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## Article

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# The Effects of Lowering the Statutory Maximum Interest Rate on Non-bank Credit Loans<sup>†</sup>

By MEEROO KIM\*

*This paper analyzes the effects of the cut in the legal maximum interest rate (from 27.4% to 24%) that occurred in February of 2018 on loan interest rates, the default rates, and the loan approval rate of borrowers in the non-banking sector. We use the difference-in-difference identification strategy to estimate the effect of the cut in the legal maximum interest rate using micro-level data from a major credit-rating company. The legal maximum rate cut significantly lowers the loan interest rate and default rate of low-credit borrowers (i.e., high-credit-risk borrowers) in the non-banking sector. However, this effect is limited to borrowers who have not been excluded from the market despite the legal maximum interest rate cut. The loan approval rate of low-credit borrowers decreased significantly after the legal maximum interest rate cut. Meanwhile, the loan approval rate of high-credit and medium-credit (i.e., low credit risk and medium credit risk) borrowers increased. This implies that financial institutions in the non-banking sector should reduce the loan supply to low-credit borrowers who are no longer profitable while increasing the loan supply to high- and medium-credit borrowers.*

Key Word: Statutory Maximum Interest Rate, Household Loan,  
Market Exclusion, Non-banking Sector  
JEL Code: G23, G28, G51

## I. Introduction

The statutory maximum interest rate<sup>1</sup> refers to the highest interest rate allowed by law<sup>2</sup> for a loan product. The statutory maximum interest rate system was

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<sup>1</sup>In this paper, I use “statutory maximum interest rate” and “legal maximum interest rate” interchangeably with the same meaning.

introduced to prevent abuse of their market power by financial institutions and to protect low-income households in the loan market. The frequent entries and exits of financial institutions can lead to distrust of financial consumers about the possibility of deposit recovery, which increases the likelihood of a bank run. Accordingly, the government tolerates the market power of financial institutions to some extent based on the authorization of financial institutions' market entrance and promotes system stability. However, based on their market power, financial institutions may impose unreasonable interest rates on households lacking bargaining power. Thus, the government is implementing the statutory maximum interest rate system to prevent this.

Considering these points, many countries, including Korea, have introduced statutory maximum interest rates and have legally restricted the maximum interest rate level. The Loan Business Act, the focus of this study, was enacted in October of 2002, and the legal maximum interest rate was initially set to 66% according to the enforcement decree. Since then, the enforcement decree has been revised seven times, and the current legal maximum interest rate is 20%. In particular, in February of 2018, the legal maximum interest rate was cut by 3.9%p (27.9% → 24%), and in July of 2021, the legal maximum interest rate was cut further by 4%p (24% → 20%). In addition, discussions are continuing in political circles about the possibility of further cuts in the legal maximum interest rate.

Reducing the legal maximum interest rate can have two major effects on the utility of financial consumers. First, the interest rates of some borrowers, especially those who paid interest rates close to the upper limit of the maximum interest rate, may be lowered by the legal maximum interest rate cut. Borrowers who received interest rates close to the upper limit of the maximum interest rate are more likely to be from low-income households. Therefore, a cut in the legal maximum interest rate can increase the disposable income of borrowers who earn relatively low incomes.

On the other hand, financial institutions that provide high-interest loans are likely not to give loans to certain borrowers who are no longer seen as profitable when the legal maximum interest rate is lowered. In particular, such action is highly likely to reduce the availability of loans provided to borrowers with a high probability of default. In general, as borrowers with lower income levels are more likely to default, these borrowers are highly likely to be excluded from the loan market.

Considering these two points, existing studies have estimated whether such a cut in the legal maximum interest rate lowers interest rates and increases market exclusion. However, our paper differs from previous studies in terms of two major aspects.

First, unlike previous studies, this study improved the accuracy of the analysis of the impact of the cut in the legal maximum interest rate by using micro-level data from a credit rating agency. The data used in this study are individual level micro-data provided by the Korea Credit Bureau (hereafter KCB). KCB data include loan data from all financial institutions in the banking and non-banking financial sectors.

<sup>2</sup>Accordingly, for a loan contract that exceeds the statutory maximum interest rate, the interest contract for the excess portion is invalid and cannot be claimed in court. The Loan Business Act and the Interest Restriction Act stipulate the maximum interest rate. The Loan Business Act applies to financial and loan businesses authorized, licensed, and registered under the Act. On the other hand, the Interest Restriction Act stipulates the maximum interest rate for loan transactions between private parties.

The non-banking sector covered in this paper includes card companies, capital companies, savings banks, insurance companies, and cooperatives, but not lending companies. The data also include complete loan histories by borrower, credit evaluation histories, credit and debit card usage, and various individual characteristic variables. KCB also has data on loan attempts. When someone attempts to secure a loan, they conduct a credit check, and this record is kept by KCB. Credit inquiries are divided into simple inquiries and loan evaluation inquiries, and the credit inquiry as used in this study is the latter type. Thus, we can determine whether a particular borrower has attempted to secure a loan through this type of credit check record.

Using micro-level data for each borrower, we can identify the impact of the cut in the legal maximum interest rate in the non-banking sector using a difference-in-difference strategy. In particular, we analyze borrowers by dividing them into high-credit, medium-credit, and low-credit classes. High-credit borrowers who belong to credit grades 1-3 represent low credit-risk borrowers. On the other hand, medium-credit borrowers who belong to credit grades 4-7 represent medium credit-risk borrowers, and low-credit borrowers who belong to credit grades 8-10 represent high credit-risk borrowers.

From various angles through descriptive statistics, the cut in the statutory maximum interest rate mainly affects the loans of low-credit borrowers (i.e., high-credit-risk borrowers) in the non-banking financial sector and some mid-credit borrowers in the non-banking financial sector. However, the cut in the statutory maximum interest rate barely affects the loans of high-credit borrowers (i.e., low-credit-risk borrowers), especially in the banking sector. Accordingly, in this paper, the control group will be credit loans of high-credit borrowers from the banking sector. In contrast, the treatment group will be credit loans of high-credit, medium-credit, and low-credit borrowers from the non-banking financial sector.

Meanwhile, to the best of the author's knowledge, this is the first study to analyze the legal maximum interest rate cut (27.9% → 24%) enacted in February of 2018. Although the statutory maximum interest rate had been cut several times prior, lowering the statutory maximum interest rate from 27.9% to 24% may have a very different effect from the previous cuts, as not only the macroeconomic environment at the time of the statutory maximum rate cut but also the distribution of default rates of financial consumers significantly influence the effectiveness of the statutory maximum rate cut<sup>3</sup>.

As a result of the analysis, the statutory maximum interest rate cut in February of 2018 significantly lowered the loan interest rates for households not excluded from the credit loan market even after the statutory maximum rate was cut. In particular, the interest rate on credit loans for the low-credit class in the non-banking financial sector was cut by a significant amount (3.5%p). On the other hand, the interest rate on credit loans for the middle-credit class in the non-banking financial sector was reduced by only 0.16%p, and no statistically significant change was found in the

<sup>3</sup>For example, suppose the probability of default by most borrowers is not that high. In such a case, a 7%p reduction in the statutory maximum interest rate from 34.9% to 27.9% may have a relatively small effect, but continuously cutting the statutory maximum interest rate afterward will gradually increase the impact on the loan interest rate and the market exclusion rate. In the same vein, the reduction of the legal maximum interest rate from 24% to 20% requires further analysis in the future. However, this study focuses on the legal maximum rate cut in February of 2018 (27.9% → 24%) due to data limitations.

credit loan interest rate for the high-credit class in the non-banking financial sector.

In addition, the default rate of borrowers who were approved for a loan despite the cut in the legal maximum interest rate decreased significantly. This effect mainly affected the low-credit class. For the mid-credit class in the non-banking financial sector, the probability of default decreased by about 0.24%p on average due to the reduced maximum interest rate. On the other hand, the low-credit class overall showed a 2.8%p decrease.

