Parsimonious Lenders: Bank Concentration and Credit Availability to Small Businesses

Yongjin, Park

Connecticut College

April 2008

Parsimonious Lenders:
Bank Concentration and Credit Availability to Small Businesses

Yongjin Park
Connecticut College
270 Mohegan Ave
New London, CT, 06320
ypark@conncoll.edu

This paper examines how bank competition affects the amount of credit provided to small businesses using both the loan turndown rate and the size of granted loans and L/Cs. Using 2003 National Survey of Small Business Finance data, we show that commercial banking in concentrated banking markets are more likely to reject loan applications. Moreover, the size of granted loans is found to be significantly smaller in concentrated markets. Finally, we show that the total limit of L/Cs that a firm has is also significantly smaller for firms in concentrated banking markets. Our finding challenges a notion that credit market competition may be inimical to the formation of mutually beneficial relationships between firms and specific creditors. We do not find any evidence that bank concentration is instrumental in building relationship banking and our results suggest the opposite.

1. INTRODUCTION

Whether bank competition affects borrowing firms is a lively topic of research. Conventional wisdom that monopolistic banks would take advantage of their market power and adversely affect the credit availability is challenged by recent studies in relationship banking. Petersen and Rajan (1995) is a seminal paper not only because it empirically shows the potential benefits of relationship banking to young firms but also because its model and empirical evidence explicitly ties the strength of relationship banking to the degree of that banks' market power. It makes a strong case that "credit market competition may be inimical to the formation of mutually beneficial relationships between firms and specific creditors." (p.407) According to this point of view, more inter-bank competition means less relationship banking and, more importantly, less favorable terms of credit to young and small firms. Di Patti and Dell'Ariccia (2004) reinforced this view by showing that bank competition is less favorable to emergence of new firms.

However, this view is challenged by many recent studies. Boot and Thakor (2000) shows that a more competitive environment may encourage banks to become more client-driven and to customize services, thus focusing more on relationship banking, since an orientation toward relationship banking can make a bank more unique relative to competitors and therefore alleviate the pressure of price competition. Cestone and White (2003) points out that monopolistic banks may favor their established borrowers over new borrowers because banks want to protect the future profitability of firms with an established lending relationship. In this case, when the market is less competitive, lenders may have less of an incentive to finance new comers. From borrowers' side, Boot (2000) warns that the threat of being informationally captured by the bank may make the firms reluctant to borrow from the bank, suggesting that relationship banking does not necessarily means that small firms will get more credit.

The amount of empirical research on the topic is relatively lacking and provides equally contradicting results. Petersen and Rajan (1995) examines the use of trade credit to assess the credit availability to firms across bank concentrations to show that firms in concentrated banking markets are less credit-constrained. Di Patti and Dell'Ariccia (2004) reinforced this view by showing that bank competition is less favorable to emergence of new firms. On the other hand, Cetorelli and Strahan (2006) focuses on the effect of banking market concentration on firm sizes to show that potential entrants face greater difficulty gaining access to credit in concentrated banking markets than those in competitive banking markets. Berger, Rosen and Udell (2007) and Craig and Hardee (2007) also shows that small firms in areas dominated by large banks are less likely to hold debt and if they do hold debt, the level of debt-to-asset ratio is significantly lower. Beck, Demirgüç-Kunt and Maksimovic(2004), using international data, finds that bank concentration increases financing obstacles, with stronger effect for small and medium firms. Also, several recent studies show that increased bank competition caused by deregulation had positive effects on various aspects of economy such as local economic growth (Jayaratne and Strahan 1996), entrepreneurship (Black and Strahan, 2001) and business cycle volatility (Morgan, Rime, and Strahan, 2001).

Using both OLS and Heckman two-step procedure model to correct for sample selection, this paper tracks both loan rejection rates and the size of granted loans to small firms across banking market concentrations. Estimates show that not only are the banks in concentrated bank markets more likely to turn down a loan application but also that the average size of granted loans is smaller than that in competitive markets. We also find that the bank concentration effect is stronger in 'relationship-based' loans (new line of credits (L/C) and renewed L/Cs) compared to other 'transactional' loans such as mortgages and equipment loans. Finally, we also find that the

total limit of L/Cs that a firm can have is also significantly smaller for firms in concentrated banking markets. This difference is more pronounced among young firms. Underlying differences in firm and loan characteristics and regional/industrial characteristics across markets are carefully controlled for all the estimates and do not appear to explain our findings.

The rest of the paper is structured as follows. In the next section, we present data and describe our methodology used for hypothesis test. In the third section, estimates are discussed further and we present and examine alternative explanations. Finally, we conclude with suggestions for future research.

2. DATA AND EMPIRICAL STRATEGY

The data in this study is obtained from the 2003 National Survey of Small Business Finances. The target population of the survey consists of U.S. domestic, non-farm, for profit, nonfinancial, nongovernmental small businesses with fewer than 500 employees that were in operation as of December 31, 2003. Out of 4,240 total firms in the sample, 1575 reported loan applications to financial institutions[1] between January of 2003 and December of 2004 and 1453 of them were granted. Out of those 1453 granted applications, 1155 applications to commercial banks and 877 applications were L/C applications (228 new and 649 renewal applications).

One unique feature of 2003 data set is that it includes five implicates with each implicate including 4,240 firms. Across implicates, the values of all reported variables remain constant, but the values of imputed variables may differ. This allows us to obtain better estimates by adjusting the estimated standard errors and confidence intervals to account for the additional variance that imputation may cause. All of the estimates reported in this paper are calculated using Rubin (1987)'s method of combining estimates from five imputations. Variable definitions and simple statistics are provided in Table 1.

To investigate how bank competition affects the amount of credit provided to small businesses, we first analyze the size of Most Recent Loans (MRL) across banking market concentrations. Then, we perform a logistic regression to check whether our findings in the loan size regressions are driven by the differences in loan turn down rates across bank concentration. To measure the degree of bank competition in the market, we use the Herfindhal index of commercial bank deposit concentration (HHI) as a proxy. NSSBF data reports a broad categorization of the HHI: whether the HHI is less than 0.1, between 0.1 and 0.18, or greater than 0.18. One potential problem with this categorization is that the first category – most competitive market - is very small (only 6.7% of the sample) compared to middle (46.6%) and the most concentrated (46.7%). So, for baseline results we focus on the difference between the markets whose HHI is larger than 0.18 (we refer to the markets as concentrated markets) and other markets whose HHI is less than 0.18, which includes both the middle markets and the most competitive markets (we refer to the markets as competitive markets). This way, we can compare two groups that fairly evenly divide the sample.

