survey had significantly less schooling than their urban counterparts, even though both urban and rural owners were roughly the same age (50 years). Rural small businesses in the survey were significantly smaller in terms of either sales or assets, even though the rural small businesses had existed for two more years, on average, than urban respondents. Rural survey participants were significantly less likely to have had trade credit denied or to have been delinquent on business obligations,

<sup>6</sup> For a detailed description of the 1993 NSSBF, see Cole and Woken (1995). For a description of the 1987 NSSBF which was used by Petersen and Rajan (1994) and Berger and Udell (1995), see Elliehausen and Wolken (1990).

<sup>7</sup> The data were stratified by urban and rural location, and this suggests that statistical comparisons should take account of this stratification. Thus, the simple statistics presented here should not be taken as estimates for the U.S. as a whole.

**Table 3.** Selected Characteristics of Urban and Rural Small Businesses

Variable	Urban Respondents	Rural Respondents	T-statistic for difference
Number of Cases	3702	935	
Education: High School no more (percent)	21.5	33.9	8.0**
Education: Some Post College (percent)	22.8	15.2	-5.1**
Owner's Age (years)	50.0	50.8	1.9
Market HHI	1297	2779	47.6**
Business Sales (million \$)	3.9	3.0	-2.0*
Business Assets (million \$)	1.8	1.2	-2.6**
Firm Age (years)	14.9	16.9	4.1**
Trade Credit Denied Recently? (percent yes)	8.1	4.9	-3.3**
Business Delinquencies (percent yes)	20.8	16.0	-3.3**
Personal Delinquencies of Owner (percent yes)	13.4	10.8	-2.1*
Firm Leverage	67.8	58.8	-1.8
Firm ROA	1.1	0.8	-1.6
Partnership (percent yes)	7.2	7.7	0.6
Corporation (percent yes)	62.7	52.1	-6.0**
Avoided Credit for Fear of Rejection (percent yes)	27.8	16.8	-6.9**
Sought Credit (percent yes)	42.5	46.3	2.1*

\*\* Statistically significant at the 1-percent level.

\* Statistically significant at the 5-percent level.

and the principal owner of a rural small business was less likely to have personal credit delinquencies. Rural respondents were a bit less levered financially and had a slightly lower return on assets, although neither of these variables differed significantly. A much lower portion of rural respondents reported having avoided credit for fear of having the application rejected, and a slightly higher proportion of rural small businesses actually had sought credit. Generalizing a bit from these results, rural small business in the survey tended to be smaller, but both the firm and the principle owner had, on average, a better credit record than urban firms.

Because this session is particularly focussed on rural areas, another way of examining these survey data is to look at the gross experience of the 46 percent of rural firms in the survey that reported having applied for credit at any time from 1991 through 1994. As Table 4 shows, rural small business borrowers whose application for credit was turned down tended to be significantly smaller and younger firms. In addition, those denied also were more likely to have been previously turned down for trade credit and to have re-

ported business delinquencies as well as personal delinquencies by the principal owner. Those small businesses that were unsuccessful in obtaining their last loan also tended to be less profitable and to have avoided seeking credit because they feared being rejected. Generalizing a bit, it appears that those rural firms that were unsuccessful in gaining a loan tended to have the sort of red flags in their business and personal histories that one might expect to make lenders worry about repayment prospects for the loan.

### Estimating the Probability that an Application is Accepted

Sorting through the 1993 NSSBF and interpreting the large amount of data collected in the survey has generated a large number of papers (see, for example, the references in Cole *et. al.* 1998 and Jayaratne and Wolken 1998). In attempting to use these data to analyze the firm's most recent borrowing experience, a particular feature of the data collection immediately becomes apparent, and it colors the analysis throughout this section. In particular, the survey collects data only on the