As such, the cut in the statutory maximum interest rate reduces the debt repayment burden for borrowers who were not excluded from the market after the cut, hence decreasing the default probability. However, this result is limited to borrowers who were not excluded from the market despite the reduction. Borrowers thus excluded from the market will be pushed to loan businesses or the non-institutional financial market.

According to the analysis, as the legal maximum interest rate was reduced from 27.9% to 24% in February of 2018, the loan approval rate of the low-credit group decreased by 3.6%p. On the other hand, the loan approval rate of the high- and medium-credit groups increased by approximately 1.0%p and 1.4%p, respectively.

The structure of this paper is as follows. Chapter II examines earlier work in this area. Chapter III examines the general changes in the credit loan market before and after the statutory maximum interest rate cut through a descriptive statistical analysis. Chapter IV introduces the empirical method, and Chapter V presents the results of the empirical analysis. Finally, the paper ends with the conclusion in Chapter VI.

## II. Literature Review

Previous research related to the legal maximum interest rate is largely divided into studies of the effects of legal maximum interest rate cuts and studies of methods to determine the loan interest rate and the cost of loan businesses.

Kim (2017) estimated the extent to which low-credit borrowers in the bank and non-bank financial sectors were excluded from the market due to a cut in the legal maximum interest rate that occurred between July of 2010 and July of 2017. According to the analysis, as the top interest rate decreases by 1%p in the entire financial sector, the number of new borrowers with low credit will decrease by 3.585%. In non-bank entities, the number of new borrowers with low credit will decrease by 3.398% as the top interest rate decreases by 1%p.

Noh *et al.* (2013) analyzed the impact on financial consumers when the statutory maximum interest rate, which was 39%, was reduced to 30%. According to their analysis, the financial costs associated with loan refusals greatly exceed the interest cost reduction benefit, and financial consumers amounting to more than twice the number of borrowers who receive the benefit are excluded from the low-income financial market. Noh (2014) argues that in order to improve the predictability of statutory maximum interest rates, it is necessary to predict a schedule of changes of the upper limit of the interest rate and/or to consider linking the statutory maximum interest rate to the market interest rate. Lee (2015) also argues that the interest rate cap must be managed in a relative manner that links the interest rate with the market

interest rate to reflect both the current low-interest rate trend and market conditions properly.

Ryu (2016) raised the need to expand public microfinance and strengthen follow-up management, as there is a high risk that a cut in the highest interest rate will lead to a reduction in the supply of funds by financial companies to the low-credit class of borrower.

Lee (2011) and Lee and Song (2021) analyzed the effect of legal maximum interest rate cut on loan companies. According to Lee (2011), the loan interest rates of loan businesses are insensitive to changes in market interest rates. He judged that regulations such as lowering the upper limit of interest rates were necessary, as this phenomenon was presumed to be due to chronic excess demand, imperfect competition, and information asymmetry. On the other hand, in Lee and Song (2021), the number of loan users and the number of new loans decreased due to the reductions of legal maximum interest rate. This suggests, unlike in the past, that the recent cut in the legal maximum interest rate has resulted in a level that can seriously damage the loan market.

Lee (2016a) shows that the number of low-credit borrowers excluded from the loan market is expected to range from at least 350,000 to at most 740,000 when the legal maximum interest rate is cut from 34.9% to 27.9%. On the other hand, the size of the loan market increased in terms of the loan amount and number of traders after the previous lowering of the upper limit of the interest rate, meaning that the problem of credit shrinkage due to the lowering of the upper limit of the interest rate did not come to the fore.

According to Jeong (2007a; 2007b), because the loan market has an imperfect competition structure, loan companies can obtain profits by imposing high-interest rates based on their monopoly power, even over high-quality customers. In addition, he argues that if micro-credit loans from low-income financial institutions are activated, the problems caused by high-interest rates by lending companies will be resolved to a large extent.

Lee (2019) suggests the need to change the loan interest rate standard to a more straightforward form to protect financial consumers. In addition, he argues that the government needs to manage the market by focusing on the degree of interest rate fluctuations after lending and the fairness of interest rate application rather than the level of the loan interest rate.

Lee and Han (2013) studied the interest rate determination mechanism in the Korean-Japanese loan market. In their study, they argue that Korea, like Japan, should also make it mandatory to subscribe to a personal credit information DB integrated with lending companies, thereby eliminating the factor of information asymmetry between lenders and users.

Finally, Lee (2016b) showed that the change in the interest rate cap regulation in march 2016 affects the profit and loss of the lending company through a cost rate analysis of loan businesses. In particular, they point out that loan companies that cannot reach the break-even point are eliminated from the market, leading to changes in the market's competitive structure.

### III. Data and Descriptive Statistics

This chapter analyzes data for one year (February 2017 - February 2019) before and after the legal maximum interest rate was cut by 3.9%p from 27.9% to 24% on February 8, 2018. The loan interest rate is generally determined by adding a certain amount of margin to the sum of the funding rate, taxes, and the credit risk costs. The credit risk cost depends on the recovery rate. The recovery rate means the ratio of principal that can be recovered by disposing of collateral even in the event of a default. Mortgage loans such as home mortgages have a high recovery rate and thus the credit risk cost is low compared to credit loans. Accordingly, the interest rate level of mortgage loans is significantly different from the legal maximum interest rate level. Therefore, this study mainly focuses on the credit loan market, especially credit loans from the non-banking financial sector. This study uses borrower-level microdata from KCB, one of Korea's representative credit-rating agencies.

#### *A. Credit Loan Market: Banking and Non-banking Sectors*

This section examines descriptive statistics of the credit loan markets in the banking and non-banking financial sectors. The KCB data used in this study include data from all financial institutions in the banking and non-banking sector, encompassing all loan histories, credit evaluation histories, credit and debit card usage statistics, and a range of characteristic variables for each individual. Also, individuals without a record of receiving a credit loan between January 2013 and March 2021 are also included in the data. Furthermore, KCB also provides data on loan attempts. When someone attempts to secure a loan, a credit check occurs, and this record is kept at KCB. Credit inquiries are divided into simple inquiries and inquiries for a loan evaluation. The type of credit inquiry used in this study is the inquiry for a loan evaluation, not merely a simple inquiry. Thus, we can determine whether a borrower has attempted to secure a loan or not.

Table 1 shows descriptive statistics for newly issued credit loans in the banking sector between February of 2017 and February of 2019 – one year before and after the legal maximum interest rate was cut from 27.9% to 24%. Meanwhile, Table 2 shows descriptive statistics on newly issued non-bank credit loans during the same period.

The distribution of interest rates on credit loans in banks and non-banks is very different. First, the average interest rate for bank credit loans is about 4.2%, whereas, for non-bank credit loans, it is approximately 14.2%, showing a difference of about 10%p. In addition, the interest rate distribution of loans in the banking sector is relatively dense compared to that of loans in the non-banking sector. The 10th percentile of the bank's credit loan interest rate is 2.7%, and the 90th percentile is 6.3%, showing a difference of about 3.6%p. On the other hand, the 10th percentile of non-bank lending rates is 4.9%, and the 90th percentile is 22.7%, showing a considerable difference of about 17.8%p. In other words, the dispersion of interest rates on credit loans in non-banking sectors is much broader than that in banks.

The interest rates on credit loans in banks do not differ significantly between financial institutions and are generally low. On the other hand, in the non-banking

sector, some institutions issue credit loans with relatively low interest rates, such as insurance and cooperatives (e.g., credit cooperatives, fisheries cooperatives, NongHyup). However, at the same time, card companies, capital companies, and savings banks included in the non-banking sector supply high-interest credit loans.