Another important concern about the use of HHI as a measure of banking market concentration is that due to recent banking market deregulations such as Riegle-Neal Act, loan market may not be local and therefore county-level HHI may not effectively capture the degree of concentration in loan markets. (For example, Peterson and Rajan, 2003) When we examine our sample, however, out of total 1453 most recent loan applications, 1345 firms (92.5%) applied to a bank that is located within 10 mile radius and 1283 firms (88.3%) within 5 mile radius. In case of

L/C applications, 822 out of total 845 L/C applications (97.2%) are to banks in 10 mile radius and 797 firms (94.3%) are to banks within 5 mile radius. So, for most small businesses, the loan market is still local and at the very least it is the case for the small firms in our sample. Given that HHI index provided in SSBF data is county-level measure of deposit concentration, it is still a proper measure of loan market concentration. Moreover, we will examine the robustness of our findings by dropping loan applications to banks that are more than 5 and 10 miles away.

We also restrict the sample to loans that are applied between January of 2003 and December of 2004 in order to minimize the timing problem. The HHI index provided in the data set is derived from December, 2003 values. By restricting the sample we are able to make a closer, albeit imperfect, alignment between the credit market concentration at the time of loan application and the HHI index in the data.

A quick look at the summary statistics in Table 1 shows that the log average (natural log is used to suppress the effect of statistical outliers) granted loan size is 12.13 in competitive markets, while in concentrated markets the average total institutional loan is smaller at 11.91. When we perform univariate regressions, estimates in Table 2 also show that loans made in concentrated banking markets seem to be smaller than those in competitive markets by about 19 (for bank loans) to 22 percent (for all institutional loans) and the difference is more pronounced among loans made to young firms.

In order to examine the topic in a more thorough manner, we first test whether or not the granted loan size is significantly different across markets, which has the following generic form:

$$L_i = a + bH_i + \beta x_i + u_i \qquad (1)$$

where L_i is the size of a granted loan for firm i, H_i is a dummy variable for the most concentrated market, x_i is a vector of other possible exogenous influences on indebtedness (with β its vector of estimated coefficients) and u_i is the random error.

One potential problem with focusing on loan amount is that there might be a selection bias if there is correlation between bank concentration and loan turndown rate. As we can see in the following section, the banks in concentrated banking markets are more likely to reject loan applications of young firms, especially L/C applications. In this case, average quality of firms in the concentrated market might be better than that of firms in competitive market, which may affect the size of granted loans. To deal with this problem, we perform Heckman two-step procedure.[2]

2.1. Control Variables

The use of a Most Recent Loan (MRL) variable as a dependent variable allows us to control for various aspects of the firm, the owner and firm-bank relationship variables in addition to loan characteristics: When regarding firm characteristics, we expect total asset and total sales of the firm to have a positive effect on loan size. For a measure of a firm's profitability, we use log value of the firms profit share (profit/sales) and for those firms that reported negative profit we converted it into zero and added dummy variable for having a negative profit. In case of the firm's age (in log form), we expect a negative coefficient because young firms need more credit to establish their business than do older, more established firms. We also added controls for sales changes compared to the last fiscal year,[3] its D&B credit ranking and its organizational form such as proprietorship and corporation. Owner variables include the weighted average of the owners' education, years of experience and the natural log of the wealth of the primary owner, including the value of the owner's home. We also added controls for African-American ownership because many studies (Blanchflower, Levine and Zimmerman, 2003; Cavalluzzo and Wolken, 2005) find that blacks are discriminated against in small business credit markets.

To control for firm-bank relationships, we use the length of relationship and the distance from the bank to which firms applied for loans (all in log form) along with the number of financial institutions firms have dealt with. Also following Cole (1998), we controlled for the use of financial services – checking account, cash management, credit, trust and brokerage services - provided by the bank to which the firm submitted its loan application.

For loan characteristics, we controlled for the loan type, the collateral required and the loan maturity. The loan interest rate is also used to control for the assessed risk of a loan not fully captured by D&B credit rating. Lastly, to control for regional and industry level differences, we added dummy variables for census region, MSA status (the only two geographical identifiers available) and 1 digit SIC codes.

3.   ANALYSIS OF RESULTS

The estimates from Equation (1) are reported in Table 3. Heckit estimates in column 1, which are based on all of the granted loans in the sample, show that after controlling for firm, owner and loan characteristics as well as firm-bank relationship variables, the size of the granted loan is smaller in concentrated banking markets than in competitive banking markets. We get consistent result when we exclude loans from non-bank institutions in order to focus on the relationship between commercial banks and small businesses, which is reported in column 2. Also, OLS estimates are consistent with Heckit estimates, though they tend to be little bit smaller than Heckit estimates. Effects reported in both columns are economically meaningful: taken literally, the size of loans granted in the concentrated market is on average about 17 to 21 percent smaller than those in other markets.

When we divide the sample into L/Cs, which is more "relationship-based" and other 'transactional' loans, estimates reported in column 3 and 4 show that the bank concentration effect is stronger in the L/C sample both in terms of statistical significance and magnitude, while the effect is smaller and insignificant in other 'transactional' loans sample. Estimates in Table 3 suggest that small firms in concentrated bank markets, according to our estimates, get less credit, not more and the banks in concentration markets are especially parsimonious in providing 'relationship-based' loans.

Also, the fact that the bank concentration effect is stronger in L/C sample suggests that our finding is driven by credit supply of banks, not by loan demand of firms. When a firm gets an L/C from a bank, the firm pays interests only for the amount they actually borrowed, not for the maximum limit of the L/C that the firm can borrow from the L/C. Borrowing firms, therefore, have little incentive to limit the size of L/C voluntarily and unlike other loans, it is usually bank that sets the maximum amount a firm can borrow from a L/C, based on various criteria. This finding challenges what Petersen and Rajan (1995) observed using trade credit usage and loan interest rates.