**Table 4.** Selected Characteristics of Rural Small Firms That Sought Credit

Variable	Applications Accepted	Applications Denied	T-Statistic for Difference
Number of Cases	389	44	
Education: High School, No more (percent)	26.2	27.3	-0.1
Education: Some Post College (percent)	15.9	25.0	-1.5
Market HHI	2846	3036	-0.9
Business Sales (million \$)	4.9	1.0	4.6**
Business Assets (million \$)	2.0	0.6	4.1**
Firm Age (years)	16.6	12.2	3.1*
Trade Credit Denied Recently? (percent yes)	5.4	25.0	-2.9**
Business Delinquencies (percent yes)	15.9	56.8	-5.3**
Personal Delinquencies of Owner (percent yes)	8.2	45.5	-4.8**
Firm Leverage	70.4	75.8	-0.5
Firm ROA	45.4	23.1	2.0*
Partnership (percent yes)	8.5	9.1	-0.1
Corporation (percent yes)	62.7	56.8	0.7
Avoided Credit for Fear of Rejection (percent yes)	13.6	65.9	-7.0**
Owner's Age (years)	50.0	47.5	1.4

\*\* Statistically significant at the 1-percent level.

\* Statistically significant at the 5-percent level.

*most recent* loan, and we have little information regarding an applicant's search for credit.

The nature of this problem might be illustrated by considering an applicant who on the survey reported receiving a loan but previously had been denied numerous times. We cannot distinguish this applicant from another who had been denied only once before obtaining the loan. Similarly, we cannot know for those denied if the denial reported was the last in a series of denials or the first.

Keeping this important caveat regarding the collection of the survey data in mind, I proceed in much the same manner as in Cole and Walraven (1998). Many of the variables are similar—the main improvement is that the characteristics of the geographic banking markets are specified much more completely. In the 1998 paper, the location of the bank was taken to be the location of the head office, a particularly dubious assumption when one considers a large, multi-state banking operation. In contrast, many of the variables that describe the market structure in this paper are tied directly to specific banking markets, while other variables describe changes in the organizational structure of the bank without regard to the location of the bank. To illustrate, with

the current data set I have information on changes in each individual geographic market, such as closures, banks that became branches, and the like. I also have included variables that describe changes in the organizational structure of the bank that may have left the banking market variables unchanged, such as the possible effect on a banking subsidiary when its distant high holder is purchased by another holding company.

In general, I estimate a logit equation of the binary variable that is true if the small business received a loan, and null if it failed to obtain the loan. I base this equation on several characteristics of the banking market and the particular bank office where the small firm sought credit, characteristics of the economic environment of the area where the firm is located, characteristics of the firm, and characteristics of the principal owner. I describe each of the variables in the course of discussing the regression results in the next section.

Because most small businesses reported that they had not sought credit during the three years preceding the survey, it seems quite possible that our sample of loan applications may be affected by a selection bias. In other words, the firms that applied for a loan may have dif-



ferred fundamentally from firms that did not apply, and this difference may have affected our parameter estimates in a systematic way. An elegant description of this type of econometric situation, as well as an effective intuitive remedy was first given in Heckman.

Following the general pattern of Heckman's approach in our problem, we first use a probit regression to estimate the probability that the small business sought a loan in the period covered by the survey. Then, we calculate the inverse of Mill's ratio (MR) for each observation, which reflects the probability that a small business applied for a loan from a commercial bank, and includes this variable:

$$MR = [\phi(z_j)]/[1 - \Phi(z_j)],$$

where  $z_j$  is the predicted probability that respondent  $j$  applied for a loan, and  $\phi(\cdot)$  and  $\Phi(\cdot)$  are, respectively, the density and the cumulative distribution function for a standard normal variable in the accepted/denied equation (the primary equation of interest). The inclusion of this variable purges the equation of selection bias, allowing one to gain consistent estimates of the parameters.

Our problem differs from the standard Heckman formulation in two ways. First, the equation of interest has a dependent variable that only can take values of 0 or 1. Second, as mentioned earlier in this section, one should take account of the sample weights when estimating the parameters. While neither of these deviations from the orthodox Heckman formulation alters the consistency of the parameter estimates,<sup>8</sup> both complicate the estimation of the appropriate standard errors of the estimates. In fact, to the author's knowledge, no procedures are currently in place to estimate standard errors in this situation.

