Firm-bank Relationship, Borrowers' Credit Availability and Banking Crises

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ABSTRACT

Do lending relationships enhance borrower's credit availability even during a banking crisis when the bank's willingness to lend is weakest? We find an affirmative answer from examining Korean banks' lending behavior during the Asian financial crisis in early 1998. Based on our unique sample of listed firms, we find that firms having closer relationships with their lending banks benefit from easier access to credit during the crisis. Moreover, this relationship lending effect is evident even for the under-capitalized banks. We also find that the under-capitalized banks tend to extend credits to riskier firms, i.e., to 'evergreen' troubled loans, presumably to avoid regulator's prompt corrective actions. Even after controlling for such an evergreening effect, the relationship lending effect still remains. This casts doubt on the view that a shock to a closely-tied bank reduces the credit availability of its borrowers and that firms thus ought to borrow from as many banks as possible.

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1. Introduction

Relationship lending refers to a situation in which a firm borrows from very few banks exclusively over an extended period of time (Boot, 2000). Exclusiveness of relationship is valuable because it encourages information production by the lending bank; if a borrower approaches many banks for credit, each lending bank's incentive to produce information is reduced by the free-rider problem.[1] In other words, non-exclusive relationships may discourage information production on a borrower. In this case, the proportion of bad borrowers in a lending bank's loan portfolio is likely to increase. Moreover, borrowers are apt to choose riskier projects unless lending banks closely monitor their actions. As a result, banks concerned about potential loss due to adverse selection and moral hazard problems do not lend their money, and some borrowers who are eligible for credit are rationed (Stiglitz and Weiss, 1981). Thus we expect that the information production of a bank decreases in line with the number of lending banks per borrower, and that this, in turn, reduces borrowers' credit availability. Exclusive relationships also facilitate renegotiations between borrowers and their lending banks.[2] When a borrower faces a temporal liquidity problem, renegotiation of credit terms, including loan maturity and interest rates, benefits the lending banks as well as the borrower. However, if there are many lending banks, the process of renegotiation can be more difficult (Detragiache, 1994; Bolton and Scharfstein, 1996). Thus, a borrower with a liquidity problem may fail to renegotiate its credit terms and enter into bankruptcy. In short, close relationship between a bank and its borrower may provide the borrower with a better access to credit (Angelini et al, 1998; Cole, 1998; Elsas and Krahnen, 1998; Petersen and Rajan, 1994).

If long-term and exclusive relationships lessen information asymmetry and result in Pareto

[1] See Holmstrom(1982) for moral hazard problems in team production. Multiple lending is a typical kind of team production.

[2] Renegotiation has characteristics of discretionary contracts. See Boot et. al.(1993) for the benefits of discretionary contracts.

efficient credit allocation, the dominant strategy for every firm would be to borrow from only one bank. In reality, we find that only a small fraction of firms borrow from a single bank. This suggests that exclusive relationships entail not only benefits but also costs for borrowers. The cost of relationship lending comes from the same factors that make relationship lending valuable. Exclusive relationships encourage information production by banks ex ante, but also cause information asymmetry between a lending bank and other banks ex post. As a result, lending banks have an information monopoly to hold up their borrowers (Sharpe, 1990; Rajan, 1992). Information monopoly entails another problem besides rent appropriation. For example, if a bank with an exclusive relationship is faced with a liquidity problem, it will reduce credit supply to its borrowers. In this case, the borrower is forced to switch to other banks with which it has no previous relationships. However, if the first bank's information on a borrower is non-transferable and proprietary, the borrower cannot access other banks. Thus, a firm may be better off choosing multiple lending in spite of the costs incurred (Detragiache et al, 2000).

Therefore, there are two competing effects during a banking crisis. At the time of the crisis, banks tend to reduce their overall credit supply and capital requirements reinforced by regulatory agencies aggravate this effect through the increase in the marginal cost of credit supply. When a banking crisis happens, firms with close ties to banks, especially troubled banks, are likely to be in trouble. However, the degree of credit reduction may be different across borrowers by their relationship with banks. That is, if relationship lending effect really exists, credit supply constraints at the time of the crisis will be real threats to firms that depend on multiple banks, but not to firms having close relationship with their banks.

The important question is then whether the relationship lending effect exists even during a crisis. To put it differently, it is whether the relationship lending effect is strong enough to

dominate the credit reduction effect during a banking crisis. This paper attempts to provide answers to these empirical questions. To address such an empirical question, we need to examine banks' lending behavior during a banking crisis. The Korean banking crisis in 1998 was chosen for this purpose.

The Korean banking crisis during the first half of 1998 was accompanied by an unprecedented credit crunch as banks with poor balance sheets reduced their overall credit supply. One interesting question is whether there existed any connection between the strength of firm-bank relationships and bank credit supply. Did every firm indiscriminately suffer from credit reduction during the crisis? Or was there any difference in credit reduction according to the intensity of firm-bank relationships?

Our empirical test is unique in two respects. First, the sample period is special. Most previous studies test whether there exist relationship lending effects under normal conditions, i.e., when there are no problems for lending banks. In this paper, however, we choose a banking crisis as our sample period. If banks which themselves are suffering shock extend credit to closely-tied firms, we can interpret this as strong evidence of a relationship lending effect. However, this may not be the whole story. Some recent evidences suggest that a close tie between banks and firms may create perverse incentives of banks especially during banking crises. For example, at the time of Japanese banking crisis, weaker banks may have shifted their loan portfolios toward riskier loans. This could occur even as banks reduce their overall lending in order to comply with the BIS capital requirements. Japanese banks, having close relationships with firms under the main bank system, supplied more credit to the most, not the least, troubled firms so that they could avoid raising capital by understating troubled loans (evergreening) and thus overstating their capital when facing capital requirements (Peek and Rosengren, 2003; Caballero et. al., 2005). In this paper, we test whether there was such an

evegreening effect and whether there was relationship lending effect even after controlling for such a perverse incentive, if any, of banks during the Korean banking crisis.

