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Banking Market Concentration and Credit Availability to Small Businesses

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This paper examines how banking market concentration affects small business credit. Based on an idea that line-of-credit (L/C) limit and L/C balance provide useful proxies for credit supply to and credit demand of a firm, we examine the effect of bank concentration on L/C limits and L/C balances. Using Heckman selection models to correct for sample selection, bank concentration is found to lower limits of L/Cs, where there was no statistically significant difference in L/C balances. We also find that small firms in concentrated banking markets have lower overall institutional debt-to-asset ratio.

Introduction

Over the past few decades, improvements in information technology and financial deregulation have contributed to a more competitive environment and encouraged an unprecedented consolidation in the banking sector. In the U.S., M&A activity in the financial institution sector reduced the number of banks by more than one-third by the end of the 1990s. Policymakers have expressed concern that consolidation in the banking industry 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, however, is relatively lacking and provides contradictory 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 the emergence of new firms. On the other

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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 show that small firms in areas dominated by large banks are less likely to hold debt and if they do hold debt, the level of the debt-to-asset ratio is significantly lower. Beck, Demirgüç-Kunt and Maksimovic (2004), using international data, find that bank concentration increases financing obstacles, with a 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 the 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 banking market concentration on credit access is the classical problem of identification: Researchers cannot always observe how much credit a firm needs and how much of that credit need is met by credit supplied by banks. Since we can only observe the size of granted loans, researchers may not be able to tell if the observed difference in the size of granted loans is supply-constrained or demand driven.

To address this problem, we focus on a unique feature of lines-of-credit (L/Cs) which is that the maximum balance that a bank allows (L/C limit) is usually different from the actual balance of a L/C (L/C balance). Since borrowing firms pay interest only on the balance of the L/C, rather than on the L/C limit, firms have little incentive to limit the size of the L/C voluntarily. It is usually banks that set the limit based on various factors such as credit quality and the length of relationship with the firm. Once an L/C limit is set for a firm, however, how much the firm actually borrows (L/C balance) depends solely on the firm's credit need. Therefore, the L/C limit and the L/C balance provide useful proxies for the amount of credit that a bank is willing to provide (credit supply) and the actual credit need of a firm (credit demand).

Another potential problem with focusing on L/Cs is that there might be selection bias if bank concentration - which is measured by the Herfindahl deposit concentration index - is correlated with the loan turndown rate. Park (2007), using the same data set, found that banks in concentrated banking markets are more likely to reject loan applications, especially L/C applications. In this case, the average quality of firms with L/Cs in a concentrated market might be better than that of firms in a competitive market, which may limit the size of L/Cs granted. To deal with this problem, we perform the Heckman two-step procedure.[1]

Using the Heckit model, we show that L/Cs granted by banks in concentrated markets have significantly lower limits than those granted by banks in competitive banking markets, even when there were 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 in all the estimates and do not appear to explain our findings. Results remain consistent throughout various robustness checks. We also find that small firms in concentrated banking markets have lower overall institutional debt-to-asset ratios, which suggests that non-bank loans do not make up for the shortage in bank issued credits. 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).

This paper is similar to Craig and Hardee (2007) in its use of the Heckman two-step procedure and the use of the L/C limit and the L/C balance. However, there are a couple of key differences. First, Craig and Hardee (2007) did not use L/C limits and balances as proxies for

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

credit supply and demand. Rather, they are used as two alternative measures of indebtedness. Second, they included both bank and non-bank originated debt to measure indebtedness. In this paper, we limit our sample to bank-originated L/Cs since the goal of the paper is to examine the effect of banking market concentration on banks' lending behavior. Lastly and most importantly, Craig and Hardee (2007) examine the effect of bank size structure (big banks' portion of deposits in MSAs or rural census regions) while this paper focuses on the effect of county level deposit concentration of banks.

The rest of the paper is structured as follows. In the next section, we present data and describe the methodology used for hypothesis testing. In the second section, we present our results and examine alternative explanations and measures. We examine how banking market concentration affects the overall indebtedness of small firms and conclude with suggestions for future research.

1. 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, non-financial and non-governmental 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 of which 1678 firms have at least one line-of-credit (L/C) from a commercial bank.

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) calculated imputed values in the place of missing values which raised some concerns about the accuracy of the imputed values and their effect on estimates. To address this problem, the 2003 NSSBF creates five different imputed values for a single missing value. Across those five implicates, only the values of imputed variables may vary. 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's (1987) method of combining estimates from five imputations.

