Do Soft Budget Constraints Cause Borrowers' Default?

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Abstract

In this paper, we examine the existence and the role of the soft budget constraints (SBC) in the Korean economy. Particular attention is given to the pre-financial crisis period of 1997 on firm level data when the Korean banking sector generated inefficient credit allocation. We report that Korean business group (*chaebol*) firms have more severe SBC problems, especially in long-term loans, and that there exist severe adverse effects on the profitability of loans to SBC firms compared to non-*chaebol* firms. It appears that the significant negative effects of loans to SBC firms on profitability before and during the crisis are mainly driven by the inefficient use of funds by *chaebol* firms.

Key words: soft budget constraint; Korean financial crisis; bank loans; defaulted firm

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1. Introduction

This paper investigates whether a soft budget constraint (SBC) exists in a small market economy. Particular attention is given to the case of the Republic of Korea ("Korea" hereinafter) especially during pre-financial crisis period before 1997. In the SBC reputation model, lender reputation can be a powerful mechanism in alleviating SBC problems, because it may become optimal for lenders to establish a reputation for toughness in pursuit of profits in the long-run, even in a situation where SBC is optimal in a single-period model due to sunk costs. That is, the existence of sunk costs may not necessarily justify the SBC of banks when borrowers respond to the actions of banks over periods.

One of the most important topics in empirical SBC studies is its effects on the performance of firms. The relationship between the availability of investment funds and the profitability of firms is studied by Grosfeld and Roland (1997), and Lizal and Svejnar (2002). They all find that the relationship is negative, implying that firms use funds for investments inefficiently for survival rather than for restructuring. Using data on industrial firms in the Czech Republic, Lizal and Svejnar (2002) study investment behaviors of firms and their ownership structure, and find that large state-owned and private firms operate under SBC.

Some other studies tested the effects of credit constraints on the profitability of firms in transition economies, or whether credit constraints might also deteriorate the profitability of firms through misallocation of resources in production.[1] Recently, Rizov (2002) finds that, using manufacturing firm data in Bulgaria, like other prior empirical studies about the effect of credit constraints, the presence of credit market constraints impinges on the profitability of credit rationed firms, causing credit constrained firms to have lower profits than other unconstrained competitors, for periods following the financial market collapse as a result of previous SBC. In this sense, both HBC and SBC are not optimal for firms.

For comparison, we try to follow some approaches of others used for transition economies whlie we try a very unique way to test the existence of SBC and exmanine its effects on the preformance of the SBC firms later on. In the market economies, firms acquire funds from various sources. Internally, they can generate extra cash inflows usually in the form of profits from operating activities. Externally, they can resort to both debt financing like loans, convertible bonds and bonds, and equity financing.

The relationship between net bank loans and profitability does not necessarily provide evidence of SBC in a market economy. First, it is difficult to interpret their relationship as an evidence of SBC, as discussed by Schaffer (1997). A positive relationship might imply efficient allocation of funds to

[1] For example, Evans and Jovanovic (1989), Greenwald and Stiglitz (1993), Schiantarelli (1995), Hubbard (1998) and Rizov (2002) suggest that hard budget constraints (HBC) might also cause misallocation of resources in firm production, leading to low profitability of firms, due to lower than optimal level of investments.

profitable firms, in the sense that banks provide less financing to inefficient firms. However, it can also be interpreted that it might be inefficient for profitable firms to obtain additional bank loans when they can generate cash flows internally and resort to various sources of financing.

Second, banks do not necessarily provide loans based on the profitability of their borrowing firms. Rather, banks will make loans as long as their expected returns from loans are high enough to compensate corresponding risks. In general, the returns from loans are more or less fixed for firms, especially for profitable firms, and depend more on overall risks and the values of collaterals, guarantees, etc. The default risks are more related to overall corporate cash flows and capital structure than year-to-year profitability. As long as the profitability of firms does not increase proportionally with the size of bank loans, we may not use the profitability as a primary regressor in testing the existence of SBC.

In this paper, we formally test whether there were some sorts of phenomena like SBC in the banking sector in Korea around the financial crisis in 1997 and how effective the credit allocation to SBC firms was in generating profits of firms. In doing so, we can test whether SBC loans was efficient or not in improving the performance of such firms during the period.

For the tests on SBC, we first develop probit models to estimate the probability of default of firms *ex ante* using the data from relatively hard budget constraint periods after the crisis and then test the existence of SBC by estimating the relationship between changes in bank loans and the predicted default risks of firms before the crisis. Considering the special aspects of chaebol firms in the Korean economy, we primarily compare their effects on SBC and their profitability of loans financed through SBC financing, relative to non-chaebol firms.

In the following section, we discuss data sets and define variables used in this study. In Section 3, we investigate the existence of SBC, focusing on default risks of firms. In Section 4, we conclude.

2. Data

The data used in this study are obtained mainly from the data base constructed by Korea Information Service, Inc. (KIS), which provides comprehensive corporate and financial information on firms listed on the Korea Stock Exchange (KSE) since 1980. While most corporate profiles and all financial information data are obtained from KIS-FAS (KIS-Financial Analysis System), some corporate profile information not provided by KIS-FAS is obtained from another data base (MKACR - Maekyung Annual Corporation Reports), constructed by Maeil Business Newspaper, which has provided such information for over 300,000 firms in Korea since 1978. Those data are highly reliable since the data bases are constructed based on financial statements and their auxiliary documents that are publicly available. All the listed firms on the KSE, during between 1990 and 2001 at least for two consecutive years, are included in the primary sample. The number of firms in our sample varies over the years, as the number of firms on the KSE changes. Firms in financial services are excluded because their accounting practices are considerably different from those of other firms in manufacturing, etc. Some observations are also excluded due to lack of information on the variables we use in the study.[2]

In order to find the determinants of corporate default and estimate the probability of defaults, we use various variables reflecting corporate capital structure, profitability, cash flows, ownership structure, etc, for defaulted firms and non-defaulted firms in the sample. While Table 1 summarizes the definitions of variables used in the study, we discuss here the definitions of some critical variables in more details.

Defaulted firms and Non-defaulted firms

Firms are identified as defaulted at the date when they reported "filed for bankruptcy", "bankrupt", "out-of-operation", "termination of lending", or anything similar in their corporate history, whichever occurred the earliest. Firms merged with other firms are not considered as defaulted as long as they actually have never defaulted.[3] The dates of default are obtained from the history of firms in MKACR.

Chaebol and Non-Chaebol firms

Chaebols are large-size business groups in Korea with many subsidiaries, mostly owned and controlled by a single family or firms owned by such families. A firm is identified as a chaebol firm from the year during which it became a member of a chaebol. In this study, we distinguish about 35 top

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[2] They are mostly firms without accounting data two years in a row and export ratios. Two years are the shortest data period required to calculate most variables used.

[3] With various reasons regarding merger and acquisitions of firms, we classify them as non-defaulted until the date of mergers, unless they are reported defaulted before they are merged.

chaebols from other firms. Chaebols consist of Samsung, Hyundai, LG, Daewoo, SK, etc. to name a few. Chaebols defined in this study are basically the same as those formally defined and announced each year by the Korean Fair Trade Commission (KFTC), whose list contains different chaebols each year due to changes in their asset sizes and ownership structure. We therefore recognize about 35 widely known business groups as chaebols in our data set, since their rankings and names change over time.[4] According to Borensztein and Lee (2000), top 30 chaebols produced around 16 percent of GDP and more than 40 percent of manufactured output in 1996 in Korea.

Table 2 provides some summary statistics for each year during the sample period. From the table, the overall performance of firms listed on the KSE was quite poor with an average of 0.09 percent in terms of net returns on total assets (EATR) during the period. The performance measured by net operating cash flows (OCFR) was 4.44 percent on average. This might imply that Korean firms suffered a lot due to interest expenses, taxes, other non-current or extraordinary activities during the period.

Short-term debt ratios (SRDebtR) and overall debt ratios (DebtR) steadily increased until 1997 or 1998, along with interest expenses (InterestR), but declined drastically after the crisis. Average total assets of a firm increased steadily over the period from 31 billion won in 1991 to 87.5 billion won in 2001, as sales of a firm on average more than doubled during the period from 28.9 billion won to 84.6 billion won, respectively. The export ratio increased slightly over the period, especially during the period of the crisis: 32.5 percent in 1998 and 30.1 percent in 1999, compared with 28.5 percent of the overall average. There were no substantial fluctuations on average in the level of working capital (WorkingKR) over the period. While overall debt ratios (DebtR) did not decline drastically after the crisis, short-term debt ratios (SRDebtR) and interest expenses (InterestR) did.

Table 1: Variables and Descriptions

MfgFirm, ConstFirm, SalesFirm, TranspFirm: 1 if a firm is in the industry of manufacturing, construction, sales, and transportation respectively, 0 otherwise[5]

[4] They are Samsung, Hyundai, Daewoo, LG, SK, Kumho, Hyosung, Doosan, Hanjin, Daelim, Jinro, Lotte, Haitai, Hanhwa, Shinho, Nongshim, Ssangyong, Daesang(Miwon), Sammi, Dongbu, Kia, Donga, Kolon, Dongyang, Dongkook, Kohap, Hansol, Youngpoong, Daesung, Daenong, Goryo. Some other chaebols like Halla, Shaehan, Jeiljedang, and Shinsegae are also classified as chaebols, even though they are legally separated from their mother groups.

[5] Firms are classified following the Korean Standard Industry Classification (Korean SIC), as reported in the primary data base KIS-FAS. In our tests, we use a simplified classification with four major categories: manufacturing, construction, sales, and transportation.

Chaebol: 1 if a firm is a member of chaebol group, 0 otherwise[6]

Age: The age of the firm (calculated from the date of establishment)

Asset: Total assets (in 1,000 won)

AssetG: The growth rate of total assets;[total asset(t) – total asset(t-1)]/total Asset(t-1)

Employee: The number of employees of a firm

***Default*:** 1 if the firm is defaulted during the whole sample period, 0 otherwise

GovSH: The share of the firm owned by the government in percentage

GovFirmSH: The share of the firm owned by government firms in percentage

BankSH: The share of the firm owned by banks in percentage

SecuritySH: The share of the firm owned by security firms in percentage

InsuranceSH: The share of the firm owned by insurance firms in percentage

FinFirmSH: The share of the firm owned by financial firms in percentage

FinFirmSH=BankSH+SecuritySH+ InsuranceSH

ForeignSH: The share of the firm owned by foreign investors in percentage

IndividualSH: The share of the firm owned by individual investors in percentage

LargestSH: The share of the firm owned by the largest shareholder in percentage

ExportR: The ratio of exports to the sales of the firm (=Export/Revenues)

SalesR: Sales(t)/ Total Asset(t-1)

SalesG: The growth rate of Sales[Sales(t) - Sales(t-1)]/ Total Asset(t-1)

CashR: Cash/ Total Asset. Cash includes cash and its equivalents.