Second, borrowers in our sample are Korea Stock Exchange listed companies. According to the relationship lending theory, firm-bank relationships are of help especially for informationally opaque borrowers. In this respect, most of the previous tests focused on unlisted companies. However, a firm with access to financial markets under normal situations borrows from banks in times of economic stress (Diamond, 1991; Saidenberg and Strahan, 1999). On these grounds, we expect that even listed companies have strong demand for bank credit during the crisis.

Our findings support the relationship lending theory. During the Korean banking crisis, firms having borrowed from fewer banks benefited from easier access to credit. Moreover, this effect was upheld even for those banks that were impaired themselves by the shock. This casts doubt on the view that a shock to a closely-tied bank reduces the credit availability of its borrowers and that consequently a firm should borrow from as many banks as possible. Of course, if the impact of the shock on a closely-tied bank is large, the credit reduction incentive of the bank may suppress the relationship lending effect. We find, however, that as long as the impact of the shock is not overly severe, firms need not be concerned about credit reduction from banks with close relationships.

We find that during the Korean crisis there were also perverse incentives of banks, similar to what prevailed among Japanese banks. That is, undercapitalized banks supplied more credit to the weakest firms to avoid an increase in their reported nonperforming loans and thus to avoid a decrease in their reported capital. However, relationship lending effect still stands after controlling for this kind of perverse incentives of banks.

This paper is organized as follows. Section 2 overviews the Korean banking sector during the

crisis. Section 3 describes the data and samples for regression tests. Section 4 analyzes the effects of firm-bank relationships on the credit availability of firms. Section 5 concludes.

2. The Korean Banking Sector during the Crisis

The currency crisis erupted in the late 1997 drove the Korean banking sector, already saddled with non-performing loans, into yet more dire straights. The tight monetary policy and the consequent monetary contraction, mandated by the IMF's bailout conditions, caused the yield on the three-year corporate bonds to rise up to 30% and asset prices to fall precipitously. As a result, the balance sheets of both firms and banks were severely impaired. At the end of December 1997, fourteen out of twenty-six commercial banks were under-capitalized, their BIS capital ratios having fallen below the regulatory minimum of 8%. The mood at the time was extremely grim, rendering little hope that the situation would improve quickly. It thus seemed imperative to restructure failing banks, lest problems from the banking sector worsen those already crippling real sector.

The government took prompt actions to prevent the collapse of the banking sector. As a first step, in February 1998, the regulatory agency ordered under-capitalized banks to submit restructuring plans by April 1998; these were to include self-rescue efforts as well as concrete means for expanding banks' capital bases. Banks whose plans fail to be approved by June 20th were to face restructuring of different schemes forced by the government, which included bank closure through P&A (purchase and assumption). Indeed, on June 29th, five banks whose restructuring plans did not receive approval were closed. This was the first time in Korea that commercial banks were forced to close. The regulatory agency, hoping to spur change, approved the plans of the rest of the under-capitalized banks on a condition that they submit the implementation timetable by July 31st.

The first half of 1998 was indeed a very difficult period for Korean banks, especially for under-capitalized banks, which had to hastily raise their capital ratios.[3] In order to survive, under-capitalized banks had to raise new equity and/or reduce assets. Since raising new equity in times of crisis by banks was extremely costly, under-capitalized banks relied more heavily on reduction of loans.[4]

[Table 1]

[Table 1] reports the change in credit supply of commercial banks in Korea for listed manufacturing firms during the first half of 1998, immediately after an outbreak of the currency crisis.[5] Commercial banks reduced their total credit outstanding by 7.5% for listed manufacturing firms during this period. What's more, under-capitalized banks reduced total credit by a greater margin than did well-capitalized banks.

3. Data and Sample

3.1. Data

We test whether bank credit supply for firms changes according to firm-bank relationships. The data for bank credit to firms comes from the Korea Federation of Banks, the trade association of commercial banks that collects and keeps transaction data between banks and firms.[6] Bank credit is defined as the sum of loans and loan-guarantees. Before the Korean

[3] The BIS capital adequacy requirements were implemented by the Korean regulatory agency in 1992. However, there was not any significant change in the lending behavior of Korean banks before 1998 (Song, 1998). This means that the BIS capital adequacy regulation was not binding, and thus was not effective before the crisis.

[4] Under-capitalized banks prefer reducing loan over raising equity because the external finance premium for a bank with low net worth should be more than that of a bank with sufficient net worth, which is called the balance sheet effect (Bernanke and Gertler, 1989; Kashyap and Stein, 1995).

[5] As will be elaborated in Section 3, our test sample is a subset of the listed manufacturing firms.

[6] We offer special thanks to the Financial Supervisory Service for arranging an access to the banks' credit

banking crisis, it was common for banks that lacked loanable funds to offer their borrowers access to credit through third parties, i.e. other banks. Of course, loan guarantees are very similar to loans in that the magnitude of the credit risk of the former is the same as that of the latter. [7] Therefore, banks intending to reduce risky assets to raise their capital ratio could decrease either the amount of loan-guarantees they had extended or their direct loans. This is why we consider loan guarantees as such an important part of bank credit in Korea. [8]

Considering unused loan commitments for the study may be important because they provide backup funding sources. The data for unused loan commitments is not readily available. We believe, however, that unused loan commitment was not a factor significant enough to affect the test results in any major way. There are two reasons. One, loan commitment is not a very popular credit facility in Korea in the first place. The aggregate data shows that bank loan provided under the loan commitments was less than four per cent of the total bank credit outstanding at the end of 1997.[9] Two, since the financial crisis had already started from the spring in 1997, we conjecture that loan commitments have been more or less exhausted by the end of 1997. Therefore, we safely abstract from unused loan commitments in our study.

3.2. Sample

We have the banking crisis as the sample period. During the beginning of the economic downturn, decreases in bank credit are the result of conditions on the supply side, but as time passes, weakness on the demand side plays a greater role. In this regard, we need to choose a very short sample period in order to exclude demand-driven decreases of bank credit; our

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data compiled by the Korean Federation of Banks.

[7] The risk weights that the BIS applies to loans and loan-guarantees are exactly the same.

[8] Loan guarantees were 29% of the total bank credits of commercial banks in Korea as of the end of 1997.