When confronted with consistent parameter estimates and difficult or even intractable expressions of the precision of the estimates, researchers often resort to bootstrap-type pro-

cedures (Efron and Tibshirani), and we also have adopted this plan. Thus, our strategy for implementing a Heckman-style correction for selection bias when the data come from a stratified random sample and the dependent variable of the equation of interest can take on only a value of 0 or 1 is as follows. First, estimate a survey weighted probit equation for all 4637 observations using the *svyprobt* procedure that is available in Stata statistical software (StataCorp). This gives a consistent estimate of the probability that a firm sought a loan. Second, calculate the inverse Mill's ratio and include it in a survey weighted logit regression estimated using *svylogit*, also available in Stata. These two steps yield consistent estimates of the parameters. To get proper estimates of the standard errors of these parameter estimates, we repeated Steps 1 and 2 one thousand times using a sample that was drawn with replacement from the original 4637 observation dataset. As is standard in bootstrap applications, the standard error of the mean parameter estimate of these 1000 replications is an estimate of the true standard error of the parameter.<sup>9</sup>

### Construction of the Banking Market Variables

Much of this description of the data follows that in Cole and Walraven (1998). We use four indicator variables to characterize the merger status of the bank that received the loan application: (1) *Acquirer Before Loan Application* indicates a bank that acquired another bank during the 18 months prior to the loan application. This is the period of adjustment that most researchers have considered when assessing the effects of mergers. (2) *Acquirer After Loan Application* indicates a bank that acquired another bank during the 18 months subsequent to the loan application. This indicator spans the time after a merger has been announced, or possibly is in the works, and

<sup>8</sup> Here we assume that the sampling weights were determined exogenously. That is, the size of the sampling weights is assumed to be uncorrelated with the likelihood that a small business will seek a loan.

<sup>9</sup> Note that each re-sample likely yielded a different proportion of firms that sought a loan, as well as a different pattern of weighting than was exhibited in the original data set.

the date that it legally is completed. (3) *Target Before Loan Application* indicates a bank that was acquired by another bank during the 18 months prior to the loan application. And (4) *Target After Loan Application* indicates a bank that was acquired by another bank during the 18 months subsequent to the loan application.

By matching the bank number with data from the Call report, we were able to construct several measures of banking performance that might be expected to affect lending decisions. I use (the log of) bank assets, Equity/Assets, Delinquent Loans/Total Loans, and Loan Loss Allowance/Total Loans for each bank where a small business respondent reported seeking a loan. I also include a dummy variable for membership in a bank holding company, and I include the set of banking performance variables that are aggregated to the holding company level. (I set to zero all of the holding company variables for an independent bank.)

Using some of the data generated from the analysis in the first several sections, one also can construct variables specific to the geographic banking market of the firm. *Number of Banking Offices in a Market* represents a count of the commercial banks, thrifts, savings banks, and the offices of any of these financial institutions that are open in the county or metropolitan area of the small business on the day that the respondent applied for the loan. *Number of Closures of Banks/Offices* represents the sum of closures from January 1992 until the day of the loan application in the banking market of the small business. *Number of Mergers in a Market* is the count of the commercial banks (not other types of targets or of branches) that were targets of mergers in the banking market from January 1992 until the day of the loan application.

One can use the NSSBF data to construct a variable indicating whether a respondent who reported seeking a loan had maintained some sort of banking relationship with the institution where the loan was sought. Because a market that had experienced a great deal of structural change might be expected to have a larger number of these types of borrowers, I constructed a market variable *Disruption* that

is the interaction of this “no relationship” variable with the sum of closures and mergers in the market.

### Estimation Results

Tables 5 and 6 give the results of estimating a single equation using the Heckman adjustment. Table 5 shows the parameter estimates from the initial probit equation, which show the contribution of a set of firm, market, and bank variables on the probability that a sample respondent had sought a loan.

The only one of the banking market variables that seemed correlated with whether the owner of a small business sought a loan was the number of banking offices that were open in the market. However, the negative sign indicates that firms located in markets with more banking offices were less likely to seek a loan.

Several of the firm characteristics seemed to be significantly correlated with the decision to seek a loan. Larger firms and those with more sales were more likely to seek a loan. Older firms were less likely to seek a loan, perhaps reflecting some dependence on accumulated retained earnings. Firms that used financial services from a greater variety of sources were more likely to seek a loan, perhaps reflecting better relationships with potential lenders. Finally, rural small firms in the sample were more likely to seek a loan than their urban counterparts.