Next, the delinquency rates of banks and non-banks also show a considerable difference. In general, when looking at defaults of 90 business days or more, which is the general standard for a default, the average default rate of bank credit loans is about 1.2%. In contrast, the average default rate of non-bank credit loans is about 3.7%. As an index directly related to the difference in delinquency rates, the average credit score of banks is about 869.8, while the average credit score of non-banks is close to 768.7.

The average annual income of borrowers in the banking sector is about 48 million won. In comparison, the average annual income of non-bank borrowers is about 29 million won, indicating that the average income of borrowers in the banking sector is about 65% higher.

Panel D of Table 1 shows the average loan amount per borrower by financial sector and loan type. From February of 2017 to February of 2019, the average sum

TABLE 1—DESCRIPTIVE STATISTIC OF BANK CREDIT LOAN BORROWERS

		N	Mean	S.D.	p10	p50	p90
A. Loan Contract Characteristics (Account)	Interest rate (%)	304,839	4.2	1.8	2.7	3.8	6.3
	Loan Amount(1 million won)	304,839	32.847	35.743	3	20	80
	Loan Term (month)	304,839	17.328	10.775	12	12	36
	Repayment Amount (1 million won)	304,839	2.651	3.886	0.175	1.690	6.222
B. Loan Contract Performances (Account)	Delinquency over 30 Days in the Next Year	304,839	0.006	0.079	0	0	0
	Delinquency over 90 Days in the Next Year	304,839	0.003	0.058	0	0	0
	Delinquency over 30 Days after Loan Contract	304,839	0.017	0.128	0	0	0
	Delinquency over 90 Days after Loan Contract	304,839	0.012	0.110	0	0	0
C. Borrower Characteristics (Account)	Income (1 million won)	304,839	47.579	26.761	21.280	40.170	82.660
	Age	304,839	44.513	10.469	30	40	60
	Job (Employed)	225,879	0.959	0.199	1	1	1
	Credit Score	304,839	869.83	97.69	729	895	974
	Credit Card Usage (1 million won)	304,839	20.519	13.596	3.907	18.537	40.288
	Debit Card Usage (1 million won)	304,839	3.003	3.328	0	1.692	8.42
D. Borrower Characteristics (person, previous month)	Bank Loan Balance (1 million won)	208,290	66.2	95.3	0	28.8	184.2
	Bank Credit Loan Balance (1 million won)	208,290	22.3	34.1	0	7.2	63.4
	Non-bank Credit Loan Balance (1 million won)	208,290	2.6	3.3	0	0	6.7
E. Borrower Characteristics (within 30 days before new contract)	Bank Credit Loan Application	297,401	1.675	0.921	1	2	3
	Non-bank Credit Loan Application	297,401	0.693	1.094	0	0	2

Note: Descriptive statistics for Job (Employed) is calculated, except for borrowers whose job information is 'other'.



TABLE 2—DESCRIPTIVE STATISTIC OF NON-BANK CREDIT LOAN BORROWERS

		N	Mean	S.D.	p10	p50	p90
A. Loan Contract Characteristics (Account)	Interest rate (%)	894,326	14.2	6.3	4.9	14.6	22.7
	Loan Amount(1 million won)	894,326	8.837	11.396	1	5	20
	Loan Term (month)	894,326	23.945	11.789	11	24	37
	Repayment Amount (1 million won)	894,326	0.475	0.832	0.087	0.282	0.901
B. Loan Contract Performances (Account)	Delinquency over 30 Days in the Next Year	894,312	0.030	0.171	0	0	0
	Delinquency over 90 Days in the Next Year	894,312	0.016	0.124	0	0	0
	Delinquency over 30 Days after Loan Contract	894,326	0.055	0.229	0	0	0
	Delinquency over 90 Days after Loan Contract	894,326	0.037	0.188	0	0	0
C. Borrower Characteristics (Account)	Income (1 million won)	894,326	29.213	13.905	18	26	43
	Age	894,326	49.582	11.442	30	50	65
	Job (Employed)	461,674	0.760	0.427	0	1	1
	Credit Score	894,326	768.7	107.0	638	766	917
	Credit Card Usage (1 million won)	894,326	20.52	13.60	3.91	15.54	40.29
	Debit Card Usage (1 million won)	894,326	19.61	14.37	2.42	17.00	41.23
D. Borrower Characteristics (person, previous month)	Bank Loan Balance (1 million won)	589,153	20.1	52.2	0	0	67.8
	Bank Credit Loan Balance (1 million won)	589,153	4.3	6.4	0	0	10
	Non-bank Credit Loan Balance (1 million won)	589,153	8.4	11.2	0	4.1	19.7
E. Borrower Characteristics (within 30 days before new contract)	Bank Credit Loan Application	461,728	0.215	0.594	0	0	1
	Non-bank Credit Loan Application	461,728	1.970	1.828	1	1	4

Note: Descriptive statistics for Job (Employed) is calculated, except for borrowers whose job information is 'other'.

of the total credit loan balance of borrowers who received credit from banks approached 24.9 million won in all financial institutions. On the other hand, according to Panel D of Table 2, the average sum of the total credit loan balance of borrowers who took out credit loans from non-banks during the same period was about 12.7 million won in all financial institutions. In other words, borrowers who took out new credit loans from banks during the period have an average of nearly twice the total credit loan balance of those who took out new credit loans from non-banks.

Figure 1 shows the proportion of loans with an interest rate of 24% or higher (henceforth, exposure) among non-bank credit loans. Therefore, exposure refers to the ratio of borrowers who are borrowing at an interest rate higher than the legal maximum level after the legal maximum interest rate was cut. Panel A shows the exposure in February-July of 2017, and Panel B shows the exposure in August of 2017 to January of 2018.

First, it is notable that more than half of the non-bank credit loans given to the low-credit class (grades 8 to 10) have an interest rate higher than 24%, which would be illegal after the statutory maximum interest rate cut. According to Panel A

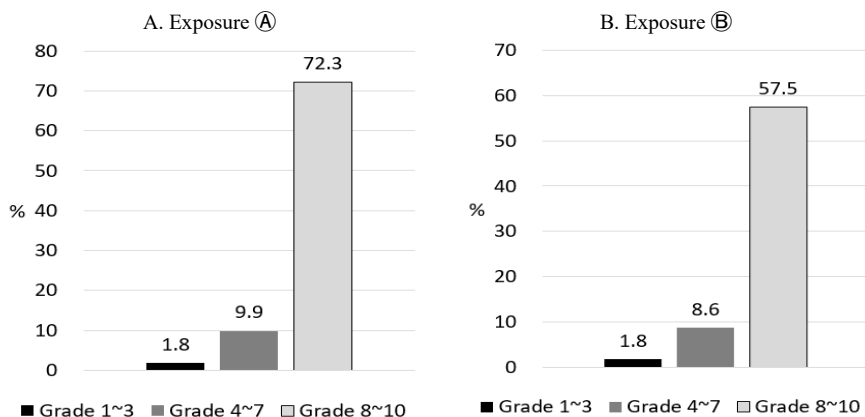


FIGURE 1. EXPOSURE IN THE NON-BANKING SECTOR BY CREDIT RATING GROUP

Note: Exposure (A) is the proportion of new credit loans with interest rates higher than 24% from February of 2017 to July of 2017, and Exposure (B) is the proportion of new credit loans with interest rates higher than 24% from August of 2017 to January of 2018.

(February-July 2017) of Figure 1, approximately 72.3% of non-bank credit loans taken out by borrowers in grades 8-10 have interest rates of 24% or higher. This proportion will decrease to 57.5% after August of 2017 (Panel B). Meanwhile, the exposure of the middle-credit class (grades 4-7) is 4.4~12.9 (%), and the exposure of the high-credit class (grades 1~3) is 0.9~3.6 (%). Thus, the exposure decreases sharply as the credit rating improves.