WorkingKR: (Current Asset – Current Debt) / Total Asset

InterestR: Interest Expenses(t)/ Total Debt(t-1)

DebtR: Total Debt/Total Asset

EBITDAR: EBITDA(t)/Total Asset(t-1)[7]

EBITDA: The ratio of earnings before interests, taxes, and depreciation and amortization

EBTR: The ratio of earnings before income taxes (EBT), EBT(t)/ Total Asset(t-1)

EATR: The ratio of earnings after income taxes (EAT), EAT(t)/ Total Asset(t-1)

EATG: The growth rate of EAT, (EAT(t)-EAT(t-1))/ Total Asset (t-1)

BLR: Bank Loan(t)/Total Asset(t-1)

Bank Loans: loans including bank overdrafts, and foreign currency loans

BLChR: [Bank Loan(t) – Bank Loan(t-1)]/Total Asset(t-1)

SRBLChR: [Short-term Bank Loan(t) – Short-term Bank Loan(t-1)]/Total Asset(t-1)

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[6] Chaebol firms (30 groups) are legally announced annually by the Korean Fair Trade Commission (KFTC).

[7] EBIDTA is earnings excluding interests, depreciation, amortization, and income taxes.

LRBLChR: [Long-term Bank Loan(t) – Long-term Bank Loan(t-1)]/Total Asset(t-1)

* Other short-term and long-term loans are defined in the same way.

ForeignLR: Foreign Loans/Total Asset

Foreign Loans: Loans in foreign currencies and overseas loans

TradeDebtR: (Accounts payables + Trade payables)/Total Asset

OCFR: Net Cash Flow from Operation(t)/Total Asset(t-1)

LoanR: Aggregate Loans(t)/Total Asset(t-1)

Aggregate Loans: Sum of all borrowings: bank loans, crony loans, and corporate bonds

LoanChR: [Loans(t) – Loans(t-1)]/Total Asset(t-1)

InvestR: Total Investments(t)/Total Asset(t-1)

LRDebtFIN: Long-term Debt Financing, LRDebtFIN(t)/Total Asset(t-1)

Note: Dates are same for the nominator(s) and the denominator(s), unless specified.

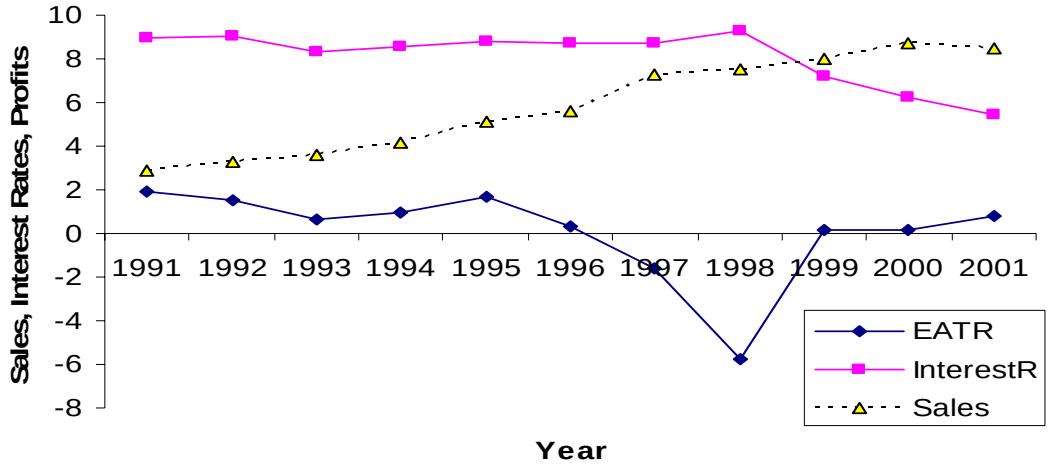
Over the period, the ownership structure of firms changed: the overall share of the government (GovSH) steadily, but a lot after the crisis to 0.6 percent by 1999, starting from 0.2 percent in 1991. The share of foreign investors increased steadily to 5.6 percent in 2001 from 2.1 percent in 1991. On the contrary, the share of financial firms (FinFirmSH) declined drastically to 5.7 percent from 21.1 percent in 1991, while there were almost no changes in the share of the largest shareholders of firms (LargestSH).

Figure 1 shows trends in average sales (Sales in 100 billion won), interest rates and profitability, measured by EATR (net income) of firms during the period. From the figure, we can see that the average sales of those firms increased during the period and that the average net income was positive during the period except 1997 and 1998. From 1999, the average interest expense of firms declined drastically from its previous peak in 1998 during the financial crisis. During 1997-1998 firms in Korea might have experienced drastic changes in their business environment.

(Insert Table 2)

(Insert Table 3)

Figure 1: Trends in Sales, Interest Rates and Profitability (EATR)

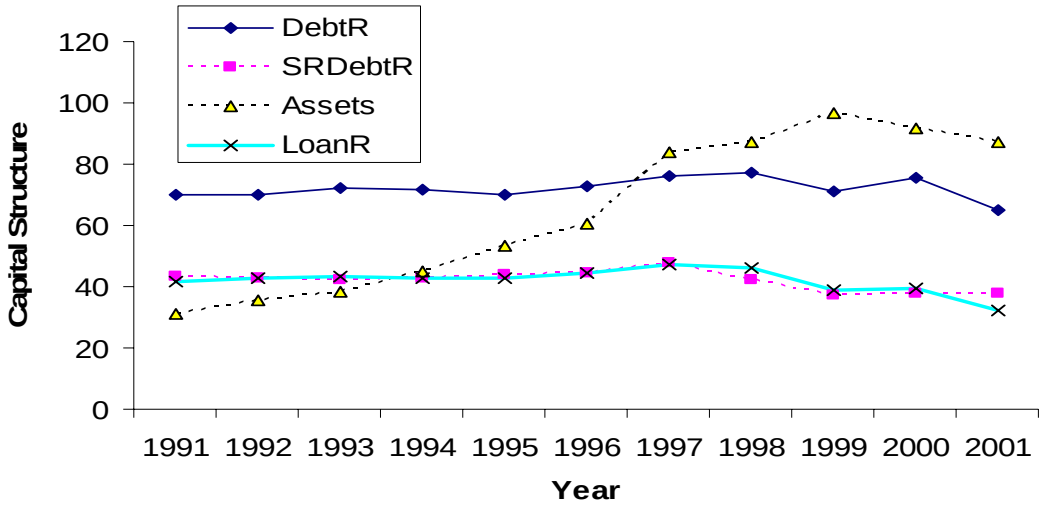


Note: 1. All values are the averages of all firms as in Table 2 and Table 3 each year.

2. Sales are in 100 billion won, and EATR and InterestR are in percent.

Figure 2 shows changes in capital structure: average firm size (Assets), measured by total assets (in 10 billion won), debt ratios (DebtR), short-term debt ratios (SRDebtR), and overall loan ratio to total assets (LoanR). Interestingly, DebtR and SRDebtR moves almost in parallel, and SRDebtR and LoanR are basically equivalent. This might suggest that firms might have financed loans each year almost the same as the amount of short-term debts each year. The declines in debt or loan ratios from 1998 might indicate that firms relied relatively less on debt financing and thus more on equity financing after the crisis, while the average firm size increased sharply until 1999. It is also noticeable that the average firm size increased in 1997 sharply more than in previous years.

Figure 2: Trends in Capital Structure



Note: 1. All values are the averages of all firms as in Table 2 and Table 3 each year.

2. Assets are in 10 billion won, and others are ratios in percent.

Table 3 compares the summary statistics of some important variables related to credit allocation in Korea before and after the crisis, and during the whole sample period from 1991 to 2001. The table confirms that firms in Korea experienced drastic changes starting from 1997 during which the financial crisis occurred. Average profit rates were negative for defaulted firms (Default) before and after the crisis, while they were positive for non-defaulted firms for the respective periods. Profit rates on total assets (EATR) for all the firms were close to zero for the whole period: 1.2 percent before the crisis and -1.2 percent after the crisis.

Debt ratios (DebtR) on average were 71.9 percent for all the firms: 99.0 percent for defaulted firms, much higher than 61.5 percent for non-defaulted firms. Those ratios were higher for defaulted firms than for non-defaulted firms both before and after the crisis. Short-term debt ratios (SRDebtR) declined sharply after the crisis from 44.2 percent to 38.6 percent. Both overall debt ratios (DebtR) and short-term debt ratios (SRDebtR) sharply increased during 1997, especially in the case of defaulted firms. While both ratios of non-defaulted firms declined drastically after the crisis, total debt ratios of defaulted firms (DebtR) increased. The extremely high ratio of short-term debts during 1997 might have aggravated the overall vulnerability of firms and of the whole economy, by seriously deteriorating short-term liquidity of firms, banks and the country.

Interest rates actually paid by defaulted firms were 9.4 percent on average during the whole sample period: with 9.8 percent before the crisis and 8.3 percent after the crisis. The interest rates for non-defaulted firms were 7.6 percent: with 8.3 percent before the crisis and 6.7 percent after the crisis. Thus the overall interest rates were higher for defaulted firms than for non-defaulted firms. The rates were higher before the crisis than after the crisis. Growth rates in sales and total assets (SalesG and AssetG)

were extremely high for all firms before the crisis: 17.2 percent per annum in sales and 13.8 percent in assets. While non-defaulted firms steadily grew at a very high rate after the crisis, defaulted firms became smaller in asset sizes and their sales did not grow much after the crisis. Interestingly, the growth rate in sales was higher for defaulted firms than for non-defaulted firms, especially before the crisis.

Export ratios of firms to their total sales increased from 27.5 percent before the crisis to 30.3 percent after the crisis. Thus, the Korean economy became more dependent on overseas markets in their sales after the crisis, possibly reflecting the overall contraction in the domestic market. The overall export ratios of non-defaulted firms were 29.7 percent, higher than those of defaulted firms, 25.5 percent.

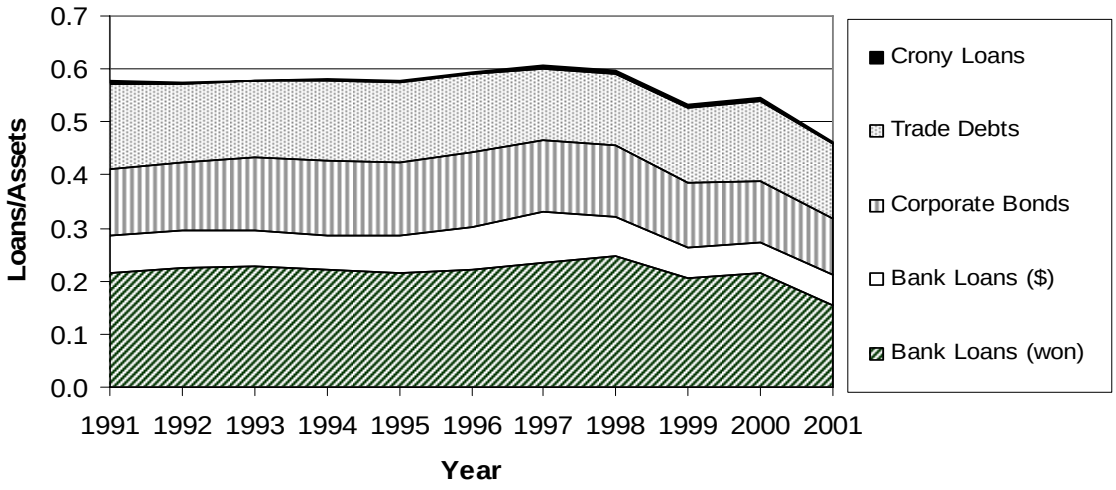
The ratio of bank loans (BLR) to defaulted firms actually increased to 50.2 percent after the crisis from 36.2 percent before the crisis. However, in the case of non-defaulted firms, it declined to 19.7 percent after the crisis from 26.0 percent before the crisis. The per annum growth rate of bank loans (BLChR) turned to negative at -6.3 percent for defaulted firms and at -2.2 percent for non-defaulted firms after the crisis, compared to 7.2 percent for defaulted firms and 4.7 percent for non-defaulted firms before the crisis. Until the year of financial crashes, defaulted firms obtained more bank loans than non-defaulted firms. This suggests of the existence of SBC before the crisis.