A. Dependent Variables

One of great challenges of studying the effect of bank competition on credit supply is that we cannot always observe how much credit a firm actually needs and how much of that need is met by the supply of credit from banks. 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 the L/C limit and the L/C balance. One of the unique features of L/Cs is that borrowing firms pay interest only on the portion of the L/Cs that they actually use, which creates different incentives for borrowing firms and banks. Borrowing firms have an incentive to secure L/Cs with the highest possible limits, not just for its current credit needs but also to secure a source of credit against future uncertainty. For banks, however, L/Cs represent a serious forward commitment which they will want to limit based on creditworthiness of the firms. The fact that the rejection rate for new L/C applications (21.6%) is much higher than that of other types of loans (6.9%)[2] illustrates the

[2] According to the Most Recent Loan variables of the NSSBF 2003 data, there were 1347 total loan applications, 291 of which were new L/C applications. Out of the 291 new L/C applications, 63 were turned down, while only 73 of the other 1056 loan applications were turned down.

level of caution banks employ when granting an L/C. This makes the L/C limit a good proxy for the amount of credit a bank is willing to supply to a firm. Once an L/C is granted to a firm, however, how much the firm actually borrows depends on the firm's current credit need, which makes the L/C balance a good proxy for the firm's credit demand. By examining how banking market concentration affects the L/C limit and the L/C balance separately, we can address the problem of identification: If banking market concentration reduces L/C limits without affecting L/C balances, it provides evidence that bank concentration reduces the supply of credit and that the reduction is not driven by a decline in the credit demand of firms.

The NSSBF reports both the limits and balances of L/Cs for 1656 firms that have one or more L/Cs from their primary L/C bank and for 275 firms that have L/Cs from more than one bank (229 firms from two banks 46 from three or more banks).[3] For these latter firms, we calculated the sum of the limits and balances of all their L/Cs combined. We refer to the former (the limits and balances of L/Cs from the primary L/C bank) as the primary L/C variables and the latter, as the total L/C variables.

An important advantage of using the primary L/C variables as dependent variables is that it allows us to control for the firm-bank relationship and the terms and conditions of the L/Cs such as the length of the relationship, the distance between the firm and its primary L/C bank, the financial services – checking, savings and cash management, transaction and credit service - that the firm uses from its primary L/C bank and the types of collateral used to secure the L/C. Therefore, for baseline regressions, we focus on the primary L/C variables. Then in the following section, we check whether the findings in the baseline regressions change when we use as dependent variables either total L/C variables or primary L/C variables as a share of assets.

A potential problem with using the L/C limit and L/C balance distinction is that the L/C balance is constrained by the L/C limit and therefore is correlated with the L/C limit. If a statistical correlation between bank concentration and the amount of bank credit granted is supply driven, then the correlation between bank concentration and the L/C limit should be stronger than that between bank concentration and the L/C balance. If the correlation is driven by small firms' credit needs, then the correlation between concentration and the L/C balance should be at least equally strong, if not stronger. Therefore, we should focus both on the magnitude and statistical significance of the effect of bank concentration on the L/C limit and the L/C balance.

B. Bank Concentration Measures and Control Variables

For a measure of the degree of bank competition, we use the Herfindahl index of commercial bank deposit concentration as a proxy. The NSSBF data reports only three broad categories 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=117), compared to the middle (n=766) and the most concentrated (n=773) categories. So, in this study, we reduce the number of categories to concentrated markets (HHI is greater than 1.8) and competitive markets (HHI is less than 1.8). This way, we can compare two categories of similar

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[3] 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. There are 254 other L/Cs issued by non-bank institutions such as savings bank (107 L/Cs) , finance companies (64 L/Cs), credit unions (28 L/Cs), brokerage or mutual fund companies (15L/Cs) and savings and loans (11L/Cs).

size. The sample is described in Table 1. The regression equation has the following generic form:

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

where $Ln(L_i)$ is the log value[4] of the L/C limit of firm i, $Ln(B_i)$ is the log value of L/C balance of firm i, H_i is a dummy variable for concentrated market, $Ln(Age_i)$ is the 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 term.

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

To ensure that the 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. The logged book value of assets and logged total sales are used to control for the effect of firm size. We also include the firm's age logged, which coefficient we expect will be negative because young firms need more credit to establish their businesses than do older firms. We also added controls for profit as a share of total sales, a profit dummy (1 if the firm's profit is positive, 0 otherwise), the change in profit compared to the prior fiscal year,[5] the firm's D&B credit ranking and the firm's organizational form (proprietorship or 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 and female ownership because many studies (Blanchflower, Levine and Zimmerman, 2003; Cavalluzzo and Wolken, 2005) find that blacks have limited access to credit markets.

Bank-firm relationship variables include the length of relationship, the physical distance between the firm and the bank and dummy variables for the use of various financial services such as checking, savings and cash management services that Cole (1998) found important in bank-firm relationships. Also, we added controls for whether collateral, guarantees and compensating balances are 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. Correlation coefficient matrices for all the control variables are provided in appendix A.

2. Bank Concentration, L/C limit and L/C balance

A. Baseline Results

When we check the univariate regression of L/C limits and L/C balances, estimates in Table 2 show that the L/C limit in concentrated banking markets is about 33% smaller and the

[4] Using the logged value is necessary to suppress the effect of statistical outliers with extreme high values, which skewed the distribution of the primary L/C limits and balances to the right. For example, due to 40 observations whose primary L/C limit was over $10 million, the weighted average of the primary L/C limit was $320,667. Without them, the mean value fell to $231,279 The mean value of the log of the primary L/C limit was 11.149, which is only $69,494.