The statutory maximum interest rate cut, which was implemented in February of 2018, was officially announced in August of 2017. Accordingly, it appears that financial institutions began adjusting interest rates in advance, starting in August of 2017. Accordingly, when conducting the difference-in-difference analysis in this paper, the period before the treatment is set to the time before the official announcement, not the time when the legal maximum interest rate cut was actually executed.

### B. Credit Loan Market before and after the Reduction in the Legal Maximum Interest Rate

This section examines the changes in the credit loan market for one year before and one year immediately after the legal maximum interest rate was cut from 27.9% to 24% in February of 2018.

The upper part of Figure 2 shows the monthly average interest rate trend of new credit loans in the banking sector for high-credit borrowers (grades 1-3), medium-credit borrowers (grades 4-7), and low-credit borrowers (grades 8-10). On the other hand, the lower part of Figure 2 shows the monthly average interest rate trend of new non-bank credit loans for borrowers with high credit scores (grades 1 to 3), borrowers with medium credit scores (grades 4 to 7), and borrowers with low credit scores (grades 8 to 10). The two vertical lines in the figure indicate when the statutory maximum interest rate cut was announced (August 2017)<sup>4</sup> and when the maximum

<sup>4</sup>Financial Services and Commission·Ministry of Justice (2017. 8. 7).

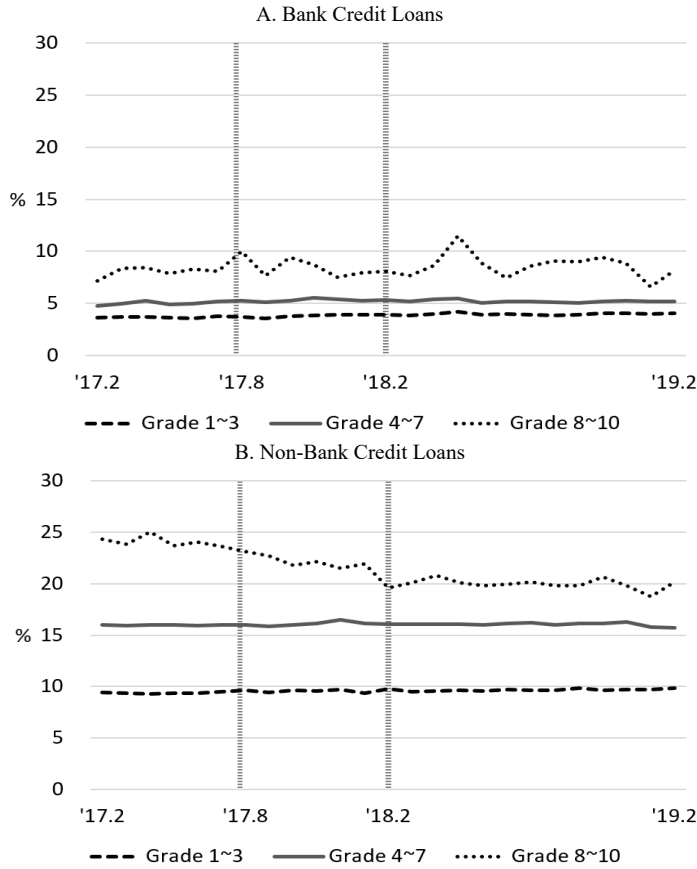


FIGURE 2. AVERAGE MONTHLY INTEREST RATES OF CREDIT LOANS BY THE CREDIT RATING GROUP IN THE BANKING AND NON-BANKING SECTORS

interest rate cut was actually carried out (February 2018).

First, the interest rates on loans to high-credit and mid-credit borrowers in the banking sector do not show significant fluctuations before and after the legal maximum rate cut. On the other hand, for low-credit borrowers, the interest rate on bank credit loans fluctuates in the range of 7-11%. The data used in this analysis excludes policy finance products such as Saitdol loans and Haetsal loans. Besides policy finance, it is rare for those with low credit scores to obtain credit loans from the banking sector; therefore, the monthly average loan interest rates vary greatly.

On the other hand, the interest rate on loans to borrowers with low credit scores from non-banking sector was reduced from 25% to 20%. In particular, looking at the change in the average interest rate of non-banking low-credit borrowers, it can be seen that the average interest rate decreased after August 2017 (when the statutory maximum interest rate cut was announced) rather than February of 2018, when the statutory maximum interest rate cut was actually implemented. This suggests that each financial institution gradually adjusted the loan contract terms starting when the legal maximum interest rate cut was announced. Accordingly, in the empirical analysis of this study, only the period before August of 2017 is regarded as the period before the treatment.

As shown in Figure 2, through the comparison before and after the legal maximum interest rate cut, the effect of the legal maximum interest rate cut on the loan interest rates of low-credit borrowers can be roughly understood. However, this cannot exclude the effect of the difference in the financial market environment over time on loan interest rates. Therefore, in this study, a difference-in-difference analysis is conducted to understand the effect of a cut on the statutory maximum interest rate. To this end, the credit loans for high-credit borrowers (credit grades 1-3) supplied by the bank are set as the control group, and the non-bank credit loans are set as the treated group. The interest rates on credit loans for high-credit borrowers supplied by banks are not likely to be affected by the statutory maximum interest rate cut.

Column A in Table 3 shows the ratio of interest rates and the number of credit loan contracts that occurred before (February to July 2017) the legal maximum interest rate was cut for each credit rating group. Meanwhile, column B in Table 3 shows the ratio of interest rates and the number of credit loan contracts that occurred after (February 2018 to February 2019) the legal maximum interest rate was cut for each credit rating group. First, looking at the change in the interest rate, we find that the average interest rate of the low-credit class declines after the legal maximum interest rate cut, as was evident from the change in the interest rate distribution earlier.

On the other hand, if we look at the change in the proportion of loan contracts by credit score before and after the statutory maximum interest rate cut, we can see that the proportion of loan contracts for the middle- and low-credit classes decreases. Theoretically, a decrease in the proportion of loan contracts is possible either due to a reduction in loan demand or a decrease in the loan supply to borrowers. Therefore, it can only be classified through a rigorous analysis whether the decrease in the ratio

TABLE 3—PROPORTION OF AVERAGE INTEREST RATES AND NUMBER OF LOAN CONTRACTS  
BEFORE AND AFTER THE LEGAL MAXIMUM INTEREST RATE CUT (BY CREDIT RATING SECTION)

	Credit Rating	A. Before (until 2017. 7)	B. After (from 2018. 2)	B - A
Interest Rate (%)	More than 950	4.87	5.01	0.13
	900 to 950	6.10	6.18	0.08
	850 to 900	8.05	8.21	0.15
	800 to 850	10.85	11.03	0.17
	750 to 800	13.06	13.17	0.12
	700 to 750	14.72	14.87	0.15
	600 to 700	16.96	16.90	<b>-0.06</b>
	300 to 600	20.74	18.92	<b>-1.82</b>
	Less than 300	16.17	14.46	<b>-1.71</b>
Proportion of New Loans (%)	More than 950	7.69	9.00	1.31
	900 to 950	11.94	14.08	2.13
	850 to 900	11.72	13.01	1.29
	800 to 850	13.99	14.28	0.29
	750 to 800	15.36	14.77	<b>-0.58</b>
	700 to 750	15.30	14.31	<b>-1.00</b>
	600 to 700	18.77	16.81	<b>-1.96</b>
	300 to 600	5.20	3.72	<b>-1.48</b>
	less than 300	0.04	0.04	<b>-0.01</b>

TABLE 4—DESCRIPTIVE STATISTICS OF THE LOAN APPROVAL RATE

		Observations	Mean	S.D.	p10	p50	p90
① Jan 2017 to Dec 2017	Loan Approval	885,128	0.70	0.46	0	1	1
	Bank Loan Approval	885,128	0.17	0.37	0	0	1
	Non-Bank Loan Approval	885,128	0.53	0.50	0	1	1
② Jan 2018 to Dec 2018	Loan Approval	838,091	0.65	0.48	0	1	1
	Bank Loan Approval	838,091	0.17	0.38	0	0	1
	Non-Bank Loan Approval	838,091	0.48	0.50	0	0	1

of loan contracts to those with a specific credit score is due to a demand factor or a supply factor. However, as loan interest rates for borrowers with low credit scores are declining due to the cut in the legal maximum interest rate, the demand for loans from those with low credit scores is highly likely to increase. Therefore, the decrease in the proportion of loan contracts for the low-credit class shown in Table 3 appears to be due to supply-side factors rather than demand-side factors. In other words, the findings here suggests that financial institutions may have reduced the supply of credit loan products for the low-credit class given their reduced profits due to the legal maximum interest rate cut. In this study, we analyze this more strictly through a regression difference-in-difference analysis.