Total borrowings of defaulted firms (LoanChR) increased by 11.5 percent until 1996 and by 13.5 percent during 1997, while those of non-defaulted firms increased only by 7.4 percent and by 13.0 percent respectively. Since 1998, they decreased by 9.9 percent per annum for defaulted firms, compared with the decrease by 2.0 percent for non-defaulted firms. They increased by 4.3 percent per annum on average for the whole period: by 8.7 percent until 1996, by 13.1 percent during 1997, and by -3.8 percent from 1998. The ratio of total borrowings to total assets (BLR) increased to 47.2 percent in 1997 from 44.0 percent on average until 1996, and then declined to 39.3 percent after the crisis. For defaulted firms, it increased to 64.0 percent by 1997 from 51.9 percent on average by 1996, and then further increased to 65.5 percent, mainly due to the substantial decrease in their total assets. On the contrary, it decreased to 31.3 percent after 1998, from its previous peak at 41.1 percent in 1997 in the case of non-defaulted firms. This might suggest that firms without sufficient internal financing increased their recourse to external financing, such as bank loans. From the table, we can observe that there were substantial differences in the magnitudes of most variables between non-defaulted firms and defaulted firms during the whole sample period, and between the pre-crisis period and the post-crisis period. During 1997, statistics were quite different from those before and after the crisis. In general, firms grew sharply without generating sufficient profits before the crisis.

Figure 3 shows the proportions of various loans over time relative to total assets (Assets). Overall debt financing decreased drastically starting from 1999. Bank loans both in won and foreign currencies were about a half of all loans outstanding, while the other half were mostly through either corporate bonds or trade-related debts. While foreign currency loans were about a 1/4 of bank loans in won, crony loans were very small in magnitude. It appears that bank loans in the domestic currency (won) declined

significantly after 1999. Table 4 provides more detailed information.

Figure 3: Changes in the Proportions of Various Loans



(Insert Table 4)

From the various analyses of summary statistics, we can infer that firms in Korea grew remarkably fast in size measured by total assets until 1998 while their profitability was aggravating, especially starting from 1996, and that their overall debt ratios were also gradually increasing until 1997 and then declined afterwards. Thus, before the crisis, firms in Korea in general might have exposed themselves to gradually more risks of defaults every year, while they grew fast in appearance with the help of more loans by banks, cronies, and trading partners and corporate bond financing. In the following section, we investigate whether firms in Korea were actually exposed themselves to higher default risks every year until 1997 and then test the validity of such increases in debt financing from the viewpoint of SBC in subsequent sections.

3. Empirical Tests

3.1. Bank Loans, Profitability and SBC

Before we continue with our own test models, we examine the existence of SBC in Korea before the crisis, based on the specifications used in Schaffer (1997). Following Schaffer (1997), we define net bank financing as changes in bank loans or

$$\text{Net Bank Financing} = \text{BLChR}_{i,t+1} = \frac{B_{i,t+1} - B_{i,t}}{A_{i,t}}$$

and profitability as the net cash flows from operation or

$$\text{OCFR}_{i,t} = \frac{OCF_{i,t}}{A_{i,t-1}},$$

where $B_{i,t+1}$ ($B_{i,t}$) is bank loans of firm *i* at the end of year t+1 (year t),

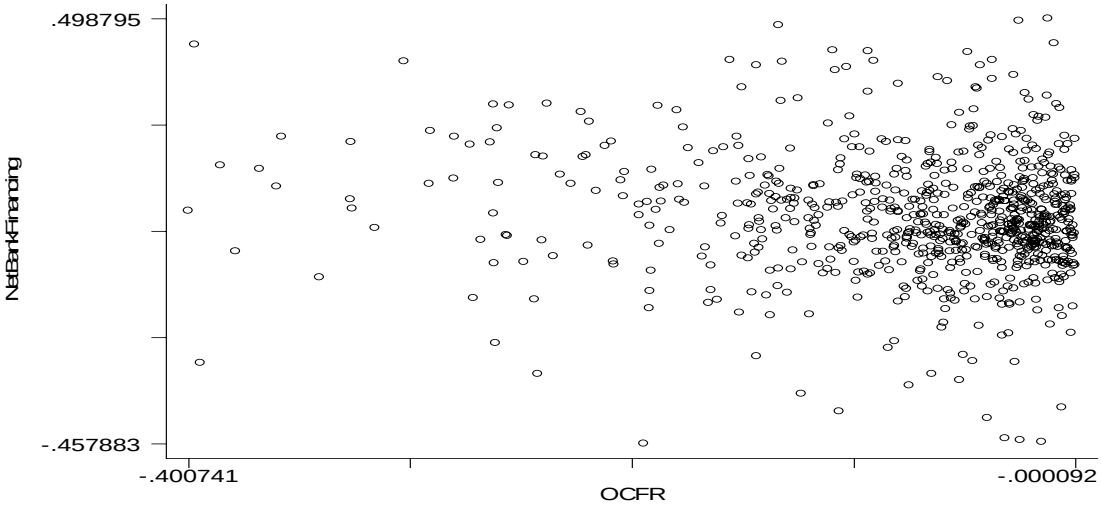
$A_{i,t}$ ($A_{i,t-1}$) is total assets of firm *i* at the end of year t+1 (year t),

$OCF_{i,t}$ is the net cash inflows from operation.

Instead of EBITDAR (earnings before interests, income taxes, and depreciation and amortization) in Schaffer (1997), we use OCFR in our set up. While they are basically very similar, OCFR reflects many more factors than EBITDAR.[8] We plot net bank loan financing versus profitability of firms in Korea before its financial crisis in 1997 from 1991 until 1996 in Figure 4 and Figure 5. Figure 4 presents the relationship for firms with negative profitability (OCFR_t <0) during the period. From the figure, we can see a somewhat negative relationship between profitability and bank loans in the following year. That is, for loss making firms, firms reporting larger losses tend to obtain more net bank financing than firms reporting smaller losses. They tended not to reduce, but to increase bank loans. The results are different from those in Schaffer (1997), where most unprofitable firms decreased bank loans and the relationship between profitability and net bank financing was positive. According to Schaffer, the negative relationship in our data provides evidence of SBC in Korea before the crisis.

Figure 4: Net Bank Financing (BLChR_{t+1}) vs. Negative Profitability (OCFR_t <0)

(Before the Korean Financial Crisis: Year 1991–1996)



[8] OCFR reflects all cash flows from operation, while EBITDAR reflects only income taxes, interest expenses, and depreciation in addition to net income.

Figure 5 presents the relationship for firms with non-negative profitability ($OCFR_t \geq 0$). From the figure, we can see a positive relationship between profitability and bank loans. That is, for profit making firms, firms reporting larger profits tend to obtain more net bank financing than firms reporting smaller profits. Most of them also tended to obtain more bank loans than before. For profitable firms, the relationship between profitability and net bank financing was also positive, but they tended to decrease bank loans after a profitable year in Schaffer (1997).

With somewhat conflicting results from the figures, we formally test their relationships and report their results in Table 5. From the table, we can say that firms in Korea obtained more bank loans the following year after reporting losses, especially in the case of unprofitable firms, while profitable firms financed more loans from banks with better performance in the year before the crisis. Interestingly, both profitable firms and unprofitable firms financed less during the crisis with higher profitability in the previous year. The negative relationship might imply that firms with more cash inflows from operation (OCFR) financed less bank loans regardless of their profitability during the credit crunch. Thus, less profitable firms relatively financed more, compared with highly profitable firms. On the contrary, profitable firms financed more bank loans with higher profitability in the previous year after the crisis, than firms with lower profitability. However, we cannot conclude that after the crisis unprofitable firms financed more loans with more losses. During the whole sample period, unprofitable firms were likely to get more bank loans after reporting more losses, but without statistical significance, while profitable firms were likely to get more bank loans with better performances in the previous year. Thus, we conclude that unprofitable firms in Korea obtained softly budgeted loans from banks before the crisis, based on the test results from the setup used in Schaffer (1997).[9]

Figure 5: Net Bank Financing ($BLChR_{t+1}$) vs. Positive Profitability ($OCFR_t > 0$)

(Before the Korean Financial Crisis: Year 1991 – Year 1996)

[9] In a setup with more control variables, like debt ratios, investment ratios, asset size, age, chaebol, etc, the overall results were quite similar, except that the relationship between them was negative both before and after the crisis, but without statistical significance.

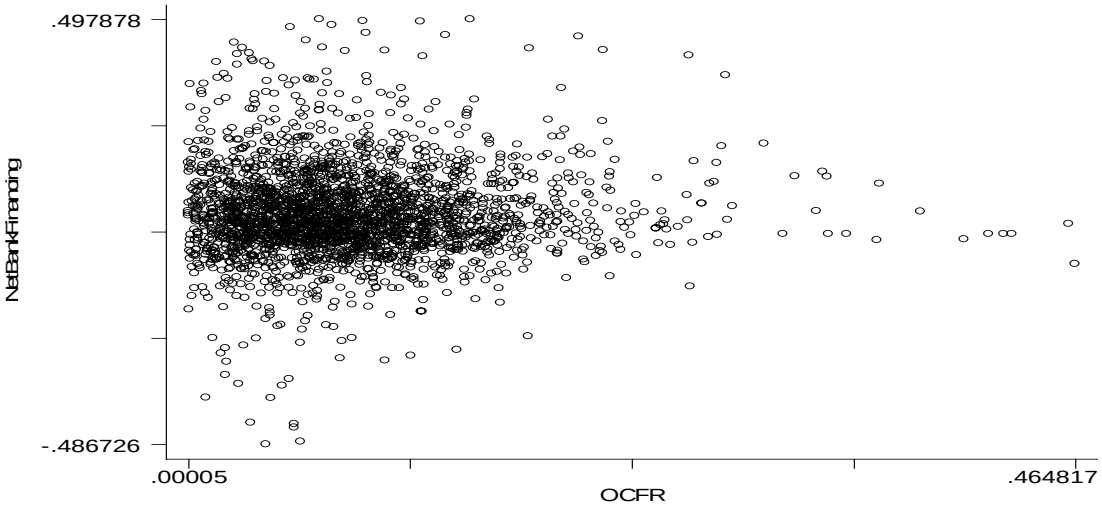


Table 5: Profitability and Evidence of SBC in Bank Loans

Firms	**Overall**	**Unprofitable**	**Profitable**
Dependent Var.: $BLChR_{t+1}$	Independent Var.: $OCFR_t$		
1. Before the Crisis: Year 1991–Year 1996			
Coeff.(p-value)	-0.046(0.030)	-0.347(0.000)	0.0503(0.042)
Observations	3483	832	2650
Prob > F	0.0059	0.0000	0.0838
Adjusted R^2	0.0007	0.0228	0.0008
2. During the Crisis: Year 1997–Year 1998			
Coeff.(p-value)	-0.0530(0.000)	-0.827(0.000)	-0.400(0.000)
Observations	177	388	689
Prob > F	0.0000	0.0000	0.0000
Adjusted R^2	0.1125	0.1671	0.0318
3. After the Crisis: Year 1999–Year 2001			
Coeff.(p-value)	0.072(0.065)	0.252(0.000)	0.136(0.023)
Observations	1766	448	1318
Prob > F	0.1295	0.0613	0.0449
Adjusted R^2	0.0007	0.0056	0.0023

4. The Whole Period: Year 1991–Year 2001

Coeff.(p-value)	0.070(0.002)	-0.081(0.147)	0.054(0.028)
Observations	5756	1543	4212
Prob > F	0.0037	0.2936	0.0557
Adjusted R^2	0.0013	0.0001	0.0006

Note: P-values are for one-tailed tests.