Estimates in Table 3 also indicate that other firm and loan variables have predicted signs: First, credit rating of a firm displays a significant positive effect on loan sizes, while the interest rate shows a significant negative effect. Firms seem to borrow more when they are young probably for initial investment, as captured by the significant negative coefficient of the firm age variable. Both total assets and total sales display a significant positive relationship with the granted loan size while profit rate has a negative but insignificant coefficient, which may suggest that firms may prefer retained profit to bank loans. Owner variables in general did not show strong effect on the loan size except the wealth of primary owner, which displayed a significant positive effect. Estimates on service usage dummy variable also show that the use financial

service may increase the size of loans granted. Interestingly, other relationship variables such as the number of financial institutions dealt with and the length of the relationship between the bank and the firm are not significant while the distance from the bank show significant positive effect, especially on the size of other loans.

3.1. Robustness Check

The evidence presented thus far suggests that controlling for the observable measures of firm, loan and relationship characteristics, firms in most concentrated markets borrow less. This section adds additional control variable to the model to test the robustness of this finding.

First, there is a potential endogeneity problem stemming from using loan interest rate as a control variable. Many researches show both positive (Berger, Rosen and Udell , 2007) and negative (Petersen and Rajan, 1995) correlation between banking market concentration and loan interest rates. When we examine the effect of banking market concentration on loan interest rate using this sample, however, we did not find any significant correlation between banking market concentration and loan rates.(not shown) Also, when we rerun baseline regressions without controlling for loan interests, it does not affect our findings. In fact, as we can see in Table 3-1, it made bank concentration effect stronger, discounting the possibility that endogeneity is driving our result.

Second, in the baseline regressions, we assumed that the firms' investment opportunities do not differ with concentration of banking market. It is possible, however, that in areas where the local economy is booming, banks may open up more branches and *de novo* banks may enter the bank market, which may create a positive association between investment opportunity and bank competition. Assuming that firms with sales growth should also have more investment opportunities, SSBF 2003 provides four different sets of dummy variables that can provide information on investment opportunities: Profit change compared to the prior year (PROFIT_1) compared to 3 years before (PROFIT_3), sales change compared to the prior year (P3) compared to 3 years ago (P3_1).[4] However, summary statistics of these variables in Table 4 do not show any evidence that firms in competitive banking markets have improved sales or profitability across banking markets: Percentage of firms reported either increase or decrease of sales and profit over 1-3 year periods is remarkably similar across banking markets. In Table 1, we can also see that the level of profit, Ln(ProfitShare), is very similar across banking markets.

Moreover, when we included dummy variable for PROFIT_1 in the baseline regression, the result in Table 3 does not indicate that market concentration captures the difference in investment opportunities: Coefficients of the firms' profit growth dummies are insignificant and have the wrong sign (firms with a profit decrease have a bigger loans than firms reported profit increase).[5] We also ran another regression without firms that reported profit decrease but the result did not change at all (not shown). Lastly, for an alternative test on the investment opportunities, we created the 'industry (1 digit SIC code) x division' dummy variables, to use in place of separate industry and census region dummies. This creates indicators for each industry (1 digit SIC code) in each census region, generating 81 dummy variables. When we added these additional dummies to baseline regression, in the second column of Table 4 the concentration coefficient only slightly decreased and remains statistically significant.[6]

To summarize, we did not find any evidence that there is substantial differences in investment opportunities across banking markets and introduction of additional control variables that might capture potential differences in investment opportunities did not produce any qualitative changes in our findings, discounting the possibility that our finding is driven by differences in investment opportunities.

Third, we need to consider a possibility that the correlation between bank concentration and the urban/rural location of the firm may drive the baseline results. In the sample, all firms in the most competitive market are located is urban area, while all firms in rural area which take up about 20 percent of the total sample belong to the mid market or the most concentrated market. Therefore, any association between urban/rural location and indebtedness of firms may cause a spurious correlation between bank concentration and loan sizes. To address this concern, we limit the sample to urban firms and repeat the original regression. As we can see in the column 3 of the Table 4, the estimates from the urban firm sample are consistent with those in baseline regressions: The most concentrated market dummy is still statistically significant and the magnitude has slightly increased, which suggests that MSA/non MSA location does provide an alternative explanation for the finding.

Another alternative explanation is that the firm size may vary across the bank concentration and thus affect the loan size. If firms in concentrated bank markets are smaller due to credit constraints, then it may also decrease the average size of L/Cs. To address this problem, we created a new variable *MRL ratio* which is the natural log of the L/C limit divided by total asset of the firm and use it as a dependent variable to replace our original dependent variable. The estimates presented in the fifth column of Table 4 show no significant changes in the concentrated market coefficient, thus ruling out that our finding is driven by firm size differences across banking markets.

Another question that we must address is whether or not the effect of bank competition is monotonic. So far we have focused on the differences between the most concentrated market and other markets but did not allow the middle market and the most competitive market to differ. To test the monotonicity, we added an additional dummy variable for the firms in the most competitive banking market. The estimates reported in column 5, however, show that the coefficient for the added dummy is not statistically different from zero though it has a positive sign. Therefore, we do not find evidence that the effect of bank competition over loan size is monotonic.

Lastly, we need to consider whether the bank market concentration affects young firms and old firms differently. Theories surveyed in the previous sections mostly focus on the effects of bank concentration on young and small firms. We expect the young firms to be more affected by market concentration. When we divide the sample into young (firm age<=10)[7] and old urban firms (firm age>10), results from OLS estimation and Heckman two-step procedure are quite different. In case of OLS, the concentration coefficient is significant only in the old firm sample. The coefficient in the young firm sample is still negative and similar in magnitude to that of old firm sample but nonetheless is statistically insignificant. Heckman estimates, however, show that OLS results are driven by the differences in loan turndown across bank market concentrations and after adjustment concentration effect seems to be stronger among young firms.[8]

3.2. Bank Competition and Loan Turndown

To test the connection between bank market concentration and credit availability, we need to examine the loan turndown rate in addition to the size of granted loans, because it is possible that banks may choose to give smaller loans to more firms instead of providing bigger loans to fewer firms. This could sway our results, as such actions will reduce the average size of observed loans but it does not mean that the total credit provided is smaller.