Table 4 shows the proportion of borrowers who actually borrowed from banks or non-banks among potential borrowers for whom credit checks were performed in 2017 and 2018. Among those who underwent a credit check in 2017 in both the banking and the non-banking sectors, the proportion that led to a loan amounted to 70%, whereas in 2018, this proportion decreased by 5%p to 65%. Breaking these outcomes down into bank loans and non-bank loans, the success rate of bank loans after a credit check did not differ significantly between 2017 and 2018, while the success rate of non-bank loans decreased from 53% in 2017 to 48% in 2018, showing a reduction of 5%p. We find that the likelihood of a loan being rejected after a credit check to obtain a credit loan after the cut in the legal maximum interest rate increased. Moreover, we note that this phenomenon was particularly pronounced in the non-banking sector. Financial institutions may reject loans after a credit check, but some borrowers voluntarily give up borrowing after the credit check, from which a limitation of this descriptive analysis comes. Therefore, we will examine this phenomenon more rigorously via an empirical analysis.

#### IV. Empirical Strategy

The two main effects expected from a cut in the legal maximum interest rate are a reduction in loan interest rates and the exclusion of some borrowers from the loan market. Therefore, this chapter introduces an empirical analysis method to estimate the effect of the cut in the legal maximum interest rate on loan interest rates, loan approval rates, and the default probability.

The identification strategy used in this paper is a difference-in-difference analysis. When viewed from various angles through descriptive statistics, the cut in the statutory maximum interest rate mainly affects credit loans for low-credit borrowers

in the non-banking sector. However, it has little effect on bank credit loans, and in particular, it has no effect on the credit loan market of banks for high-credit borrowers. Accordingly, the banks' credit loan market for high-credit borrowers is a good control group for estimating the effect of the legal maximum interest rate cut.

Therefore, this paper utilizes a difference-in-difference analysis, setting the banks' credit loan market for high-credit borrowers as the control group and the non-bank credit loan market as the treatment group. In a general difference-in-difference analysis, the treatment group should be observed both before and after the policy change. However, when the legal maximum interest rate is lowered, some borrowers are excluded from the market and are not observed after policy changes. Therefore, in this paper, the treatment group is limited to borrowers who are not excluded from the market even after the statutory maximum interest rate cut. Meanwhile, we also analyze the market exclusion effect of the legal maximum interest rate cut through a difference-in-difference analysis using loan approval rates in the treatment group and the control group.

The assumption known as the parallel trend assumption is the most crucial identification aspect of the difference-in-difference analysis here. The parallel trend assumption implies that in the absence of a treatment, the difference in the value of the dependent variable between the treatment group and the control group before the treatment and after the treatment would be identical. Although it is impossible directly verify to whether the parallel trend assumption is satisfied, in general, the validity of the assumption is indirectly judged by examining whether the trends of the dependent variables of the control and treated groups are parallel before the treatment.

Figure 3 shows the interest rate trends of bank credit loans for high-credit borrowers and those of non-bank credit loans according to the credit rating group to which the borrowers belong. As mentioned earlier, the bank credit loan market for high-credit borrowers becomes the control group, and the non-bank credit loan market for each credit rating group becomes the treatment group. Until the announcement of the legal maximum interest rate cut, the monthly average interest

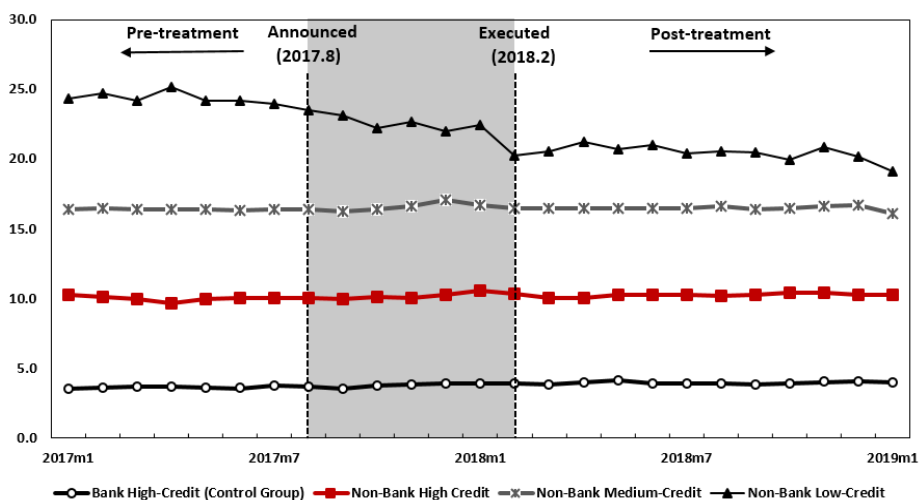


FIGURE 3. AVERAGE MONTHLY INTEREST RATES OF CREDIT LOANS (JANUARY 2017 - JANUARY 2019)

rates for each group moved in parallel. However, after August of 2017, when the statutory maximum interest rate cut was announced, the interest rates of non-banking low-credit loans started gradually to decrease. Accordingly, only the period before the announcement is used as the pre-treatment period.

Based on the parallel trend assumption introduced earlier, a regression difference-in-difference is performed in this study. The regression equation of the analysis is as follows:

$$(1) \quad y_{ijt} = \beta_0 + \beta_1 D_{Treated} + \beta_2 D_{After\ the\ Cut} + \beta_3 D_{Treated \times After\ the\ Cut} + X_{ijt} + f_j + \varepsilon_{ijt}$$

$$(2) \quad y_{ijt} = \beta_0 + \beta_1 D_{Non-bank\ Credit\ Check} + \beta_2 D_{After\ the\ Cut} + \beta_3 D_{Non-bank\ Credit\ Check \times After\ the\ Cut} + X_{ijt} + f_j + \varepsilon_{ijt}$$

$$D_{Treated} = \begin{cases} 1, & \text{Non-bank Credit Loan} \\ 0, & \text{Bank Credit Loan} \end{cases}$$

$$D_{After\ the\ Cut} = \begin{cases} 1, & \text{After the Legal Maximum Interest Rate Cut} \\ 0, & \text{Before the Legal Maximum Interest Rate Cut} \end{cases}$$

$$D_{Non-bank\ Credit\ Check} = \begin{cases} 1, & \text{Non-bank Credit Check} \\ 0, & \text{Bank Credit Check} \end{cases}$$

First, to analyze the effect of the cut in the legal maximum interest rate on non-bank credit loan interest rates and the probability of default, we use the regression difference-in-difference equation (1). The dependent variable is the interest rate when analyzing the effect of the cut in the statutory maximum interest rate on the interest rates given by non-bank credit loans. On the other hand, when analyzing the effect of the cut in the legal maximum interest rate on the default probability, the dependent variable is whether the loan is overdue for more than 90 business days (1 if a delinquency occurs for more than 90 business days after the loan is issued or 0 otherwise). As explanatory variables, we use different variables that can affect credit loan interest rates or the default probability. Specifically, these include credit scores, income, job status, age, bank credit loan balances, non-bank credit loan balances, total loan balances, total credit card usage in the preceding year, total debit card usage in the preceding year, and the Bank of Korea's base rate. Also, we include individual financial institution fixed effects in the regression model.

