Banking Market Concentration and Credit Availability to Small Businesses

Park, Yongjin
Connecticut College

March 2008

Banking Market Concentration and Credit Availability to Small Businesses

JEL Classification: G21

Keywords: Bank Competition, Indebtedness, Small Business, Relationship Banking

ABSTRACT

This paper examines how banking market concentration affects small businesses finance. Using the Survey of Small Business Finance, the empirical model show that bank concentration may adversely affect the amount of credit supplied to small businesses. We find that bank concentration decreases the L/C limits of firms significantly, while there is no statistically significant difference in L/C balance across banking markets. We also show that bank concentration lowers the overall debt-to-asset ratio of small firms that includes loans from non-bank institutions, suggesting that credit from non-bank institutions do not fully make up the effect of bank concentration.

1. Introduction

Over the past few decades, improvements in information technology, financial deregulation has contributed to create a more competitive environment and have encouraged an unprecedented consolidation in the banking sector. In the U.S., M&A activity in the financial institution sector has reduced the number of banks by more than one-third until the end of the 1990s. Consolidation in the banking industry has raised concerns among policymakers that this may lead to a reduced availability of credit for small businesses, primarily due to the decrease in the number of small banks specialized in this type of lending.

Empirical research on the effect of banking concentration on credit availability is relatively lacking and provides contradicting results. Petersen and Rajan (1995) show that small firms in concentrated banking markets are less credit-constrained by examining the use of trade credit and loan rates. 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(2004) and Cetorelli and Strahan (2006) show that potential entrants face greater difficulty gaining access to credit in concentrated banking markets than those in competitive banking markets. 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).

One of great challenges in examining the effect of bank competition on credit access is the classical problem of identification: Researchers cannot always observe how much credit a firms needs and how much of that credit need is met by credit supply of banks. Since we can only observe the size of granted loans, researchers may not tell any observed difference in the size of granted loans is supply-constrained or demand-constrained. To address this problem, we focus on a unique feature of lines of credit (L/Cs) that the maximum balance of an L/C that a bank allows (L/C limit) is usually different from actual balance of an L/C (L/C balance). Since borrowing firms pay interest only for the balance of L/C not for the whole limit, firms have little incentive to limit the size of L/C voluntarily. It is usually banks that set the limit based on various factors such as credit quality and length of relationships. Once L/C limit is set for a firm, however, how much the firm actually borrows (L/C balance) solely depends on the firm's credit need. Therefore, L/C limit and L/C balance provides useful proxies for the maximum credit that a bank is willing to provide (credit supply) and credit need of a firm (credit demand), respectively.

Using both OLS and Heckit model to correct for sample selection, we show that L/Cs granted by banks in concentrated markets have significantly lower limits than those

granted by banks in competitive banking markets, while there was no statistically significant differences in L/C balances. 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. Results remain consistent throughout robustness checks. We also show that small businesses in concentrated banking market has significantly lower debt-to-asset ratio. This result is consistent with Boot and Thakor (2000), Beck, Demirgüç-Kunt and Maksimovic (2004) and challenges the well-known findings of Peterson and Rajan (1995).

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, our results are presented and we present and examine alternative explanations and measures. We also examine how banking market concentration affects the overall indebtedness of small firms. 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. There are 4,240 total firms in the sample and out of them 1910 firms have at least one line-of-credit (L/C) from commercial banks.

One unique feature of 2003 data set is that it includes five implicates with each implicate including 4,240 firms. Past NSSBF data sets (published in 1987, 1993, 1998) calculates imputed values in the place of missing values and it raised some concerns about accuracy of those imputed values and their effect on estimates. To address this problem, 2003 NSSBF creates five different sets of imputed values for single missing values. Across those five implicates, the values of all reported variables remain constant, but only 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.

For a measure of the degree of bank competition in the market, we use the Herfindhal index of commercial bank deposit concentration as a proxy. NSSBF data reports only three broad categorization of the Herfindahl index: whether the Herfindahl index 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 number of firms in the most competitive category (Herfindahl Index<0.1) is very small (n=129) compared to middle (n=881) and the most concentrated (n=900). So, we focus on the difference between the markets whose HHI is larger than 1.8 (we refer to the markets as concentrated markets) and other markets whose HHI is less than 1.8, 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. The sample is described in Table 1.

In order to investigate how bank competition affects the amount of bank credit offered to small firms, we analyze the effect of banking market concentration on L/C limit and L/C balance. One of great challenges of studying the effect of bank competition on credit supply is that we cannot always observe how much credit a firms needs and how much of that credit need is met by credit supply of banks. Since we can only observe how much loan is granted, even when we find a statistical correlation between bank competition and total bank loans used does not necessarily tell us whether the correlation is supply-driven by banks or demand-driven by borrowing firms. Though it is well known that small businesses are more likely to be credit constrained, that a firm in a concentrated banking market has less bank debt does not necessarily mean that the firm is more financially constrained.

