

Determinants of Corporate Loans and Bonds before and After
Economic Crisis in Korea: Empirical Study on the Firm-level Data

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경제위기 전후 기업대출시장 및 회사채시장의 결정요인:
미시적 실증연구

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- Key Word: Economic Crisis(경제위기), Corporate Loans Market(기업대출시장), Corporate Bonds Market(회사채시장), Chaebols(재벌)
- JEL code: A9, A8, J3
- Received: 2006. 5. 22 • Referee Process Started: 2006. 5. 23
- Referee Reports Completed: 2006. 7. 4

ABSTRACT

The paper suggests that there has been a shift in the allocation of bank credit from large firms to small firms before and after the economic crisis. The paper also suggests that the improved lending practices of financial institutions, at least partially, contributed to this shift of corporate loans from large firms to small firms.

Comparing the periods before and after the economic crisis also suggests that some important changes occurred to the corporate bond market. The effect of firm size on the corporate bond market differs before and after the economic crisis. Before the crisis, the larger the firms, the more they could borrow in the corporate bond market. However, after the crisis, it is not the case. The following interpretation could be put forward. Before the crisis, investors in the corporate bond market expected that the government would rescue large firms if they face the risk of bankruptcies. However, the collapse of Daewoo Group in 1999 shattered the TBTF (Too Big To Fail) myth of the public. The liquidity crisis of Hyundai Group in 2000-2001 reinforced the disintegration of the TBTF myth.

경제위기 이후 은행 등 금융기관의 기업 규모별 대출분포를 살펴보면 대규모 기업에서 중소기업으로 그 비중이 이동하였음을 알 수 있다. 이러한 현상의 원인 중 하나로 경제위기 이후 진행된 금융구조 개혁으로 금융기관의 대출관행이 개선된 점을 들 수 있다.

경제위기 이후 회사채시장에서도 중요한 변화가 정착되고 있다. 경제위기 이전에는 기업 또는 그룹의 규모 자체가 회사채 조달

에 있어 중요한 결정요인 중 하나였는데, 경제위기 이후 그러한 현상이 사라져가고 있는 것이다. 이는 경제위기 이전에는 소위 “대마불사”의 신화로 일반투자자들이 대규모 재벌의 회사채를 수익성과 관계없이 선호하였으나, 1999년 대우그룹 붕괴 및 2000~2001년 현대그룹 유동성 위기 등으로 그러한 불합리한 믿음이 깨지게 된 것과 밀접한 관련이 있다.

1. Introduction

Using the firm-level data set¹, this paper attempts to examine the dynamic patterns in the allocation of credit across firms in Korea. Supposedly, in Korea, the economic crisis in 1997 had a significant impact on the pattern in the allocation of credit across firms, in particular, across large and small firms.

Corporate financing issues are intimately related to the cause of the Korean crisis. For instance, the chaebols' indebtedness to banks is viewed as having contributed much to the crisis.² Among others, Krueger and Yoo (2001) demonstrate that the chaebols' indebtedness is indeed the chief culprit of the crisis. In this regard, since the outbreak of the financial crisis in 1997, the government has undertaken various reform measures to restructure the financial and corporate sectors³. The new regulatory system is now underway to induce the financial institutions to change their imprudent lending practices, and the capital market began to force the chaebols to correct their incentive structure. Supposedly, these post-crisis developments in Korea have caused the chaebols and financial institutions to change their previously imprudent (borrowing and lending) practices.

The paper suggests that large firms, to some extent, are leaving banks and going to the capital market for their financing after the crisis.⁴ The paper also suggests that small firms are gaining better access to credit by financial institutions after the crisis. There has been a shift in the allocation of bank credit from large firms to small firms. The paper suggests that the improved lending practices of financial institutions, at least partially, contributed to this shift of corporate loans from large firms to small firms.⁵ The paper also suggests the improved practices of the corporate bond market after the economic crisis. For these purposes, the paper attempted to empirically investigate the determinants of corporate loans and bonds.

The firms' affiliation with chaebols was an important (positive) determinant of corporate loans before the crisis whereas it turned out to be the opposite after the crisis. Furthermore, before the economic crisis, given the firms are affiliated with chaebols, the less profitable firms borrowed more from financial institutions. But, after the economic crisis, given the firms are affiliated with chaebols, the more profitable firms borrowed more from financial institutions.

Comparing the periods before and after the economic crisis also suggests that some important changes occurred to the corporate bond market. The effect of firm size on the corporate bond market differs before and after the economic crisis. Before the crisis, the larger the firms, the more they could borrow in the corporate

¹ The data set covers most of the Korean firms except for extra-small ones.

² The failure of chaebols' corporate governance exacerbated the situation. For the failure of chaebols' corporate governance before the crisis, see Joh (2003).

³ Bankruptcy policy reform was one of the essential elements in these structural reforms. Lim (2003a) studies empirically the post-crisis bankruptcy policy reform in Korea.

⁴ Shortly after the crisis, the corporate bond market took off with the weak regulatory infrastructure. This immature expansion led to liquidity crises in 1999 and 2001. See Lim (2002) as well as Oh and Rhee (2002).

⁵ Borensztein and Lee (2002) examine the micro data on Korean listed firms in 1996-1998. They suggest that chaebol-affiliated firms lost the preferential access to credit and that credit was reallocated in favor of more efficient firms.

bond market. However, after the crisis, it is not the case. The following interpretation could be put forward. Before the crisis, investors in the corporate bond market expected that the government would rescue large firms if they face the risk of bankruptcies. However, the collapse of Daewoo Group in 1999 shattered the TBTF (Too Big To Fail) myth of the public. The liquidity crisis of Hyundai Group in 2000-2001 reinforced the disintegration of the TBTF myth.

This paper is organized as follows. Section 2 explains the firm-level data. In Section 3, we examine the dynamic patterns in the allocation of credit across firms by comparing empirical distributions before and after the economic crisis. In Section 4, we look for the possible determinants of corporate loans and bonds before and after the economic crisis. Section 5 concludes the paper.

2. The Firm-level Data

This study uses detailed financial information on the firms that have external audit reports. According to the Act on External Audit of Joint-Stock Corporations, a firm with assets of 7 billion won or more must issue audited financial statements. The data thus include all the firms with assets of 7 billion won or more. The total number of firms in the data is about 11,000.

The Financial Supervisory Commission is responsible for establishing accounting and auditing standards and the Securities and Futures Commission is then responsible for the review of the audited financial statements issued by firms. Finally, the National Information and Credit Evaluation, Inc. (NICE) coded this public information into their database after checking the consistency of the reported financial statements. The NICE data make us to construct the firms' borrowings from all the financial institutions put together, but not the firms' borrowings from each financial institution.

<Table 1-1> presents summary statistics (mean, median, minimum, maximum, standard deviation) for the key variables in the empirical analysis. It divides the sample period into the four sub-periods around the crisis: 1992-1996 (before the crisis), 1997-1998 (during the crisis), 1999-2001 (after the crisis I), and 2002-2005 (after the crisis II). During the period of 1999-2001, liquidity crises continued to afflict the financial market as shown both in the collapse of Daewoo Group in 1999 and in the financial distress of Hyundai Group in 2000-2001. Hence we divided the post-crisis period into the two sub-periods. Profitability is measured by the EBIT (Earnings before Interest and Tax Payment) divided by total assets.