Meanwhile, we use equation (2) to analyze the effect of the legal maximum interest rate cut on the loan approval rate. In this case, the dependent variable is a new loan occurrence dummy after a loan application. We can know whether a potential borrower applies for a new loan through the credit check history. KCB distinguishes between simple credit inquiries and credit checks for opening new loans. The credit check history used in this study is the latter type, sourced from the

credit check record for the opening of new loans, not the simple credit inquiry type.

Of course, there may be cases where the loan is voluntarily abandoned after a credit check for a loan application. Therefore, in this difference-in-difference regression model, another identification assumption is added in addition to the parallel trend assumption. The additional assumption is that there may be a difference in the rate of the voluntary giving up of loans between high-credit borrowers and low-credit borrowers. However, we assume that this difference does not vary before and after the legal maximum interest rate cut; i.e., we utilize a parallel trend assumption for the rate of voluntarily giving up.

## **V. Empirical Results**

This chapter introduces the empirical results of the effect of the cut in the legal maximum interest rate on credit loan interest rates, default rates, and loan approval rates for the different credit rating groups.

Table 5 is the regression difference-in-difference estimates of the effect of the reduction in the legal maximum interest rate on the loan interest rate. The control group for the regression difference-in-difference is the group of credit loans given to high-credit borrowers (credit grades 1 to 3) in the banking sector that are not affected by the cut in the statutory maximum interest rate. In column 1 of Table 5, credit loans to non-bank high-credit borrowers (grades 1 to 3) are the treatment group. In column 2, the treatment group is credit loans from non-bank medium-credit borrowers (grades 4-7). Finally, in column 3 of Table 5, the treatment group is credit loans to non-banking low-credit borrowers (grades 8-10).

As a result of the analysis, the cut in the legal maximum interest rate mainly lowered the interest rate of credit loans for low-credit borrowers in the non-banking sector. According to the third column of Table 5, the average interest rate of low-credit credit loans in the non-banking sector decreased by about 3.5%p due to the cut in the legal maximum interest rate. On the other hand, for medium-credit borrowers, the interest rate on new loans only decreased by 0.20%p during the same period, and no significant change in the loan interest rates was found for high-credit borrowers. This phenomenon is also consistent with the observation of the distribution of interest rates on non-bank credit loans by credit rating before and after the legal maximum rate cut.

The effects of the credit score, income, and base interest rate on loan interest rates also coincide with common sense. The higher the credit score and income, the lower the interest rate, and the higher the Bank of Korea base rate, the higher the loan interest rate. On the other hand, borrowers who hold higher bank loan balances have lower interest rates on new credit loans. This appears to be a phenomenon in which soft information that accumulates in financial institutions through existing transactions lowers the interest rate of new credit loans. Moreover, access to a bank loan in the past signals a borrower with low credit risk when non-banks evaluate borrower credit risk. On the other hand, the higher the non-bank credit loan balance is, the higher the interest rate also is. This may stem from the fact that the default probability is higher for borrowers who have multiple non-bank credit loans.

Due to the nature of the difference-in-difference analysis, the constant term



TABLE 5—EFFECTS OF THE LEGAL MAXIMUM INTEREST RATE CUT ON LOAN INTEREST RATES  
(DIFFERENCE-IN-DIFFERENCE)

Variables	Dependent Variable: Interest Rate (%)		
	(1) Grade 1~3	(2) Grade 4~7	(3) Grade 8~10
DID Effect	-0.032 (0.027)	-0.20*** (0.024)	-3.47*** (0.040)
After Cutting the Interest Rate Cap (After the Treatment Dummy)	0.092*** (0.024)	0.11*** (0.024)	0.17*** (0.013)
Non-Banking Credit Loan Dummy (Treatment Dummy)	5.54*** (0.021)	7.00*** (0.026)	18.5*** (0.051)
Credit Score/100	-1.94*** (0.016)	-2.71*** (0.0082)	-3.00*** (0.010)
Annual Income (1 Million Won)	-0.056*** (0.0034)	-0.080*** (0.0036)	-0.084*** (0.0019)
Credit Card Usage (1 Million Won)	-0.027*** (0.0053)	-0.059*** (0.0039)	-0.032*** (0.0035)
Debit Card Usage (1 Million Won)	-0.019*** (0.0023)	-0.035*** (0.0018)	-0.091*** (0.0014)
BOK Base Rate (%)	0.69*** (0.060)	0.57*** (0.048)	0.38*** (0.039)
Bank Loan Balance (1 Million Won)	-0.014*** (0.0084)	-0.029*** (0.0094)	-0.027 (0.05)
Bank Credit Loan Balance (1 Million Won)	-0.033*** (0.0026)	-0.044*** (0.0029)	-0.030*** (0.0014)
Non-bank Credit Loan Balance (1 Million Won)	0.010*** (0.00066)	0.014*** (0.00048)	0.089* (0.049)
Constants	21.8*** (0.16)	29.0*** (0.100)	6.51*** (0.10)
Job Dummy	O	O	O
Age Group Dummy	O	O	O
Financial Institute Fixed Effect	O	O	O
Observations	265,128	610,652	155,051
R <sup>2</sup>	0.483	0.670	0.855

Note: 1) Statistical Significance levels: \*\*\*p<0.01, \*\*p<0.05, \*p<0.1, 2) Standard errors in parentheses.

estimate refers to the average interest rate of the control group when the values of explanatory variables other than double-difference-related variables are 0. In this difference-in-difference regression, the control group is the group of high-credit borrowers in the banking sector. Looking at the constant term estimates in Table 5, the values of the high- and medium-credit classes are high, at 21.8 and 29.0, respectively. On the other hand, in the case of the low-credit class, the constant term is estimated to be 6.51, which is relatively small. This is mainly explained by the effect of credit ratings on loan interest rates. The average credit score of high-credit borrowers in the banking sector is approximately 919.9 points (9.199 if divided by 100). Therefore, multiplying the credit score coefficient estimates (-1.94, -2.71, -0.30) of each credit class by 9.199 generates corresponding values of 17.8, -24.9,

and -2.8 for the respective groups. That is, for the high-credit group and the middle-credit group, a large value is subtracted from the constant term when credit scores are taken into account. However, a relatively small value is subtracted for the low-credit group. In the same way, by substituting the average value of high-credit borrowers in the banking sector into each explanatory variable and adding this value to the constant term estimate, we find similar values of 3.4, 3.4, and 3.5 for the corresponding groups. As mentioned earlier, this is the average interest rate on loans for high-credit borrowers in the banking sector in the first half of 2017.