To address this problem, this paper focuses on the difference between L/C limit and L/C balance. One of unique features of L/Cs is that borrowers do not need to use the maximum credit balance that a bank allows and pay interests only for the used portion of the L/Cs. This feature creates different incentive for borrowing firms and banks. Obviously, borrowing firms have an incentive to secure L/Cs with highest possible limits for its current and future credit needs and also to secure a source of credit against future uncertainty. Banks, however, have to be very careful in granting L/Cs and in determining limits of the L/Cs based on creditworthiness of firms since it is a serious forward commitment for them. This probably is the reason why turndown rate of new L/C

application (21.6%) is much higher than that of other loans (6.9%).[1] Once a L/C is granted and limit is determined to a firm, however, how much the firm actually borrows solely depends on the firm's current credit need. This unique structure of L/Cs makes L/C balance a good proxy for the loan demand of a firm while L/C limit is more likely to be set by lenders. If banking market concentration makes banks to reduce credit supply to small businesses, then we should expect the L/C limits in the concentrated markets to be smaller while the amount of L/C balance is relatively unaffected by banking market structure.

One potential problem that we have to deal with when we use L/C limit, L/C balance distinction is that L/C balance is constrained by the L/C limit and therefore might be correlated with L/C limit. If a statistical correlation between bank concentration and the amount of bank credit granted is supply driven, then L/C limit should more closely reflect the correlation and it will affect L/C balance only indirectly. If the correlation is driven by small firms' credit needs, then it should be reflected by L/C balance and only to a lesser degree by L/C limit. Therefore, we should focus both on the magnitude and strength of statistical correlation between bank concentration and L/C limit and L/C balance.

NSSBF reports both limits and balances of L/Cs for 1656 firms that have one or more L/Cs from its primary L/C bank.[2] Also, there are 275 firms have L/Cs from more

[1] According to Most Recent Loan variables of NSSBF 2003 data, there was 1347 total loan application and 291 of them was new L/C applications. Out of 291 new L/C applications 63 applications are turned down. In case of all the other 1056 loan applications, only 73 applications are turned down.
[2] Since we focus on the effect of banking market concentration on L/C variables, L/Cs issued by non-bank financial institutions are excluded from the sample.

than one banks (229 firms from two banks 46 from three or more banks). For these firms, we calculated the sum of limits and balances of all the L/Cs that they have. We call the former (limits and balances of L/Cs from primary L/C bank) as primary L/C variables and the latter as total L/C variables.

A major advantage of using primary L/C variables as dependent variables is that it is based on one firm-one bank relationship. This allows us to controls for the firm-bank relationship and terms and conditions of the L/C such as the length of relationship and the distance between a firm and its primary L/C bank, financial services – checking, saving account and cash management, transaction and credit service - that the firm use from its primary L/C bank and types of collateral used to secure the L/C. Therefore, for baseline regressions, we focus on primary L/C variables. Then in the following section, we check whether the outcome changes when we use total L/C variables and primary L/C variables as a share of assets as dependent variables.

When we checked the univariate regression of L/C limits and L/C balance, estimates in Table 2 show that L/C limits in concentrated banking market is about 24% smaller and the difference is statistically significant at 1% ($t = 2.76$). When we divide the sample into young (firm age$\leq$14) and old firms (firm age>14) using the median age of 14 years, the differences in L/C limit is more pronounced in young firms sample at about 42% ($t = 3.17$), compared to old firm sample in which the difference is much smaller and insignificant. The amount of L/C balance did not display significant difference across banking market structure but the coefficients are negative and only slightly smaller in magnitude.

To examine the topic in a more thorough manner, we perform multivariate regressions with L/C limit and L/C balance as separate dependent variables. Regression equation has the following generic form:

$$Ln(L_i) = a + bH_i + cLn(Age_i) + \beta x_i + u_i$$

$$Ln(U_i) = a + bH_i + cLn(Age_i) + \beta x_i + u_i \qquad (1)$$

where Ln(L_i) is the log value of L/C limit of a firm i, Ln(U_i) is the log value of L/C balance of a firm i, H_i is a dummy variable for concentrated market, $Ln(Age_i)$ is a log value of firm i's age in years. 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.

In addition to this standard model, we will also explore the possibility that banking market structure might affect firms' access to L/Cs, using Heckman two-step model that examines the level of L/C limits and balances conditional on access to L/Cs.

Our model contains many control variables that might affect L/C variables to ensure that banking market structure variable does not pick up extraneous elements that would bias the results. We control for various aspects of firm, owner, and firm-bank relationship characteristics: When regarding firm characteristics, book value of asset, total sales and number of employees (all in log form) are used to control for the effect of firm size. 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 Volken, 2005) find that blacks have limited access to credit markets. Bank-firm relationship variables include the length of relationship and physical distance between the firm and the bank and dummy variables for use of various financial services such as checking, saving and cash management services that Cole (1998) found important in firm-bank relationships. Also, we added controls for whether collateral is used to secure the L/C and for the types of collateral used. 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. Bank Concentration, L/C limit and L/C balance

3.1 Baseline Results

Our estimates from Eq.(1) appear in Table 3.

[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.

First, estimates support our key assumption that L/C limit is a proxy for credit supply while L/C balance reflects credit need of a firm. For example, the coefficient of credit rating variable is positive and significant in L/C Limit regressions, while it is negative and significant in L/C balance regressions. It means that firms with better credit ratings secure higher L/C limits while they actually use less L/C credits. We believe this is the case because banks offer higher L/C limits to firms with better credit ratings while it is the firms with bad credit rating that are in more dire need for credit. Personal wealth of owner variable also shows a similar pattern. While owner wealth has positive effect on L/C limit, suggesting that banks will offer higher L/C limits to firms with wealthier owner, it does not show any significant effect on L/C balance and the coefficient becomes negative.