This loan turndown test also serves as a robustness check for the loan size regression because an alternative explanation for our loan size finding is that the average quality of the firm might vary across bank concentrations causing the L/C limits to differ accordingly. If relationship

banks are more generous in granting loans to small businesses, or if close relationship between firms and their relationship banks cause soft-budget problem as suggested by Boot (2000), the average quality of firms in the concentrated banking market can be lower than that of firms in the competitive market. However, the competing hypothesis – 'winners' curse' problem (Shaffer, 1999) - predicts the opposite: average quality of firms in a competitive banking market may be lower because intense competition in banking sector coupled with asymmetric information may lead banks to fund inferior firms that bank would not have funded otherwise.

Table 5 shows summary statistics of loan turndown rates. Among various types of loans, new L/C application had the highest turndown rate (21.6%), while L/C renewals had the lowest rate (2.1%). In both L/C applications, turndown rate was the highest in the most concentrated market. However, this difference is statistically insignificant. Also, when we look at the average D&B credit rating of firms that were granted a loan in Table 3, we could not find significant differences in credit ratings, though the ratings gets slightly better as market concentration increases.

For a more thorough analysis, we perform a Logit analysis of loan turndown. In Logit regressions, we use most of the control variables that we used in the loan size regressions except for the loan interest rate, collateral requirements and the maturity variables, which are not available for rejected loan applications. Also, the size of loan applied for is added to control for the effect of loan size on the loan turndown. Results are summarized in Table 6. Estimates in all six columns of Table 6 consistently show that banks in concentrated market are more likely to reject loan applications from young firms, while there is no significant difference in old firm sample. Moreover, results from column 3 and 5 show that banks are more likely to reject L/C applications from young firms, especially new L/C applications[9]: Banks in concentrated markets are about 8% and 14% more likely to reject loan and L/C applications from young firms, respectively. In case of new L/C application, the difference is 57%.

While the effect is surprisingly strong, it is not driven by the urban/rural firm difference nor is sensitive to the critical firm age that we used to divide the sample. Estimates summarized in Table 7 show that the concentration coefficients remain consistent with those in Table 6 when we use the whole sample (instead of young and old firms separated) allowing different intercepts and age slopes for each level of bank market concentration.[10] New firms in concentrated market are 6% (all loans and all L/Cs) to 40% (new L/Cs) more likely to get rejections and the concentrated market effects become stronger in all urban samples. Furthermore, the coefficients of age in the most concentrated market are positive and statistically significant (with an exception of New L/Cs sample) while the coefficients are much smaller in magnitude and insignificant in the competitive markets. This suggests that banks in concentrated markets are especially hard on young firms in the area, while firm age does not seem to matter in competitive banking markets.

This finding has several important implications: First, this result is almost exact opposite of what Peterson and Rajan (1995) found in their loan rates regressions. Combined with loan size results in the previous section, it directly challenges the notion that concentrated banking market may provide better environment for relationship banking and provides support for the argument of Boot and Thakor (2000) and Cestone and White (2003) that the bank competition may encourage relationship banking. Second, it shows that our loan size finding is not caused by the small-loans-to-more-firms strategy of banks. It also confirms that our loan size finding is driven by credit supply of banks rather than loan demand of firms. Finally, our finding does not support the premise of 'winner's curse' hypothesis. Rather, it suggests the opposite: If all the other things are equal, young firms in concentrated markets that secured bank loans should be of higher

quality than young firms in competitive markets. This also confirms that our loan size finding is not driven by differences in firm quality across banking markets.[11]

3.3. Bank Concentration and Total L/C Limit

So far we find that banks in concentrated market are more likely to reject loan applications and when the amount of granted loans tends to be smaller. In this section, we examine whether bank concentration affects the overall amount of credit available to small firms. While the results so far would predict that firms get less credit supplied, NSSBF 2003 does not have a variable that show the total amount of bank loans a firm has.[12] Thus, instead of total debt, we use the sum of all the L/C limits a firm has as a proxy. Firms can have more than one L/C to increase their total L/C limits and about 18% of firms have more than one L/C issued by commercial banks. We add limits of the combined L/Cs of a firm issued by commercial banks to create the dependent variable.

For control variables, we use all the firm and owner variables used in the previous regressions. However, due to the fact that many firms have more than one L/C from multiple banks, we could not control for variables such as loan maturity, loan interest rate and the types of collateral required and firm-bank relationship variables such as length of relationship and firm-bank distance.[13] Instead, we used the number of L/Cs a firm has, number of banks from which the firms get L/Cs and the number of L/Cs that required collaterals and guarantors.

Estimates from the total L/C limit regressions are summarized in Table 8. Specification of each column repeats the robustness checks of Table 4: Specification 1 is the baseline regression. Specification 2 is based on urban firm sample, Specification 3 has added control of 'Industry x Division' dummy. Specification 4 checks the effect of firm size and Specification 5 checks the monotonicity of the bank concentration effect. Across specifications, estimates consistently show that the total L/C limits are lower when firms are located in a concentrated banking market. Our finding does not seem to be driven by differences in investment opportunities (Specification 2), urban-rural differences (Specification 3) or firm size differences (Specification 5) across banking markets. As was, consistent with MRL regressions, the coefficient for the most competitive market dummy is not statistically different from zero suggesting that the effect of bank competition over loan size may not be monotonic.

Interestingly, however, when we divide the sample into young (firm age<=10) and old firms, the concentration coefficient of the young firm sample is statistically significant and much stronger than the estimates from the old firm sample. The total limit of L/Cs of young firms in concentrated market is on average 23 percent smaller than the limits of young firms in competitive banking markets. In the case of old firms, the difference is only 9.5% and statistically insignificant. This result, which is quite different from the estimates of MRL size regressions, suggests that the high L/C turndown rate in concentrated bank markets may have contributed lowering the total amount of credit granted to young firms in the market.

To investigate this idea more rigorously, we introduced a selection bias using a two-stage Heckman model. Estimates from Heckman regressions are reported in the bottom rows of Table 8. The Inverse Mills Ratio has a positive and statistically significant coefficient, which suggests that there is selection bias. Overall, the Heckman estimates are larger than OLS estimates. Taken literally, young firms in concentrated banking market have about 25% lower L/C limits. We believe that the reason why the selection bias has a stronger impact on the total L/C limits compared to the Most Recent Loan is because a loan turndown will affect the total number of L/Cs that a firm has, which cannot be captured in case of the most recent loans.