[5] Unlike past waves of NSSBF data sets, the 2003 dataset does not report the profit of the previous fiscal year. Instead, it asks firms whether the profit has grown, decreased, been the same , compared to the previous year, or whether the firm did not operate during the previous year.

difference is statistically significant at the 1% level (t = 3.34). When we divide the sample into young firms, whose age is less than or equal to the median age of 14 years, and old firms, the difference in the L/C limit due to concentration is more pronounced for the young firms sample at about 55% (t = 3.27), compared to old firm sample in which the difference is much smaller and insignificant. Bank concentration also has a negative and larger effect on the L/C balance, though it is not statistically significant.

For a more thorough analysis, we perform the Heckman two-step procedure with the full set of control variables discussed in the previous section. When we look at the effect of banking market concentration on the access to bank-originated L/Cs, or the first step of the Heckman two-step procedure, summarized in appendix B, it shows that small firms in concentrated banking markets are about 13 percent less likely to have access to L/Cs and 15 percent less likely to hold institutional debt (total debt net of loans by owner or owner's retirement fund and loans from family or other individuals). The effect of banking market concentration on the level of the L/C limit and balance – the second step - is summarized in Table 3. First, estimates seem to support our key assumption that the L/C limit is a proxy for credit supply while L/C balance reflects credit need of a firm: The coefficient of the credit rating variable is positive and significant in the L/C Limit regressions, while it is negative and significant in the L/C balance regressions. Firms with better credit ratings secure higher L/C limits while they actually use less L/C credits. The personal wealth of owner variable also shows a similar pattern. While owner wealth has a positive effect on the L/C limit, suggesting that banks will offer higher L/C limits to firms with a wealthier owner, its effect becomes much smaller in magnitude and statistically insignificant on the L/C balance.

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

Third, after correcting for the potential selection bias, estimates in the first column show that the L/C limits of firms in concentrated banking markets are smaller than ones in competitive banking markets. The difference is statistically significant and is economically meaningful. Taken literally, being in a concentrated banking market is associated with an L/C limit that is 21% smaller than for firms in unconcentrated markets. In the case of the L/C balance regression, however, banking market structure does not seem to have any significant effect and the coefficient is positive.

To summarize, after controlling for underlying differences in firm and loan characteristics and regional/industrial characteristics across markets, we find that banks in concentrated banking markets offer significantly lower L/C limits while there is no difference in the L/C balance. This result discounts the possibility that the lower L/C limit in concentrated banking markets is driven by lower demand for credit.

B. Robustness Checks

In order to ensure robustness of our estimates, we run a series of regressions with additional control variables. First, the bank concentration effect may be driven by differences in investment opportunities across banking markets. For example, in areas where the local economy is booming, more banks would open up new branches and *de novo* banks are more likely to enter the local banking market. This may create a positive association between investment opportunity and bank competition. For a test of the effect of investment

opportunities, we created 'industry (1 digit SIC code) x division" dummy variables, which creates indicators for each 1 digit SIC code industry in each census region. This new set of dummy variables should be able to capture regional economic conditions for each industry. Still, the bank concentration coefficient reported in the first column of Table 4 is virtually unchanged from the baseline regression.[6] In the case of the L/C balance, the coefficient becomes positive but is still statistically insignificant.

Second, we need to consider the possibility that the correlation between bank competition and the urban/rural location of the firm may drive the baseline results. In our sample, all the young firms in the most competitive markets are located in urban areas, 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 credit may cause a spurious correlation between bank concentration and the use of bank credit. When we limit the sample to urban firms and repeat the baseline regression to address this concern, however, estimates from the urban firm sample remain consistent with those in baseline regressions: L/C limits in concentrated banking markets are still significantly smaller than those in competitive markets and the gap becomes slightly wider, suggesting that the connection between bank concentration and urban/rural location does not explain our findings. In case of L/C balances, the coefficient becomes much bigger in magnitude but it still remains insignificant.

Third, in the univariate L/C balance regressions, the L/C balance was also lower in concentrated banking markets though the difference was statistically insignificant. The difference may well be driven by the low limits of L/Cs in concentrated markets but it may also be a reflection of relatively less demand for credit. To examine the potential L/C limit and L/C balance connection in a more rigorous manner, we added L/C balance as an additional control variable for the 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 3rd column show that the addition of L/C balance has no effect on the bank concentration coefficient. The coefficient is almost identical to that of the baseline regression and remains statistically significant, while as expected, the L/C balance has significant positive correlation with L/C limit. When we do the same in the L/C balance regression by adding L/C limit as a control variable, the result 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.

Several papers surveyed in the previous section hypothesize that bank concentration may have a stronger effect on young firms. To investigate this possibility, we run regressions on separate samples for young and old firms. Estimates reported in the fourth and fifth column of Table 4 show that the effect of bank concentration on both the L/C limit and the L/C balance is stronger in the sample of young firms than old firms. In the case of L/C balances, the bank concentration effect is positive both in the young and old firms samples, though neither coefficient is statistically significant. Finally, when observations from the most competitive market (HHI>1.8) is dropped from the sample to compare the intermediate market and the concentrated market, the results (summarized in HHI column) remain unchanged, suggesting that our finding is not driven by the extreme values in the most competitive markets.