Another interesting variable is the number of financial institutions related. It is well documented that banks do not prefer firms that have relationship with multiple banks. Therefore, given our assumption that L/C limit is determined by banks, it is expected that the variable has a negative and significant coefficient on L/C limits (in column I). Interestingly, however, it has an opposite effect on L/C balance (in column III). The positive and significant coefficient, we believe, stems from that firms with more credit needs would try multiple financial institutions to fill their credit demand, supporting our assumption that L/C balance is a proxy for credit demand.

Second, estimates in column I show that L/C limits of firms in concentrated banking markets are smaller than ones in competitive banking markets. The difference is statistically significant at 1% and is economically meaningful. Taken literally, being in a

concentrated banking market is associated with 14% smaller L/C limit. In case of the L/C balance, however, banking market structure did not have any significant effect. As which we can see in column III, the coefficient of concentrated market dummy is statistically insignificant and is much smaller in magnitude. It is worth noting that the negative coefficient of concentrated banking market dummy is expected given the fact that the amount of L/C balance is ultimately limited by L/C limit.

One potential problem with focusing on L/C is that there might be a selection bias if there is correlation between bank concentration and loan turndown rate. Park (2007), using the same data set, finds that the banks in concentrated banking markets are more likely to reject loans, especially L/Cs. In this case, average quality of firms with L/Cs in the concentrated market might be better than that of firms in competitive market, which may affect the limits of L/Cs granted. To deal with this problem, we use Heckman two-step model for our regressions.[4] Estimates from Heckman regressions are reported in column II and IV of Table 3.

In the column II, the coefficient of inverse Mills ratio in L/C limit regression is statistically significant, which confirms the presence of selection bias and therefore justifies the use of Heckman selection model. In case of L/C balance regressions, however, we do not find evidence of selection bias; inverse Mills ratio is not statistically significant.

Correcting for sample selection makes a couple of interesting changes. First, the bank concentration effect on L/C limits became stronger after the correction while its

[4] Probit estimates on having an L/C (the first step of Heckit) are reported in Appendix.

effect on L/C balance becomes even smaller. When all the other things are equal, L/C limits in concentrated banking market are about 25% smaller than those in competitive markets. Coefficient of black ownership variable also shows an interesting change. Its OLS estimate has a positive sign, which is unexpected given well documented racial discrimination against blacks in small business lending. Once we correct for selection bias, however, the coefficient becomes negative, though it is not statistically significant.[5] Another interesting variable is the number of financial institutions related. While the coefficient on L/C limit is negative in the baseline OLS regression, its Heckit coefficient becomes positive and significant at 1%. It is because firms with multiple banking relationships are much more likely to have at least one L/C. Therefore, after correcting for selection bias, the number of banks that a firm has relationship with may have a positive effect on L/C limit.

To summarize, after controlling for underlying differences in firm and loan characteristics and regional/industrial characteristics across markets, we find that banking market concentration lowers L/C limit significantly but it does not seem to affect the amount of L/C balance. This result discount the possibility that lower L/C limit in concentrated banking market is demand driven.

3.2. Robustness Checks

[5] Another interesting change is that the number of financial institutions that a firm has relationship with has a negative and significant coefficient on L/C limit in OLS regressions but in Heckman regression coefficient becomes positive and significant at 1%. It is well documented that banks do not favor firms that have relationship with multiple banks but at the same time firms with multiple banking relationships are more likely to have at least one L/C. Therefore, after correcting for selection bias, the number of banks that a firm has relationship with may have a positive effect on L/C limit.

In order to ensure robustness of our estimates, we run a series of additional regressions with additional control variable to the model. Since baseline regression results show the evidence of selection bias, we use two-step Heckit for all the regressions from below.

First, several papers surveyed in the previous section expect bank concentration may have stronger effect on young firms. To investigate this possibility, we first divide the sample using median firm age of 14 years. Estimates from young and old firm samples are reported in the second and the third column of Table 4, respectively. It shows that bank concentration effect on both L/C limit and L/C balance is stronger among young firms than older firms. Taken literally, among young firms, being in concentrated banking market means about 29% smaller L/C limits while among old firms it means about 19% lower limits. In case of L/C balances, bank concentration effect is negative among young firms but becomes positive but neither of them is statistically significant.

Second, we need to consider a possibility that the correlation between bank competition and the urban/rural location of the firm may drive the baseline results. In the sample, all the young firms in the most competitive market are located is urban area, while 34 percent of firms in concentrated markets are in rural areas. Therefore, a potential connection between urban/rural location and the use of bank debt may cause a spurious correlation between bank concentration and the use of bank credit. To address this concern, we limit the sample to urban firms and repeat the baseline regression. As we can see in the fourth column 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 in L/C limit regression and the magnitude of the bank concentration effect slightly increases, suggesting that the connection between bank concentration and urban/rural location does not explain our findings. In case of L/C balance, the coefficient becomes much bigger in magnitude but it still remains insignificant.