4. CONCLUSION

We find that market concentration in the commercial banking industry may reduce the amount of credit supplied to small businesses in the area. Banks in concentrated markets are more likely to reject an L/C application and when they do grant an L/C, the limit of that L/C tends to be smaller than the limit of those granted by banks in competitive markets. Also, the concentration effect seems stronger among young firms when we look at the combined L/C limits that a firm has.

Our empirical evidence supports the arguments of Boot and Thakor (2000) and Cestone and White(2003) that banks with market power may deter entrance of young firms to protect the profitability of their existing borrowers. Our finding is also consistent with recent studies such as Black and Strahan (2001) and Cetorelli and Strahan (2006) that emphasize the benefits of increased bank competition and banking market deregulation. The policy implications of our finding, therefore, should also be in line with these studies.

The theoretical implications of our finding on relationship banking are not as clear. It may simply mean that the market concentration is not a good predictor of relationship banking. Banks in concentrated markets may not provide L/Cs to young firms simply because they are not interested in relationship banking, while banks in competitive markets engage in relationship banking more actively for the reasons that Boot and Thakor (2000) articulate. If this is the case, the connection between the banking market concentration and relationship banking practice needs to be questioned. Alternatively, it may also signify that banks in concentrated markets are a different breed of relationship bank: they are more concerned about protecting their existing relationships rather than creating new ones, as Cestone and White (2003) modeled. Discriminating these two competing hypotheses is impossible based on our findings in this study but it would make a good topic for future research.

Table 1. Definitions and Summary Statistics of Variables by Credit Market Structure

Variable Name	Variable Definition	Competitive Markets	Concentrated Markets
Loan Amount	Amount of Most Recent Loan (in millions)	1.131	0.964
		(4.145)	(3.099)
Assets	Book Value of Assets (in millions)	4.558	3.792
		(14.400)	(8.945)
Sales	Current Year's Sales (in millions)	8.777	8.063
		(18.100)	(15.700)
Totemp	Total Number of Employees	55.534	50.627
		(77.179)	(67.804)
Ln(Loan Amount)	Natural Log Amount of Most Recent Loan	12.135	11.917
		(1.923)	(1.980)
Ln(Assets)	Natural Log Value of Book Value of Assets	13.575	13.512
		(2.083)	(2.060)
Ln(Sales)	Natural Log Value of Current Year's Sales	14.575	14.462
		(1.942)	(1.973)
Ln(Totemp)	Natural Log of Number of Employees	3.176	3.094
		(1.404)	(1.410)
Ln(ProfitShare)	Natural Log of Profit / Total Sales	0.131	0.127
		(0.178)	(0.176)
Ln(FirmAge)	Natural Log of Firm's Age in years	2.587	2.640
		(0.861)	(0.836)
Owner_Educ	Average Education of Owners	4.775	4.761
		(1.836)	(1.804)
Owner_Exper	Average Experience of Owners	0.227	0.231
		(0.108)	(0.110)
Black_Share	Share of Black Owners	0.015	0.012
		(0.116)	(0.108)
Credit_Score	Dunn & Bradstreet Credit Score	3.903	4.072
		(1.456)	(1.463)
Ln(Wealth)	Natural Log of Wealth of Primary Owner	3.190	2.422
		(23.905)	(7.351)
# Institutions	# Financial Institutions Firm Has Relationship With	3.761	3.520
		(2.265)	(1.939)
Ln(Distance)	Natural Log of Distance from Bank in Miles	0.034	0.049
		(0.117)	(0.160)
Ln(Relationship)	Natural Log of Length of Relationship with Bank	0.098	0.106
		(0.101)	(0.104)
Interest	Interest Rate of Most Recent Loan Granted	5.570	5.832
		(2.478)	(2.879)
MSA Status	MSA Status of Firm's Headquarter (0,1)	1.074	1.399
		(0.263)	(0.490)
Corporation	Firm is a Corporation (0,1)	0.773	0.765

		(0.419)	(0.424)
Proprietorship	Firm is a Proprietorship (0,1)	0.139	0.134
		(0.346)	(0.341)
Observations		775	679

Standard deviations appear in parentheses.

Table 2. Univariate Regressions Estimates

		All Loans	Young Firms (Firm Age≤10)	Old Firms (Firm Age>10)
All Loans				
	Concentrated Market (0,1)	-0.226	-0.505	-0.132
		(0.103)*	(0.186)**	(0.122)
	Observations	1453	455	998
Bank Loans				
	Concentrated Market (0,1)	-0.197	-0.463	-0.112
		(0.110)	(0.199)*	(0.131)
	Observations	1156	346	810

Notes: Standard errors appear in parentheses.
** Coefficient is significant at 1 percent level, * coefficient is significant at 5 percent level