The financing pattern varies according to the size of firms. For example, the loans' share in total asset varies according to the size of firms. For this reason, we first divide all individual firms into ten groups based on the distribution of asset size, and then select three representative size cohorts for presenting the empirical results. We employ the following three size cohorts: (1) the largest firms (top 10% in asset size)⁶, (2) the medium-sized firms (middle 10% in asset size), and (3) the smallest

⁶ For the case of large firms, we present the results using this particular cohort, but defining the largest firms differently such as the top 1%, or the top 5%, does not change the qualitative results.

<Table 1-1> Summary Statistics of Firm-level Data

		(million won)			
		1992~1996	1997~1998	1999~2001	2002~2005
	N	28,189	15,069	32,349	52,159
ASSET	MEAN	61,832.3	98,940.1	88,817.9	100,983.8
	MEDIAN	8,474.3	11,460.4	11,573.9	17,586.2
	STD	473,180.1	866,687.8	882,797.3	976,202.6
	MIN	2.8360	2.6550	0.0840	0.0415
	MAX	32,026,789.1	49,083,094.2	64,529,738.4	68,898,808.3
FIXED ASSET	MEAN	35,257.7	60,041.5	57,829.7	62,547.2
	MEDIAN	3,937.9	5,144.9	4,844.8	7,208.5
	STD	359,035.2	669,577.0	742,819.1	769,501.2
	MIN	0.0000	0.0000	0.0149	-465.9013
	MAX	30,023,935.3	46,474,112.6	61,721,821.7	65,627,908.0
LIABILITIES	MEAN	45,441.5	75,652.0	59,588.3	59,641.4
	MEDIAN	6,232.6	8,131.7	7,030.7	10,978.5
	STD	307,985.1	621,355.7	563,712.1	490,884.5
	MIN	0.0036	0.0000	-9.0810	-25.9839
	MAX	16,935,173.4	31,223,840.0	33,582,612.1	24,591,864.2
LOAN	MEAN	23,451.4	39,033.8	23,766.1	22,164.3
	MEDIAN	3,216.2	4,588.9	3,338.8	5,794.9
	STD	135,646.2	266,406.6	196,967.6	172,837.2
	MIN	0.0000	-4,531.3135	-340.0000	-99.6915
	MAX	5,490,033.4	8,859,246.3	15,110,408.4	12,116,021.7
BOND	MEAN	32,943.6	97,724.4	121,553.8	97,010.3
	MEDIAN	3,562.6	4,970.0	6,204.5	4,355.0
	STD	167,293.2	559,397.5	634,613.5	540,736.3
	MIN	-93.0659	0.0000	0.0000	-7.3016
	MAX	5,822,790.6	15,640,749.4	17,593,664.3	10,860,654.8
EBIT	MEAN	4,368.6	4,415.4	4,625.5	8,622.3
	MEDIAN	556.8	673.5	884.5	1,021.4
	STD	37,243.6	74,808.7	166,128.4	156,567.1
	MIN	-247,334.6	-5,885,988.2	-17,239,034.1	-4,466,470.9
	MAX	2,882,958.7	2,400,227.7	8,443,815.7	18,657,308.0

firms (bottom 10% in asset size).

For the three size cohorts, <Table 1-2-1> to <Table 1-2-6> provides summary statistics (mean, median, minimum, maximum, standard deviation) for the key variables in the empirical analysis. It also divides the sample period into the four sub-periods around the crisis.

<Table 1-2-1> Summary Statistics for the Three size Cohorts in Firm-level Data: Asset

	(million won)											
	Large Firms (Top 10% in asset size)				Medium-sized Firms (Middle 10% in asset size)				Small Firms (Bottom 10% in asset size)			
	1992~1996	1997~1998	1999~2001	2002~2005	1992~1996	1997~1998	1999~2001	2002~2005	1992~1996	1997~1998	1999~2001	2002~2005
N	2,817	1,506	3,234	5,214	2,820	1,507	3,234	5,216	2,823	1,507	3,237	5,218
MEAN	506,549.0	839,832.6	742,003.8	798,033.1	10,058.6	13,338.7	13,379.5	20,175.9	1,139.0	1,244.6	1,538.0	4,847.3
MEDIAN	154,008.3	216,359.5	189,134.4	213,897.2	10,159.7	13,242.1	13,340.9	19,953.5	1,117.8	1,219.6	1,490.0	5,042.5
STD	1,421,158.3	2,628,164.0	2,705,726.7	2,998,483.6	2,062.4	1,275.0	1,499.5	3,189.7	618.4	758.8	924.8	2,479.5
MIN	53,389.7	89,887.7	82,017.8	90,827.9	6,386.0	11,089.2	10,382.8	14,576.5	2,836.0	2,655.0	0,084.0	0,041.5
MAX	32,026,789.1	49,083,094.2	64,529,738.4	68,898,808.3	14,312.4	16,164.5	16,759.1	27,425.5	2,582.3	2,657.0	3,652.6	8,823.1

<Table 1-2-2> Summary Statistics for the Three size Cohorts in Firm-level Data: Fixed Asset

	(million won)											
	Large Firms (Top 10% in asset size)				Medium-sized Firms (Middle 10% in asset size)				Small Firms (Bottom 10% in asset size)			
	1992~1996	1997~1998	1999~2001	2002~2005	1992~1996	1997~1998	1999~2001	2002~2005	1992~1996	1997~1998	1999~2001	2002~2005
N	2,817	1,506	3,234	5,212	2,820	1,507	3,234	5,211	2,818	1,501	3,229	5,189
MEAN	297,092.8	524,583.7	507,872.7	528,619.1	5,012.7	6,443.1	6,242.1	8,853.8	472.0	486.4	588.1	2,061.6
MEDIAN	78,565.2	114,766.7	104,039.8	117,635.7	4,750.1	6,300.9	6,110.8	8,517.2	350.3	310.0	397.5	1,517.2
STD	1,101,505.3	2,060,534.0	2,300,441.7	2,382,458.3	2,568.3	3,310.0	3,575.1	5,806.5	416.0	469.6	570.0	1,914.6
MIN	937.2	1,345.0	15.9	0.7	0.0	0.0	0.2	0.2	0.4130	0.0000	0.0149	0.0124
MAX	30,023,935.3	46,474,112.6	61,721,821.7	65,627,908.0	13,882.9	15,512.7	16,392.9	27,398.2	4,804.6	2,556.6	3,384.5	8,789.4

<Table 1-2-3> Summary Statistics for the Three size Cohorts in Firm-level Data: Liabilities