Another potential problem we need to consider is that the captured bank concentration effect was driven by differences in investment opportunities across banking markets. For example, in areas where the local economy is booming, more banks may open up more branches and *de novo* banks may enter the bank market, which may create a positive association between investment opportunity (thus, loan demand) and bank competition. For a 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. Still, the concentration coefficient reported in fifth column of Table 4 decreased only slightly and remains statistically significant at 1%.[6] In case of L/C balance, the coefficient of concentrated market dummy becomes positive, suggesting firms may borrow more despite lower L/C limits in concentrated banking markets though the difference is statistically insignificant.

One final check that we need to make is a connection between L/C limit and L/C balance. Though they are not statistically significant, the coefficients of concentrated market dummy are still negative in many regressions. It may well be driven by the low

[6] We also tried 2 digit SIC code instead of industry x division dummies and the results are still consistent with baseline regressions.

limits of L/Cs in concentrated markets but it may also be a reflection of relatively less demand for credit. To address the problem of L/C limit and L/C balance connection, in a more rigorous manner, we added L/C balance as an additional control variable for L/C limit regression to get the effect of bank concentration on L/C limit *when the L/C balance is given*. Estimates in the last column show that the addition of L/C balance has no effect on bank concentration coefficient. The coefficient is almost identical to that of baseline regression and statistically significant at 1%, while as expected, the L/C balance has significant positive correlation with L/C limit. When we do the same in L/C balance regression by adding L/C limit as a control variable, coefficient of the concentrated banking market dummy becomes positive. It suggests that given the L/C limit, firms in the concentrated market may use more credit than similar firms in competitive markets but the difference is statistically insignificant.

To summarize, even after controlling for differences in urban-rural area and in investment opportunities, our findings appears to be robust: Firms in the most concentrated banking markets get significantly less credit from banks while credit demand of firms do not seem to differ across banking markets. Moreover, L/C limits in concentrated banking market tend to smaller even when the L/C balance is given, further discounting that our finding is driven by differences in credit demand across banking markets.

3.3. Alternative L/C variables

As we noted earlier, there are 275 firms have L/Cs from more than one banks. Since primary L/C is not the only source of L/Cs for these firms, to capture the impact of banking market concentration on overall credit availability we need to calculated the sum of limits and balances of all the L/Cs that they have, which we define as total L/C variables. When we use logarithmized total L/C variables as dependent variables, we cannot control for types of collateral that a firm posted to secure each L/Cs nor can we control for firm-bank relationship variables for each bank that granted L/Cs to the firm. Instead, we added 'total number of collateral' that a firm used for all the L/Cs and used relationship variables between firm and primary L/C bank.[7]

Using total L/C variables as dependent variable, we replicate baseline regression and all the robustness checks of Table 4 and summarize them in Table 5. As we can see from the estimates, results from total L/C regressions are consistent with and very similar in magnitude to those of primary L/C regressions. Bank concentration effect does not depend on the number of L/Cs or the number of banks from which a firm gets L/Cs.

Another alternative set of L/C variables are 'L/C ratio' which is the ratio of L/C variables and total asset of a firm. If firms in concentrated bank markets are smaller due to credit constraints, then it may also affect the average size of L/Cs. Using 'L/C ratio' should be able to fix this potential problem. When we calculate the ratio, however, we face a small number of observations with unusually high value for the ratio, mostly due to unusually small reported book value of assets. To suppress the effect of these outliers, we use logarithmized vale of the ratio and eliminate observations whose L/C limit or L/C

[7] Whether we include firm-bank relationship variables or not did not change the quantitative nor qualitative outcome of our findings.

balance is more than five times bigger than its assets.[8] Table 6 summarizes the estimates from alternative dependent variable regressions. Again, results are very similar to those of primary L/C and total L/C regressions. One key difference is that L/C balance ratio seems to be lower in concentrated banking market and the difference is statistically significant at 1%. While this may provide evidence that there is significant difference in credit demand across banking markets, the magnitude of the difference is far smaller than that of L/C balance ratio. For example, in the baseline regressions, L/C limit ratio is about 37% lower in concentrated banking market while the difference in L/C balance is only about 5%. So, it seems that the lower L/C balance ratio is not strong enough to explain the differences in L/C limit ratio.

3.4. Bank Concentration and Overall Indebtedness of Small Businesses

The results presented so far suggest that the banking market structure plays an important role in supplying credit to small businesses while credit demand does not seem to be affected by credit market. In this section, we examine how banking market structure affects the overall indebtedness of small businesses. By including all the loans from both bank and non-bank institutions, we examine whether small firms utilizes non-bank institutions such as credit unions and S&Ls to make up for the shortage of bank-issued credits that we find in the previous sections.

[8] 47 observations are excluded from the sample for L/C limit ratio regressions and 20 for L/C balance ratio regressions. Whether we include these observations or not did not alter the quantitative or qualitative outcome of our findings.

For this test, we explore the effect of banking market concentration on logarithmized total debt-to-asset ratio conditional on debt access using Heckman two-step regressions. We include all the control variables that we used for total L/C regressions to ensure that the concentrated market dummy do not reflect spurious correlation that would bias the results. Our estimates from this regression appear in Table 7.[9] The coefficient of the concentrated banking market dummy, which captures the difference in total debt-to-asset ratio of firms across banking markets, is negative and statistically significant at 5%. The effect is also economically meaningful: Firms in concentrated banking markets start out with more than 10 percent lower bank debt-to-asset ratio.

Estimates in Table 6 also show that the bank concentration effect is not driven by differences urban-rural location (column 2) of firms or investment opportunities (column 3). They also show that the bank concentration effect is stronger among young firms (column 4) compared to older firms (column 5).