Table 3. Baseline Results

	All Loans	Bank Loans	L/C	Non L/C
HECKIT ESTIMATES				
Inverse Mills Ratio	2.036	1.521	0.717	1.692
	(0.269)**	(0.287)**	(0.356)*	(0.599)**
Ln(Assets)	0.213	0.198	0.224	0.147
	(0.025)**	(0.028)**	(0.031)**	(0.061)*
Ln(Sales)	0.401	0.427	0.451	0.218
	(0.038)**	(0.044)**	(0.048)**	(0.103)*
Ln(ProfitShare)	-0.064	-0.088	-0.191	-0.314
	(0.174)	(0.195)	(0.218)	(0.420)
Concentrated Market (0,1)	-0.211	-0.175	-0.211	-0.083
	(0.065)**	(0.069)*	(0.077)**	(0.151)
Ln(FirmAge)	-0.078	-0.093	-0.107	-0.037
	(0.051)	(0.056)	(0.062)	(0.124)
Owner_Educ	0.038	0.020	0.011	0.033
	(0.018)*	(0.019)	(0.022)	(0.042)
Owner_Exper	-0.352	-0.622	-0.199	-0.994
	(0.360)	(0.388)	(0.422)	(0.876)
Black_Share	-0.472	-0.028	0.043	-0.244
	(0.281)	(0.325)	(0.350)	(0.807)
Credit_Score	0.100	0.084	0.072	0.131
	(0.023)**	(0.025)**	(0.028)**	(0.059)*
Ln(Wealth)	0.336	0.301	0.307	0.193
	(0.050)**	(0.054)**	(0.059)**	(0.126)
#Institutions	-0.030	-0.022	-0.027	-0.015
	(0.015)	(0.017)	(0.018)	(0.039)
Ln(Distance)	0.217	1.059	1.569	0.483
	(0.239)	(0.431)*	(0.607)**	(0.640)
Ln(Relationship)	-0.495	-0.186	-0.315	-0.128
	(0.324)	(0.337)	(0.389)	(0.679)
Loan Interest Rate	-0.079	-0.082	-0.071	-0.118
	(0.013)**	(0.017)**	(0.019)**	(0.044)**
MSA Status	0.188	0.234	0.184	0.270
	(0.077)*	(0.084)**	(0.096)	(0.170)
Profit Decrease (0,1)	0.043	0.044	0.042	0.047
	(0.067)	(0.072)	(0.079)	(0.173)
Profit Same (0,1)	-0.060	-0.011	-0.004	0.063
	(0.081)	(0.086)	(0.098)	(0.182)
Not in Business (0,1)	-0.328	-0.109	-0.137	-0.266
	(0.228)	(0.259)	(0.310)	(0.494)
Checking Account (0,1)	0.136	0.245	0.356	-0.091
	(0.092)	(0.121)*	(0.145)*	(0.236)
Transaction Service (0,1)	-0.134	-0.175	-0.146	-0.153
	(0.069)	(0.072)*	(0.078)	(0.171)
Credit Service (0,1)	0.322	0.278	0.323	-0.041
	(0.091)**	(0.093)**	(0.101)**	(0.222)

Savings Account (0,1)	-0.070	-0.114	-0.193	0.149
	(0.075)	(0.077)	(0.086)*	(0.178)
Cash Mgmnt. Service (0,1)	0.450	0.371	0.371	0.146
	(0.084)**	(0.087)**	(0.092)**	(0.222)
OLS ESTIMATES				
Concentrated Market (0,1)	-0.183	-0.158	-0.203	-0.049
	(0.066)**	(0.070)*	(0.077)**	(0.152)
Observations	1453	1155	845	310

Notes: The dependent variable is natural log amount of the most recently granted loan. The regression also includes nine industry dummy variables, eight regional dummy variables, dummies for loan types, firm's organization type, services and collateral types and an intercept. Standard errors appear in parentheses.
** Coefficient is significant at 1 percent level, * coefficient is significant at 5 percent level

Table 3-1. Estimates without Loan Interest Rates

	All Loans	Bank Loans	Bank L/C	Bank Other
Concentrated Market (0,1)	-0.230**	-0.183**	-0.217**	-0.086
	(0.066)	(0.070)	(0.078)	(0.153)
Ln(FirmAge)	-0.067	-0.093	-0.107	-0.025
	(0.051)	(0.057)	(0.063)	(0.125)
Inverse Mills Ratio	2.021**	1.604**	0.789*	1.899**
	(0.273)	(0.289)	(0.358)	(0.600)
Observations	1453	1155	845	310

Notes: The dependent variable is natural log amount of the most recently granted loan. The regression all the control variables in Table 3 and nine industry dummy variables, eight regional dummy variables, dummies for loan types, firm's organization type, services and collateral types and an intercept. Standard errors appear in parentheses.
** Coefficient is significant at 1 percent level , * coefficient is significant at 5 percent level

Table 4. Bank Market Concentration and Small Business Profitability

	WHOLE SAMPLE		MOST RECENT LOAN SAMPLE	
	Competitive Market	Concentrated Market	Competitive Market	Concentrated Market
Profit Change in 3 Years				
Increase	814 (37.58)	809 (39.01)	288 (43.90)	234 (43.17)
Decrease	712 (32.87)	693 (33.41)	233 (35.52)	198 (36.53)
Same	360 (16.62)	341 (16.44)	85 (12.96)	72 (13.28)
Not in Business	280 (12.93)	231 (11.14)	50 (7.62)	38 (7.01)
Profit Change in 1 Year				
Increase	781 (36.06)	768 (37.03)	270 (41.16)	217 (40.04)
Decrease	704 (32.50)	678 (32.69)	239 (36.43)	191 (35.24)
Same	604 (27.89)	563 (27.15)	132 (20.12)	125 (23.06)
Not in Business	77 (3.55)	65 (3.13)	15 (2.29)	9 (1.66)
Sales Change in 3 Years				
Increase	1,010 (46.63)	984 (47.44)	363 (55.34)	319 (58.86)
Decrease	569 (26.27)	546 (26.33)	176 (26.83)	122 (22.51)
Same	304 (14.04)	311 (15.00)	67 (10.21)	62 (11.44)
Not in Business	283 (13.07)	233 (11.23)	50 (7.62)	39 (7.20)
Sales Change in 1 Year				
Increase	945 (43.63)	892 (43.01)	323 (49.24)	282 (52.03)
Decrease	516 (23.82)	493 (23.77)	162 (24.70)	118 (21.77)
Same	627 (28.95)	624 (30.09)	155 (23.63)	133 (24.54)
Not in Business	78 (3.60)	65 (3.13)	16 (2.44)	9 (1.66)
Total Observations	2,166	2,074	656	542

Percentage values reported in parenthesis

Table 4-1. Robustness Checks

	All Loans	Division *SIC	Urban Sample	HHI Index	MRL Ratio	Young Firms	Old Firms	10 Mile Radius	5 Mile Radius
OLS ESTIMATES									
Concentrated Market (0,1)	-0.183**	-0.163*	-0.199**	-0.184*	-0.188*	-0.168	-0.169*	-0.151*	-0.150*
	(0.066)	(0.068)	(0.072)	(0.068)	(0.078)	(0.132)	(0.078)	(0.067)	(0.067)
Ln(FirmAge)	-0.118*	-0.120*	-0.105	-0.118*	-0.106	-0.138	-0.122	-0.095	-0.080
	(0.051)	(0.052)	(0.057)	(0.051)	(0.060)	(0.122)	(0.108)	(0.053)	(0.054)
Most Competitive Market				-0.008					
				(0.127)					
Observations	1453	1453	1121	1453	1449	455	998	1343	1292
HECKMAN ESTIMATES									
Concentrated Market (0,1)	-0.211**	-0.222**	-0.193**	-0.210**	-0.216**	-0.275*	-0.157*	-0.176**	-0.177**
	(0.065)	(0.071)	(0.066)	(0.066)	(0.077)	(0.132)	(0.077)	(0.066)	(0.066)
Ln(FirmAge)	-0.078	-0.074	-0.082	-0.078	-0.066	-0.092	-0.092	-0.054	-0.038
	(0.051)	(0.056)	(0.052)	(0.051)	(0.059)	(0.120)	(0.106)	(0.052)	(0.053)
Most Competitive Market				0.007					
				(0.125)					
Inverse Mills Ratio	2.036**	2.144**	1.945**	2.037**	2.092**	1.921**	2.348**	2.067**	2.107**
	(0.269)	(0.307)	(0.276)	(0.269)	(0.323)	(0.465)	(0.383)	(0.281)	(0.283)
Observations	1453	1453	1121	1453	1449	455	998	1343	1292