	(million won)											
	Large Firms (Top 10% in asset size)				Medium-sized Firms (Middle 10% in asset size)				Small Firms (Bottom 10% in asset size)			
	1992~1996	1997~1998	1999~2001	2002~2005	1992~1996	1997~1998	1999~2001	2002~2005	1992~1996	1997~1998	1999~2001	2002~2005
N	2,817	1,506	3,234	5,214	2,820	1,507	3,234	5,216	2,808	1,486	3,185	5,192
MEAN	369,153.2	642,315.8	498,828.7	447,958.4	7,572.2	9,845.0	8,784.2	13,178.0	831.1	911.2	915.9	3,852.8
MEDIAN	118,273.7	165,475.3	118,619.5	123,829.7	7,263.1	9,757.0	8,589.6	12,846.8	756.1	825.8	783.1	2,981.6
STD	911,710.4	1,870,792.5	1,719,506.1	1,448,569.0	2,833.9	4,431.7	4,863.1	7,242.4	581.8	694.6	776.3	7,989.1
MIN	191.2	1,024.1	122.1	13.3	21.5	0.8	0.5	2.4	0.0036	0.0000	-9.0810	-25.9839
MAX	16,935,173.4	31,223,840.0	33,582,612.1	24,591,864.2	33,705.5	81,445.4	109,964.8	129,198.9	6,274.4	10,135.4	7,469.7	512,622.0

<Table 1-2-4> Summary Statistics for the Three size Cohorts in Firm-level Data: Loan

	(million won)											
	Large Firms (Top 10% in asset size)				Medium-sized Firms (Middle 10% in asset size)				Small Firms (Bottom 10% in asset size)			
	1992~1996	1997~1998	1999~2001	2002~2005	1992~1996	1997~1998	1999~2001	2002~2005	1992~1996	1997~1998	1999~2001	2002~2005
N	2,745	1,463	2,955	4,346	2,497	1,328	2,815	4,393	1,181	615	1,819	3,791
MEAN	152,616.4	254,940.9	165,858.1	136,596.6	3,200.4	4,425.7	4,213.2	7,228.5	403.6	484.4	533.8	2,348.2
MEDIAN	49,326.3	69,601.7	43,530.0	47,682.2	2,932.2	4,042.1	3,728.2	6,396.0	286.0	349.3	393.3	1,535.2
STD	354,273.1	702,208.2	561,235.3	479,591.8	2,125.0	3,801.0	3,874.1	5,937.0	402.0	538.0	508.8	2,750.0
MIN	7.4	114.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0043	0.1446	-340.0000	0.0470
MAX	5,490,033.4	8,859,246.3	15,110,408.4	12,116,021.7	24,135.6	74,452.9	106,349.4	126,063.5	5,501.6	8,560.9	5,495.4	35,294.6

<Table 1-2-5> Summary Statistics for the Three size Cohorts in Firm-level Data: Bond

	(million won)											
	Large Firms (Top 10% in asset size)				Medium-sized Firms (Middle 10% in asset size)				Small Firms (Bottom 10% in asset size)			
	1992~1996	1997~1998	1999~2001	2002~2005	1992~1996	1997~1998	1999~2001	2002~2005	1992~1996	1997~1998	1999~2001	2002~2005
N	2,028	1,070	1,573	1,856	476	205	153	403	22	10	75	339
MEAN	91,669.7	245,841.3	264,694.0	278,372.1	981.0	1,545.2	1,853.7	3,114.8	253.5	293.3	563.1	1,586.5
MEDIAN	23,697.9	39,311.0	38,589.9	39,242.5	782.5	939.0	990.7	2,285.7	82.5	154.1	512.3	1,114.5
STD	278,681.0	879,497.2	925,603.4	882,445.0	775.7	1,652.8	2,029.8	2,758.5	411.1	369.6	417.3	2,923.3
MIN	42.7	73.7	0.0	-7.3	0.0	0.0	0.0	0.8	18.2850	0.8376	0.0000	7.0524
MAX	5,822,790.6	15,640,749.4	17,593,664.3	10,860,654.8	4,397.5	9,141.5	10,544.7	24,144.5	1,708.0	1,192.8	1,966.5	49,071.9

<Table 1-2-6> Summary Statistics for the Three size Cohorts in Firm-level Data: EBIT

	(million won)											
	Large Firms (Top 10% in asset size)				Medium-sized Firms (Middle 10% in asset size)				Small Firms (Bottom 10% in asset size)			
	1992~1996	1997~1998	1999~2001	2002~2005	1992~1996	1997~1998	1999~2001	2002~2005	1992~1996	1997~1998	1999~2001	2002~2005
N	2,817	1,505	3,193	5,209	2,819	1,504	3,112	5,203	2,601	1,270	2,287	4,828
MEAN	34,395.4	33,960.8	29,822.7	71,755.7	772.1	961.8	1,046.9	1,243.0	80.5	71.5	8.2	-207.3
MEDIAN	10,931.0	11,091.4	11,725.2	15,048.3	710.6	926.8	940.8	1,164.1	66.0	58.7	30.9	125.7
STD	111,413.2	228,388.7	488,327.8	485,980.2	913.2	1,502.1	1,726.8	3,229.6	148.9	283.3	413.8	3,148.0
MIN	-247,334.6	-5,885,988.2	-17,239,034.1	-4,466,470.9	-9,209.1	-11,066.6	-20,796.2	-43,435.9	-1,519.0	-5,473.8	-6,244.9	-61,929.9
MAX	2,882,958.7	2,400,227.7	8,443,815.7	18,657,308.0	12,149.4	14,766.3	21,296.8	71,472.5	1,587.3	1,779.4	3,152.9	122,033.7

The statistics in <Table 1-2>'s present a different picture compared to the one in <Table 1-1>. The aggregate numbers in <Table 1-1> do not fully capture the changes in the financing pattern experienced by heterogeneous firms during the sample period. For instance, profitability evolves differently according to size groups. During the period of 1992-2001, profitability worsens for large and small firms whereas it rebounds for medium-sized firms. On the other hand, during the period of 2002-2005, profitability worsens only for small firms whereas it rebounds for large firms. While the share of loans in asset decreases for large firms, the opposite is the case for the other groups.

3. Dynamic Patterns in the Allocation of Credit across Large and Small Firms: Loans and Bonds

In Section 2, the summary statistics of key variables hint that the heterogeneity of firms is important in understanding the evolution of corporate borrowing patterns after the crisis. The sample means of key variables hint the following pattern around the crisis: the largest firms are leaving financial institutions and switching directly to the financial markets for their financing, whereas the small- and medium-sized firms are increasing their dependency on financial institutions for financing. The empirical distributions of key variables show this point more clearly. The empirical distributions have different shapes according to the size of firms and evolve differently after the crisis. In this section, we present the result from comparing the empirical distributions of key variables before and after the crisis.