This finding is consistent with our findings in the previous sections and also suggests that loans from non-bank institutions are not enough to make up for the shortage of bank-issued credit to small businesses in concentrated markets.

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. Small businesses, especially

[9] Probit estimates on taking on debt (the first step of Heckit) are reported in Appendix. Interestingly, probit results show that firms in concentrated banking markets are significantly less likely to have any debt.

young firms in concentrated banking markets have significantly less amount of bank debt and much lower bank debt-to-asset ratio, compared to similar firms in competitive banking markets. Moreover, using a unique distinction between L/C limit and L/C balance, we show that the bank concentration effect is driven by banks, not by varying loan demands of firms across banking markets.

Our findings directly challenge the findings of Petersen and Rajan (1995). We could not find any evidence that banking market concentration might be beneficial to young and small firms in the area. Rather, empirical evidence in this paper is consistent with recent studies such as Beck, Demirgüç-Kunt and Maksimovic(2004), Cetorelli and Strahan(2006) and Craig and Hardee(2007) 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. Also, it would be interesting to investigate whether or not bank size causes institutions to react differently to changes in banking market structure. If bank size is in fact an important contributor to bank behavior, it would be interesting to see how they differ.

Reference

Beck, T., Demirgüç-Kunt, A., Maksimovic, V., 2004. Bank Competition and Access to Finance: International Evidence. J.Money, Credit, Banking 36, 627-648

Berger, A.N., Udell, G., 1995. Relationship lending and lines of credit in small firm finance. J. Business 68, 351-382

Berlin, M., Mester, L., 1997. Why is the banking sector shrinking? Core deposits and relationship lending. FRB Philadelphia Working Paper 96-18/R.

Berlin, M., Mester, L., 1998. On the profitability and cost of relationship lending. J. Banking Finance 22, 873-897

Black, S., Strahan, P.E., 2001. Entrepreneurship and bank credit availability. J.Finance 57, 2807-2833.

Blanchflower, D., Levine, P., Zimmerman, D.J., 2003. Discrimination in the smalll business market. Rev. Econ. Statist. 85, 930–943

Boot, A.W., 2000. Relationship banking: what do we know? J. Fin.Intermediation 9, 7-25

Boot, A.W., Thakor, A., 2000. Can relationship banking survive competition. J.Finance 55, 679-713

Campbell, T.S., Kracaw, W.A., 1980. Information production, market signaling and the theory of financial intermediation. J.Finance 35, 863-882

Cavalluzzo, K., Wolken, J., 2005. Small business loan turn downs, personal wealth and discrimination. J.Business, 78, 2153-2178

Cestone, G., White, L., 2003. Anti-competitive financial contracting: The design of financial claims. J.Finance 58, 2109-2142

Cetorelli, N., 2004. Real effects of bank competition. J.Money, Credit,.Banking 36, 543-558

Cetorelli, N., Strahan, P.E., 2006. Finance as a barrier to entry: bank competition and industry structure in local U.S. markets. J.Finance 61, 437-461

Cole, R.A., 1998. The importance of relationships to the availability of credit. J.Banking Finance 22, 959-977

Craig, S. G., Hardee, P., 2007. The impact of bank consolidation on small business credit availability. J.Banking.Finance. 31, 1237-1263

Dinç, I., 2000. Bank reputation, bank commitment, and the effects of competition in credit markets. Rev.Finan.Stud. 13, 781-812

Degryse, H., Von Cayseele, P., 2000. Relationship lending within a bank based system: evidence from European small business data. J.Finan.Intermediation 9, 90 – 109

Degryse, H., Ongena, S., 2007. The impact of competition on bank orientation. J.Finan.Intermediation 16, 399-424

Di Patti, B.E., Dell'Ariccia, G., 2004. Bank competition and firm creation. J.Money, Credit, Banking 36, 225-251

Gompers, P., 1995. Optimal investment, monitoring, and the staging of venture capital. J.Finance 50, 1461-1489

James, C., 1987. Some evidence on the uniqueness of bank loans. J.Finan.Econ. 19, 217-235

Jayaratne, J., Strahan, P.E., 1996. The finance-growth nexus: evidence from bank branch deregulation. Quart. J. Econ. 111, 639-670.

Morgan, D., Rime, B., Strahan, P.E., 2001. Bank integration and business volatility. Center for Financial Institutions Working Papers 02-10, Wharton School Center for Financial Institutions, University of Pennsylvania.

Park, Y., 2003, Social benefits of relationship banking. Ph.D Disseration, University of Massachusetts at Amherst.

Petersen, M., Rajan, R., 1994. The Benefits of lending relationships: evidence from small business data. J.Finance 49, 3-37.

Petersen, M., Rajan, R., 1995. The effect of credit market competition on lending relationships. Quart. J. Econ. 90, 407-444.

Rubin, D.B., 1987. Multiple imputation for nonresponse in surveys. New York: John Wiley & Sons.

Sahlman, W.A., 1990. The structure of governance of venture capital organizations. J.Finan.Econ. 27, 473-524

Scott, J.A., Dunkelberg. W., 2003. Bank mergers and small firm financing. J.Money, Credit, Banking 35, 999-1017.

Shaffer, S., 1999 The winner's curse in banking. J. Finan.Intermediation 7, 359-392.