To summarize, even after controlling for differences in urban-rural area and in investment opportunities, our findings appear to be robust. Small firms in the most concentrated banking markets get significantly less credit from banks while credit demand of

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

the small firms does not seem to vary across banking markets. Moreover, L/C limits in the concentrated banking market tend to be smaller even when the L/C balance is given, further discounting that our finding is driven by differences in credit demand across banking markets.

C. Alternative L/C variables

Total L/C variables

As we noted earlier, there are 275 firms that have L/Cs from more than one bank. Since the primary L/C is not the only source of L/Cs for these firms, in order to capture the impact of banking market concentration on overall credit availability we need to calculate total L/C variables, which is the sum of the limits and balances of all the L/Cs held by each firm . When we use total L/C variables as dependent variables, we can examine whether small firms in concentrated banking markets can make up for the shortage of L/C credit from their primary L/C banks by acquiring L/Cs from other banks. One disadvantage of using total L/C variables is that we cannot control for types of collateral that a firm posted to secure each L/C, nor can we control for firm-bank relationship variables for each bank that granted L/Cs to a firm. Instead, we add 'total number of collateral' that a firm used for all the L/Cs and use relationship variables between a firm and its primary L/C bank.[7]

Using total L/C variables as the dependent variables, we replicate the baseline regression and all the robustness checks of Table 4 and summarize them in Table 5. As we can see from the estimates, the results from the total L/C regressions are very similar to those of the primary L/C regressions. The bank concentration seems to affect total amount of L/C credit that a firm can finance and the effect does not seem to depend on the number of L/Cs a firm has or the number of banks from which a firm gets its L/Cs.

Ratio of L/C Variables to Assets

Another alternative set of L/C variables is the 'L/C ratio' variable which is measured by the L/C variable as a share of assets. If firms in concentrated bank markets are smaller due to credit constraints, that may also affect the average size of L/Cs. Using the 'L/C ratio' should correct for this potential problem. When we calculate the ratio, however, we face a small number of observations with unusually high values for the ratio, due mostly to unusually small reported book values of assets. To suppress the effect of these outliers, we use the log value of the ratio and eliminate observations whose L/C limit or L/C balance is more than five times the size of its assets.[8] Table 6 summarizes the estimates for the alternative dependent variable regressions. Again, results are very similar to those of the primary L/C and total L/C regressions. Banking market concentration reduces L/C limit ratio and the finding does not seem to be driven by how much L/C credit a firm actually use.

L/C Balance-Limit Ratio

Finally, we examine the ratio of the primary L/C balance to its limit as an alternative. If a firm in a concentrated banking market gets a lower L/C limit while there is no difference in credit demand, we can expect that the L/C balance-limit ratio to be higher among firms in

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[7] Whether we include firm-bank relationship variables or not did not change the quantitative or qualitative outcomes of our findings.

[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.

concentrated banking markets. This variable may ease the concern about possible misspecifications of control variables used in estimating demand for and supply of credit lines separately. In examining this variable, we dropped 31 firms from the sample which reported an L/C balance that exceeded its limit (ratio>1) . Table 7 summarizes estimates from this alternative set of regressions. As we expected, firms in concentrated markets record about a 4 to 5 percent higher L/C balance-limit ratio and the difference is statistically significant at the 5 percent level. Also, consistent with our findings from other measures, the effect of banking market concentration seems to be stronger among young firms (in fourth column) compared to older firms (in fifth column).

D. Bank Concentration and Overall Indebtedness of Small Businesses

The results presented so far suggest that the supply of credit in concentrated banking markets, controlling for other determinants, is lower, while the demand for credit is not. 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 utilize non-bank institutions, such as credit unions and S&Ls, to make up for the shortage of bank-issued credit in concentrated markets.

For this test, we explore the effect of banking market concentration on the institutional debt-to-asset ratio of all the firms that have at least one bank-issued L/C, conditional on institutional debt access, using the Heckit two-step selection procedure. We include all the control variables that were used for the total L/C regressions to ensure that the concentrated market dummy does not reflect spurious correlations that would bias the results. We also replicate the baseline regression and all the robustness checks of Table 4, except for the L/C limit-balance conditional regressions. Our estimates are summarized in Table 8. Again, the coefficient on the concentrated banking market dummy is negative and significant. Firms in concentrated banking markets have on average about a 26 to 29 percent lower debt-to-asset ratio than similar firms in competitive banking markets.

Estimates in Table 8 also show that the bank concentration effect is not driven by differences in investment opportunities (column 2) of firms or urban-rural differences (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 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, which is also consistent with what Craig and Hardee (2007) found using the 1998 SSBF data set.

3. Conclusion

We find that market concentration in the commercial banking industry may reduce the amount of credit supplied to small businesses. Small businesses, especially young firms in concentrated banking markets have significantly lower L/C limits and lower debt-to-asset ratio. Moreover, using the L/C balance as a proxy for credit demand, we find that the bank concentration effect is not driven by varying demand for credit.