[9] Monthly Statistics, Bank of Korea

sample period is the first half of 1998, which is very short.[10] Moreover, as noted earlier, under-capitalized banks were supposed to face government-driven restructuring schemes including disclosure on June 1998 unless their plans for restructuring would be approved by the government on April 1998, which means that the willingness of banks to lend was the weakest at that time. In these respects, during the first half of 1998, bank credit supply was severely constrained whereas bank credit demand of firms was at the highest. Therefore, during the sample period, we hope to determine the value of firm-bank relationships more clearly.

Our sample firms are manufacturing companies that were listed and yet had no alternative funding sources other than bank credits during the banking crisis. Other studies that examined the impact of lending relationships on the credit availability largely limited their sample to non-listed, small and medium size companies. This is because listed or large firms have non-bank funding sources and thus may not be highly bank-dependent. However, we could consider listed firms to be candidates for our sample because a firm with access to financial markets under normal situation borrows from banks in time of economic stress (Diamond, 1991; Saidenberg and Strahan, 1999). In other words, even listed companies may be shut off from the financial markets during the crisis and thus become highly bank-dependent. The candidates of our sample firms thus include 487 manufacturing companies listed at the Korea Stock Exchange at the end of 1997. [11]

Table 2 reports the characteristics of listed manufacturing firms and their relationships with banks as of the end of 1997, the beginning of the crisis. In so doing, firms are classified into ten groups by the size of bank credit. Firm data are from the Korea Information Service.

[10] According to Kim (1999), there was excess demand in the Korean bank credit market during the first half of 1998

[11] An advantage of choosing listed firms as our sample is that information on firm characteristics is readily available and more accurate.

[Table 2]

In [Table 2], two points are worth mentioning. First, firm asset size increases in proportion to the size of bank credits. Whereas the mean of total assets for firms in the smallest total credit size group is 79 billion won, that for firms in the largest credit size group is 5,363 billion won. The latter is almost 68 times larger than the former. In this respect, the total bank credit of a firm contains information about the firm's asset size. Second, larger firms carry higher debt/equity ratios on average. Third, the number of lending banks increases in line with the bank credit size; thus, on average, firms with relatively small bank credit borrow from fewer banks. The implication of this data is that large firms have a tendency to keep larger bank credit and higher debt/equity ratios. Moreover, large firms have weaker relationships with their lending banks, borrowing from more banks than do small firms.

Although, the vast majority of listed firms were locked out of the financial markets during the crisis, a handful of companies probably had some access. To correct for this possible sample bias, we include only relatively small firms in our sample, as small firms are highly dependent on bank financing; firms in the upper 50th percentile in terms of the size of bank credit are screened out (219 firms).[12] In addition, the affiliates of the five largest *chabols* are screened out (48 firms).[13] When affiliates of the five largest *chaebols* experienced liquidity problems, they were sometimes able to fill the gap with help from other affiliates with reserve cash. Moreover, *chaebol* affiliates would have had less difficulty issuing corporate bonds because they were highly rated by rating agencies and/or their bond issuance could be easily underwritten by their investment bank affiliates. As a matter of fact, total amount of public

[12] Such a screening criterion automatically eliminates very large firms that may be 'too big to fail' and thus could distort the lending bank's credit decision.
[13] *Chaebol* is a family controlled large conglomerate with diversified business portfolios.

placement of corporate bonds during the first half of 1998 was 2,423 billion won, of which 80.2%, or 1,944 billion won, was issued by affiliates of the five largest *chaebols*. In this respect, affiliates of the five largest *chaebols* are much less bank-dependent, regardless of their firm size.

Our sample thus finally selected includes 220 firms. The average firm in the sample has the debt/equity ratio of 231% and the number of lending banks of 3.9. Thus, the average firm in our sample has the relatively healthy balance sheets and the relatively closer borrowing relationships with their lending banks (See [Table 3]).

[Table 3]

In the first half of 1998, overall corporate bond outstanding of the sample firms decreased by 12.2%, which shows that our sample firms are not likely to have any other alternative financing sources but banks. In this respect, we can say that the sample firms are highly dependent on bank during the crisis even though they are listed companies. When the change in bank credit during the crisis is investigated for the final sample firms only, bank credit rather increases (Table 4). The increase in total bank credit mostly comes from the well-capitalized banks, but even the under-capitalized banks increase the credit outstanding to the sample firms.

[Table 4]

In Table 5, we summarize some statistics of commercial banks in Korea at the end of December 1997. The number of well-capitalized banks is 12 while that of under-capitalized ones is 14; over-half of the commercial banks in Korea are under-capitalized. Moreover, the

under-capitalized banks are much larger and older than the well-capitalized banks. Total asset size of the well-capitalized and the under-capitalized banks are 13.9 and 18.2 trillion won, respectively. The simple average age is 23.0 years for the well-capitalized banks and 39.2 years for the under-capitalized banks. It is worthwhile to note that the average age of the sample firms is 27.9 years (see Table 3), which is longer than that of the well-capitalized banks. Therefore, at least at the end of 1997 in Korea, many of our sample firms are likely to have already established relationships with the under-capitalized banks even before some of the well-capitalized banks were born. This inference is more plausible considering that the weighted average age (with the total asset size of each bank as weights) for well and under-capitalized banks are 9.8 and 35.0 years, respectively. At the end of 1997, listed firms of our sample are likely to have closer relationships with under-capitalized banks than with well-capitalized ones.