Sharpe, S.A. 1990. Asymmetric information, bank lending and implicit contracts: A stylized model of customer relationships. J. Finance 45, 1069-1087

Von Thadden, E.L. 2004. Asymmetric information, bank lending and implicit contracts: the winners curse, Finance Research Letters 1, 11-23

Yafeh, Y., Yosha, O., 2001, Industrial organization of financial systems and strategic use of relationship banking. Europ.Finance Rev. 5, 63-78

Table 1. Summary Statistics for Firms Classified by Age and Credit Market Structure*

Variable	Definition	Mean	Std. Dev.
DEPENDENT VARIABLES			
LnLC_Limit_Prime	Logarithmized limits of L/Cs from primary L/C bank	12.078	1.866
LnLC_Balance_Prime	Logarithmized balance of L/Cs from primary L/C bank	7.331	5.704
LnLC_Limit_Total	Logarithmized limits of All L/Cs that a firm has	12.194	1.881
LnLC_Balance_Total	Logarithmized balance of All L/Cs that a firm has	7.598	5.696
LnLC_Limit_Prime_Ratio	Logarithmized limit of primary L/Cs as a share of assets	-1.322	1.354
LnLC_Balance_Prime_Ratio	Logarithmized balance of Primary L/Cs as a share of assets	0.171	0.342
CONTROL VARIABLES			
Concentrated Market	Banking Market Concentration (Herfindahl Index) is larger than 1.8: (0,1)		
Logarithmized Value of Assets	Logarithmized value of assets	13.353	2.333
Logarithmized Total Sales	Logarithmized value of sales	14.444	2.009
Logarithmized Total Employees	Logarithmized total number of employees	3.075	1.427
Profit Rate	Profit as a share of assets	0.060	1.556
Logarithmized Firm Age	Logarithmized age of firm in years	2.626	0.850
D&B Credit Score	D&B credit score of a firm: 1–6, 1 = worst, 6 = best	4.064	1.459
Owner Experience	Weighted average number of years of experience of owners	0.231	0.110
Owner Education	Weighted average education level of owners	4.797	1.832
Share Owned by Black	Weighted percent of ownership that is black	0.016	0.119
Logarithmized Owner's Wealth	Logarithmized value of primary owner's net worth	0.831	0.733
# of Financial Institutions Related	Number of financial institutions that firm has relationship with	3.432	2.058
# of Lines of Credit	Number of L/Cs firm has from its primary L/C bank	1.132	0.425
Length of Relationship with Bank	Logarithmized length of relationship with primary L/C bank in months	4.506	1.039
Distance from the Bank	Logarithmized distance from the primary L/C bank in miles	1.595	1.297
MSA Status	Firm is located in MSA: dummy variable (0,1)	0.792	0.406
Proprietorship	Firms is sole proprietorship: (0,1)	0.141	0.348

Corporation	Firm is corporation: (0,1)	0.761	0.427
Checking Account	Firm has a checking account from the primary L/C bank: (0,1)	0.904	0.295
Transaction Service	Firm used transaction service from the primary L/C bank: (0,1)	0.536	0.499
Credits Service	Firm used credit service from the primary L/C bank: (0,1)	0.129	0.335
Saving Account	Firm has a savings account from the primary L/C bank: (0,1)	0.232	0.423
Cash Service	Firm used cash service from the primary L/C bank: (0,1)	0.240	0.427

Table 2. Univariate Regression

	L/C Limits	L/C balance
All Firms		
Concentrated Market (0,1)	-0.248**	-0.209
	(0.090)	(0.262)
Observations	1910	1910
Young Firms		
Concentrated Market (0,1)	-0.424**	-0.401
	(0.134)	(0.372)
Observations	851	851
Old Firms		
Concentrated Market (0,1)	-0.134	-0.046
	(0.117)	(0.369)
Observations	1059	1059

Dependent variable is logarithmized limits of L/Cs from primary L/C bank for column I and logarithmized balances of L/Cs from primary L/C bank for column II.

** Coefficient is significant at 1 percent level, * coefficient is significant at 5 percent level

Table 3. Baseline Regression on Bank Concentration and L/C Limits and L/C balance