3.2. The Existence of SBC – Ex Ante

In Section 3.2, we tested the existence of SBC for defaulted firms. But, it is not possible for lenders to know with certainty whether a firm will default or when it will default. In reality, a lender presumably forecasts the probability of a borrower's default to determine whether to provide financing, the interest rates or any other terms in their loan contracts with the firm. Given with information about firms' financial performance, capital structure, etc. periodically lenders will estimate corporate default risks accordingly. Together with expected returns, the expected risks will be taken into consideration in loan-related decision makings. Low quality firms with high default risks in a short period of time due to poor performances and/or risky capital structure are expected to be denied not only additional loans but also rolling existing loans over in an HBC market. As a result, a smaller amount of loans will be reported in the balance sheet of a firm with very high default risk, compared to the previous year.[10] Therefore, if it is not the case, we can conclude that SBC exists. The conclusion will be strengthened if lenders provide more loans for firms with higher default risk, *ceteris paribus*.

3.2.1 Default Model

We assume that given information about firms' financial performance realized or expected, as well as non-financial information, lenders estimate the probability of defaults of firms in order to make new loans, roll over existing loans, or take any other measures required. As lenders consider many factors to measure overall default risk of their loans, we try to estimate corporate default risks by finding out determinants of corporate defaults in probit default models with various variables, starting with 699 firms: 198 defaulted firms and 501 non-defaulted firms. As discussed before, we use data for 1999 for non-defaulted firms. From the 699 firms, in the primary sample, the size of the data set decreases to 663 observations when we use only 162 defaulted firms for the period between 1997 and 2002, excluding 36

[10] Basically, the amount of loans should decrease by the portion of short-term borrowings, with maturities shorter than one-year from the end of the accounting year.

firms that defaulted prior to 1997. The number of observations drops to 629 firms when we consider export ratios (ExportR) as another 34 observations without information related to export ratios are dropped. Thus, the number of observations varies across probit models. The basic model for estimating default risks of firms is specified in the following multivariate probit model:

$$Default_{i,t+1} = ß'X_{i,t} + \varepsilon_{i,t+1} \quad (1)$$

where the dependent variable, $Default_{i,t}$, indicates whether a firm i defaulted in t+1, where all independent variables used in the model as listed in Table 6, are denoted by $X_{i,t}$, and where $\varepsilon_{i,t+1}$ denotes error terms.

The basic specification assumes the default risk of a firm can be estimated with information available in the prior year. We introduce four categories of industry as dummy variables to control for their effect on default risks of firms: manufacturing firms (MfgFirm), construction firms (ConstFirm), sales firms (SalesFirm) and transportation firms (TranspFirm). However, we use only manufacturing firms (MfgFirm) against non-manufacturing firms in the final model.[11] We also control for the effect of chaebol firms (Chaebol) with a dummy variable. It is commonly believed that, compared to non-chaebol firms, they are less likely to default due to their unfair, sometimes presumably illegal, trading behaviors, like inter-corporate subsidization between affiliated firms. A firm with longer history (Age), and larger size (Asset and Employee) are expected to default less. Presumably, better performing firms in sales (Sales), and cash flows (OCFR: net cash flows from operating activities) are expected to enhance the probability of their survival. The effect of new investments (InvestR) on the default risk of firms can be either positive or negative, depending on the marginal risks of the whole firm due to new investments. We use ratios in most of those financial data to control for heteroskedasticity resulting from size effects.

Additional loans in the previous period might have some effects on the default risk of firms. Successful debt financing can provide positive signals to outside investors, but might increase the risks of firms for overly indebted firms. Due to high corporate debt ratios in Korea, increases in debt financing are expected to be positively related with corporate default risks. The changes in the magnitudes of debt financing (BLChR: the rate of changes in bank loans, CLChR: that in crony loans, BondChR: that in corporate bonds, FLChR: that in foreign currency loans, and TDChR: that in trade-related debts) and the fact that a firm has increased or reduced outstanding loans (BLINC: an increase in bank loans, CLINC: that in crony loans, BondINC: that in corporate bonds, and TDINC: that in trade-related debts) are expected to increase corporate default risks. Those variables related to loans in default models are used in studying default risks of firms.

They are excluded from estimating default model to test the existence of SBC, because they will be used as dependent variables in the second stage to investigate the existence of SBC. The effects of

[11] The results with and without industries other than manufacturing in the model are basically same.

those variables, not introduced into the models, can be reflected by other variables such as working capital ratios (WorkingKR), interest expense ratios (InterestR), and debt ratios (DebtR). Cash and cash equivalent (CashR) and working capital (WorkingKR) are in general expected to decrease default risks, since they reflect the liquidity of firms. The high ratio of interest expenses to total liabilities (InterestR), a crucial indictor of low quality firms, might severely harm profitability of highly indebted firms, and thus is expected to increase default risks.

Ownership structure also might be an important factor in estimating default risks. To reflect the effect of ownership structure, we first divide the ownership into 8 categories according to the types of shareholders: the government (GovSH), firms owned by the government (GovFirmSH), foreigners (ForeignSH), and individuals (IndividualSH). We expect that the higher the government ownership is, the less likely a firm is to default, while the effects of other types of owners require further study. In order to aggregate the effects of ownership held by the financial sector, we define the share of financial firms (FinFirmSH) as the sum of shares of the firm owned by banks (BankSH), security firms(SecuritySH), and insurance firms(InsuranceSH). To control the effect of ownership diffusion, we introduce a variable reflecting the share of the largest shareholder (LargestSH). We expect that the larger the share of the largest shareholder is, the smaller the default risk of a firm will be. It is because the stronger commitment by a single shareholder might help the firms in jeopardy survive.

Finally, we introduce the ratio of exports to total sales (ExportR) to investigate the effect of propensity to export on the default risk of firms. In an export-oriented economy like Korea, firms producing goods or services to sell abroad might get some sort of subsidies, and thus be less likely to default.

3.2.2 Predictability of Models

The results of different specifications are summarized in Table 6. By dropping 18 observations with missing data, we eventually use data from 613 firms including 133 defaulted firms.

The predictability of model (p(Right)) measured by the percentage of observations predicted correctly reaches about 88 percent in the sample used for estimation.[12] The model predicts non-defaulted firms (p(Right|NonD)) better with an accuracy of around 95 percent than defaulted firms (p(Right|D)). The model predicts defaulted firms (p(Right|D)) with an accuracy of 61.7 percent. The ratio of predicted defaults to actual defaults (predD/Default)) is 75.9 percent.

[12] According to Falkenstein, et. al (2000), Moody's Default Model predicted up to 78.53% right with 28,104 firms including 1604 defaulted firms, whiles Libby (1975) predicted 74% right with 30 defaulted and 60 non-defaulted firms, in 1 year horizon. For more details, see Falkenstein et. al (2000).

Table 6: Predictability of Default model

Observations	Total	predD
Defaulted 133	82	
Non-Defaulted	480	24
Total Observations	613	106
p(Right)	0.878	
p(Right|D)	0.617	
p(Right|NonD)	0.950	
predD/Default	0.797	

Note: 1. predD: the number of observations predicted to default

2. p(Right|D): the probability of predicting correctly, given that firms are actually defaulted

3. p(Right|NonD): the probability of predicting correctly, given that firms are actually not defaulted

Table 7 provides estimated values of model specified above. Model fit quite well with probit models, in terms of the probability greater than χ^2 value, which is 0 for model. Pseudo R^2 value is 0.4279. From the results, we can conclude that manufacturing firms (MfgFirm) were less likely to default. Thus, non-manufacturing firms had higher default risks. This might be because manufacturing firms have more fixed assets and other valuable intangible assets like patent rights, or production technology inherent to a specific firm that are valuable as collaterals and difficult to give up, compared to non-manufacturing firms.

Firms owned by the government (GovSH) were relatively safer from defaults as expected, while the opposite was true for firms owned by government firms (GovFirmSH). Firms owned by government firms might have been relatively inefficient in operation and/or risky in capital structure, but not protected by the government. Overall ownership by financial firms (FinFirmSH) did not have any statistically significant effect on default risks, as in the case of the models with various financial firms separately. On the contrary, ownership by individuals (IndividualSH) reduced the default risks of firms with statistical significance. Firms were less likely to default when their largest shareholders (LargestSH) had a larger share of stocks. Thus, we found that firms' default risk depended a lot on their ownership structure.

While the size of firms (Asset) measured in total assets had a negative relationship with their

default risks, the number of employees (Employee) was positively related with their default risks. That is, a firm with more total assets was safer from defaults. The number of employees might have implied inefficiency in labor management or rigidity in labor-management relationship. Being a member of chaebol groups (Chaebol) reduced default risks to a degree, but without strong statistical significance. As expected, the default risks of a firm decreased as its age (Age) increased. From the results, we can conclude that corporate default risks of firms in Korea depended a lot on their non-financial factors such as size, affiliation with other firms, and age.

Higher cash holdings (CashR) reported in financial statements were an indicator of higher default risks of firms. Cash holdings at the end of the accounting year were found to be very strongly correlated with the ratio of short-term debts to total assets (SRDebtR). The results are quite against common beliefs that firms with more highly liquid assets on the book are safer. On the contrary, the high short-term liquidity of firms net of short-term liabilities measured by the ratio of working capital (WorkingKR) decreased their default risks substantially. The results imply that safe firms are more liquid in paying short-term debts, but they do not hold their assets in the form of highly liquid cash or its equivalents in a proportional way.

As expected, the results support our expectation that the riskier capital structure with a higher debt ratio (DebtR), and higher interest burden incurred from debts (InterestR), the more the corporate default risk tended to aggravate.[13] Likewise, better performance in sales (SalesR) and net cash flow from operation (OCFR) resulted in lower default risks. In the models reported here, we did not use income-related variables like EBTR, EATR, and EBITDAR. They were found to be highly correlated with the variable OCFR, but estimated corporate default risks much worse than OCFR. The variable OCFR reflects not only profitability of firms but also net cash flows from ordinary business activities, better than other profitability variables, which include extraordinary losses or gains, etc.

Higher investment ratio (InvestR) tended to increase the overall risks of firms. This might imply that overall investments of Korean firms were not efficient during the period in reducing default risks. Long-term financing (LRDebtFinR) had a negative relationship with risks, but without statistical significance. Debts resulting from trade (TradeDebtR) and foreign debts (FgnDebtR) were positively and significantly related with default risks.