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 an area. Rather, empirical evidence in this paper is consistent with studies such as Beck, Demirgüç-Kunt and Maksimovic (2004) and Craig and Hardee (2007) that emphasize the

benefits of increased bank competition. 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.

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

VARIABLES	DEFINITONS	Mean	Std.Dev
DEPENDENT VARIABLES			
LnLC_Limit_Prime	Log limits of L/Cs from primary L/C bank	11.149	1.505
LnLC_Balance_Prime	Log balance of L/Cs from primary L/C bank	6.988	5.181
LnLC_Limit_Total	Log limits of all L/Cs that a firm has	11.269	1.555
LnLC_Balance_Total	Log balance of all L/Cs that a firm has	7.220	5.172
LnLC_Limit_Prime_Ratio	Log limit of primary L/Cs as a share of assets	0.891	2.350
LnLC_Balance_Prime_Ratio	Log balance of primary L/Cs as a share of assets	0.381	5.239
LC_Balance_Limit_Ratio	A Ratio between primary L/C balance and its limit	0.413	0.383
Inst_Debt_Ratio	A Ratio of total institutional debt of a firm to its assets	2.995	1.222
CONTROL VARIABLES			
Concentrated Market	Banking market concentration (Herfindahl Index) is larger than 1.8:		
Log Value of Assets	Log value of assets	12.189	2.080
Log Value of Total Sales	Log value of sales	13.281	1.695
Profit Share	Profit as a share of total sales	0.048	2.150
Profit Dummy (0,1)	Firm has a positive profit	0.819	0.385
Log Firm Age	Log value of the age of firm in years	2.466	0.855
D&B Credit Score	D&B credit score of a firm: 1–6, 1 = worst, 6 = best	3.852	1.497
Owner Experience	Weighted average number of years of experience of owners	0.208	0.108
Owner Education	Weighted average education level of owners	4.642	1.878
Share Owned by Black	Weighted percent of ownership by black	0.014	0.115
Share Owned by Women	Weighted percent of ownership by women	0.215	0.358
Log Value of Owner's Wealth	Log value of primary owner's net worth	0.566	0.530
# of Financial Institutions Related	Number of financial institutions that firm has relationship with	2.829	1.650
Length of Relationship with Bank	Log value of length of relationship with primary L/C bank in months	4.534	1.027

Table 1

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

VARIABLES	DEFINITONS	Mean	Std.Dev
Distance from the Bank	Log value of distance from the primary L/C bank in miles	1.407	1.051
MSA Status	Firm is located in MSA: dummy variable (0,1)	0.234	0.424
Proprietorship	Firms is sole proprietorship: (0,1)	0.247	0.431
Corporation	Firm is corporation: (0,1)	0.637	0.481
Checking Account	Firm has a checking account from the primary L/C bank: (0,1)	0.998	0.049
Transaction Service	Firm used transaction service from the primary L/C bank: (0,1)	0.466	0.499
Credits Service	Firm used credit service from the primary L/C bank: (0,1)	0.089	0.285
Cash Service	Firm used cash service from the primary L/C bank: (0,1)	0.096	0.295
Saving Account	Firm has a savings account from the primary L/C bank: (0,1)	0.198	0.399
Profit Increased Previous Year (0,1)	Firm's Profit has increased compared to the previous year (0,1)	0.370	0.483
Profit Decreased Previous Year (0,1)	Firm's Profit has decreased compared to the previous year (0,1)	0.331	0.471
Profit Unchanged Previous Year (0,1)	Firm's Profit has not changed compared to the previous year (0,1)	0.274	0.446
Not in Business Previous Year (0,1)	Firm was not in business (0,1)	0.025	0.155
L/C Guaranteed (0,1)	Line of Credit was guaranteed (0,1)	0.407	0.491
L/C Compensating Balance (0,1)	Line of Credit requires compensating balance (0,1)	0.905	0.294

Table II
Univariate Regressions

		L/C Limit	L/C Balance
All Firms			
	Concentrated Market (0,1)	-0.335**	-0.491
		(0.111)	(0.412)
	Observations	1414	1414
	Adjusted R^2	0.0116	0.0016
Young Firms			
	Concentrated Market (0,1)	-0.549**	-0.950
		(0.168)	(0.562)
	Observations	600	600
	Adjusted R^2	0.0301	0.0056
Old Firms			
	Concentrated Market (0,1)	-0.088	-0.024
		(0.139)	(0.604)
	Observations	813	813
	Adjusted R^2	-0.0003	-0.0010