[Table 5]

4. Empirical Test

4.1. Methodology

We test whether the closeness of firm-bank relationship affects the lending behavior of individual banks by investigating the change in credit outstanding from each bank to each firm. More specifically, we hypothesize that firms with close lending relationships with banks have relatively easier access to credit even during a financial crisis. The dependent variable in our regression tests is the log change in the amount of credit outstanding from bank j to firm i (***DCREDIT***). The independent variable should be a variable measuring the lending relationship. The log of the number of lending banks (***NUMB***) is a proxy variable measuring the degree of

the firm-bank relationship.[14] As an alternative proxy for the lending relationship, we also employee the Herfindahl-Hirschman Index (***HHI***) of bank credits for each firm. That is, banks are less likely to reduce their credit supply for firms whose borrowings from banks are not scattered among many lending banks. All regressions are run twice: first with ***NUMB*** and second with ***HHI.***

Other explanatory variables to control for confounding factors are as follows. Firm age (***AGE***) reflects a degree of information asymmetry in the market and could positively affect credit availability, as it represents whether a firm has survived risky and uncertain periods (Berger and Udell, 1995). Debt-equity ratio (***LEV***) is a measure of financial risk of firms. Lending banks are likely to reduce their credit supply for a firm with high ***LEV*** first because highly indebted firms are likely to fall into problems of solvency, not just liquidity, during an economy-wide crisis. The log of the amount of credit outstanding from bank j to firm i (***CREDIT***) is chosen to determine whether banks reduce their credit supply relatively more to firms with larger credit exposure than to firms with smaller credit exposures.[15] The ratio of the number of under-capitalized banks to the number of total lending banks (***BNUM***) is included to measure an effect of strategic behavior among banks. Conceivably, during the first half of 1998, under-capitalized banks suffering from the crisis more severely than well-capitalized ones were more reluctant to extend credit supply to their borrowing firms. When many of the lending banks of a firm are under-capitalized (i.e., high ***BNUM***), banks that are afraid of a reduction in the credit supply from other banks will try to decrease their own credit supply in advance. This

[14] Most previous studies use as the proxy variables the period of the relationship as well as the number of lending banks (Petersen and Rajan, 1994; Cole, 1998; Angelini, Salvo and Ferri, 1998), while some other studies use the relationship period only (Berger and Udell, 1995; Elsas and Krahnen, 1998). Due to data availability, we don't consider the period of the relationship.

[15] During the sample period, the default risk of Korean firms was very high, so each bank was eager to decrease its exposure to an individual firm as much as possible. Moreover, the earlier response of many banks facing potential liquidity problems was first to reduce large-size credit in order to mitigate their own problems.

may result in a competitive reduction of credit supply among lending banks.

We also include two additional explanatory variables measuring a bank's capital adequacy vis a vis the BIS ratio of eight percent, a regulatory minimum. There have been several empirical studies reporting that the BIS capital requirements cause a credit crunch (Bernanke and Lown, 1991; Furlong, 1992; Ito and Sasaki, 1998). Thus we need to control for any potential impact of under-capitalization of a bank. As the first capital adequacy variable, we include a dummy identifying a bank as either under-capitalized or well-capitalized (***BAD***; under-capitalized bank=1, otherwise=0). If our tests show that ***BAD*** carries a negative coefficient, it indicates that capital requirements cause a credit crunch even after considering firm characteristics and the firm-bank relationship.

While the first capital adequacy variable is for the case of all banks, the second one, the BIS ratio gap, applies to each of the two subsets of banks. More specifically, to measure changes in the credit supply caused by capital requirements more clearly, we divide banks into two subsets: well-capitalized and under-capitalized. This grouping is to account for a potentially asymmetric impact of the BIS ratio between under-capitalized banks and well-capitalized banks. We use two variables representing the BIS ratio gap of banks (***BISOVER*** = actual ratio – 8%, for well-capitalized banks; ***BISHORT*** = 8% – actual ratio, for under-capitalized banks). The under-capitalized group would tend to reduce its credit supply in line with the BIS ratio gap. Thus, the ***BISHORT*** variable is likely to carry a negative and significant coefficient for the under-capitalized bank group. In contrast, BIS capital requirements do not constrain banks belonging to the well-capitalized bank group; therefore, the coefficient of ***BISOVER*** is expected to be insignificant for this group. The variables are summarized in [Table 6].

[Table 6]

4.2. Empirical results

The results are reported in [Table 7] for three groups of the banks; all banks, the under-capitalized banks, and the well-capitalized banks. For each group of banks, there are two regressions, each with an alternative measure of closeness of lending relationship: one with the number of lending banks for each firm (***NUMB***) and the other with Herfindahl Hirschman Index of bank credits for each firm (***HHI***). We first present and discuss the results for our sample firms; firms with bank credit outstanding in the lower 50 percentile. Then, we briefly discuss the results of the test for the firms excluded from the sample; firms with bank credit outstanding in the upper 50 percentile and member firms of five largests *chaebols*.

[Table 7]

4.2.1 Empirical results for the sample firms

The coefficient on ***AGE*** is positive but not statistically significant, suggesting that the amount of information on a firm released to the market does not seem to increase in line with its age. The ***CREDIT*** coefficient carries a negative sign as expected and is statistically significant in all cases. This reflects bank's tendency to reduce their credit supply to firms to which they have large exposures.

The coefficient on ***NUMB***, which represents the change in bank credit supply conditional on a bank's relationship with firms, is negative and statistically significant in all cases. Firms borrowing from fewer banks (a proxy for the strength of their relationship with lending banks) benefit from easier access to credit. In particular, even banks belonging to the under-capitalized bank group redistribute their credit supply based on their relationships with

borrowing firms. This means that the benefit of relationship lending exists even when relationship banks are themselves in distress. In fact, the benefit of lending relationship with the under-capitalized banks seems to be economically greater and statistically more significant than that with the well-capitalized banks. We believe this results from the country specific feature of the Korean banking industry. As shown in Table5, the average age of the sample firms is longer than that of the well-capitalized banks. Therefore, many of our sample firms are likely to have already established relationships with the under-capitalized banks even before some of the well-capitalized banks were born. Then, at least as of late 1997 in Korean, many of the well-capitalized banks are considered to be 'fringe lenders' rather than 'relationship lenders' for our sample firms. That's why relationship lending effect seems to be weaker among well-capitalized banks and, we think, ***HHI***, another proxy variable representing firm-bank relationship, is significant only among under-capitalized banks.