Table 6 shows the diff-in-diff estimates of the effect of the cut in the legal maximum interest rate on the loan approval rate. According to the empirical results, when the legal maximum interest rate was reduced, the loan approval rate for low-credit borrowers decreased by about 3.6%p. On the other hand, the loan approval rate for high-credit borrowers increased by approximately 1.0%p, and the loan

TABLE 6—EFFECTS OF THE LEGAL MAXIMUM INTEREST RATE CUT ON LOAN APPROVAL RATES  
(DIFFERENCE-IN-DIFFERENCE)

Variables	Dependent Variable: Loan Approved Dummy		
	(1) Grade 1~3	(2) Grade 4~7	(3) Grade 8~10
DID Effect	0.010*** (0.0030)	0.014*** (0.0018)	-0.036*** (0.0069)
After the Treatment Dummy	-0.017*** (0.0015)	-0.017*** (0.0013)	-0.016*** (0.0015)
Non-Bank Credit Check Dummy (Treated Dummy)	-0.043 (0.031)	-0.024 (0.015)	-0.065 (0.050)
Credit Score/100	0.006** (0.0018)	0.02*** (0.0015)	0.01*** (0.0019)
Annual Income (1 Million Won)	0.00022*** (0.00003)	0.00023*** (0.00003)	0.00024*** (0.00003)
Credit Card Usage (1 Million Won)	0.00026*** (0.00005)	0.00020*** (0.00003)	0.00029*** (0.00006)
Debit Card Usage (1 Million Won)	0.00050*** (0.00002)	0.00030*** (0.00002)	0.00055*** (0.00003)
Bank Loan Balance (1 Million Won)	0.00006*** (0.00001)	0.00007*** (0.00001)	0.00007*** (0.00001)
Bank Credit Loan Balance (1 Million Won)	0.0022*** (0.0002)	0.0022*** (0.0002)	0.0023*** (0.0003)
Non-bank Credit Loan Balance (1 Million Won)	-0.0021*** (0.0007)	-0.0013*** (0.0004)	-0.0029*** (0.0009)
Constants	0.696*** (0.0160)	0.691*** (0.0137)	0.739*** (0.0167)
Job Dummy	O	O	O
Age Group Dummy	O	O	O
Financial Institute Fixed Effect	O	O	O
Observations	243,482	358,821	192,590
R <sup>2</sup>	0.2099	0.2122	0.2482

Note: 1) Statistical Significance level: \*\*\*p<0.01, \*\*p<0.05, \*p<0.1, 2) Standard errors in parentheses.

approval rate for medium-credit borrowers increased by about 1.4%p. These outcomes stem from the fact that non-bank financial institutions reduce the supply of credit loans for low-credit borrowers, who are no longer generating profits. On the other hand, non-bank financial institutions increase the supply of credit loans for high-credit and medium-credit borrowers, as these loans can still generate profits after the cut in the legal maximum interest rate.

On the other hand, the effects of the credit score, income, credit card usage, and debit card usage of borrowers on their loan approval rates is also consistent with a priori outcomes. The higher the credit score, the higher the loan approval rate, and the higher the income, the higher the loan approval rate. Lastly, at the time of the loan review, the greater the bank loan balance, the higher the loan approval rate, whereas the greater the non-bank credit loan balance, the lower the loan approval rate.

Table 7 shows the diff-in-diff estimates of the effect of a cut in the legal maximum

TABLE 7—EFFECTS OF THE LEGAL MAXIMUM INTEREST RATE CUT ON LOAN APPROVAL RATES  
(ONLY CONSIDERING CARD AND CAPITAL COMPANIES AND SAVINGS BANKS)

Variables	Dependent Variable: Loan Approved Dummy		
	(1) Grade 1~3	(2) Grade 4~7	(3) Grade 8~10
DID Effect	0.007** (0.0024)	0.014*** (0.0019)	-0.048*** (0.0069)
After the Treatment Dummy	-0.017*** (0.0018)	-0.017*** (0.0014)	-0.016*** (0.0015)
Non-Bank Credit Check Dummy (Treated Dummy)	-0.048*** (0.0025)	-0.042*** (0.0017)	-0.086*** (0.028)
Credit Score/100	0.01*** (0.002)	0.02*** (0.002)	0.01*** (0.002)
Annual Income (1 Million Won)	0.0025*** (0.0003)	0.0018*** (0.0003)	0.0024*** (0.0003)
Credit Card Usage (1 Million Won)	0.00043*** (0.00005)	0.00040*** (0.00004)	0.00030*** (0.00006)
Debit Card Usage (1 Million Won)	0.00066*** (0.000021)	0.00030*** (0.000016)	0.00058*** (0.000025)
Bank Loan Balance (1 Million Won)	0.00007*** (0.00001)	0.00008*** (0.00001)	0.00007*** (0.00001)
Bank Credit Loan Balance (1 Million Won)	0.0026*** (0.0002)	0.0023*** (0.0002)	0.0023*** (0.0003)
Non-bank Credit Loan Balance (1 Million Won)	-0.0040*** (0.0006)	-0.0030*** (0.0004)	-0.0031*** (0.0009)
Constants	0.683*** (0.0186)	0.653*** (0.0155)	0.736*** (0.0168)
Job Dummy	O	O	O
Age Group Dummy	O	O	O
Financial Institute Fixed Effect	O	O	O
Observations	189,436	329,394	191,888
R <sup>2</sup>	0.2293	0.1894	0.2527

Note: 1) Statistical Significance level: \*\*\*p<0.01, \*\*p<0.05, \*p<0.1, 2) Standard errors in parentheses.

interest rate on the loan approval rate, but the treatment group is limited to card companies, capital companies, and savings banks. According to the analysis, with the 3.9%p cut the legal maximum interest rate from 27.9% to 24%, the approval rate of non-bank credit loans for low-credit borrowers decreased by about 4.8%p. On the other hand, the approval rate for non-bank credit loans for high-credit borrowers increased by about 0.7%p, while that for medium-credit borrowers increased by approximately 1.4%p. This result is similar to the result of the previous analysis (Table 6) in which all non-bank financial institutions were included as the treatment group.

In particular, as the legal maximum interest rate is lowered, the supply of credit loans for low-credit borrowers, who no longer generate profits, is reduced, and the supply of credit loans for high-credit borrowers and medium-credit borrowers is increased.

Table 8 shows the diff-in-diff estimates of the effect of the cut in the legal maximum interest rate on the default probability. The analysis results indicate that the default rate decreased after the legal maximum interest rate was cut. However, this only affected borrowers who successfully obtained a loan despite the cut in the legal maximum interest rate.

The effect was particularly apparent in the low-credit class. As the statutory maximum interest rate decreased from 27.9% to 24% in February of 2018, no significant change was observed in the default probability for high-credit borrowers. On the other hand, the default probability of medium-credit borrowers decreased by about 0.24%p on average. Considering that the average default probability of non-bank medium-credit borrowers is close to 4.44%, the statutory maximum rate cut reduced the default probability of medium-credit borrowers by about 5.4%. On the other hand, the default probability of low-credit borrowers decreased by a whopping 2.8%p. This means that the default probability decreased by nearly 21% when considering the average default probability (13.6%) of non-bank low-credit borrowers.

The effects of various explanatory variables, such as the credit score, income, amount of credit card use in the previous year, and debit card use amount in the previous year on the default probability also coincides with common sense. The higher the credit score, the lower the default probability, and the higher the income, the lower the default probability. On the other hand, when the Bank of Korea base rate is high, the probability of a default decreases because the base rate decreases and the probability of a default increase during an economic downturn.

According to Table 5, the cut in the legal maximum interest rate mainly led to loan rate cuts for low-credit borrowers in the non-banking sectors. In addition, according to Table 8, the default probability of low-credit borrowers significantly decreased due to the reduction of the legal maximum interest rate. Taken together, for low-credit borrowers who successfully took out loans despite the legal maximum rate cut, the loan interest rate was reduced. As a result, the monthly repayment burden decreased, thereby reducing the probability of a default.