Table 7: Default model regression result

Observations	613
Prob > χ^2	0

[13] The short-term debt ratio (SRDebtR) shows a very strong positive relationship with corporate default risks in all the models. The variable is dropped from those models listed above due to severe multicollinearity with cash holdings (CashR).

Pseudo R^2	0.4279	
Variables	Coeff.	p-value
MfgFirm	-0.228	(0.117)
Chaebol	-0.207	(0.145)
Age	-0.020	(0.004)
Asset	-4e-11	(0.339)
Employee	0.0001	(0.001)
GovSH	-0.345	(0.148)
GovFirmSH	0.060	(0.003)
ForeignSH	-0.009	(0.124)
IndividualSH	-0.013	(0.003)
LargestSH	-0.013	(0.003)
FinFirmSH	-0.002	(0.362)
ExportR	-0.824	(0.003)
CashR	6.044	(0.000)
WorkingKR	-1.686	(0.001)
FgnDebtR	-0.434	(0.331)
TradeDebtR	-1.7e-9	(0.004)
DebtR	1.947	(0.000)
InterestR	9.831	(0.000)
SalesR	-0.148	(0.141)
OCFR	-1.860	(0.010)
InvestR	2.182	(0.011)
LRDebtFinR	-0.442	(0.207)
Constant	-1.502	(0.004)

Note: 1. The dependent variable is Default $_{t+1}$. All independent variables are in the *t*-period.

2. P-values are for one-tailed tests.
3. Other types of industry like construction (ConstFirm), sales (SalesFirm) and transportation (TranspFirm) are excluded from models for simplicity.
4. The share of ownership by other firms (FirmSH) is dropped from the models reported here to avoid multicollinearity. With FirmSH in the model, the coefficients are significantly positive.
5. Other variables related to profitability like EATR, EBTR, and EBITDAR are not used, because net cash flows from operation (OCFR) reflect them and work best among them in the model.
6. Short-term debt ratios (SRDebtR) are dropped due to multicollinearity with cash ratios (CashR).

3.2.3 Tests for the Existence of SBC

For the *ex ante* tests for the existence of SBC, we use two-stage models. We first predict default risks of firms as described in the earlier section using default models estimated with data from a relatively tough period since 1997. With the predicted default risks, we test the relationship between the expected default risks and net debt financing in the second stage. The primary specification that will be estimated is given by equations (6) and (7):[14]

$$\text{Stage 1: } \text{Default}_{i,t+1} = \beta' X_{i,t} + \varepsilon_{i,t} \tag{6}$$

$$\text{Stage 2: } \_\_\text{ChR}_{i,t} = \beta_0 + \beta_1 \text{Chaebol}_{i,t} + \beta_2\, p(\text{Default})_{i,t+1} + \beta_3 \text{Chaebol}_{i,t} \cdot p(\text{Default})_{i,t+1} + \beta_4\, \text{InterestR}_{i,t} + \beta_5\, \text{Chaebol} \cdot \text{InterestR}_{i,t} + \varepsilon_{i,t} \tag{7}$$

The specifications and variables used in the first stage of the model are the same as Model in Section 3.2.2. In the second stage, we use BLChR, SRBLChR, LRBLChR as dependent variables, denoted by $\_\_\text{ChR}_{i,t,}$ respectively to test SBC in the corresponding debts. $p(\text{Default})_{i,t+1}$ in the second stage model denotes the probability of default, predicted by the estimation model developed in the first stage for firm i in period t+1. We introduce some interactive terms to test the additional effects of chaebol firms relative to non-chaebol firms: $\text{Chaebol}_{i,t}$ is 1 if firm i is a chaebol firm in t and 0 otherwise, $\text{Chaebol}_{i,t} \cdot p(\text{Default})_{i,t+1}$, is the expected default risk of chaebol firm i in period t+1, and 0 for non-chaebol firm i, in period t+1 and $\text{Chaebol} \cdot \text{InterestR}_{i,t}$, is the interest rate of chaebol firm i incurred in period t, and 0 for non-chaebol firm i, in period t.

Again, without specific information about returns to each loan, we use an overall interest rate for all those loans, calculated based on interest expenses paid out to outstanding loans (InterestR) reported in the financial statements of firms, except bonds. For corporate bonds, we use an overall interest rate of bonds, calculated based on interest expenses paid out only for bonds (BondInterestR).

To see overall effects of all firms jointly, we first perform tests, after changing the specification (7) slightly as follows:

$$\_\_\text{ChR}_{i,t} = \beta_0 + \beta_1 \text{Chaebol}_{i,t} + \beta_2\, p(\text{Default})_{i,t+1} \cdot \text{All}_{i,t} + \beta_3\, \text{InterestR}_{i,t} + \beta_4\, \text{Chaebol} \cdot \text{InterestR}_{i,t} + \varepsilon_{i,t} \tag{7a}$$

where "$\text{All}_{i,t}$" denotes all firms in the data set in t, including non-chaebol and chaebol firms. Thus, a quite positive coefficient of $p(\text{Default})_{t+1} \cdot \text{All}_t$ indicates the existence of SBC in t. We report the results from this specification only for the interactive term with the test results using (7).

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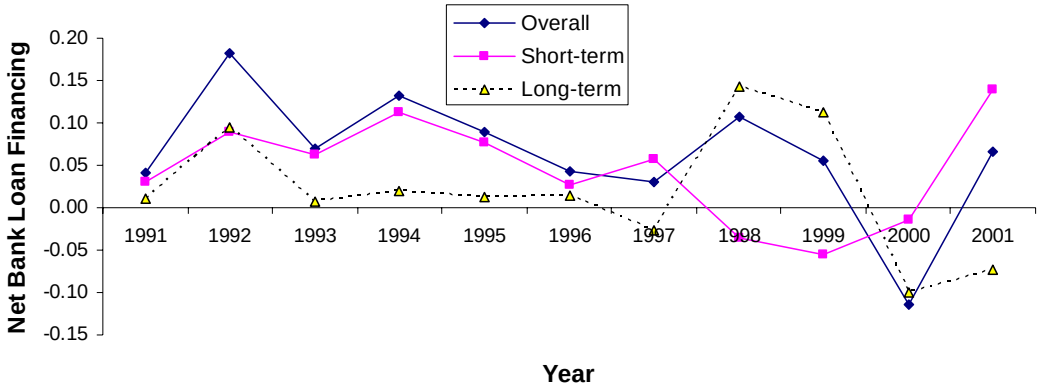
[14] Banks might use duration models for defaults as in Gross and Souleles (1998) in estimating personal bankruptcy and delinquency empirically in the credit card market in the United States.

Figure 6 presents the coefficients of $p(Default)_{t+1} \cdot All_t$ for all firms over time. Persistently positive coefficients of the variable in most years before the crisis, and in some cases during and after the crisis might suggest some evidence of SBC, in overall, short-term and long-term bank loan financing before the crisis, and possibly afterwards. While higher default risks had positive effects on both short-term and long-term bank loans had been higher before the crisis, their effects from 1997 are mixed in direction.

Figure 6: The Effects of Default Risk on Bank Loan Financing



The test results in Table 22 provide the effects of default risks for all firms, including non-chaebol firms and chaebol firms.[15] First, let's see their effects on all firms based on the coefficients of $p(Default)_{t+1} \cdot All_t$. From the table, we can conclude that firms in general financed quite more in bank loans before and during the crisis, with higher default risks. It was almost similar in the cases of short-term loans (SRBLChR) and long-term loans (LRBLChR). Only after the crisis starting from 1999, there existed no substantial differences in bank loan financing by high risk firms and low risk firms. The effect of default risks of non-chaebol firms are reflected in the coefficients of $p(Default)_{t+1}$. We also can see that much more bank loan financing (BLChR), both in short-term loans and long-term loans, was provided to non-chaebol firms with higher expected default risks, $p(Default)_{t+1}$, than those with lower default risk firms both before the crisis and during the crisis. After the crisis, high risk non-chaebol firms financed a lot more in short-term loans, but less in long-term loans, than low risk firms.

Tests implemented separately for each year during the whole period also provide a clear evidence of severe SBC in most years before the crisis in bank loans both in short -term loans and long-term loans. We see a strong evidence of SBC in long-term loans during 1998-1999, and in short-term loan in 1997 and 2001. Thus, we can conclude that substantial *ex ante* SBC in bank loan financing existed in Korea before the crisis both in short-term loans and long-term loans, and persisted in some cases even after the

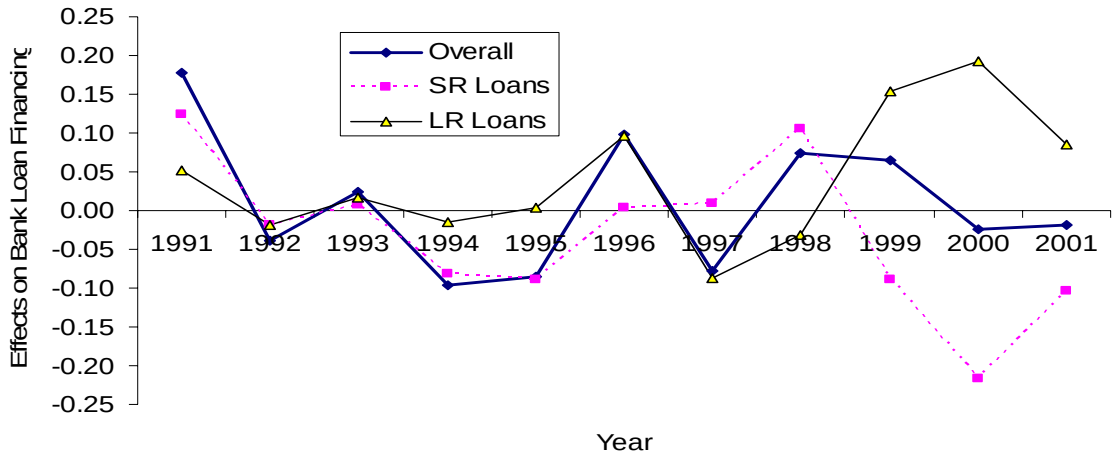
[15] In Appendix A, we can reconfirm our test results regarding the existence of SBC in bank loans, with a default model using firms defaulted since 1999, as in the default model using firms defaulted since 1997.

crisis.

The relationship between corporate bank-loan financing (BLChR) and interest expenses (InterestR) was significantly positive before and after the crisis, as expected, both in short-term loans and in long-term loans. It was significantly positive only for short-term loans during the crisis, but not different from 0 for long-tem loans. This might imply that banks considered interest revenues more than default risks of borrowing firms, especially before the crisis.

Now, consider the effects of chaebol firms on financing and their interest expenses in financing. The additional effects of chaebol firms on bank loan financing are reflected in the coefficients of $Chaebol_t \cdot p(Default)_{t+1,}$ relative to non-chaebol firms. Figure 7 shows the marginal effect of being chaebol firms, or the coefficient of the interactive term, $Chaebol_{i,t} \cdot p(Default)_{i,t+1,}$ for each year. It appears that chaebol firms obtained more bank loan financing than non-chaebol firms and in 1991, 1993, and 1996, 1998 and 1999, in 1991, 1993, and 1996-1998 in short-term loans, and in 1991, 1993, 1995, 1996, and 1999-2001 in long-term loans. Thus, it is not clear to determine whether chaebol firms obtained more bank loans than non-chaebol firms.