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

Table III
Baseline Regressions

VARIABLES	L/C Limit	L/C Balance
Inverse Mills Ratio	2.291**	-1.191
	(0.380)	(2.216)
Log Book Value Asset	0.262**	0.109
	(0.0261)	(0.149)
Log Sales	0.630**	-0.203
	(0.0471)	(0.271)
Profit Share	-0.0493**	0.0577
	(0.0157)	(0.0923)
Profit Dummy (0,1)	-0.0282	-0.875*
	(0.0698)	(0.411)
Concentrated Market (0,1)	-0.218**	0.231
	(0.0582)	(0.340)
Log Firm Age	-0.0427	-0.311
	(0.0436)	(0.255)
D&B Credit Score	0.100**	-0.686**
	(0.021)	(0.122)
Owner Experience	0.240	0.918
	(0.312)	(1.778)
Owner Education	0.0534**	0.155
	(0.0160)	(0.093)
Share Owned by Blacks	-0.100	2.200
	(0.228)	(1.314)
Share Owned by Women	-0.169*	0.253
	(0.0798)	(0.469)
Log Owner's Wealth	0.259**	0.0410
	(0.0465)	(0.272)
# of Financial Institutions Used	0.111**	0.193
	(0.0244)	(0.142)
Length of Relationship with Bank	-0.0422	0.0478
	(0.0288)	(0.165)
Distance from the Bank	0.0623*	0.387**
	(0.0242)	(0.141)
Profit Decreased Previous Year (0,1)	0.0743	0.427
	(0.0598)	(0.356)
Profit Unchanged Previous Year (0,1)	-0.0473	0.164
	(0.0693)	(0.402)
Not in Business Previous Year (0,1)	0.123	-1.417
	(0.209)	(1.229)

Table III
Baseline Regressions (continued)

MSA Status (0,1)	0.0235	-0.318
	(0.0687)	(0.403)
Proprietorship (0,1)	-0.271*	0.649
	(0.125)	(0.707)
Corporation (0,1)	0.0462	0.321
	(0.0976)	(0.558)
L/C Guaranteed (0,1)	-0.0602	-0.828*
	(0.0548)	(0.324)
L/C Compensating Balance (0,1)	0.0559	1.001
	(0.0906)	(0.540)
Observations	1366	1366
Adjusted R^2	0.641	0.153

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. Standard errors appear in parentheses.

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

Table IV
Robustness Checks on L/C Limit Regressions

VARIABLES	Div*Sic	Urban	Conditional	Young	Old	HHI
L/C Limit						
Inverse Mills Ratio	2.318**	2.541**	2.345**	2.596**	1.959**	2.119**
	(0.391)	(0.446)	(0.366)	(0.613)	(0.524)	(0.393)
Log L/C Balance			0.0460**			
			(0.0046)			
Concentrated Market (0,1)	-0.191**	-0.246**	-0.229**	-0.242*	-0.163*	-0.226**
	(0.0600)	(0.0631)	(0.0560)	(0.0967)	(0.0756)	(0.0601)
Log Firm Age	-0.0237	-0.0446	-0.0284	-0.0624	0.177	-0.0368
	(0.0450)	(0.0490)	(0.0422)	(0.0810)	(0.115)	(0.0456)
D&B Credit Score	0.0911**	0.0952**	0.132**	0.119**	0.0853**	0.100**
	(0.0216)	(0.0237)	(0.0204)	(0.0325)	(0.0279)	(0.0216)
Observations	1366	1084	1366	581	784	1271
Adjusted R^2	0.659	0.645	0.662	0.625	0.703	0.761
L/C Balance						
Inverse Mills Ratio	-1.891	0.169	-4.823*	-0.351	-2.528	-1.522
	(2.288)	(2.660)	(2.170)	(3.389)	(3.192)	(2.285)
Log L/C Balance			1.586**			
			(0.161)			
Concentrated Market (0,1)	0.372	0.0470	0.577	0.259	0.383	0.204
	(0.352)	(0.378)	(0.330)	(0.539)	(0.462)	(0.347)
Log Firm Age	-0.286	-0.340	-0.243	-0.486	-0.744	-0.0994
	(0.264)	(0.289)	(0.247)	(0.461)	(0.736)	(0.263)
D&B Credit Score	-0.757**	-0.662**	-0.845**	-0.638**	-0.721**	-0.668**
	(0.126)	(0.141)	(0.119)	(0.183)	(0.170)	(0.126)
Observations	1366	1084	1366	581	784	1271
Adjusted R^2	0.193	0.126	0.204	0.180	0.169	0.153

Notes: The dependent variable is a natural log sum of the L/C limit and the amount of L/Cs a firm has used. Regressions include all the control variables that are used for baseline regressions in addition to nine industry dummy variables, eight regional dummy variables, dummies for collateral types and financial services – checking and savings accounts, cash management, transaction, credit service - and an intercept, except for the Div*SIC column 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 V
Estimates from Total L/C Regressions