Among those characteristics of the primary owner of the firm, those who recently had obtained new equity from relatives were more likely to seek a bank loan, while those with no more than a high school education were less likely to seek credit. Those owners who reported having avoided applying for a loan during the past three years because they feared that they might be rejected were more likely to report seeking a loan on the survey.

Table 6 shows the parameter estimates from the logistic regression of whether or not a small business was denied credit on a number of characteristics of the firm, the market, the principal owner, the bank that received the application, and the probability that the firm

**Table 5.** Parameter Estimates of First Step Probit Regression Factors Affecting Whether a Firm Sought a Loan

Variable	Estimate	P-value
Number of Banking Offices in the Market	-0.00003	0.007**
Number of Closures of Banks/Branches	-0.012	0.113
Number of Mergers in Market	0.00004	0.934
Log of Annual Sales	0.072	0.005**
Log of Firm Assets	0.138	0.00**
Business's Delinquencies	0.045	0.146
Trade Credit Denied	0.165	0.162
Log of Firm Age	-0.155	0.000**
Number of Sources for Financial Services	0.278	0.000**
Credit Card Balance/Firm Assets	0.053	0.684
Return on Assets	0.0006	0.936
High School Education	-0.209	80.001*
Some Post-College Education	-0.086	0.217
Personal Delinquencies	0.011	0.771
Banking Market Concentration (HHI-1992) (*0.0001)	-0.074	0.824
Employment Growth in Area	0.010	0.227
Urban Area	-0.259	0.001**
Equity Recently Raised from Existing Owners Their Relatives	0.241	0.000**
New Equity Recently Raised from Other Sources	0.010	0.744
Not Applied in the Past Three Years Fearing Denial	0.208	0.002**
Liabilities/Assets (before loan application)	-0.010	0.445

\*\* Statistically significant at the 1-percent level.

\* Statistically significant at the 5-percent level.

applied for credit that was estimated in the previous probit equation.

Among these variables, the number of sources of financial services, the firm size and annual sales, whether the respondent had a prior relationship with the bank before requesting the loan, and whether the firm was located in a rural or urban area significantly affected the probability that a small business's application for credit was accepted. Larger firms and those with a greater variety of providers of financial services all had a significantly higher probability that their loan application was accepted. In addition, urban firms, other things equal, had a higher probability of having their loan request turned down. Firms with no previous relationship with the lender were significantly less likely to obtain the loan that they requested. The parameter on Lambda, the probability that the firm sought credit, was highly significant, indicating that the data were substantially affected by selection bias.

These regressions included applications for

all types of loans, and one possible problem might be that loans for working capital, the most common type of loan reported by small businesses in the survey, differ fundamentally from other types of loans to businesses. Repeating the above regressions only for working capital loans yielded roughly the same patterns of significance, except that the parameter estimate for urban became insignificant.

### Summary and Conclusions

This paper employed a variety of sources of data and a number of methods to describe rural lending markets. The data, where possible, spanned the period 1992 through the present, giving some perspective on changes in the nature of banking in the recent past. Over this interval there has been a pronounced trend towards affiliation of banks, both urban and rural, with holding companies. While most rural targets of takeovers already were members of holding companies, the increasing prevalence

**Table 6.** Logistic Regression Results (Observations are weighted by sampling weights. T-values are from bootstraps of size 100)