Figure 7: Additional Effects of Chaebol Firms on Bank Loan Financing



Based on the formal test results, we can conclude that chaebol firms financed a lot more long-term bank loans than non-chaebol firms both before and after the crisis, but somewhat less during the crisis, while they financed short-term bank loans a lot more during the crisis, a lot less after the crisis. From Table 8 (5. B.), we can conclude that chaebols financed a lot more in 1999 and 2000, but less in 1997 in the case of long-term bank loans, and more in 1998 but less in 2000 in the case of short-term bank loans. Chaebol firms financed a lot more long-term bank loans than non-chaebol firms during the whole period.

Another interesting aspect of chaebol financing is whether they had special treatments from banks in their interest rates. From the specification, we know a significantly negative value for the coefficient value of Chaebol·InterestR implies that chaebol firms might have had substantial benefits from banks in

terms of interests. From the table, we can see that chaebol firms financed both short-term and long-term bank loans at a much lower interest rate than non-chaebol firms before the crisis, while they financed at a much higher interest rate than non-chaebol firms after the crisis. During the whole period, chaebol firms in sum paid lower interest rates than non-chaebol firms for long-term bank loans. Thus, we can infer that chaebol firms financed a lot more bank loans, while paying less interest expenses, than non-chaebol firms, especially in the form of long-term bank loans.[16]

Table 8: The *Ex Ante* SBC in Bank Loans

1. Before the Crisis: Year 1991–Year 1996

Dependent Var.:	$BLChR_t$	$SRBLChR_t$	$LRBLChR_t$
Observations	3483	3483	3483
Adjusted R^2	0.0882	0.0727	0.0175
Independent Var.:	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)
$p(Default)_{t+1} \cdot All$	0.090(0.000)	0.063(0.000)	0.027(0.000)
$p(Default)_{t+1}$	0.084(0.000)	0.065(0.000)	0.018(0.003)
$Chaebol_t \cdot p(Default)_{t+1}$	0.020(0.160)	-0.007(0.339)	0.027(0.011)
$InterestR_t$	1.261(0.000)	0.945(0.000)	0.316(0.000)
$Chaebol \cdot InterestR_t$	-0.474(0.008)	-0.147(0.184)	-0.327(0.002)
$Chaebol_t$	0.024(0.059)	0.014(0.136)	0.010(0.140)
Constant	-0.063(0.000)	-0.046(0.000)	-0.017(0.000)

2. During the Crisis: Year 1997–Year 1998

Dependent Var.:	$BLChR_t$	$SRBLChR_t$	$LRBLChR_t$
Observations	1077	1077	1077
Adjusted R^2	0.1117	0.0927	0.0237
Independent Var.:	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)
$p(Default)_{t+1} \cdot All$	0.137(0.000)	0.067(0.000)	0.069(0.000)
$p(Default)_{t+1}$	0.114(0.000)	0.031(0.085)	0.083(0.000)
$Chaebol_t \cdot p(Default)_{t+1}$	0.070(0.052)	0.110(0.003)	-0.040(0.084)

[16] In Appendix 1, we also obtained test results suggesting the existence of SBC before the crisis, more severely in loans to chaebol firms before the crisis, with a default model using firms defaulted since 1999, as in the default model using firms defaulted since 1997.

$InterestR_t$	0.610(0.002)	0.672(0.000)	-0.062(0.323)
$Chaebol \cdot InterestR_t$	1.383(0.000)	1.353(0.000)	0.029(0.451)
$Chaebol_t$	-0.144(0.000)	-0.156(0.000)	0.012(0.308)
Constant	-0.062(0.001)	-0.064(0.000)	0.001(0.451)

3. After the Crisis: Year 1999–Year 2001

Dependent Var.:	$BLChR_t$	$SRBLChR_t$	$LRBLChR_t$
Observations	1766	1766	1766
Adjusted R^2	0.0191	0.0274	0.0111
Independent Var.:	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)
$p(Default)_{t+1} \cdot All$	-0.007(0.370)	0.018(0.135)	-0.026(0.084)
$p(Default)_{t+1}$	-0.007(0.394)	0.058(0.002)	-0.065(0.001)
$Chaebol_t \cdot p(Default)_{t+1}$	-0.001(0.489)	-0.149(0.000)	0.148(0.014)
$InterestR_t$	0.992(0.000)	0.455(0.001)	0.537(0.001)
$Chaebol \cdot InterestR_t$	-0.151(0.351)	0.286(0.163)	-0.437(0.089)
$Chaebol_t$	-0.002(0.467)	-0.018(0.176)	0.016(0.234)
Constant	-0.094(0.000)	-0.057(0.000)	-0.038(0.000)

4. The Whole Period: Year 1991–Year 2001

Dependent Var.:	$BLChR_t$	$SRBLChR_t$	$LRBLChR_t$
Observations	6326	6326	6326
Adjusted R^2	0.0766	0.0609	0.0134
Independent Var.:	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)
$p(Default)_{t+1} \cdot All$	0.115(0.000)	0.085(0.000)	0.031(0.000)
$p(Default)_{t+1}$	0.099(0.000)	0.078(0.000)	0.021(0.001)
$Chaebol_t \cdot p(Default)_{t+1}$	0.048(0.002)	0.020(0.072)	0.028(0.009)
$InterestR_t$	0.905(0.000)	0.596(0.000)	0.309(0.000)
$Chaebol \cdot InterestR_t$	-0.014(0.464)	0.204(0.055)	-0.218(0.023)
$Chaebol_t$	-0.019(0.065)	-0.028(0.003)	-0.009(0.139)
Constant	-0.069(0.000)	-0.047(0.000)	-0.022(0.000)

5. By the Year

A. The Effect of p(Default): For All Firms

Independent Var.: $p(Default)_{t+1} \cdot All$

Dependent Var.:	$BLChR_t$	$SRBLChR_t$	$LRBLChR_t$

Year	Observations	Coeff.(p-value)		Coeff.(p-value)		Coeff.(p-value)	
1991	553	0.041	(0.098)	0.030	(0.129)	0.011	(0.289)
1992	573	0.183	(0.000)	0.090	(0.000)	0.094	(0.000)
1993	567	0.070	(0.000)	0.062	(0.000)	0.008	(0.143)
1994	582	0.132	(0.000)	0.112	(0.000)	0.020	(0.034)
1995	597	0.089	(0.000)	0.076	(0.000)	0.013	(0.069)
1996	611	0.042	(0.020)	0.027	(0.075)	0.015	(0.163)
1997	471	0.031	(0.170)	0.057	(0.024)	-0.026	(0.027)
1998	606	0.107	(0.000)	-0.036	(0.064)	0.143	(0.000)
1999	594	0.056	(0.064)	-0.056	(0.018)	0.112	(0.001)
2000	602	-0.115	(0.001)	-0.015	(0.287)	-0.100	(0.000)
2001	570	0.066	(0.081)	0.139	(0.000)	-0.073	(0.022)

B. The Additional Effect of Chaebol Firms

Independent Var.: Chaebol·p(Default)$_{t+1}$

Dependent Var.:		BLChR$_t$		SRBLChR$_t$		LRBLChR$_t$	
Year	Observations	Coeff.(p-value)		Coeff.(p-value)		Coeff.(p-value)	
1991	553	0.177	(0.004)	0.125	(0.013)	0.052	(0.104)
1992	573	-0.038	(0.268)	-0.019	(0.345)	-0.019	(0.283)
1993	567	0.025	(0.234)	0.008	(0.393)	0.017	(0.155)
1994	582	-0.097	(0.010)	-0.082	(0.007)	-0.014	(0.267)
1995	597	-0.085	(0.014)	-0.089	(0.004)	0.003	(0.430)
1996	611	0.099	(0.015)	0.003	(0.469)	0.096	(0.003)
1997	471	-0.077	(0.135)	0.010	(0.435)	-0.087	(0.001)
1998	606	0.074	(0.089)	0.105	(0.021)	-0.031	(0.261)
1999	594	0.064	(0.225)	-0.088	(0.074)	0.153	(0.028)
2000	602	-0.024	(0.372)	-0.216	(0.000)	0.192	(0.001)
2001	570	-0.018	(0.439)	-0.104	(0.086)	0.086	(0.164)

Note: 1. P-values are for one-tailed tests. The probability greater than F-value is 0 for all models.

2. The estimates for Chaebol·p(Default)$_{t+1}$, are from the specification in (7a) for all firms combined.

To investigate formally whether there were some improvements of SBC *ex ante* in bank loan financing After the crisis, compared to the pre-crisis period, we formally test the difference in coefficients After the crisis using the following specification:

$$BLChR_{i,t} = \beta_0 + \beta_1 Post_{i,t} + \beta_2\, p(Default)_{i,t+1} + \beta_3 Post_{i,t} \cdot p(Default)_{i,t+1} + \beta_4\, InterestR_{i,t} + \beta_5\, Post \cdot InterestR_{i,t} + \varepsilon_{i,t} \quad (7b)$$

where $Post_{i,t}$, a dummy variable, is 1 for a year in 1999-2001, and 0 otherwise for firm i. The interactive term, $Post_{i,t} \cdot p(Default)_{i,t+1}$ denotes the predicted default risk of firm i in t+1 for the period, while $Post \cdot InterestR_{i,t}$ is the average interest rate paid on loans of firm *i* in *t* for the period after the crisis, if $Post_{i,t} = 1$ or before the crisis otherwise. Those interactive terms denote the differences in coefficients of corresponding variables in the post-crisis period from the pre-crisis period. We report the test results for non-chaebol firms in Table 9.

Table 9: Changes in Non-Chaebol Firms' Bank Loan Financing After the Crisis

Dependent Var.:	$BLChR_t$	$SRBLChR_t$	$LRBLChR_t$
Observations	4524	4524	4524
Adjusted R^2	0.0842	0.0634	0.0278
Independent Var.:	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)
$p(Default)_{t+1}$	0.097(0.000)	0.065(0.000)	0.032(0.000)
$Post_t \cdot p(Default)_{t+1}$	-0.104(0.000)	-0.007(0.360)	-0.097(0.000)
$InterestR_t$	0.900(0.000)	0.641(0.000)	0.259(0.000)
$Post \cdot InterestR_t$	0.092(0.315)	-0.186(0.109)	0.278(0.022)
$Post_t$	-0.041(0.001)	-0.020(0.026)	-0.021(0.012)
Constant	-0.053(0.000)	-0.037(0.000)	-0.016(0.003)

Note: 1. P-values in the parentheses are for one-tailed tests.

2. The probability greater than F-value is 0 for all models.

3. Post is the dummy variable for the period of 1999-2001, compared to the period of 1991-1996.

The significantly negative slope coefficients of predicted default risks and the constants ($Post_t \cdot p(Default)_{t+1}$, and $Post_t$) suggest that bank financing became quite tougher for non-chaebol firms with higher default risks after the crisis than before the crisis, especially in long-term financing. The significantly positive slope coefficients of interest rates for long-term loans during the post-crisis period ($Post_t \cdot InterestR_t$) suggest that firms had to pay higher interest rates after the crisis than before. Thus, we conclude that banks became much tougher against low quality firms after the crisis than before.