The weak significance of ***HHI*** as a proxy for firm-bank relationship may stem from the natural difference of the information contained in ***NUMB*** and ***HHI***. ***HHI*** contains the information about the degree of a borrower's credit concentration into banks. Meanwhile, ***NUMB*** contains the information about the coordination possibility among lending banks as well as that about the degree of a borrower's credit concentration into banks; both of which are particularly important factors given that our sample period is that of a banking crisis. In this respect, ***NUMB*** seems to be a more relevant variable representing firm-bank relationship at the time of the crisis.[16]

[16] As a matter of a fact, ***HHI*** may not be a good proxy variable for the firm-bank relationship. Imagine a situation where there are, for example, four lending banks for a firm and most of its borrowings are concentrated on one bank and thus not distributed evenly among the lending banks. The firm in this case has a high value of ***HHI*** but nevertheless may face during a banking crisis competitive credit reduction from fringe banks. This is because fringe banks know well that the bank with the concentrated credit cannot easily join in cutting back on loans. Since a firm with a high concentration of credits from a bank may face credit reduction due to strategic behavior of other fringe banks, the test based on ***HHI*** may not capture the true aspect of lending relationships.

The regulatory capital requirements clearly contributed to the credit crunch during the Korean banking crisis. We speculate that there are two competing effects when a relationship bank is facing a problem. On the one hand, a bank under crisis is motivated to reduce credit supply to raise its capital ratio. Thus, firms having exclusive relationships with this bank find themselves with reduced liquidity. In fact, the coefficient of ***BAD*** is negative and significant for the all bank case. At the same time, the coefficient on ***BISHORT*** is negative and significant for the under-capitalized bank group. These results reconfirm the empirically regularity that the mandatory capital requirements tend to accelerate the contraction of bank credit supply during the crisis. Thus, if capital requirements are strengthened when a relationship bank is in trouble, firms having an exclusive relationship with that bank are likely to be in trouble too. On the other hand, however, close relationships to banks can increase the credit availability of borrowing firms. If this relationship lending effect is in place, a reduction of credit supply by a relationship bank in trouble may not result in a uniform decrease of credit availability for borrowing firms. The empirical result in [Table 7] shows that the decrease in credit supply stemming from one percent decrease in the BIS ratio of a lending bank could be recovered if the firm reduces the number of lending banks it borrows from by 1.2.[17] Thus, firms having a close relationship with not more than a few banks may not have to be concerned about a decrease in credit availability unless the lending banks are in serious trouble.

In contrast to the under-capitalized bank group, the coefficient on ***BISOVER*** is not significant for the well-capitalized bank group. This means that the effect of capital requirements is asymmetric. Capital requirements imposed by a regulatory agency trigger a reduction of credit supply from banks when their actual BIS ratios are below the required level,

[17]From [Table8], d(***DCREDIT***) = –0.856d(***NUMB***)–14.481d(***BISHORT***). If we let d(***DCREDIT***)=0, and d(***BISHORT***)=0.01, then we know the number of lending banks that a firm must drop in order to recover a 1% decrease in the BIS ratio of its lending banks.

but they do not cause any significant impact once the ratios are above the threshold.

The coefficient on ***BNUM*** is not significant for the case of all banks, and yet it is for the two subsets. Interestingly, however, the signs of ***BNUM*** for the two subsets of banks are reversed. For the under-capitalized bank group, the sign is negative as expected. When many of the lending banks of a firm are under-capitalized, those under-capitalized banks, afraid of competitive credit reduction from other banks, seem to rush to reduce credit supply. On the contrary, however, the coefficient on ***BNUM*** is positive for the well-capitalized bank group. This means that well-capitalized banks act as alternative funding sources for firms to supplement the reduction in credit supply from under-capitalized banks. If a firm with high ***BNUM*** has difficulty obtaining credits, it may be due less to its own problem than that of its lending banks.[18] Thus, it is apparent that the well-capitalized banks could increase credit supply to firms with high ***BNUM*** without being concerned about a 'lemon's problem.[19]

Lastly, the coefficient on ***LEV*** is insignificant for the case of all banks. It is, however, significant for the two subsets. Moreover, the two subsets carry opposite signs: negative for the well-capitalized bank group and positive for the under-capitalized one. It seems therefore that the opposite signs of ***LEV*** for the two subsets cause the variable to be insignificant for the case of all banks. The result showing that under-capitalized banks supply more credit to firms with higher financial risk could be a kind of smoking gun for evergreening of troubled loans. As long as troubled borrowers can make interest payments on the outstanding loans, banks can avoid a mandatory increase in their reported nonperforming loans and a consequent decrease in

[18] It is assumed that each bank is able to observe the characteristics of other banks.

[19] We replace ***BNUM*** with the size of bank credit from under-capitalized banks divided by total bank credit of firm i (***BCREDIT***). The coefficient of ***BCREDIT***, however, is not significant (not reported). It seems then that, for the reason that follows, what is relevant is the proportion of the number of under-capitalized banks involved rather than the proportion of bank credits from under-capitalized banks. If a firm has high ***BCREDIT*** and, at the same time, its borrowings are concentrated among small number of undercapitalized banks, a strategic bank credit reduction among lending banks is less likely to occur in spite of its high dependence on undercapitalized banks.

their capital. That's why under-capitalized banks may extend ever greater amount of credit to the most troubled firms. Reportedly, such a perverse incentive of banks were also pervasive in Japan (Peek and Rosengren, 2003; Caballero et al, 2005).

Of course, the crisis in Korea was different from that in Japan. It might be noted in this regard that the Korea's weak banks had, relative to the Japanese counterparts, a stronger incentive but a weaker capability to evergreen troubled corporate loans. The under-capitalized banks in Korea were facing government's threats of closure through P&A and thus had a strong incentive to hide nonperforming loans. The Korean banks, however, could not easily evergreen nonperforming loans because high interest rates made evergreening very costly and regulator's scrutiny in the presence of IMF conditionality for bailout made hiding more difficult. In contrast, the Japanese banks were allegedly encouraged to rollover nonperforming loans by the Japanese bank regulators who arguably pursued a policy of denying the existence of any problems and delaying any reforms and restructuring of the banks. In addition, low interest rates and a lack of international pressure made evergreening less costly and more acceptable, respectively. In a nutshell, the perverse behavior during the crisis of evergreening by the under-capitalized banks, though conceivable, was not likely to be very severe in Korea.