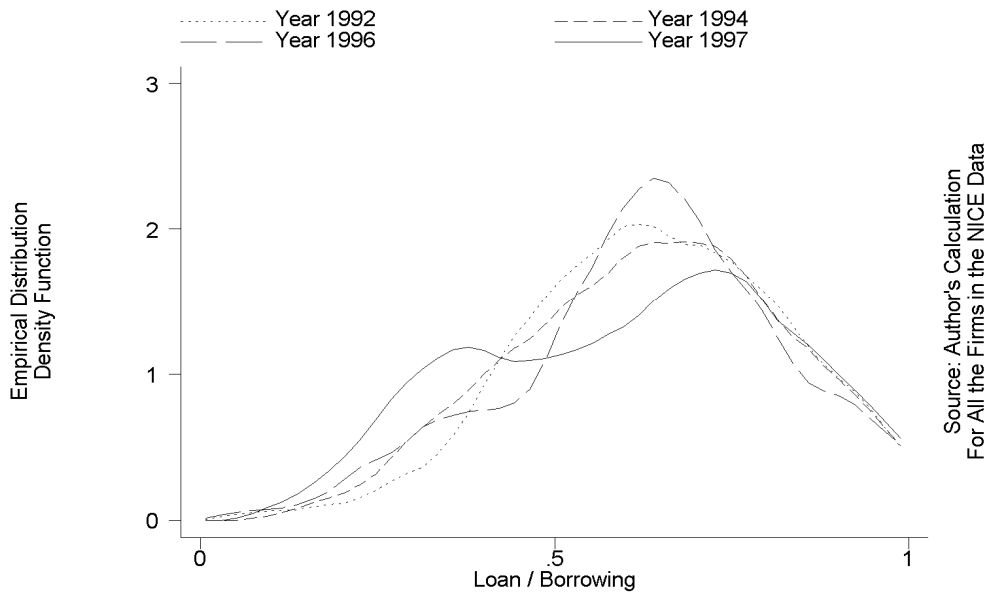
3.1 Empirical Distribution of Corporate Loans for Different Cohorts

[Figure 1-1-1] and [Figure 1-1-2] show the distribution of the loan-borrowing ratio for the largest cohort (top 1% firms in asset size) before and after the crisis. After the crisis, the loan-borrowing ratio distribution for the largest firms shifts leftwards clearly, as seen in [Figure 1-1-2]. This leftward shift starts partly in 1997 during the crisis.

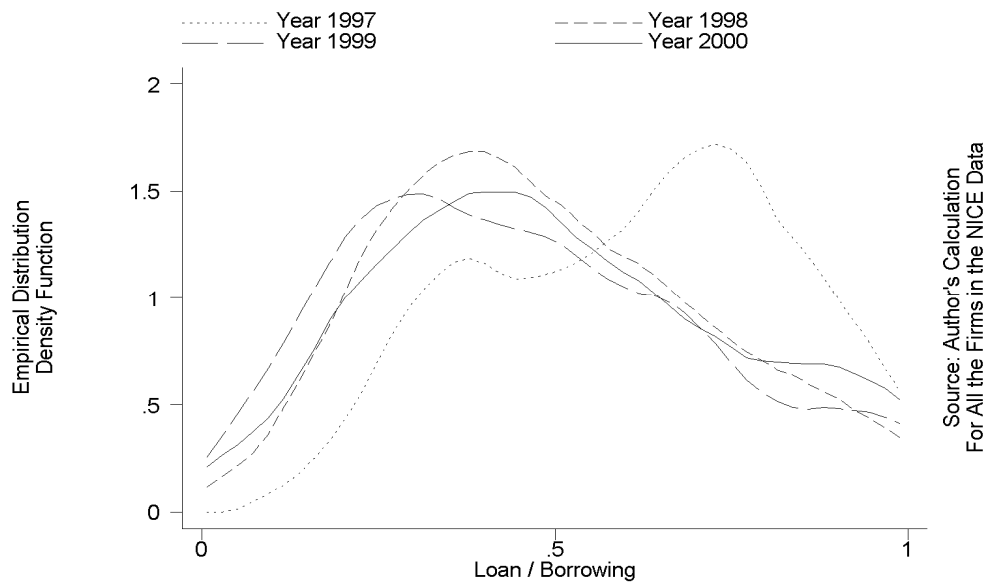
For the small-sized firms (bottom 10% firms in asset size) the distribution of the loan-borrowing ratio shifts to the right markedly in 1996 (actually in 1995, although not shown in the paper) and maintains more or less this pattern even after the crisis ([Figure 1-2-1] and [Figure 1-2-2]).

In [Figure 1-2-1], we note that, until 1994, a certain portion of the firms in our database does not have any access to financial institutions for their corporate financing. One could see a certain dense around zero. However, after 1994, this pattern changes: the dense around zero continue to disappear until 1997, and, after the crisis, a dense around zero appears again, but to a much smaller scale than before 1995. [Figure 1-2-1] and [Figure 1-2-2] make another interesting point. After 1994, we continue to see a peak at one and a certain mass around one, which indicates that these firms depend completely on the loans from financial institutions for their borrowing.

[Figure 1-1-1] Largest Firms - Top 1 %; Before the Crisis



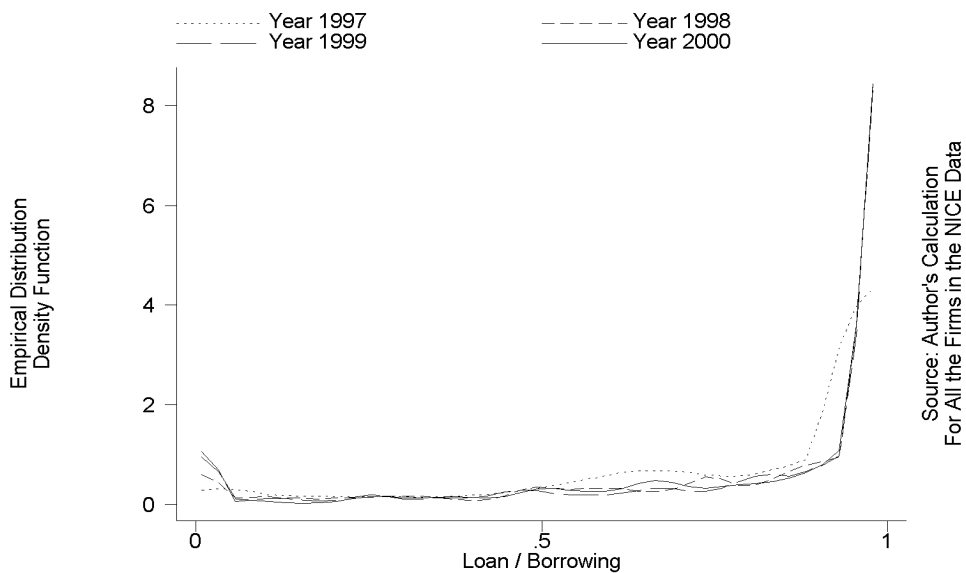
[Figure 1-1-2] Largest Firms - Top 1 %; After the Crisis



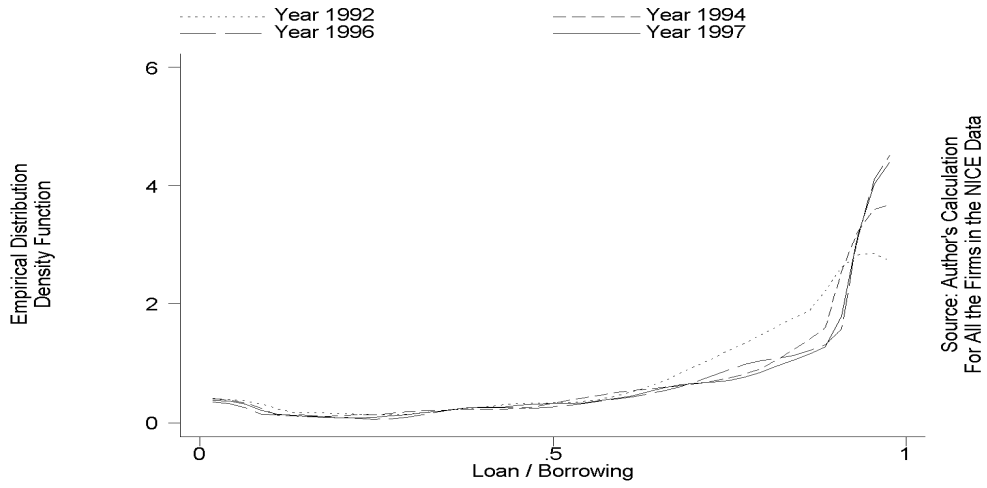
[Figure 1-2-1] Small-sized Firms - Bottom 10%; Before the Crisis