3.3. Effects of SBC on Profitability

We test the relationship between a financing related variable as a regressor, and profits of firms to examine whether SBC causes adverse effects on credit allocations by aggravating the profitability of firms in market economies. If the relationship is negative, the profitability of SBC firms financed with loans is lower than that of non-SBC firms. We expect SBC loans to have negative effects on profitability for SBC firms. Otherwise, as in the case of transition economies, the existence of SBC is not a matter of concern in market economies. For comparisons, we will examine the effects of loans on profitability of firms before and after the crisis for high risk firms and low risk firms.

3.3.1. Profitability of Bank Loans to SBC Firms

In this section, we investigate the effects of bank loans to soft budget constrained firms on their profitability and cash flows measured by net cash inflows from operating activities (OCFR). OCFR is a more pertinent concept in measuring the profitability of firms, than earnings before income taxes (EBTR) or earnings after income taxes (EATR). Thus, the specification of models for SBC firms is as follows:

$$\begin{aligned} OCFR_{i,t+1} = {} & \beta_0 + \beta_1 Chaebol_{i,t} + \beta_2 OCFR_{i,t} + \beta_3 Chaebol \cdot OCFR_{i,t} \\ & + \beta_4 BLChR_{i,t} + \beta_5 Chaebol \cdot BLChR_{i,t} + \varepsilon_{i,t+1} \end{aligned} \quad (8)$$

where OCFR is the ratio of operating cash flows to total assets, BLChR is the ratio of net bank loan financing to total assets, the interactive term, $Chaebol \cdot OCFR_{i,t}$, is the net operating cash flows of chaebol firm i, in period t, and the other interactive term, $Chaebol \cdot BLChR_{i,t}$, is the net bank loan financing of chaebol firm i, in period t. The current-period operating cash flows ($OCFR_t$) are to control for the lagged effect on the profitability of a firm in the following period ($OCFR_{t+1}$). We include only one lagged variable of OCFR for one year. A similar approach was used by Lizal and Svejnar (2002) who included lagged variables up to four quarters. We assume that the effect of lags for two years or more is not quite large.

Similarly as before, to get the overall effects of bank loans to all firms, chaebol and non-chaebol firms jointly, we re-specify (8), by dropping the latter interactive term, $Chaebol \cdot BLChR_{i,t}$, as follows:

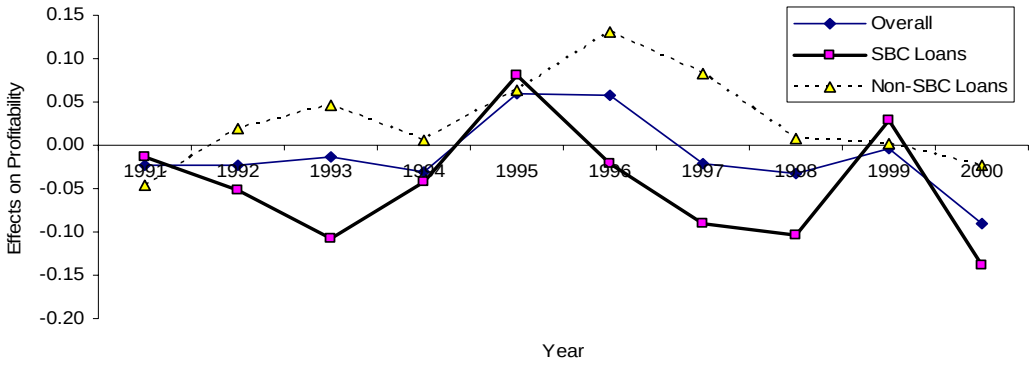
$$\begin{aligned} OCFR_{i,t+1} = {} & \beta_0 + \beta_1 Chaebol_{i,t} + \beta_2 OCFR_{i,t} + \beta_3 Chaebol \cdot OCFR_{i,t} \\ & + \beta_4 BLChR_{i,t} \cdot All_{i,t} + \varepsilon_{i,t+1} \end{aligned} \quad (8a)$$

where $BLChR_{i,t}$. $All_{i,t}$ is the net bank loan financing of firm i, in period t.

In examining the profitability of loans to SBC firms, we define "SBC loans", as additional loans to firms predicted to default with a probability of higher than 50 percent and "non-SBC loans" as additional loans to firms predicted not to default in the following year. The use of 0.5 as a critical value in determining whether the firm is expected to default in the following year is arbitrary, but conventional in the sense that probit models use the value to distinguish "successes" from "failures" in their prediction.

The tests are implemented by separating the whole samples into two groups: SBC loans and non-SBC loans.[17] The former is for bank loans to firms expected to default and the latter is for bank loans to firms expected not to default in the following year. We focus our study on the effect of bank loan financing on the profitability of firms predicted to default in the following year. The year denotes the year of loan-making. We also separate the data set based on the time period (before, during, and after the crisis), and by the year to compare the effects of bank loans on profits of firms. Figure 8 and Table 10 summarize the results of the tests.

Figure 8: The Effects of Bank Loans on Profitability (OCFR)



From Figure 8, we can see that the effect of overall bank loan financing on profitability (OCFR) in the next year was negative in all years, except 1995 and 1996, while they were positive for the majority of years in the case of non-SBC loans, except 1991 and 2000. Most importantly, the effect of bank loan financing by SBC firms was mostly negative each year except in 1995 and 1999. Bank loan financing in 1995 contributed a lot to the performance of firms in 1996, possibly due to improvements in the performance of firms from an average OCFR of 1.4 percent in 1995 to 2.9 percent in 1996.

[17] We use "SBC loans" and "non-SBC loans" interchangeably with "SBC firms" and "non-SBC firms" or "SBC debts" and "non-SBC debts", respectively.

From the test results in Table 10 regarding the effect of bank loan financing of all firms ($All \cdot BLChR_t$), following the specification (8a), we can see that the effect of SBC bank loan financing on profitability was negative, but without statistical significance, while that of non-SBC bank loan financing, and of all bank loans, was significantly positive before the crisis. During the crisis, even though the profitability of overall bank loan financing was somewhat positive, SBC bank loans showed significantly negative effects on profitability. After the crisis, the profitability of overall bank loan financing was significantly negative, mainly due to significantly negative effects of SBC bank loan financing, while non-SBC bank loan no substantial effects on profitability. During the whole sample period, the effect of SBC bank loan financing on corporate performance was significantly negative for SBC loans, but significantly positive for non-SBC loans. In general, bank loan financing by SBC firms resulted in worse performance persistently, while bank loan financing by non-SBC firms resulted in better performance.

Table 10 also provides test results about the additional effects of chaebol financing ($Chaebol \cdot BLChR_t$) as specified in (8), relative to non-chaebol firms. Before the crisis, bank loans made to chaebol firms resulted in quite worse performance, while their effects on SBC and non-SBC loans to chaebol firms, when separately tested, were not statistically significant negative. Quite interestingly, the effects of SBC loans to chaebol firms on their profitability were significantly positive, while the effects of non-SBC loans to chaebol firms were significantly negative, compared to loans to non-chaebol firms during the crisis. However, bank loans to chaebol firms resulted in much poor performance again after the crisis, relative to non-chaebol firms. In sum, loans to chaebol firms affected quite adversely their profitability, regardless of whether they were SBC loans or non-SBC loans. Thus, bank loans to SBC firms resulted in much poor performance in their profitability in the following year, much worse in the case of chaebol firms.

Table 10: Effects of Bank Loan Financing on Profitability

1. Before the Crisis: Year 1991–Year 1996

Groups	SBC Loans	Non-SBC Loans	Overall
Dependent Var.: $OCFR_{t+1}$			
Independent Var.	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)
$All \cdot BLChR_t$	-0.004(0.406)	0.074(0.088)	0.032(0.002)
$OCFR_t$	-0.293(0.000)	-0.159(0.000)	-0.178(0.000)
$Chaebol \cdot OCFR_t$	0.048(0.179)	-0.230(0.000)	-0.111(0.001)
$BLChR_t$	0.008(0.021)	0.088(0.000)	0.049(0.000)
$Chaebol \cdot BLChR_t$	-0.033(0.174)	-0.052(0.088)	-0.054(0.013)
$Chaebol_t$	0.012(0.034)	0.013(0.007)	0.010(0.007)
Constant	0.005(0.107)	-0.002(0.171)	-0.002(0.151)

Observations	1283	2195	3478
Adjusted R^2	0.0896	0.0704	0.0723

2. During the Crisis: Year 1997–Year 1998

Groups	SBC Loans	Non-SBC Loans	Overall
Dependent Var.: $OCFR_{t+1}$			
Independent Var.	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)
$All \cdot BLChR^t$	-0.081(0.008)	-0.074(0.000)	0.032(0.002)
$OCFR_t$	-0.686(0.000)	-0.487(0.000)	-0.543(0.000)
$Chaebol \cdot OCFR_t$	-0.093(0.210)	-0.115(0.070)	-0.148(0.014)
$BLChR_t$	-0.135(0.001)	0.100(0.004)	-0.023(0.200)
$Chaebol \cdot BLChR_t$	0.065(0.024)	-0.182(0.001)	-0.017(0.349)
$Chaebol_t$	-0.002(0.455)	0.004(0.331)	0.005(0.253)
Constant	0.040(0.000)	0.036(0.000)	0.038(0.000)
Observations	328	753	1076
Adjusted R^2	0.3403	0.2524	0.2895

3. After the Crisis: Year 1999–Year 2001

Groups	SBC Loans	Non-SBC Loans	Overall
Dependent Var.: $OCFR_{t+1}$			
Independent Var.	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)
$All \cdot BLChR_t$	-0.113(0.011)	-0.002(0.456)	-0.039(0.009)
$OCFR_t$	-0.818(0.000)	-0.426(0.000)	-0.453(0.000)
$Chaebol \cdot OCFR_t$	-0.869(0.008)	-0.035(0.297)	-0.205(0.002)
$BLChR_t$	-0.042(0.224)	-0.014(0.234)	-0.022(0.124)
$Chaebol \cdot BLChR_t$	-0.275(0.006)	0.053(0.095)	-0.078(0.024)
$Chaebol_t$	0.048(0.069)	0.012(0.062)	0.025(0.002)
Constant	0.014(0.220)	0.023(0.000)	0.024(0.000)
Observations	148	1047	1195
Adjusted R^2	0.3028	0.1997	0.2013

4. The Whole Period: Year 1991–Year 2001

Groups	SBC Loans	Non-SBC Loans	Overall
Dependent Var.: $OCFR_{t+1}$			
Independent Var.	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)

All·BLChR$_t$	-0.055(0.000)	0.040(0.000)	-0.003(0.381)
OCFR$_t$	-0.429(0.000)	-0.270(0.000)	-0.295(0.000)
Chaebol·OCFR$_t$	-0.088(0.043)	-0.205(0.000)	-0.202(0.001)
BLChR$_t$	-0.037(0.022)	0.057(0.000)	0.019(0.031)
Chaebol·BLChR$_t$	-0.053(0.042)	-0.061(0.006)	-0.070(0.000)
Chaebol$_t$	0.020(0.001)	0.013(0.001)	0.015(0.000)
Constant	0.011(0.003)	0.012(0.000)	0.013(0.000)
Observations	1754	3995	5749
Adjusted R^2	0.1652	0.1347	0.1442

By the Year: Indep. Var: All·BLChR$_t$

Year	Obs.	Coeff.	(p-value)	Obs.	Coeff.	(p-value)	Obs.	Coeff.	(p-value)
1991	196	-0.014	(0.235)	355	-0.046	(0.050)	551	-0.023	(0.077)
1992	221	-0.052	(0.101)	361	0.020	(0.230)	572	-0.024	(0.149)
1993	200	-0.107	(0.051)	366	0.047	(0.171)	566	-0.013	(0.369)
1994	193	-0.042	(0.139)	389	0.005	(0.463)	582	-0.031	(0.138)
1995	236	0.080	(0.069)	360	0.063	(0.056)	596	0.059	(0.030)
1996	247	-0.022	(0.280)	364	0.131	(0.005)	611	0.057	(0.023)
1997	190	-0.090	(0.022)	280	0.083	(0.073)	470	-0.021	(0.271)
1998	133	-0.103	(0.028)	473	0.007	(0.425)	606	-0.033	(0.121)
1999	59	0.028	(0.269)	535	0.001	(0.487)	594	-0.003	(0.434)
2000	89	-0.139	(0.029)	512	-0.023	(0.179)	601	-0.091	(0.001)

Note: 1. P-values are for one-tailed tests. The probability greater than F-value is 0 for all models.