In spite of all these considerations, if evergreening of loans existed among under-capitalized banks in Korea as well, we may not readily conclude that there is a benefit from the lending relationship; actually, it represents a dark side of the closeness of firm-bank relationship. Therefore, we need to test whether there is evergreening of troubled loans among under-capitalized banks and whether relationship lending effect still remains after controlling explicitly for the evergreening effect. For this, we include as evergreening effect variables ***BAD*×*LEV*** (the product of ***BAD*** and ***LEV***) and ***BISHORT*×*LEV*** (the product of ***BISHORT*** and ***LEV***) in all bank group and under-capitalized bank group respectively. The results are in

[Table 8].

[Table 8]

As shown in [Table 8], we can see the evergreening effect was a real one among under-capitalized banks. Let's see the results for the case of all banks. The coefficient on ***BAD×LEV*** is positive and significant; under-capitalized banks supply more credit to the most troubled, and thus most likely to be insolvent firms. Interestingly, with the interaction variable ***BAD×LEV*** included, the coefficient on ***LEV*** becomes significant. This suggests that the insignificance of ***LEV*** in [Table 7] is mainly due to the evergreening effect of undercapitalized banks. Similar changes can bee seen for the under-capitalized bank group. Now, ***LEV*** is not significant any more and, instead, the coefficient on ***BISHORT×LEV*** is positive and significant; the more under-capitalized a bank is, the more loans the most troubled firms of the bank are likely to obtain. However, even after controlling for the evergreening effect, the economic as well as the statistical significance of the coefficient on ***NUMB*** is not qualitatively different from those in [Table 7]. Thus, we are confident that the relationship lending effect indeed stands.

4.2.2 Empirical Results for firms excluded from the sample

We now conduct a regression test for those firms excluded from the sample: member firms of the five largest *chaebol*s and firms with large bank credit outstanding in the upper 50^{th} percentile. Unlike the prior results, the coefficient on ***NUMB*** is significant neither for the well-capitalized banks nor for the under-capitalized banks (See [Table 9]).[20]

[20] The result from the regression analysis of all manufacturing firms was the same and thus not reported.

[Table 9]

This result may be related to the fact that these firms have many lending banks: the mean of the number of lending banks for these firms is 8.2, far exceeding that of the sample firms (3.9). When too many lending banks are engaged, information production among banks may be weak and renegotiation of credit terms nearly impossible. Accordingly, when the number of lending banks exceeds a threshold, the value of lending relationship disappears, and credit availability does not increase even when a firm reduces the number of lending banks. This suggests that the relation between the number of lending banks and the credit availability of borrowers is nonlinear.

Another feature in [Table 9] is that there aren't evergreening effects; the coefficient of ***LEV*** is negative and significant even, unlike the result in [Table 7], for the under-capitalized banks. The average size of credit outstanding of banks for their firms excluded from the sample is 16.4 times as large as that of the sample firms. Therefore, it may cost banks lots of money to supply more credit to their troubled large firms so that they can keep on making interest payments, without default, on their outstanding loans. It is unlikely, however, that the under-capitalized banks impaired by the shock can fund such big money required for evergreening.

The last unique feature in [Table 9] is the change in bank credit to the affiliates of the five largest *chaebol*. The bargaining power of these affiliates can make it difficult for banks with strong incentives to reduce credit supply to do so. Moreover, in the middle of economic downturns, banks are likely to redistribute their loan portfolio from low quality borrowers to high quality ones (flight to quality; Bernanke et. al., 1994). In this respect, the coefficient on the dummy variable for the five largest *chaebol* firms (***DUM5*)** is expected to be positive. Surprisingly, however, it is negative and significant for the under-capitalized bank group. This

result may have less to do with decisions made by lending banks during the crisis (supply side) and more to do with those made by the five largest *chaebol*-affiliates (demand side). Even though the affiliates experienced liquidity problems, they could fund the gap with assistance from other affiliates (internal markets) or the bond markets (external markets).[21] Decreases in bank credit to affiliates of the five largest *chaebols* therefore seem to have been caused by substitution of bank loans, and not by reductions of credit supply initiated by lending banks.

Why then does bank credit for the five largest *chaebol*-affiliates decrease significantly only in the under-capitalized bank group? One possibility is that these firms exerted a disciplinary effect over banks. That is, in the course of reducing their total bank loans and switching to other funding sources, they refunded loans from troubled banks first. Affiliates of the five largest *chaebols* seem to have prepared themselves for the default of some of their lending banks.

5. Conclusion

The Korean banking crisis, triggered by the currency crisis, led banks to be reluctant to extend credit supply to firms in trouble. In particular, the enforcement of BIS capital requirements greatly weakened the willingness of banks to lend, which in turn reduced the credit availability of bank-dependent borrowers.

However, there are other factors that affect the credit availability of bank-dependent borrowers. Our results show that a firm having borrowed from fewer banks before the crisis had relatively easier access to credit during the crisis. This supports the relationship lending

[21] The outstanding balance of corporate bonds of the listed manufacturing affiliates of the five largest *chaebols* increased by 22% during the sample period.

theory whereby a close firm-bank relationship increases the credit availability of borrowers. In addition, this benefit exists even for firms having close relationships with troubled banks. Our findings cast doubt on the view that an adverse shock to closely-tied banks reduces the credit availability of borrowers and that firms therefore should borrow from as many banks as possible. Of course, there were perverse incentives among under-capitalized banks during the Korean banking crisis like in Japan; under-capitalized banks supply more credit to their firms even with solvency problem (evergreening of troubled loans). However, the relationship lending effect still remains after controlling for such an evergreening effect.

The existence of the relationship lending effect has a variety of implications. First, a firm borrowing from many banks for easier access to credit may see its situation worsened, not bettered. Thus, bank-dependent (i.e., informationally opaque) borrowers may well be better off by borrowing from fewer banks. When a banking crisis pops up, firm-bank relationship can benefit even listed companies which are less opaque and thus have access to financial markets under normal situations. Second, close relationships between firms and banks may smooth out economic fluctuations. Reducing information asymmetry through a firm-bank relationship can prevent banks from suddenly altering their lending behavior. As a result, borrowing firms have easier access to credit regardless of economic conditions or their lending banks' problems. That is, close ties between firms and their banks at the micro level act as a counter-cyclical stabilizer at the macro level.[22] Third, bank regulators should consider firm-bank relationships when deciding on bank closures, as the termination of firm-bank relationships have a value destructive impact. Other things being equal, a bank having fewer relationship borrowers should be closed first.