The dependent variable is natural log amount of the most recently granted loan. The regression also includes all the control variables in Table 3 and nine industry dummy variables, eight regional dummy variables, dummies for checking account, credit, transaction, cash management and brokerage service, loan types and collateral types and an intercept. Standard errors appear in parentheses.
** Coefficient is significant at 1 percent level, * coefficient is significant at 5 percent level

Table 5. Pattern of Loan Turndown

		Competitive Bank Market	Concentrated Bank Market
All Loans			
	Rejected	85	74
	Accepted	769	664
	Total	853	738
Bank Loans			
	Rejected	73	63
	Accepted	658	553
	Total	731	616
New L/C			
	Rejected	33	30
	Accepted	126	102
	Total	159	132
L/C Renewal			
	Rejected	6	8
	Accepted	368	281
	Total	374	289
Other Loans			
	Rejected	34	25
	Accepted	164	170
	Total	198	195

Table 6. Bank Concentration and Loan Rejection

	All Loans		Bank Loans		Bank L/Cs		New L/Cs	
	Young	Old	Young	Old	Young	Old	Young	Old
Concentrated Market (0,1)	-0.061[**]	0.004	-0.087[**]	0.002	-0.141[**]	0.004	-0.571[**]	0.024
	(2.80)	(0.94)	(2.65)	(0.61)	(3.21)	(1.63)	(2.77)	(1.26)
Ln (FirmAge)	-0.012	0.003	0.010	0.003	0.034	-0.002	0.072	-0.038
	(0.81)	(0.50)	(0.37)	(0.56)	(1.70)	(0.64)	(0.26)	(1.52)
Observations	531	1034	427	875	284	638	115	163
Pseudo R^2	0.36	0.38	0.37	0.41	0.49	0.44	0.42	0.45

The dependent variable is whether a loan application is accepted (= 1) or not (= 0). The regression also includes nine industry dummy variables, eight regional dummy variables, dummies for loan types and an intercept, except for column 3 where division x 1-digit SIC is used. Marginal effects, instead of logit coefficients are reported and t-statistics appear in parentheses.

Table 7. Bank Concentration and Loan Rejection with Different Age Coefficients

	All Loans		Bank Loans		L/Cs		New L/Cs	
	All	Urban	All	Urban	All	Urban	All	Urban
Concentrated Market (0,1)	-0.041[*]	-0.055[**]	-0.061[**]	-0.098[**]	-0.062[**]	-0.129[**]	-0.409[*]	-0.777[**]
	(2.54)	(2.78)	(2.73)	(3.06)	(3.10)	(3.30)	(2.39)	(2.87)
Ln(FirmAge) in Competitive	-0.003	-0.006	0.000	-0.006	0.000	-0.003	-0.015	-0.087
	(0.56)	(1.35)	(0.02)	(0.92)	(0.06)	(0.79)	(0.48)	(1.38)
Ln(FirmAge) in Concentrated	0.012[*]	0.014[*]	0.017[*]	0.023[**]	0.013[**]	0.019[**]	0.091	0.210[*]
	(2.00)	(2.38)	(2.22)	(2.68)	(2.73)	(2.85)	(1.55)	(2.12)
Observations	1575	1229	1302	1015	922	740	278	230
Pseudo R^2	0.354	0.387	0.382	0.399	0.448	0.471	0.355	0.397

The dependent variable is whether a loan application is accepted (= 1) or not (= 0). The regression also includes nine industry dummy variables, eight regional dummy variables, dummies for loan types and an intercept.
Marginal effects, instead of logit coefficients are reported and t-statistics appear in parentheses.
** Coefficient is significant at 1 percent level, * coefficient is significant at 5 percent level

Table 8. Total L/C Limits and Bank Concentration

	All Loans	Division* SIC	Urban Sample	HHI Index	L/C Limit to Asset	Young Firms	Old Firms
OLS ESTIMATES							
Concentrated Market (0,1)	-0.128*	-0.125*	-0.151*	-0.120*	-0.165*	-0.213*	-0.095
	(0.055)	(0.056)	(0.060)	(0.057)	(0.070)	(0.106)	(0.065)
Competitive Market (0,1)				0.071			
				(0.108)			
HECKMAN ESTIMATES							
Concentrated Market (0,1)	-0.189**	-0.186**	-0.214**	-0.181**	-0.401**	-0.252*	-0.165*
	(0.057)	(0.059)	(0.062)	(0.059)	(0.068)	(0.111)	(0.067)
Competitive Market (0,1)				0.070			
				(0.108)			
Inverse Mills' Ratio	4.856**	4.800**	5.096**	4.855**	19.233**	3.225	5.797**
	(1.268)	(1.316)	(1.522)	(1.269)	(1.547)	(2.517)	(1.500)
Observations	1510	1510	1194	1510	1503	465	1045

The dependent variable is a natural log sum of limits of all the L/Cs a firm has. The regression also includes nine industry dummy variables, eight regional dummy variables, dummies for loan types and an intercept, except for column 3 where division x 1-digit SIC is used. Standard errors appear in parentheses.
** Coefficient is significant at 1 percent level, * coefficient is significant at 5 percent level