Variable	Estimate	T-statistic
<b>Merger Variables (at bank that receives loan application)</b>		
Acquirer Before Loan Application	-0.248	-0.605
Acquirer After Loan Application	-0.395	-0.975
Target Before Loan Application	-0.379	-0.603
Target After Loan Application	0.286	0.706
<b>Market Variables</b>		
Number of Banking Offices in a Market	0.00006	0.750
Number of Closures of Banks/Offices	0.088	1.544
Number of Mergers in a Market	-0.002	-0.400
Employment Growth in Area	-0.058	-0.906
Banking Market Concentration (HHI-1992) (*0.0001)	-0.799	-0.341
Urban Location of Firm	1.500	2.326**
<b>Business Variables</b>		
Disruption (Interaction of No Relationship and (Mergers + Closures)	-0.009	-0.664
Log of Annual Sales	-0.450	-2.571**
Log of Assets	-0.748	-2.911*
Business's Delinquencies	-0.038	-0.174
Trade Credit Denied	0.098	0.140
Length of Pre-Existing Relationship With Lender	0.010	0.323
Number of Sources for Financial Services	-1.552	-3.274**
Leverage	-0.060	-0.411
Return on Assets	-0.022	-0.379
Log of Firm Age	0.311	0.829
No Prior Relationship With Lender	2.245	3.351**
<b>Borrower Variables</b>		
High School Education	0.753	1.397
Some Post-College Education	0.022	0.045
Personal Delinquencies	0.362	1.454
<b>Characteristics of the Bank Receiving the Application</b>		
Membership in a Bank Holding Company	0.390	1.242
Log of Bank Assets	0.173	1.301
Equity/Assets (Bank)	-0.152	-1.063
Delinquencies/Total Loans (Bank)	-0.232	-1.311
Loan Loss Allowance/Total Loans (Bank)	0.015	0.088
Log Assets (Holding Company)	0.028	0.252
Equity/Assets (Holding Company)	0.083	0.525
Delinquencies/Total Loans (Holding Company)	0.189	0.995
Loss Allowance/Total Loans (Holding Company)	0.110	0.407
Lambda	6.889	3.146**

\*\* Statistically significant at the 1 percent level.

\* Statistically significant at the 5 percent level.

of bank holding companies in rural areas could change lending patterns as the degree of local control of lending decisions diminishes. Of course, the trend towards holding company structure among rural banks is not new, and

the diversification of risks and the like that this trend provides rural banks is a topic worthy of several research projects.

Likely coming as a surprise to few readers, rural targets of bank mergers were smaller

than urban targets. Rural targets also were more profitable and had lower rates of delinquency. Nevertheless, rural targets of mergers held a significantly smaller portion of their assets as loans, perhaps explaining some of their attraction to buyers.

The second section of the paper looked at the level and changes in banking market concentration from mid 1992 until mid 1997. Concentration in rural banking markets increased a bit more than in urban markets over this five-year span. However, the degree of concentration in the least competitive rural markets improved a bit—that is, the value of the upper percentiles of the distribution fell back towards the median. One topic that seems a fruitful area for future research is the relative effect of *de novo* banks on the concentration in urban and rural areas. Another is the effect of technological change in the financial industry, where standardization of loan terms, securitization of loans, and innovations such as electronic banking may gradually make geographic measures of competition such as the HHI obsolete.

The final section of the paper looked specifically at rural borrowers using data from the 1993 NSSBF. The model of credit search used in this overview found some evidence that although rural small businesses were less likely to apply for a loan, those that did were more likely to have their application accepted than urban firms that applied for credit. That is, after one controlled for characteristics of the small business firm, the principal owner, and the banking market; the urban or rural location of the small business had a significant effect on both the probability that a firm sought a loan and on the likelihood that the loan was granted. Of the variables constructed to describe banking markets, only the number of banking offices had a significant effect on the likelihood that a small business sought a loan, and the data indicate that the more banking offices in a market, the *less* likely a small business is to seek a loan. After one adjusts for the probability that a firm seeks a loan, the size and annual sales of the small business, the number of sources of financial services that the firm maintained, and whether the firm had

maintained a relationship with the bank that received the loan application also had a significant effect on whether the firm was granted the loan.

One shouldn't read too much into these results. The sample seems fairly small—only 44 loan requests originating from rural small businesses were reported to have been turned down in the survey. However, keeping in mind the relative paucity of rural loans and the survey problems mentioned in the paper, larger firms and those that maintained banking relationships seemed the least likely to be refused a loan. Furthermore, there was some tentative evidence that rural small businesses were slightly less likely to be turned down for a loan, although they were less likely to apply, suggesting some self-selection.

Of course, these results may be addressing a different point than some specialists in rural development might prefer. Namely, many of the most notable features of rural small businesses are those that tend to lower the joint probability (the probability that the loan is granted conditional on the probability that they applied) that they receive a bank loan. Just reviewing some of the list of significant variables in the probit equation, smaller firms and those with fewer sources of financial services were significantly less likely to seek a loan. Some observers might assert that these are inherent characteristics of rural small businesses.