	L/C Limit		L/C balance	
	OLS	Heckit	OLS	Heckit
Natural Log of Book Value of Assets	0.178	0.266	0.125	0.087
	(0.021)**	(0.024)**	(0.117)	(0.137)
Natural Log of Total Sales	0.376	0.642	0.085	-0.028
	(0.032)**	(0.049)**	(0.184)	(0.282)
Natural Log of Total Employees	0.059	0.041	-0.251	-0.244
	(0.035)	(0.035)	(0.197)	(0.198)
Profit Rate	-0.055	-0.046	0.035	0.031
	(0.016)**	(0.015)**	(0.089)	(0.089)
Concentrated Bank Market (0,1)	-0.141	-0.255	-0.063	-0.014
	(0.055)**	(0.056)**	(0.310)	(0.324)
Natural Log of Firm Age in Years	-0.076	-0.064	-0.176	-0.181
	(0.043)	(0.042)	(0.243)	(0.243)
D&B Credit Score	0.043	0.112	-0.658	-0.687
	(0.018)*	(0.020)**	(0.102)**	(0.116)**
Owner Experience	0.424	0.224	1.094	1.178
	(0.303)	(0.299)	(1.688)	(1.696)
Owner Education	0.038	0.056	0.091	0.083
	(0.015)*	(0.015)**	(0.087)	(0.088)
Share Owned by Black	0.232	-0.193	1.935	2.115
	(0.212)	(0.219)	(1.193)	(1.243)
Natural Log of Owner's Wealth	0.332	0.258	-0.025	0.006
	(0.045)**	(0.046)**	(0.254)	(0.260)
# of Financial Institutions Related	-0.027	0.112	0.218	0.159
	(0.013)*	(0.023)**	(0.075)**	(0.135)
# of Lines of Credit	0.385	0.386	1.979	1.979
	(0.058)**	(0.057)**	(0.331)**	(0.331)**
Length of Relationship with Bank	-0.034	-0.042	-0.010	-0.007
	(0.028)	(0.027)	(0.156)	(0.156)
Distance from the Bank	0.056	0.048	0.269	0.272
	(0.021)**	(0.020)*	(0.118)*	(0.118)*
MSA Status (0,1)	-0.052	0.008	-0.149	-0.174
	(0.067)	(0.066)	(0.382)	(0.386)
Inverse Mills Ratio		2.570		-1.089
		(0.359)**		(2.078)
Observations	1656	1656	1656	1656
R-squared	0.76	0.77	0.18	0.18

Notes: The dependent variable is a natural log sum of the L/C limit and the amount of L/Cs a firm has used. The regression also includes nine industry dummy variables, eight regional dummy variables, dummies for collateral types and financial services – checking and savings account, cash management, transaction, credit service - 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

Table 4. Robustness Check for Baseline Regressions

	Baseline	Urban	Div*Sic	Young	Old	Conditional
L/C PRIME LIMIT						
Inverse Mills Ratio	2.570	2.746	2.576	2.735	2.366	2.616
	(0.359)**	(0.418)**	(0.368)**	(0.579)**	(0.494)**	(0.349)**
Concentrated Bank Market (0,1)	-0.255	-0.289	-0.240	-0.293	-0.196	-0.255
	(0.056)**	(0.060)**	(0.057)**	(0.091)**	(0.073)**	(0.054)**
Natural Log of Firm Age	-0.064	-0.073	-0.044	-0.057	0.166	-0.057
	(0.042)	(0.047)	(0.043)	(0.077)	(0.111)	(0.041)
Logarithmized Primary L/C Balance						0.042
						(0.005)**
Observations	1656	1311	1656	729	927	1656
R-squared	0.77	0.77	0.78	0.75	0.78	0.78
L/C PRIME USED						
Inverse Mills Ratio	-1.089	-0.049	-1.831	-0.568	-1.582	-4.730
	(2.078)	(2.474)	(2.143)	(3.149)	(3.012)	(2.060)*
Concentrated Bank Market (0,1)	-0.014	-0.201	0.101	-0.161	0.217	0.347
	(0.324)	(0.357)	(0.333)	(0.501)	(0.443)	(0.317)
Natural Log of Firm Age	-0.181	-0.234	-0.172	-0.035	-0.645	-0.090
	(0.243)	(0.275)	(0.251)	(0.433)	(0.706)	(0.237)
Logarithmized Primary L/C Limit						1.417
						(0.156)**
Observations	1656	1311	1656	729	927	1656
R-squared	0.18	0.18	0.22	0.20	0.21	0.23

Notes: The dependent variable is a natural log sum of the L/C limit and the amount of L/Cs a firm has used. The regression also includes nine industry dummy variables, eight regional dummy variables, dummies for collateral types and financial services – checking and savings account, cash management, transaction, credit service - 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

Table 5. Total L/C Variable Regressions

	All	Urban	Div_Sic	Young	Old	Conditional
TOTAL L/C LIMIT						
Inverse Mills Ratio	2.527	2.872	2.550	3.121	2.123	2.514
	(0.354)**	(0.410)**	(0.363)**	(0.571)**	(0.481)**	(0.343)**
Concentrated Bank Market (0,1)	-0.232	-0.260	-0.230	-0.306	-0.165	-0.228
	(0.054)**	(0.059)**	(0.056)**	(0.088)**	(0.071)*	(0.053)**
Natural Log of Firm Age	-0.054	-0.052	-0.037	-0.041	0.208	-0.048
	(0.036)	(0.041)	(0.037)	(0.060)	(0.109)	(0.035)
Logarithmized Total L/C Balance						0.042
						(0.004)**
Observations	1656	1311	1656	729	927	1656
R-squared	0.77	0.78	0.78	0.76	0.79	0.79
TOTAL L/C BALANCE						
Inverse Mills Ratio	0.303	1.036	-0.262	1.622	-0.440	-3.220
	(2.006)	(2.402)	(2.067)	(3.045)	(2.916)	(1.984)
Concentrated Bank Market (0,1)	-0.099	-0.125	-0.028	-0.191	0.017	0.225
	(0.312)	(0.346)	(0.319)	(0.474)	(0.430)	(0.305)
Natural Log of Firm Age	-0.151	-0.137	-0.169	0.025	-0.567	-0.076
	(0.209)	(0.239)	(0.214)	(0.329)	(0.688)	(0.203)
Logarithmized Total L/C Limit						1.394
						(0.148)**
Observations	1656	1311	1656	729	927	1656
R-squared	0.19	0.19	0.22	0.20	0.21	0.23