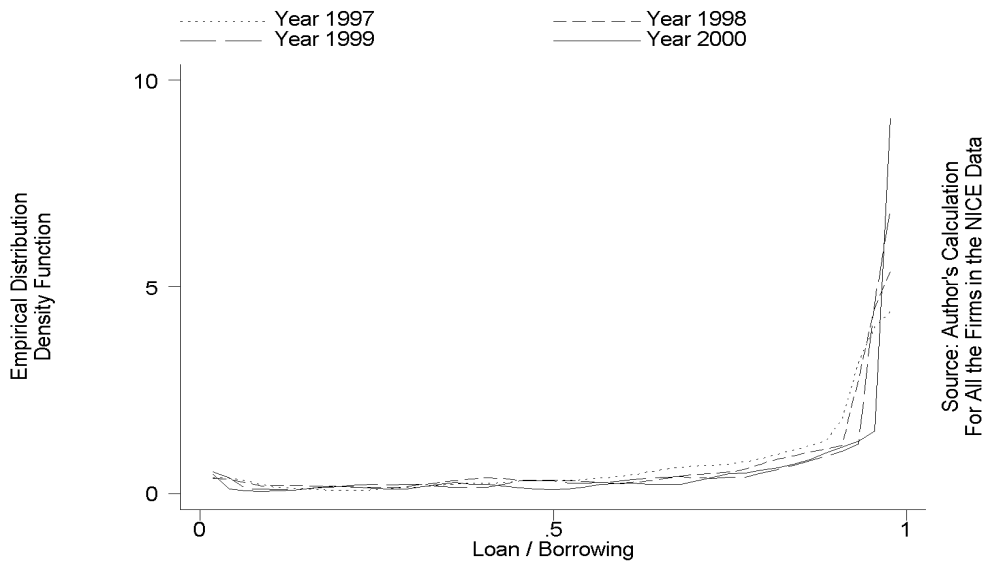
[Figure 1-2-2] Small-sized Firms - Bottom 10%; After the Crisis



[Figure 1-3-1] Medium-sized Firms - Middle 10%; Before the Crisis



[Figure 1-3-2] Medium-sized Firms - Middle 10%; After the Crisis



For the medium-sized firms, the share of loans in total borrowing does not show any marked changes before and after the crisis, except that, after the crisis, we could see a more cluster around one ([Figure 1-3-1] and [Figure 1-3-2]).

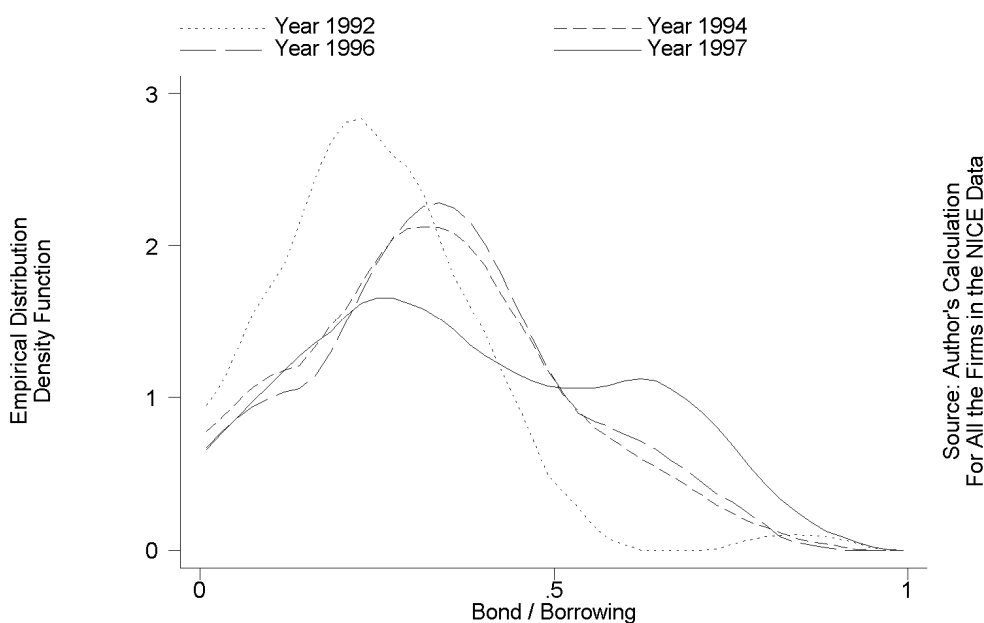
3.2 Empirical Distribution of Corporate Bonds for Different Cohorts

The result in the above implies that the large firms move to some other sources of financing after the crisis. This section will show that the large firms go to the bond market to compensate the decrease in loans by financial institutions. This was hinted in Section 2.

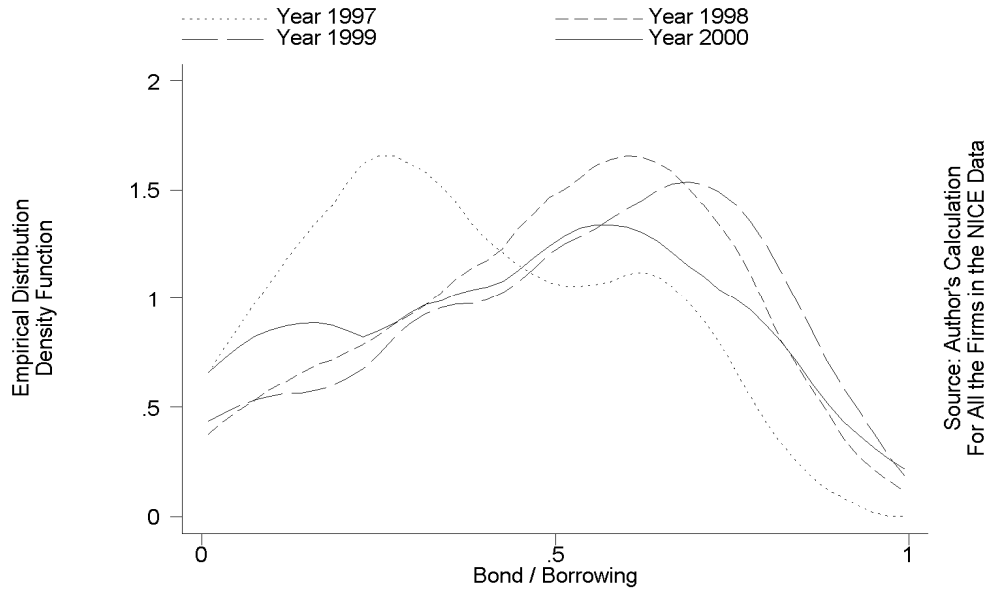
[Figure 2-1-1] and [Figure 2-1-2] show the bond-borrowing ratio distributions before and after the crisis for the largest cohort. After the crisis, the bond-borrowing ratio distribution for the largest firms shifts clearly to the right ([Figure 2-1-2]).