FOOTNOTES

1. We excluded loan applications to non-financial firms and to family members.
2. Probit estimates on having an L/C (the first step of Heckit two-step procedure) are reported in Table 7.
3. Unlike past waves of NSSBF data sets, 2003 data does not report the sales or profit of previous fiscal year. Instead, it asks firms whether the sales or profit has grown, decreased, been the same compared to the previous year or firm did not operate during the previous year.
4. Unlike previous version of SSBF data set, 2003 data does not provide actual value of sales or profit of the previous year. Therefore, we could not calculate how much profit and sales had changed.
5. Whether we included PROFIT_3, P3 or P3_1 did not make any difference. We did not include dummy of each variable at the same time because they are strongly correlated with each other.
6. We also tried 2 digit SIC code instead of industry x division dummies and the results are still consistent with baseline regressions.
7. 10th year is used as a critical year following Peterson and Rajan (1994).
8. This result is not sensitive to critical firm age of 10 years. Even when we divide the sample using the median age of 16 years, we get a consistent result.
9. We could not test for L/C renewals because of very low turndown rate. There are only six L/C renewal rejections in competitive markets and eight in concentrated markets.
10. We could not test the Industry x Division fixed effect because it makes the number of regressors almost equal to the number of total loan rejections.
11. When we used two-stage Heckman model to control for this selection bias, the estimates (not shown) from the second stage regression are very similar to those in Table 3 and the coefficient of Inverse Mills Ratio is statistically insignificant.
12. NSSBF has a total debt variable (variable S1) but the total debt includes debt from various institutions and individuals.
13. Omission of these variables does not seem to drive our total L/C limit results. When we check the L/C limits from primary L/C bank, which allows us to control for the length of relationship, the distance and the types of collaterals, the results are very similar to ones that we got from total L/C limit regressions.

REFERENCES

Berger, Allen N., and Gregory Udell. "Relationship Lending and Lines of Credit in Small Firm Finance." Journal of Business 68 (1995): 351-382

Berger, Allen N., Rosen, Richard J., and Gregory Udell. "Does Market Size Structure Affect Competition? The Case of Small Business Lending." Journal of Banking and Finance 31 (2007): 11-33

Berlin, Mitchell., and Loretta Mester, "Why is the Banking Sector Shrinking? Core deposits and relationship lending." Federal Reserve Bank of Philadelphia Working Paper 96-18/R (1997).

Berlin, Mitchell., and Loretta Mester. "On the Profitability and Cost of Relationship Lending." Journal of Banking and Finance 22 (1998): 873-897

Black, Sandra., and Philip E. Strahan. "Entrepreneurship and Bank Credit Availability." Journal of Finance 57 (2001): 2807-2833.

Blanchflower, David., Levine, Phillip., and David J. Zimmerman. "Discrimination in the Smalll Business Market." The Review of Economics and Statistics 85 (2003): 930–943

Boot, Arnot. "Relationship Banking : What Do We Know?" Journal of Financial Intermediation 9 (2000): 7-25

Boot, Arnot., and Thakor, Anjan. "Can Relationship Banking Survive Competition." Journal of Finance 55 (2000): 679-713

Campbell, Tim S., and William A. Kracaw. "Information Production, Market Signaling and the Theory of Financial Intermediation." Journal of Finance 35 (1980): 863-882

Cavalluzzo, Ken and John Wolken. "Small Business Loan Turn Downs, Personal Wealth and Discrimination." Journal of Business, 78 (2005): 2153-2178

Cestone, Giacinta and Lucy White. (2003). "Anti-competitive Financial Contracting: The Design of Financial Claims." Journal of Finance 58, 2109-2142

Cetorelli, Nicola. "Real Effects of Bank Competition." Jounal of Money, Credit and Banking 36 (2004): 543-558

Cetorelli, Nicola and Philip E. Strahan. "Finance as a Barrier to Entry: Bank Competition and Industry Structure in Local U.S. Markets." Journal of Finance 61 (2006), 437-461

Cole, Rebel. "The Importance of Relationships to the Availability of Credit." Journal of Banking and Finance 22 (1998), 959-977

Degryse, Hans., and Patrick Von Cayseele. "Relationship Lending within a Bank Based System: Evidence from European Small Business Data." Journal of Financial Intermediation 9 (2000): 90 - 109

Di Patti, B. Emilia., and Giovanni Dell'Ariccia "Bank Competition and Firm Creation." Journal of Money, Credit and Banking 36 (2004): 225-251

Jayaratne, Jith., and Philip E. Strahan. "The Finance-Growth Nexus: Evidence from Bank Branch Deregulation." Quarterly Journal of Economics 111 (1996): 639-670.

Morgan, Donald., Bertrand Rime, and Philip E. Strahan. "Bank Integration and Business Volatility." Center for Financial Institutions Working Papers 02-10 (2001), Wharton School Center for Financial Institutions, University of Pennsylvania.

Peterson, Mitchell., and Raghuram Rajan. "The Benefits of Lending Relationships: Evidence from Small Business Data." Journal of Finance 49 (1994): 3-37.

Peterson, Mitchell., and Raghuram Rajan. "The Effect of Credit Market Competition on Lending Relationships." Quarterly Journal of Economics 90 (1995), 407-444.

Peterson, Mitchell., and Raghuram Rajan.. "Does Distance Still Matter? The Information Revolution in Small Business Lending" Journal of Finance 58 (2003): 2533-2570

Rajan, Raghuram. "Insiders and Outsiders: The Choice between Informed and Arm's Length Debt." Journal of Finance 47 (1992): 1367-1400.

Rubin, Donald B. Multiple Imputation for Nonresponse in Surveys. New York: John Wiley & Sons, 1987.

Sahlman, William A."The Structure of Governance of Venture Capital Organizations." Journal of Financial Economics 27 (1990): 473-524

Scott, Jonathan A. and William Dunkelberg. "Bank Mergers and Small Firm Financing." Journal of Money, Credit and Banking 35 (2003): 999-1017.

Shaffer, Sherrill "The Winner's Curse in Banking." Journal of Financial Intermediation 7 (1999): 359-392.

Sharpe, Steven A. "Asymmetric Information, Bank Lending and Implicit Contracts: A Stylized Model of Customer Relationships." Journal of Finance 45 (1990): 1069-1087

Von Thadden, Ernst-Ludwig. "Asymmetric Information, Bank Lending and Implicit Contracts: The Winners Curse", Finance Research Letters 1 (2004), 11-23