VARIABLES	Baseline	Div*SIC	Urban	Conditional	Young	Old
Total L/C Limit						
Inverse Mills Ratio	2.582**	2.622**	2.896**	2.565**	3.342**	1.956**
	(0.354)	(0.363)	(0.411)	(0.343)	(0.536)	(0.505)
Log L/C Balance				0.0423**		
				(0.0045)		
Concentrated Market (0,1)	-0.232**	-0.230**	-0.260**	-0.229**	-0.300**	-0.164*
	(0.0544)	(0.0556)	(0.0586)	(0.0527)	(0.0844)	(0.0730)
Log Firm Age	-0.0310	-0.0155	-0.0215	-0.0204	-0.0170	0.266*
	(0.0397)	(0.0408)	(0.0442)	(0.0386)	(0.0671)	(0.119)
Observations	1557	1557	1232	1557	735	822
Adjusted R^2	0.658	0.670	0.665	0.675	0.662	0.698
Total L/C Balance						
Inverse Mills Ratio	0.394	-0.145	1.041	-3.203	2.311	-2.067
	(2.004)	(2.064)	(2.405)	(1.985)	(2.884)	(3.061)
Log L/C Balance				1.394**		
				(0.148)		
Concentrated Market (0,1)	-0.0668	-0.0050	-0.0849	0.256	-0.180	0.0414
	(0.311)	(0.319)	(0.346)	(0.304)	(0.464)	(0.444)
Log Firm Age	-0.250	-0.263	-0.227	-0.207	0.0809	-0.637
	(0.229)	(0.236)	(0.260)	(0.223)	(0.375)	(0.748)
Observations	1557	1557	1232	1557	735	822
Adjusted R^2	0.127	0.168	0.116	0.169	0.156	0.139

Notes: The dependent variable is a natural log total of the L/C limit and the L/C balance a firm has used. Regressions include all the control variables that are used for baseline regressions in addition to 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 Div*SIC column 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 VI
Estimates from Primary L/C ratio Regressions

VARIABLES	Baseline	Div*SIC	Urban	Conditional	Young	Old
(L/C Limit)/Asset						
Inverse Mills Ratio	1.944**	1.953**	2.046**	2.030**	2.211**	1.841**
	(0.381)	(0.393)	(0.456)	(0.367)	(0.621)	(0.517)
Log L/C Balance				0.0447**		
				(0.0046)		
Concentrated Market (0,1)	-0.203**	-0.176**	-0.223**	-0.214**	-0.220*	-0.155*
	(0.0575)	(0.0593)	(0.0632)	(0.0554)	(0.0957)	(0.0753)
Log Firm Age	-0.0550	-0.0372	-0.0616	-0.0408	-0.0779	0.154
	(0.0432)	(0.0444)	(0.0487)	(0.0417)	(0.0800)	(0.117)
Observations	1361	1361	1080	1361	577	783
Adjusted R^2	0.609	0.631	0.611	0.630	0.586	0.687
(L/C Balance)/Asset						
Inverse Mills Ratio	-1.912	-2.627	-0.718	-4.988*	-1.609	-2.398
	(2.263)	(2.335)	(2.744)	(2.210)	(3.488)	(3.212)
Log L/C Limit				1.582**		
				(0.161)		
Concentrated Market (0,1)	0.248	0.387	0.0715	0.569	0.301	0.374
	(0.341)	(0.353)	(0.380)	(0.331)	(0.541)	(0.463)
Log Firm Age	-0.317	-0.294	-0.346	-0.230	-0.519	-0.718
	(0.255)	(0.264)	(0.290)	(0.246)	(0.461)	(0.737)
Observations	1362	1362	1081	1362	577	785
Adjusted R^2	0.167	0.210	0.147	0.211	0.184	0.178

Notes: The dependent variable is the ratio between the limit of the primary L/C and the assets of a firm. Regressions include all the control variables that are used for baseline regressions in addition to 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 Div*SIC column 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 VII
L/C Balance Limit Ratio

VARIABLES	Baseline	Div*SIC	Urban	Young	Old
Inverse Mills Ratio	-0.349*	-0.391*	-0.349*	-0.554*	-0.232
	(0.146)	(0.151)	(0.176)	(0.238)	(0.199)
Concentrated Market (0,1)	0.0475*	0.0501*	0.0495*	0.0760*	0.0320
	(0.0219)	(0.0226)	(0.0242)	(0.0373)	(0.0281)
Log Firm Age	-0.0212	-0.0200	-0.0222	-0.0344	-0.0121
	(0.0162)	(0.0167)	(0.0184)	(0.0307)	(0.0443)
Observations	1335	1335	1056	564	770
Adjusted R^2	0.202	0.238	0.182	0.249	0.203

Notes: The dependent variable is the ratio between the limit and the balance of the primary L/C of a firm. Regressions include all the control variables that are used for baseline regressions in addition to 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 Div*SIC column 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 VIII
Institutional Debt-to-Asset Ratio

VARIABLES	Baseline	Div*SIC	Urban	Young	Old
Inverse Mills Ratio	1.619*	1.834*	1.822*	3.262**	2.314*
	(0.653)	(0.737)	(0.826)	(1.191)	(0.955)
Concentrated Market (0,1)	-0.262**	-0.292**	-0.285*	-0.491**	-0.325*
	(0.0879)	(0.0983)	(0.111)	(0.157)	(0.129)
Log Firm Age	-0.403**	-0.444**	-0.456**	-0.714**	-0.455*
	(0.136)	(0.153)	(0.172)	(0.244)	(0.211)
D&B Credit Score	-0.0681*	-0.0778*	-0.0774	-0.146*	-0.097*
	(0.0325)	(0.0363)	(0.0406)	(0.0573)	(0.047)
Observations	1502	1502	1186	649	853
Adjusted R^2	0.352	0.359	0.339	0.342	0.338