In [Figure 2-2-1] and [Figure 2-2-2], we show the similar figures for another size cohort (top 11% - top 20% firms in asset size). This cohort is, in fact, the smallest firms to have any access to the bond market at all in the sample period. For this cohort, the bond-borrowing ratio distribution shifts to the right marginally before the crisis. After the crisis, however, the distribution shifts back to the left. There is a large peak around zero in 1999 and the distribution becomes degenerate in 2000 (i.e., this cohort does not have any access to the bond market). A large proportion of the bonds that has been issued during the crisis, was under the risk of default, especially after the demise of the Daewoo group in 1999 (the second largest business group at that time in Korea). The demise of the Daewoo group put the whole market for corporate bonds into a state of malfunction in 1999 and in 2000.

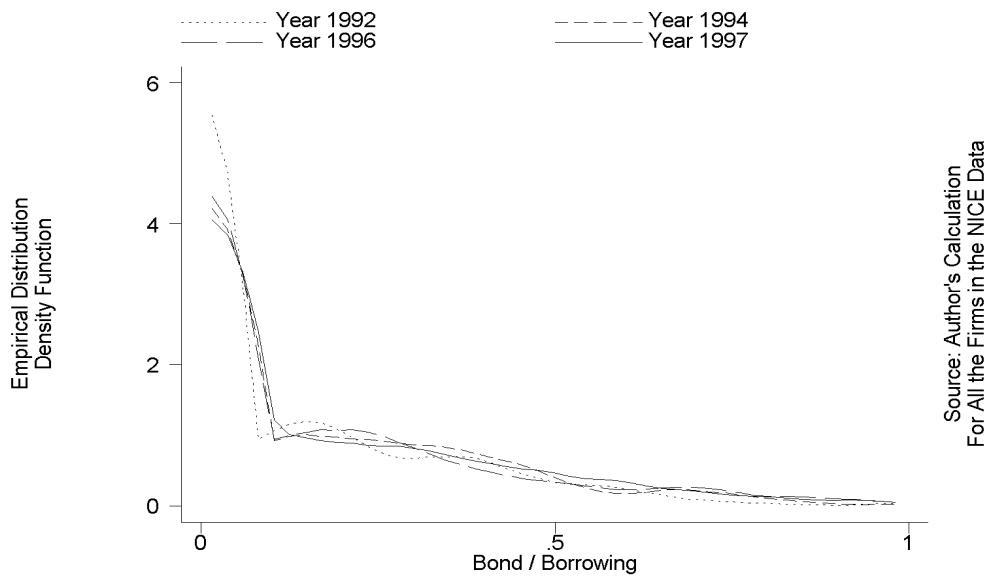
[Figure 2-1-1] Large-sized Firms - Top 1 %; Before the Crisis



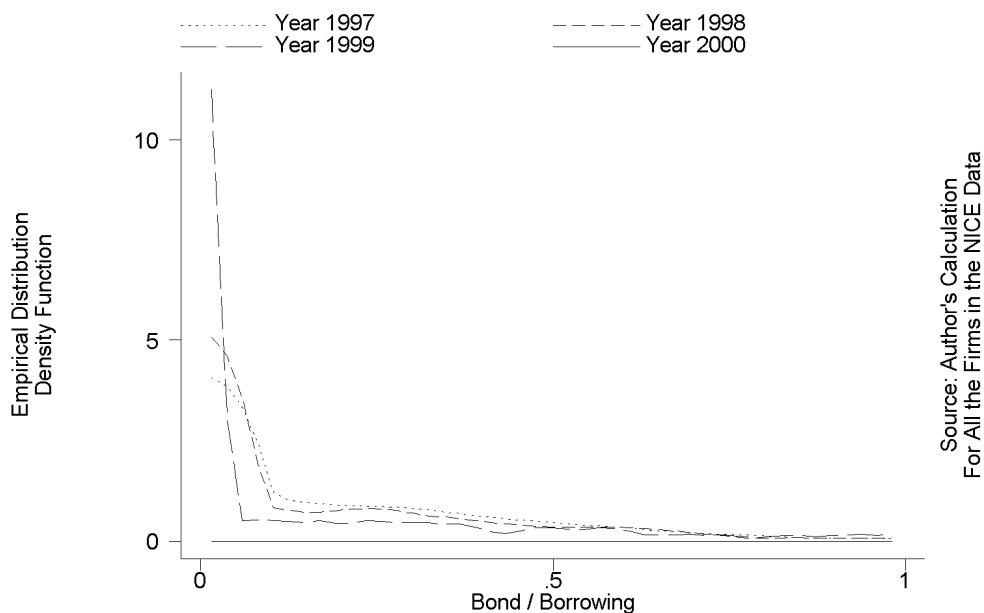
[Figure 2-1-2] Large-sized Firms - Top 1 %; After the Crisis



[Figure 2-2-1] Top 11% - Top 20% in Asset Size; Before the Crisis



[Figure 2-2-2] Top 11% - Top 20% in Asset Size; After the Crisis



Source: Author's Calculation
For All the Firms in the NICE Data

4. Determinants of Corporate Loans and Bonds

In this section, we look for the possible determinants of corporate loans and bonds before and after the economic crisis.

Both theoretical and empirical literatures suggest that firm size, profitability, and collateral ability, among others, could be important determinants of corporate borrowing. The log of total asset is used to measure firm size, whereas we use the ratio of fixed asset to total asset as a proxy variable for collateral ability. As mentioned in Section 2, profitability is measured by the ratio of EBIT (Earnings before Interest and Tax Payment) to total assets.

Next, we include several dummy variables to control for the effect of going public, chaebol effect, economic crisis effect, business cycle effect, and industry effect. List dummy variable measures the effect of public companies as compared to private companies. Chaebol dummy variable identifies the sample firm's belonging to chaebols. The Korean Fair Trade Commission (KFTC) identifies the large business groups and announces them every year. We use the definition of chaebols by the KFTC. The dummy variable for economic crisis assigns 1 to the period of 1997-98, 0 otherwise. Year dummy variable is introduced to control for the effect of business cycle whereas industry dummy is included to control for the effect of industry. Lastly, we include an interaction dummy variable, chaebol dummy multiplied by profitability.

4.1 Determinants of Loans

In the regression, the dependent variable is the loan-asset ratio (defined as the borrowing from financial institutions divided by total asset). <Table 2-1>, <Table 2-2>, and <Table 2-3> summarize the regression results. The estimation method of ordinary least squares (OLS) was used. We also tried the (within unit) fixed effects estimation, but it produced similar results.

First, we divided the whole sample into the two groups, listed companies and unlisted companies, and ran the same regression separately to the two groups. <Table 2-1> reports the regression results for all samples, listed companies, and unlisted companies. The hypothesis here is that public companies might behave differently as compared to private companies since they have other sources of corporate financing. <Table 2-1> shows that the coefficient on list dummy variable is negative and significant: listed companies depend less on loans. Regarding firm size, profitability, collateral ability, and the effect of crisis period, the listed and unlisted companies do behave similarly.