## References

- Berger, Allen N., and Gregory F. Udell. "Relationship lending and lines of credit in small firm finance." *Journal of Business* 68(1995):351–382.
- Berger, Allen N., Anthony Saunders, Joseph M. Scalise, and Gregory F. Udell. "The effect of bank mergers and acquisitions on small business lending." Mimeo, Federal Reserve Board, 1997.
- Cole, Rebel A. "The Importance of Relationships to the Availability of Credit," *Journal of Banking and Finance*, forthcoming.
- , and John D. Wolken. "Sources and uses of financial services by small businesses: Evidence from the 1993 National Survey of Small-

- Business Finances," *Federal Reserve Bulletin* 81 (1995):629-670.
- , and Louise Woodburn. "Bank and non-bank competition for small business credit: Evidence from the 1987 and 1993 National Surveys of Small Business Finances," *Federal Reserve Bulletin* 82 (1996):983-995.
- Cornett, Marcia Millon and Hassan Tehranian. "Changes in corporate performance associated with bank acquisitions," *Journal of Financial Economics* 31(1992):211-234.
- Efron, B. *The Jackknife, the Bootstrap, and Other Resampling Plans*. Philadelphia: Society for Industrial and Applied Mathematics, 1982.
- Efron, B. and R. Tibshirani. "Bootstrap measures for standard errors, confidence intervals, and other measures of statistical accuracy," *Statistical Science* 1(1986): 54-77.
- Elliehausen, Gregory E. and John D. Wolken. "Banking markets and the use of financial services by small and medium-sized businesses" *Federal Reserve Bulletin* 76(1990):801-817.
- Goldberg, G. Lawrence, and Lawrence J. White. "De novo banks and lending to small businesses: An Exploratory Analysis." *Journal of Banking and Finance* forthcoming.
- Greene, William. "Sample selection bias as a specification error." *Econometrica* 49(1981):795-798.
- Heckman, James. "Sample selection bias as a specification error." *Econometrica* 47(1979):153-161.
- Hosmer, D. W., Jr., and S. Lemshow. *Applied Logistic Regression*, New York, NY: John Wiley & Sons, Inc., 1989.
- Houston Joel F, and Michael D. Ryngaert. "The overall gains from large bank mergers." *Journal of Banking and Finance* 18(1994):1155-1176.
- Jayarathne, Jith and John D. Wolken. "How Important are Small Banks to Small Business Lending? New Evidence From a Survey of Small Firms, The Consolidation of the Financial Services Industry." Federal Reserve Bank of New York, March 1998.
- Keeton, William R. "Do bank mergers reduce lending to businesses and farmers? New evidence from Tenth District states." Mimeo, Federal Reserve Bank of Kansas City, 1996.
- Maddala, G. S. *Limited Dependent and Qualitative Variables in Econometrics*. Cambridge University Press: Cambridge, 1983.
- Munnell, Alicia, Geoffrey Tootell, Lynne Browne, And James McEneaney. "Mortgage Lending in Boston: Interpreting the HMDA Data." *American Economic Review* 86(1996):25-53.
- Peek, Joseph, and Eric Rosengren. "Bank consolidation and small business lending: It's not just bank size that matters." *Journal of Banking and Finance*, forthcoming.
- Petersen, Mitchell A., and Raghuram G. Rajan. "The benefits of lending relationships: Evidence from small businesses." *Journal of Finance* 49(1994):3-37.
- . "The effect of credit market competition on lending relationships." *Quarterly Journal of Economics* 105(1995):407-443.
- Pilloff, Steven J. "Performance changes and shareholder wealth creation associated with mergers of publicly traded banking institutions." *Journal of Money, Credit, and Banking* 28(1996): 294-310.
- Rhoades, Stephen A. "Market Share Inequality, the HHI, and Other Measures of the Firm-Composition of a Market." *Review of Industrial Organization*, 10(1995):657-674.
- Schranz, Mary S. "Takeovers improve performance: Evidence from the banking industry." *Journal of Political Economy* 101(1993):299-326.
- StataCorp. *Stata Statistical Software: Release 5.0* College Station, TX: Stata Corporation, 1997.
- Strahan, Philip E. and James Weston. "Small business lending and the changing structure of the banking industry." *Journal of Banking and Finance*, forthcoming.
- Walraven, Nicholas. "Small business lending by banks involved in mergers." *Finance and Discussion Series* 97-25, Federal Reserve Board, Washington, DC, 1997.