Notes: The dependent variable is a natural log of the ratio between total institutional debt and the assets of a firm has used. Regressions include all the control variables that are used for baseline regressions in addition to 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 the Div*SIC column 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 A. Correlation Coefficient Matrix

	Log Asset	Log Sales	Profit Share	Profit Dummy	Concentrated Market	Log Firm Age	Credit Score	Owner Experience	Owner Education
Log Sales	0.820	1.000							
Profit Share	0.065	0.138	1.000						
Profit Dummy (0,1)	0.024	0.067	0.184	1.000					
Concentrated Market	-0.025	-0.052	-0.035	0.003	1.000				
Log Firm Age	0.263	0.268	0.024	0.017	0.009	1.000			
D&B Credit Score	0.069	0.095	-0.011	0.052	0.036	0.181	1.000		
Owner Experience	0.281	0.233	0.034	-0.016	0.007	0.572	0.121	1.000	
Owner Education	0.092	0.100	-0.021	0.003	-0.058	-0.029	-0.010	-0.071	1.000
Share Owned by Black	-0.051	-0.070	0.006	-0.006	-0.010	-0.054	-0.052	-0.042	0.017
Share Owned by Women	-0.156	-0.167	-0.046	-0.059	0.039	-0.062	-0.011	-0.140	-0.118
Log Owner's Wealth	0.517	0.500	0.030	0.029	-0.048	0.228	0.081	0.336	0.118
# of Financial Institutions	0.369	0.386	0.013	-0.013	-0.031	0.073	0.012	0.077	0.046
Length of Relationship	0.077	0.040	0.030	0.007	0.035	0.350	0.144	0.274	-0.060
Distance from the Bank	0.114	0.107	-0.026	-0.039	-0.044	-0.050	-0.014	-0.019	-0.004
MSA Status (0,1)	-0.015	-0.065	-0.001	-0.021	0.363	0.043	0.052	0.051	-0.152
Proprietorship (0,1)	-0.358	-0.495	0.018	0.040	0.007	-0.031	-0.073	-0.041	-0.071
Corporation (0,1)	0.309	0.434	-0.032	-0.032	-0.010	0.173	0.109	0.101	-0.008

	Share by Black	Share by Women	Owner's Wealth	# Financial Institution	Relation Length	Distance	MSA Status	Proprietor - ship	Corporation
Share Owned by Black	1.000								
Share Owned by Women	0.046	1.000							
Log Owner's Wealth	-0.052	-0.145	1.000						
# of Financial Institution	-0.041	-0.026	0.206	1.000					
Length of Relationship	-0.011	-0.016	0.072	-0.042	1.000				
Distance from the Bank	-0.001	-0.028	0.111	0.092	-0.158	1.000			
MSA Status (0,1)	-0.051	0.024	-0.079	-0.001	0.079	-0.030	1.000		
Proprietorship (0,1)	0.055	0.001	-0.234	-0.204	0.045	-0.041	0.085	1.000	
Corporation (0,1)	-0.040	-0.020	0.188	0.202	0.041	0.036	-0.052	-0.736	1.000

Appendix B.
Probit Regression Estimates of the probability of having L/Cs and Institutional Debt

VARIABLES	LC	Institutional Debt
Log Book Value Asset	0.0767**	0.0834**
	(0.0186)	(0.0175)
Log Sales	0.181**	0.214**
	(0.026)	(0.025)
Profit Share	-0.0026	-0.0028
	(0.0020)	(0.0016)
Profit Dummy (0,1)	0.0240	-0.0403
	(0.0775)	(0.0781)
Concentrated Market (0,1)	-0.138*	-0.155*
	(0.064)	(0.063)
Log Firm Age	-0.0191	-0.0985*
	(0.0483)	(0.0475)
D&B Credit Score	0.0462*	-0.0084
	(0.0210)	(0.0209)
Owner Experience	-0.109	-0.0043
	(0.351)	(0.346)
Owner Education/10	0.0653	-0.0065
	(0.172)	(0.173)
Share Owned by Black	-0.390*	-0.277
	(0.180)	(0.169)
Share Owned by Women	-0.151*	-0.135
	(0.0741)	(0.0725)
Log Owner's Wealth	-0.0351	-0.138*
	(0.0630)	(0.0639)
Profit Decreased Previous Year (0,1)	0.0915	0.0842
	(0.0736)	(0.0732)
Profit Unchanged Previous Year (0,1)	-0.0044	0.0158
	(0.0743)	(0.0724)
Not in Business Previous Year (0,1)	0.0223	0.159
	(0.195)	(0.180)
MSA Status (0,1)	0.103	0.120
	(0.076)	(0.074)
Proprietorship (0,1)	-0.0399	0.087
	(0.106)	(0.103)
Corporation (0,1)	0.0791	0.132
	(0.0999)	(0.098)
Constant	-3.303**	-3.263**
	(0.329)	(0.323)
Observations	4086	4086

Notes: The dependent variable is the ratio between the limit and the balance of the primary L/C of a firm. Regressions include all the control variables that are used for baseline regressions in addition to 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. Standard errors appear in parentheses.

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