However, regarding chaebol effect, the listed and unlisted companies do behave differently. First, the chaebol-affiliated listed companies depend less on loans compared to independent listed companies, whereas the chaebol-affiliated unlisted companies depend more on loans compared to independent unlisted companies. Second, given they are affiliated with chaebols, the less profitable listed companies borrowed more from financial institutions, whereas the more profitable unlisted companies borrowed more from financial institutions.

Next, we divided the whole sample into the four sub-periods and ran the same regression separately to the sub-periods. The regression result is shown in <Table 2-2>. Regarding firm size, profitability, collateral ability, and the effect of going public, all the sub-periods produced similar results to the one from the whole sample period.

However, when it comes to the effect of affiliating with chaebols, <Table 2-2> shows different results. First, before the crisis, chaebol-affiliated companies borrowed more from financial institutions compared to independent companies, whereas, after the crisis, chaebol-affiliated companies borrowed less from financial institutions compared to independent companies. Second, before the crisis, given they are affiliated with chaebols, the more profitable listed companies borrowed more from financial institutions, whereas the pre-crisis period does not produce any significant result. These two results point to the fact that the market for corporate loans enhanced the efficiency in resource allocation after the financial crisis of 1997. In other words, financial institutions improved their lending practices towards big business groups after the economic crisis.

Next, we divided the whole sample into both the four sub-periods and the ten size groups. We ran the same regression separately to the size groups in each sub-period. For the large and small groups before and after the crisis, the regression results are shown in <Table 2-3>. Except for the effect of collateral, the size groups behave similarly to each other in each sub-period. For large companies, the collateral ability was an important determinant of corporate loans before the crisis, whereas it is not after the crisis. This result is consistent with the previous

<Table 2-1> Determinants of Corporate Loans

Independent Variables :	Dependent variable Borrowing from Financial Institutions / Total Asset		
	All	Listed Firm	Unlisted Firm
Firm Size	-0.029227** (-31.59)	-0.036987** (-25.50)	-0.028257** (-23.27)
EBIT/ Asset	-0.290248** (-63.17)	-0.267790** (-40.36)	-0.308511** (-50.64)
Borrowing(t-1)	0.065079** (21.10)	0.023758** (6.62)	0.158999** (29.00)
Fixed Asset/ Total Asset	0.131092** (27.32)	0.200425** (18.44)	0.120516** (22.44)
List Dummy	-0.046471** (-18.10)		
Chaebol	-0.043225** (-7.92)	0.021503** (2.80)	-0.066738** (-8.44)
Chaebol* (EBIT/ Asset)	0.447972** (15.35)	-0.112649** (-2.03)	0.531704** (15.46)
Dummy for Crisis Period (97~98)	0.050290** (8.15)	0.053337** (5.15)	0.054114** (7.23)
Year Dummy	Included	Included	Included
Industry Dummy	Included	Included	Included
Number of Observations	80,882	20,514	60,368

Note: 1. Number in the parenthesis are t-values.

2. * significant at the 10% significance level.

** significant at the 5% significance level.

3. Firm size is measured by the log of total asset.

4. The independent variable "Chaebol" denotes for the dummy for the big business groups legally defined by the Korea Fair Trade Commission.

<Table 2-2> Determinants of Corporate Loans for Sub-period (I)

Independent Variables :	Dependent variable Borrowing from Financial Institutions / Total Asset			
	1992~1996	1997~1998	1999~2001	2002~2005
Firm Size	-0.014277** (-9.11)	-0.013198** (-6.30)	-0.024973** (-13.62)	-0.047138** (-28.84)
EBIT/ Asset	-0.554560** (-31.39)	-0.392148** (-29.31)	-0.349424** (-29.13)	-0.252323** (-41.85)
Borrowing(t-1)	0.074994** (5.97)	0.016191** (2.43)	0.075039** (16.82)	0.072996** (11.34)
Fixed Asset/ Total Asset	0.171695** (17.97)	0.236490** (18.71)	0.170876** (16.29)	0.102402** (14.11)
List Dummy	-0.020267** (-4.96)	-0.029564** (-5.07)	-0.045274** (-8.90)	-0.068163** (-15.10)
Chaebol	0.020830** (2.13)	0.002455 (0.23)	-0.096787** (-8.71)	-0.084582** (-8.00)
Chaebol* (EBIT/ Asset)	0.142019 (1.50)	-0.095785 (-1.49)	0.733454** (15.75)	0.499114** (9.49)
Year Dummy	Included	Included	Included	Included
Industry Dummy	Included	Included	Included	Included
Number of Observations	15,765	9,930	19,019	36,168

Note: 1. Number in the parenthesis are t-values.

2. * significant at the 10% significance level.

** significant at the 5% significance level.

3. Firm size is measured by the log of total asset.

4. The independent variable "Chaebol" denotes for the dummy for the big business groups legally defined by the Korea Fair Trade Commission.

<Table 2-3> Determinants of Corporate Loans for Sub-period (II)

Independent Variables :	Dependent variable Borrowing from Financial Institutions / Total Asset			
	1992~1996		2002~2005	
	Large Firm	Small Firm	Large Firm	Small Firm
Firm Size	-0.029247** (-5.02)	-0.200298** (-9.22)	-0.038007** (-6.75)	-0.241116** (-16.91)
EBIT/ Asset	-0.499235** (-6.59)	-0.734748** (-6.74)	-0.586840** (-17.29)	-0.203096** (-16.75)
Borrowing(t-1)	0.073540** (5.12)	0.468002** (12.33)	0.045995** (7.25)	0.081134** (30.44)
Fixed Asset/ Total Asset	0.057653** (2.20)	0.087035 (1.61)	0.000148 (0.01)	0.080849** (2.31)
List Dummy	-0.046521** (-5.37)	0.030033 (0.89)	-0.082421** (-8.83)	-0.052044** (-2.28)
Chaebol	0.084589** (6.28)	-	-0.070500** (-5.17)	0.069151 (0.49)
Chaebol* (EBIT/ Asset)	-0.545554** (-3.68)	-	0.249724** (2.37)	0.382456** (3.52)
Year Dummy	Included	Included	Included	Included
Industry Dummy	Included	Included	Included	Included
Number of Observations	2,272	522	4,110	2,763

Note: 1. Number in the parenthesis are t-values.
 2. * significant at the 10% significance level.
 ** significant at the 5% significance level.
 3. Firm size is measured by the log of total asset.
 4. The independent variable "Chaebol" denotes for the dummy for the big business groups legally defined by the Korea Fair Trade Commission.

implication that financial institutions improved their lending practices towards big business groups after the economic crisis. Note that, for small companies, the collateral ability was not an important determinant of corporate loans before the crisis, whereas it becomes an important factor after the crisis.

4.2 Determinants of Corporate Bonds

In the regression, the dependent variable is the bond-asset ratio (defined as the bond holdings divided by total asset). The regression results are shown in <Table 3-1> and <Table 3-2>. As in the case of corporate loans, the OLS estimation method was used. The (within unit) fixed effects estimation was also tried for robustness check, but it does not change the main results.