Notes: The dependent variable is a natural log sum of limits and balances of all the L/Cs that a firm has. The regression also includes nine industry dummy variables, eight regional dummy variables, dummies for collateral types and financial services – checking and savings account, cash management, transaction, credit service - 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

Table 6. Primary L/C variables as a share of assets

	All	Urban	Division*sic	Young	Old	Conditional
PRIMARY L/C LIMIT/ASSET						
Inverse Mills Ratio	5.252	5.345	5.332	5.832	5.189	5.360
	(0.390)**	(0.462)**	(0.403)**	(0.638)**	(0.520)**	(0.383)**
Concentrated Bank Market (0,1)	-0.375	-0.411	-0.369	-0.459	-0.286	-0.380
	(0.065)**	(0.069)**	(0.067)**	(0.108)**	(0.083)**	(0.063)**
Natural Log of Firm Age	-0.079	-0.099	-0.075	-0.008	0.016	-0.073
	(0.048)	(0.054)	(0.050)	(0.090)	(0.127)	(0.047)
Logarithmized Primary L/C Balance						0.036
						(0.005)**
Observations	1609	1271	1609	703	906	1609
R-squared	0.29	0.30	0.32	0.32	0.29	0.31
PRIMARY L/C BALANCE/ASSET						
Inverse Mills Ratio	0.645	0.661	0.620	0.650	0.744	0.636
	(0.085)**	(0.104)**	(0.088)**	(0.148)**	(0.107)**	(0.082)**
Concentrated Bank Market (0,1)	-0.053	-0.058	-0.050	-0.053	-0.048	-0.043
	(0.014)**	(0.016)**	(0.014)**	(0.025)*	(0.017)**	(0.013)**
Natural Log of Firm Age	-0.009	-0.015	-0.009	-0.002	-0.004	-0.004
	(0.011)	(0.012)	(0.011)	(0.022)	(0.026)	(0.010)
Logarithmized Primary L/C Limit						0.068
						(0.006)**
Observations	1636	1293	1636	716	920	1636
R-squared	0.20	0.20	0.24	0.22	0.24	0.27

Notes: The dependent variable is logarithmized limits and balances of L/Cs from primary L/C bank as a share of assets. The regression also includes nine industry dummy variables, eight regional dummy variables, dummies for collateral types and financial services – checking and savings account, cash management, transaction, credit service - 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

Table 7. Robustness Checks on the Effect of Bank Concentration on Small Business Indebtedness

	All	Urban	Div_sic	Young	Old
Inverse Mills Ratio	-0.868	-0.888	-0.847	-1.226	-0.505
	(0.359)*	(0.423)*	(0.364)*	(0.549)*	(0.471)
Concentrated Bank Market (0,1)	-0.103	-0.100	-0.102	-0.143	-0.065
	(0.046)*	(0.051)	(0.046)*	(0.069)*	(0.061)
Natural Log of Firm Age	-0.139	-0.139	-0.144	-0.156	-0.146
	(0.038)**	(0.044)**	(0.038)**	(0.065)*	(0.092)
Observations	3866	3058	3866	1943	1923
R-squared	0.09	0.08	0.11	0.10	0.10

Notes: The dependent variable is a natural log of total debt-to-asset ratio. The regression also includes nine industry dummy variables, eight regional dummy variables, dummies for financial services – checking and savings account, cash management, transaction, credit service - 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

Appendix. Probit Regression Estimates on having Debt and L/C

	Have Any Debt (0,1)	Have an L/C (0,1)
Natural Log of Book Value of Assets	0.023	0.058
	(0.013)	(0.014)**
Natural Log of Total Sales	0.193	0.182
	(0.019)**	(0.019)**
Profit Rate	-0.005	-0.002
	(0.003)	(0.003)
Concentrated Bank Market (0,1)	-0.109	-0.093
	(0.049)*	(0.049)
Natural Log of Firm Age in Years	-0.111	0.008
	(0.033)**	(0.032)
D&B Credit Score	-0.077	0.045
	(0.017)**	(0.016)**
Owner Experience	0.438	-0.209
	(0.256)	(0.254)
Owner Education	-0.014	0.009
	(0.013)	(0.013)
Share Owned by Black	-0.105	-0.212
	(0.130)	(0.149)
Natural Log of Owner's Wealth	-0.168	-0.061
	(0.043)**	(0.041)
MSA Status (0,1)	0.132	0.057
	(0.059)*	(0.058)
Sole Proprietorship (0,1)	-0.300	-0.011
	(0.081)**	(0.084)
Corporation (0,1)	0.129	0.127
	(0.076)	(0.075)
Checking Account (0,1)	-0.031	0.199
	(0.128)	(0.168)
Savings Account (0,1)	0.001	-0.131
	(0.051)	(0.050)**
Transaction Service (0,1)	0.199	0.146
	(0.047)**	(0.046)**
Cash Management Service (0,1)	-0.127	0.067
	(0.074)	(0.070)
Credit Management Service (0,1)	0.324	0.395
	(0.095)**	(0.085)**
Trust Service (0,1)	0.028	0.146
	(0.060)	(0.057)**
Brokerage Service (0,1)	-0.128	-0.062
	(0.085)	(0.084)
Observations	4240	4240
Pseudo R^2	0.16	0.19