[22] When banks themselves have liquidity constraints, firm-bank relationships do not bring about an increase in total bank credit, but they affect its reallocation among borrowing firms. Reallocating bank credit, however, may be of help in smoothing out economic downturns. When no firms have close relationships with banks, every firm indiscriminately suffers from credit reduction during a crisis. As a result, economic downturns are more serious when no firms have firm-bank relationships.

There are two caveats to this paper. First, due to data availability, all the proxies employed for a firm-bank relationship are the number of lending banks and the degree of concentration of bank borrowings. The effect of some other important relationship variables, such as duration, is overlooked due to data unavailability. The second caveat regards the sample period. The reason for choosing the time of the banking crisis as the sample period is to find strong evidence, if any, of the relationship lending effect. That is, if banks increase credit supply to closely-tied borrowers even when the banks themselves are suffering liquidity problems, this may be a strong evidence of the relationship lending effect. However, an argument can be advanced that our sample period is not appropriate. Banking crises are extreme situations in which banks have strong incentives to cut back their lending; thus, strategic activity among lending banks prevails. Accordingly, it may be difficult to identify what results are due to relationship lending and what not. In other words, the change in bank credit supply during the crisis comes not from the degree of information asymmetry between banks and firms, but largely from competitive credit reduction among the banks. This is taken into account by introducing the ***BNUM*** variable, but it may not fully reflect the strategic behavior of the banks. The empirical results of this paper should be interpreted with these two caveats in mind.

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[Table 1] Changes in Commercial Bank Credit for Listed Manufacturing Companies during the First Half of 1998

	Total Credits (billion won)		Change (billion won)	Growth rate (%)
	End of Dec., 1997	End of June, 1998		
Commercial Banks*	64,433	59,619	-4,814	-7.5
Well-capitalized Banks**	18,286	17,877	-409	-2.2
Under-capitalized Banks**	46,147	41,742	-4,405	-9.5

* There were 26 commercial banks in Korea at the end of December 1997. Korean branches of foreign banks were excluded.

** Well-capitalized and under-capitalized banks are the ones with their BIS ratios over and less than 8%, respectively

Source: Korea Federation of Banks

[Table 2] Firm-Bank Relationship According to the Size of Bank Credit (Dec., 1997)

Decile	Total Bank Credit (billion won) *	Total Asset (billion won) *	Debt/Equity Ratio(%)*	Firm Age (years) *	Number of Lending Banks	
					Mean	Max
0~10%	4	79	316	26.8	2.4	5
11~20%	9	115	335	27.8	4.1	7
21~30%	13	124	227	26.6	3.9	9
31~40%	20	132	339	28.3	4.3	8
41~50%	30	191	346	30.7	4.9	14
51~60%	41	262	439	33.7	5.9	11
61~70%	57	362	683	28.6	7.0	13
71~80%	97	465	852	32.7	7.8	14
81~90%	217	1,243	724	33.9	9.5	17
91~100%	829	5,363	676	36.9	12.6	20

* Mean value

Source: Korea Federation of Banks, Korea Information Service

[Table 3] Sample Firm Characteristics and Relationships to Banks (Dec., 1997) [*]

	Number of Firms	Total Bank Credit (billion won)	Total Asset (billion won)	Debt/Equity Ratio (%)	Firm Age (years)	Number of Lending Banks
Sample Firms[**]	220	14	111	231	27.9	3.9
Firms Excluded from the Sample[***]	267	230	1,435	776	32.8	8.2
All Listed Manufacturing Firms	487	132	837	494	30.6	6.2

[*] Mean value

[**] Firms with bank credit outstanding in the lower 50th percentile

[***] Firms with bank credit outstanding in the upper 50th percentile or member firms of the five largest *chaebols*

Source: Korea Federation of Banks, Korea Information Service

[Table 4] Changes in Commercial Bank Credit for Sample Firms (first half of 1998)

	Total credit (Billion Won)		Difference (Billion Won)	Growth rate (%)
	End of Dec., 1997	End of June, 1998		
Commercial Banks	3,057	3,266	209	6.8
Well-capitalized Banks	1,240	1,427	187	15.1
Under-capitalized Banks	1,817	1,839	22	1.2

Source: Korea Federation of Banks

[Table 5] Summary Statistics of Commercial Banks in Korea at the End of December, 1997

		Well-capitalized Banks*	Under-capitalized Banks*
Number of Banks		12	14
Average Total Assets (Billion Won)		13,900	18,153
Ages (years)	Simple Average	23.4	39.2
	Weighted Average (weighted by asset size of each bank)	9.8	35.5

* Well-capitalized or under-capitalized banks are the ones with their BIS ratios more or less than 8%, respectively.

[Table 6] Summary of Variables

The dependent variable is the log change in the credit outstanding from bank j to firm i (***DCREDIT***)

DCREDIT = ln (Credit Outstanding of Bank j for Firm i at the End of June 1998)

- **ln (Credit Outstanding of Bank j for Firm i at the End of Dec., 1997)**

Explanatory Variables	Definition	Expected Sign
AGE	ln (Firm Age)	+
CREDIT	ln (Credit Outstanding from Bank j to Firm i at the End of Dec., 1997)	–
LEV	Debt/Equity of Firm i	–
NUMB	ln (Number of Lending Banks) of Firm i	–
HHI	Herfindahl Hirschman Index of Bank Credit of Firm i	+
BAD	If Lending Banks are Under-capitalized =1, otherwise = 0	–
BNUM	Number of Under-capitalized Banks/Number of Total Lending Banks of Firm i	–
BISOVER	Well-capitalized Banks: (Actual ratio – 8%)	?
BISHORT	Under-capitalized Banks: (8% – Actual ratio)	–

[Table 7] Changes in Bank Credit Supply According to Relationship with Firms (1)

The results of this table are from a regression on the sample firms, i.e., firms that are in the lower 50th percentile of bank credit size and not affiliates of the five largest *chaebols*. The dependent variable ***DCREDIT*** is the log change in the credit outstanding from bank j to firm i. ***AGE*** is the log of firm age. ***CREDIT*** is log of credit outstanding from bank j to firm i at the end of Dec., 1997. ***LEV*** is debt-equity ratio of firm i. ***NUMB*** is log of number of lending banks for firm i. ***HHI*** is Herfindahl-Hirschman Index of bank credit for firm i. ***BAD*** is a dummy representing lending banks are well or under-capitalized (under-capitalized banks=1, otherwise =0). ***BISOVER*** for well-capitalized banks only amounts to 'BIS ratio of each banks minus 8%'. ***BISHORT*** for under-capitalized banks only amounts to '8% minus BIS ratio of each bank'. ***BNUM*** is the number of under-capitalized banks divided by the number of total lending banks of firm i.