2. The estimates for the coefficients of p(Default)t+1·Allt are from tests using the specification in (8a).

As before, we formally test whether there existed differences in the effects of bank loans to SBC firms (SBC bank loans) and non-SBC firms (non-SBC bank loans) on the profitability of firms, using the following specification:

$$OCFR_{i,t+1} = \beta_0 + \beta_1 SBC_{i,t} + \beta_2 OCFR_{i,t} + \beta_3 SBC \cdot OCFR_{i,t} + \beta_4 BLChR_{i,t} + \beta_5 SBC \cdot BLChR_{i,t} + \varepsilon_{i,t+1} \quad (9)$$

where $SBC_{i,t}$ is equal to 1, if the expected default risk of firm i in t is greater than 0.5, or 0 otherwise, and

where $SBC \cdot OCFR_{i,t}$ and $SBC \cdot BLChR_{i,t}$ are to denote net operating cash flows and bank loan financing of SBC firm i in t respectively. If the coefficient of the latter interactive term is significantly negative, we conclude that SBC bank loans had large adverse effects on profitability, relative to non-SBC bank loans. Based on Table 11, we conclude that SBC bank loans had adverse effects on profitability, relative to non-SBC bank loans before, during, and after the crisis.

Table 11: Differences in Profitability between SBC and Non-SBC Bank Loans

	Before the Crisis	During the Crisis	After the Crisis	Whole Period
Observations	3478	1076	1195	5749
Adjusted R^2	0.0768	0.3041	0.1970	0.1440
Dependent Variable: OCFRt+1				
Independent Var.:	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)
OCFRt	-0.163(0.000)	-0.520(0.000)	-0.476(0.000)	-0.302(0.000)
SBC·OCFRt	-0.128(0.000)	-0.295(0.000)	-0.180(0.025)	-0.156(0.000)
BLChRt	0.072(0.000)	0.028(0.180)	-0.005(0.411)	0.043(0.000)
SBC·BLChRt	-0.076(0.001)	-0.128(0.002)	-0.092(0.003)	-0.090(0.000)
SBCt	0.006(0.049)	-0.016(0.033)	-0.005(0.302)	0.002(0.318)
Constant	-0.003(0.097)	0.041(0.000)	0.030(0.000)	0.015(0.000)

Note: 1. P-values in the parentheses are for one-tailed tests.

2. The probability greater than F-value is 0 for all models.

3. SBC is the dummy variable for SBC firms in bank loans.

3.3.2. Robustness of the Tests

3.3.2.1. Different Critical Values for Default

To strengthen the validity of test results in the previous section where we used 0.5 as a critical value to define SBC loans and non-SBC loans, we try some other critical values based on some estimators provided by the default forecasting model. One way is to introduce the concept of confidence interval of the predicted default risks. Given the mean default risk, we assume that firms with predicted default risks one-standard deviation and two-standard deviations higher than the sample mean default risk are likely to default in the following year with 68 percent and 95 percent confidence.

First, using a confidence interval one-standard deviation (0.2831) away from the overall mean default risk of all the samples (0.3171), we define “SBC bank loans” as the loans to firms with predicted default risks of 0.6002 or higher, and “non-SBC bank loans” as the loans to firms with predicted default

risks lower than the value (Model II). Similarly, using a 95 percent confidence interval two-standard deviations (0.5662) away from the overall mean default risk of all the samples (0.3171), we define "SBC bank loans" as the loans to firms with predicted default risks of 0.8833 or higher, and "non-SBC bank loans" as the loans to firms with predicted default risks lower than the value (Model III). From the test results in Table 12 with higher critical values in determining firms expected to default, we do not observe any noticeable differences between models and conclude that our previous tests on profitability of bank loans are robust.

Table 12: Robustness Tests of Profitability with Different Critical Values

1. SBC Loans (Year 1991-Year 2001)

Models	**Model I**	**Model II**	**Model III**
Dependent Var.:$OCFR_{t+1}$			
Independent Var.:	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)
$OCFR_t$	-0.429(0.000)	-0.454(0.000)	-0.453(0.000)
$Chaebol \cdot OCFR_t$	-0.088(0.043)	-0.067(0.122)	-0.185(0.004)
$BLChR_t$	-0.037(0.022)	-0.048(0.009)	-0.063(0.046)
$Chaebol \cdot BLChR_t$	-0.053(0.042)	-0.064(0.035)	-0.178(0.004)
$Chaebol_t$	0.020(0.001)	0.020(0.005)	0.045(0.007)
Constant	0.011(0.003)	0.014(0.002)	0.018(0.067)
Observations	1754	1357	421
Adjusted R^2	0.1652	0.1751	0.1820

2. Non-SBC Loans (Year 1991- Year 2001)

Models	**Model I**	**Model II**	**Model III**
Dependent Var.:$OCFR_{t+1}$			
Independent Var.:	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)
$OCFR_t$	-0.270(0.000)	-0.266(0.000)	-0.282(0.000)
$Chaebol \cdot OCFR_t$	-0.205(0.043)	-0.212(0.000)	-0.171(0.000)
$BLChR_t$	0.057(0.000)	0.052(0.000)	0.035(0.001)
$Chaebol \cdot BLChR_t$	-0.061(0.006)	-0.058(0.005)	-0.040(0.019)
$Chaebol_t$	0.013(0.001)	0.015(0.001)	0.011(0.001)
Constant	0.012(0.000)	0.011(0.000)	0.011(0.000)
Observations	3995	4392	5328
Adjusted R^2	0.1347	0.1313	0.1375

Note: 1. P-values are for one-tailed tests. The probability greater than F-value is 0 for all models.

2. In Model I, SBC loans are when p(Default)> 0.5, while in Model II and III SBC loans are when p(Default)>0.6002 and p(Default) > 0.8833, respectively.

3.3.2.2. With Different Measures of Profitability: EBTR, EATR

As discussed before, the profitability of firms due to additional bank loan financing can be best measured by using net cash flows from operating activities (OCFR). It is because other measurements, like earnings before income taxes (EBT) and after income taxes (EAT), are affected by the effects of non-operating or extraordinary gains or losses as well as income taxes, while gross income, operating income, etc. do not reflect all cash inflows since they are net of depreciation, amortization, etc. as a result of financial accounting practices. It is, however, worthwhile to check the robustness of our previous results using other profit measurements like net income before and after income taxes (EBT and EAT), using the same specification and critical value of p(Default) = 0.5 to distinguish SBC loans from non-SBC loans.

Table 13: Robustness Tests of Profitability with Different Measurements

1. SBC Loans (Year 1991-Year 2001)

Dependent Var.:	$OCFR_{t+1}$	$EBTR_{t+1}$	$EATR_{t+1}$
Independent Var.:	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)
$OCFR_t$	-0.429(0.000)	-0.890(0.000)	-0.934(0.000)
Chaebol·$OCFR_t$	-0.088(0.043)	-0.217(0.004)	-0.209(0.006)
$BLChR_t$	-0.037(0.022)	-0.076(0.024)	-0.074(0.016)
Chaebol·$BLChR_t$	-0.053(0.042)	-0.037(0.267)	-0.044(0.232)
$Chaebol_t$	0.020(0.001)	0.004(0.381)	0.045(0.007)
Constant	0.011(0.003)	0.015(0.028)	0.018(0.067)
Observations	1754	1742	1743
Adjusted R^2	0.1652	0.3277	0.3388

2. Non-SBC Loans (Year 1991-Year 2001)

Dependent Var.:	$OCFR_{t+1}$	$EBTR_{t+1}$	$EATR_{t+1}$
Independent Var.:	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)

Lagged_t	-0.270(0.000)	-0.536(0.000)	-0.616(0.000)
$\text{Chaebol}\cdot\text{Lagged}_t$	-0.205(0.043)	-0.109(0.006)	-0.106(0.008)
BLChR_t	0.057(0.000)	0.070(0.000)	0.058(0.000)
$\text{Chaebol}\cdot\text{BLChR}_t$	-0.061(0.006)	-0.107(0.000)	-0.091(0.001)
Chaebol_t	0.013(0.001)	-0.004(0.163)	-0.004(0.145)
Constant	0.012(0.000)	0.013(0.000)	0.016(0.001)
Observations	3995	3995	3995
Adjusted R^2	0.1347	0.2248	0.2595

Note: 1. P-values are for one-tailed tests.

2. Lagged_t * denotes the lagged variable for each corresponding dependent variable. For example, OCFR_t for OCFR_{t+1}.

The results from the tests are provided in Table 13. From these tests, we can see that the test results on the profitability of bank loans are basically the same as in models with different profit measurements (OCFR, EBTR and EATR), except that the effects of loans to chaebol firms are not significantly negative in the models with EBTR and EATR, while it was significantly negative in the model with OCFR. Models with EBTR and that EATR, with higher adjusted R^2 than the model with OCFR, seem to fit better in ordinary linear regressions. The quite similar test results with other profitability measurements might support our previous conclusion that additional bank loans to firms highly likely to default in Korea had quite severe adverse effects on the profitability of firms, compared to such loans to firms unlikely to default.

4. Conclusion

In this paper, we have formally tested using firm-level data before and after the Korean financial crisis in 1997 and found that there existed substantial SBC in the banking sector before the crisis and the credit allocation during the period was ineffective in generating profits of firms. For the tests on SBC, we first developed probit models to estimate the probability of default of firms ex ante using the data from relatively hard budget constraint periods after the crisis and then test the existence of SBC by estimating the relationship between changes in bank loans and the predicted default risks of firms before the crisis. Considering the special aspects of chaebol firms in the Korean economy, we have compared their effects on SBC and their profitability of bank loans financed through SBC financing, relative to non-chaebol firms and tested whether the worse profitability of loans were mainly due to bank loans,

especially loans to chaebol firms. We have found that chaebol firms had more severe SBC, especially in long-term loans, that they had severely adverse effects on the profitability of loans to SBC firms, compared to non-chaebol firms, and that the significant negative effects of loans to SBC firms on profitability before and during the crisis were mainly due to inefficient use of funds by chaebol firms.

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