In the first set of regressions, we divided the whole sample into the listed and unlisted companies. <Table 3-1> reports the regression results for all samples, listed companies, and unlisted companies. <Table 3-1> shows that the coefficient on list dummy variable is positive and significant: listed companies borrowed more in the corporate bond market than unlisted companies. Unlike corporate loans from financial institutions, borrowing in the corporate bond market usually requires the reputation from the public.

The patterns in the corporate bond market are similar to the ones in the corporate loan market. With respect to firm size, profitability, and collateral ability, the listed and unlisted companies do behave similarly. For unlisted companies, the effect of crisis period is not significant.

As in the case of corporate loans, the affiliation with chaebols has different effects on listed and unlisted companies. First, the chaebol-affiliated listed companies borrowed more in the corporate bond market relative to independent listed companies, whereas the chaebol-affiliated unlisted companies borrowed less in the corporate bond market compared to independent unlisted companies. Second, given the affiliation with chaebols, the less profitable listed companies borrowed more in the corporate bond market, whereas the opposite is the case in the group of unlisted companies.

In the second set of regressions, we divided the whole sample into the four sub-periods. <Table 3-2> shows the regression result. We note the following two things.

First, the effect of firm size differs before and after the economic crisis. Before the crisis, the larger the firms, the more they could borrow in the corporate bond market. However, after the crisis, it is not the case. One possible interpretation is as follows. Before the crisis, the TBTF myth had an effect on the perception of the public. That is, investors in the corporate bond market expected that the government would rescue large firms if they face the risk of bankruptcies. This kind of expectation by the public was often fulfilled by the government's rescuing big business groups in case of near bankruptcies. However, the collapse of Daewoo Group in 1999 shattered the TBTF myth. The Daewoo Group was the second largest business group at the time. The liquidity crisis of Hyundai Group in

<Table 3-1> Determinants of Corporate Bonds

Independent Variables :	Dependent variable Bond / Total Asset		
	All	Listed Firm	Unlisted Firm
Firm Size	-0.006432** (-5.10)	-0.003314** (-2.06)	-0.014005** (-6.93)
EBIT/ Asset	-0.243308** (-43.66)	-0.169265** (-23.35)	-0.318397** (-38.72)
Borrowing(t-1)	0.045706** (21.27)	0.014400** (5.85)	0.114846** (28.12)
Fixed Asset/ Total Asset	0.030238** (3.59)	0.028039** (2.33)	0.036964** (3.18)
List Dummy	0.010282** (3.25)		
Chaebol	-0.003801 (-0.77)	0.038878** (6.40)	-0.021412** (-2.47)
Chaebol* (EBIT/ Asset)	0.508267** (20.31)	-0.052508 (-1.28)	0.659630** (20.56)
Dummy for Crisis Period (97~98)	0.012609* (1.85)	0.019409** (2.16)	0.006616 (0.68)
Year Dummy	Included	Included	Included
Industry Dummy	Included	Included	Included
Number of Observations	15,918	8,961	6,957

Note: 1. Number in the parenthesis are t-values.
 2. * significant at the 10% significance level.
 ** significant at the 5% significance level.
 3. Firm size is measured by the log of total asset.
 4. The independent variable "Chaebol" denotes for the dummy for the big business groups legally defined by the Korea Fair Trade Commission.

<Table 3-2> Determinants of Corporate Bonds for Sub-period

Independent Variables :	Dependent variable Bond / Total Asset			
	1992~1996	1997~1998	1999~2001	2002~2005
Firm Size	0.008469** (6.36)	0.008652** (3.81)	-0.007937* (-1.83)	-0.013345** (-6.15)
EBIT/ Asset	-0.134844** (-7.21)	-0.130830** (-12.28)	-0.355732** (-17.48)	-0.226826** (-32.89)
Borrowing(t-1)	0.017874** (2.89)	0.015594** (3.74)	0.064532** (12.74)	0.023824** (6.02)
Fixed Asset/ Total Asset	-0.007224 (-0.83)	-0.027522* (-1.85)	0.036364 (1.18)	0.088361** (6.56)
List Dummy	0.013400** (4.60)	0.009459* (1.75)	0.025480** (2.22)	-0.006980 (-1.30)
Chaebol	-0.000678 (-0.10)	0.055053** (7.10)	-0.023961 (-1.46)	0.025705** (2.60)
Chaebol* (EBIT/ Asset)	0.048551 (0.69)	-0.058131 (-1.33)	0.818367** (15.47)	0.072016 (1.11)
Year Dummy	Included	Included	Included	Included
Industry Dummy	Included	Included	Included	Included
Number of Observations	4,836	2,694	3,176	5,212

Note: 1. Number in the parenthesis are t-values.

2. * significant at the 10% significance level.

** significant at the 5% significance level.

3. Firm size is measured by the log of total asset.

4. The independent variable "Chaebol" denotes for the dummy for the big business groups legally defined by the Korea Fair Trade Commission.

2000-2001 reinforced the disintegration of the TBTF myth.⁷

Second, the collateral ability was not an important factor in the corporate bonds

⁷ For the detailed account of the disintegration of the TBTF myth after the economic crisis, see Lim (2002).

market before the crisis. Given the asset size itself was an important factor in the corporate bond market before the economic crisis, the collateral ability might have not had an additional information content.

5. Concluding Remarks

The paper documents that large firms, to some extent, are leaving financial institutions and going to the capital market for their financing after the crisis.⁸ It also shows that small firms have better access to credit by financial institutions after the crisis. Financial institutions are reallocating their credit from large firms to small firms after the crisis.

We then attempted to empirically investigate the determinants of corporate borrowing before and after the economic crisis. The firms' affiliation with chaebols was an important (positive) determinant of corporate loans before the crisis whereas it turned out to be the opposite after the crisis. Furthermore, before the economic crisis, given the firms are affiliated with chaebols, the less profitable firms borrowed more from financial institutions. But, after the economic crisis, given the firms are affiliated with chaebols, the more profitable firms borrowed more from financial institutions. These results could be partially contributed to the improved lending practices of financial institutions towards large firms (in particular, big business groups) after the economic crisis.

We also investigated the determinants of corporate borrowing from the bond market. Comparing the periods before and after the economic crisis suggests that some important changes occurred to the corporate bond market. First, the effect of firm size on the corporate bond market differs before and after the economic crisis. Before the crisis, the larger the firms, the more they could borrow in the corporate bond market. However, after the crisis, it is not the case. The following interpretation could be put forward. Before the crisis, investors in the corporate bond market expected that the government would rescue large firms if they face the risk of bankruptcies. However, the collapse of Daewoo Group in 1999 shattered the TBTF myth of the public. The liquidity crisis of Hyundai Group in 2000-2001 reinforced the disintegration of the TBTF myth. Second, the collateral ability was not an important factor in the corporate bond market before the crisis. Given the asset size itself was an important factor in the corporate bond market before the economic crisis, the collateral ability might have not had an additional information content.

⁸ Clearly, the liberalization of financial markets, which happened at an accelerating rate after the crisis, contributed to broaden the supply base of various corporate financing sources. But, for further deepening of the supply base of various corporate financing sources, Korea needs better protection of investors' rights.

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