Explanatory Variables	**All banks**		**Well-capitalized Banks**		**Under-capitalized Banks**	
CONSTANT	4.445 (5.49)***	3.515 (4.20)***	5.266 (4.64)***	5.083 (4.30)***	4.272 (3.97)***	2.353 (2.07)**
AGE	0.300 (1.27)	0.306 (1.30)	0.246 (0.75)	0.219 (0.67)	0.319 (1.04)	0.364 (1.17)
CREDIT	- 0.658 (-23.8)***	- 0.659 (-22.7)***	- 0.783 (-21.14)***	- 0.796 (-21.22)***	- 0.489 (-10.95)***	-0.483 (-10.33)***
LEV	- 0.013 (-0.35)	- 0.034 (-0.93)	- 0.172 (-2.59)***	- 0.183 (-2.76)***	0.112 (2.65)**	0.086 (2.07)**
NUMB	- 0.610 (-3.94)***		- 0.451 (-1.73)*		- 0.856 (-4.41)***	
HHI		0.248 (0.64)		- 0.281 (-0.44)		1.063 (2.15) **
BAD	- 0.530 (-3.17)***	- 0.532 (-3.14)***				
BISOVER			- 0.843 (-0.07)	1.232 (0.10)		
BISHORT					-14.481 (-4.92)***	-14.858 (-5.07)***
BNUM	0.437 (1.24)	0.400 (1.11)	1.039 (1.89)*	0.653 (1.22)	- 1.136 (-2.39)**	-1.004 (-2.05)**
Adjusted R^2	0.39	0.38	0.53	0.52	0.29	0.27
Number of Observations	970	970	433	433	537	537

Heteroscedasticity-robust t-statistics are shown in parentheses
*, **, *** significant at 10%, 5%, 1% level respectively

[Table 8] Changes in Bank Credit Supply According to Relationship with Firms (2)

The results of this table are from a regression on the sample firms, i.e., firms that are in the lower 50th percentile of bank credit size and not affiliates of the five largest *chaebols*. The dependent variable ***DCREDIT*** is the log change in the credit outstanding from bank j to firm i. ***AGE*** is the log of firm age. ***CREDIT*** is log of credit outstanding from bank j to firm i at the end of Dec., 1997. ***LEV*** is debt-equity ratio of firm i. ***NUMB*** is log of number of lending banks for firm i. ***BAD*** is a dummy representing lending banks are well or under-capitalized (under-capitalized banks=1, otherwise =0). ***BISHORT*** amounts to '8% minus BIS ratio of each bank'. ***BNUM*** is the number of under-capitalized banks divided by the number of total lending banks of firm i. ***BAD×LEV*** and ***BIS×LEV*** are cross terms of ***BAD*** and ***LEV, BIS*** and ***LEV***, respectively**.**

Explanatory Variables	All banks	Under-capitalized Banks
CONSTANT	4.794 (5.96)***	4.445 (4.14)***
AGE	0.310 (1.33)	0.326 (1.06)
CREDIT	- 0.657 (-23.5)***	- 0.493 (-11.05)***
LEV	- 0.168 (-2.60)***	0.028 (0.49)
NUMB	- 0.633 (-4.11)***	- 0.846 (-4.36)***
BAD	- 1.165 (-4.68)***	
BISHORT		-20.285 (-4.55)***
BNUM	0.465 (1.61)	- 1.106 (-2.33)**
BAD×LEV	0.260 (3.42)***	
BISHORT×LEV		2.287 (2.00)**
Adjusted R^2	0.40	0.29
Number of Observations	970	537

Heteroscedasticity-robust t-statistics are shown in parentheses
*, **, *** significant at 10%, 5%, 1% level respectively

[Table 9] Changes in Bank Credit Supply According to Relationship with Firms (3)

The results of this table are from a regression on firms that were excluded from the sample, i.e., firms that are in the upper 50th percentile of bank credit size or affiliates of the five largest *chaebols*. The dependent variable ***DCREDIT*** is the log change in the credit outstanding from bank j to firm i. ***AGE*** is the log of firm age. ***CREDIT*** is log of credit outstanding from bank j to firm i at the end of Dec., 1997. ***LEV*** is debt-equity ratio of firm i. ***NUMB*** is log of number of lending banks for firm i. ***BNUM*** is the number of under-capitalized banks divided by the number of total lending banks of firm i. ***BISOVER*** for well-capitalized banks only amounts to 'BIS ratio of each banks minus 8%'. ***BISHORT*** for under-capitalized banks only amounts to '8% minus BIS ratio of each bank'. ***DUM5*** is a dummy identifying firms as affiliates of five largest chaebols (1) or not (0).

	Well-capitalized Banks	**Under-capitalized Banks**
CONSTANT	1.634 (1.60)	2.418 (2.74)***
AGE	0.606 (2.48)**	0.477 (2.43)**
CREDIT	-0.606 (-15.75)***	-0.385 (-9.78)***
LEV	-0.041 (-2.92)***	-0.016 (-1.76)*
NUMB	0.131 (0.57)	0.042 (0.25)
BNUM	1.308 (1.91)*	-1.013 (-1.56)
BISOVER	14.482 (1.64)	
BISHORT		-7.175 (-3.72)***
DUM5 (5 *chaebol* affiliates=1, otherwise=0)	0.182 (0.73)	-0.876 (-4.22)***
Adjusted R^2	0.30	0.18
Number of Observations	987	1,337

Heteroscedasticity-robust t-statistics are shown in parentheses
*, **, *** significant at 10%, 5%, 1% level respectively