TABLE 8—EFFECTS OF CUTTING THE INTEREST RATE CAP ON THE DEFAULT RATE  
(DIFFERENCE-IN-DIFFERENCE)

Variables	Dependent Variable: Default Dummy		
	(1) Grade 1~3	(2) Grade 4~7	(3) Grade 8~10
DID Effect	0.00030 (0.00074)	-0.0024** (0.0010)	-0.028*** (0.0023)
After Cutting Down Interest Rate Cap (After the Treatment Dummy)	-0.00062 (0.00065)	0.0011 (0.0011)	-0.00023 (0.00077)
Non-Banking Credit Loan Dummy (Treatment Dummy)	0.0078*** (0.00058)	0.047*** (0.011)	0.10*** (0.0029)
Credit Score/100	-0.0061*** (0.00044)	-0.019*** (0.00035)	-0.0084*** (0.00058)
Income (1 Million Won)	-0.00014 (0.000092)	-0.00061*** (0.00015)	-0.00022** (0.00011)
Credit Card Usage (1 Million Won)	-0.000043*** (0.000015)	-0.00017*** (0.000017)	-0.00068*** (0.00020)
Debit Card Usage (1 Million Won)	0.000011 (0.00063)	0.000076*** (0.000078)	0.000054 (0.00082)
BOK Base Rate (%)	-0.0023 (0.0017)	-0.0090*** (0.0021)	-0.0034 (0.0023)
Bank Loan Balance (1 Million Won)	-0.00016*** (0.000023)	-0.00065*** (0.000041)	-0.00010*** (0.000029)
Bank Credit Loan Balance (1 Million Won)	0.00037*** (0.000071)	0.00046*** (0.00012)	6.0e-06 (8.3e-06)
Non-bank Credit Loan Balance (1 Million Won)	0.0021*** (0.00018)	0.0040*** (0.0002)	0.0022 (0.0028)
Constants	0.069*** (0.0045)	0.18*** (0.0043)	0.088*** (0.0060)
Job Dummy	O	O	O
Age Group Dummy	O	O	O
Financial Institute Fixed Effect	O	O	O
Observations	265,128	610,652	155,051
R <sup>2</sup>	0.006	0.015	0.079

Note: 1) Statistical Significance level: \*\*\*p<0.01, \*\*p<0.05, \*p<0.1, 2) Standard errors in parentheses.

## VI. Conclusion

This study showed that the loan interest rates of low-credit borrowers who use the non-banking sector fell significantly due to the legal maximum interest rate cut in February of 2018. On the other hand, no significant decline was found in the loan interest rates of high-credit and low-credit borrowers. In addition, the default rates of low-credit borrowers using the non-banking sector decreased significantly due to a reduction in the monthly repayment burden caused by the reduced loan interest rates.

However, this phenomenon is limited to borrowers who could still obtain a loan

despite the cut in the legal maximum interest rate. In fact, according to the results of the analyses here, the loan approval rates of low-credit borrowers using the non-banking sector decreased significantly due to the cut in the legal maximum interest rate.

Many borrowers receiving loans at a level similar to the legal maximum interest rate are likely to be from vulnerable classes with low incomes or low credit ratings. Considering this, the findings here suggest that policy supplements are necessary for borrowers excluded from the market due to the reduced legal maximum interest rate. In particular, as the statutory maximum interest rate is lowered continuously, the number of borrowers excluded from the market due to further cuts in the statutory maximum interest rate is highly likely to increase.

In fact, when policy authorities recently lowered the legal maximum interest rate from 24% to 20%, taking into account the possibility of excluding vulnerable borrowers from the market, they implemented follow-up measures, such as providing policy loans for low-income borrowers. Therefore, in future research, examining whether these follow-up measures following the cut in the legal maximum interest rate sufficiently provided a safety net is necessary. These points represent limitations of this study and are left as future research tasks.

On the other hand, lowering the legal maximum interest rate reduces financial institutions' profits. Therefore, a cut in the statutory maximum interest rate creates a new market environment for financial institutions, providing incentives to develop new markets. In particular, compared to the high-interest-rate loan market, where obtaining a loan has become relatively difficult due to the cut in the legal maximum interest rate, the medium-rate market can be a new avenue for card companies, capital companies, and savings banks.

Two major problems have been pointed out as factors that prevented the middle-interest rate credit loan market from being activated. The first problem is that there is serious information asymmetry between financial providers and consumers, and the second point is the lack of incentives to supply medium-rate credit loans due to limited competition from financial institutions. In particular, according to a previous study by Kim (2019), it is highly likely that the lack of incentives to supply medium-rate credit loans has been the greatest obstacle to the vitalization of medium-rate loans. Therefore, by introducing an appropriate incentive system when the statutory maximum interest rate is reduced, it would be possible to absorb some of the borrowers who could potentially be excluded from the market due to the statutory maximum interest rate cut. This is a case in which the government could intervene more actively through policy compared to the situations in other countries, and it is a necessary measure in the current situation where the legal maximum interest rate is relatively low compared to those in other countries.

## APPENDIX

Table A1 presents the analysis result without including any explanatory variables other than the variables for the difference-in-difference for the robustness check of Table 5. Similar to the results in Table 5, the cut in the legal maximum interest rate mainly leads to a reduction in the loan rates for low-credit borrowers in the non-banking sector. On the other hand, due to the nature of the difference-in-difference analysis, the estimate of the constant term ( $\beta_0$ ) refers to the average interest rate of credit loans for high-credit borrowers in the banking sector.

Table A2 is the result of an additional robustness check for Table 5 and confirms once again that the cut in the legal maximum interest rate mainly lowers the loan rates for low-credit borrowers in the non-banking sector.

Table A3 is the robustness check result for Table 8, confirming once again that lowering the legal maximum interest rate mainly reduces the default rate for low-credit borrowers in the non-banking sector. As shown in Table 5, the cut in the legal maximum interest rate leads to a lower loan interest rate for low-credit borrowers. As a result, the monthly repayment burden is reduced. A reduction in the monthly repayment burden can lead to a reduction in the default rate. Therefore, the results in Table 8 are consistent with our expectations.

TABLE A1—EFFECTS OF THE CUTTING THE INTEREST RATE CAP ON INTEREST RATES (DID)

Variables	Dependent Variable: Interest Rate (%)		
	(1) Grade 1~3	(2) Grade 4~7	(3) Grade 8~10
DID effect	-0.064*** (0.024)	-0.28*** (0.023)	-3.54*** (0.037)
After cutting the Interest Rate Cap (After the Treatment Dummy)	0.24*** (0.017)	0.24*** (0.020)	0.24*** (0.0074)
Non-Banking Credit Loan Dummy (Treated Dummy)	6.36*** (0.017)	12.7*** (0.016)	20.1*** (0.024)
Constants	3.72*** (0.012)	3.72*** (0.014)	3.72*** (0.0052)
Observations	431,978	805,364	228,396
R <sup>2</sup>	0.390	0.601	0.821

Note: 1) Statistical Significance level: \*\*\*p<0.01, \*\*p<0.05, \*p<0.1, 2) Standard errors in parentheses.

TABLE A2—EFFECTS OF CUTTING THE INTEREST RATE CAP ON INTEREST RATES (DID)

Variables	Dependent Variable: Interest Rate (%)	
	(1)	(2)
DID Effect	-0.19*** (0.025)	
DID Effect (Credit grade 1-3)		-0.0067 (0.033)
DID Effect (Credit grade 4-7)		-0.19*** (0.025)
DID Effect (Credit grade 8-10)		-3.39*** (0.100)
After cutting down Interest Rate Cap (After Treatment Dummy)	0.10*** (0.025)	0.10*** (0.025)
Non-bank Credit Loan Dummy (Treated Dummy)	5.86*** (0.021)	
Non-bank Credit Loan Dummy (Credit grade 1-3)		5.29*** (0.025)
Non-bank Credit Loan Dummy (Credit grade 4-7)		6.81*** (0.026)
Non-bank Credit Loan Dummy (Credit grade 8-10)		7.17*** (0.074)
Credit Score/100	-3.10*** (0.0057)	-2.76*** (0.0082)
Annual Income (1 Million Won)	-0.072*** (0.0034)	-0.072*** (0.0034)
Credit Card Usage (1 Million Won)	-0.011*** (0.0037)	-0.013*** (0.0037)
Debit Card Usage (1 Million Won)	-0.021*** (0.0017)	-0.025*** (0.0017)
BOK Base Rate (%)	0.59*** (0.046)	0.60*** (0.045)
Bank Loan Balance (1 Million Won)	-0.034*** (0.0087)	-0.030*** (0.0087)
Bank Credit Loan Balance (1 Million Won)	-0.013*** (0.0028)	-0.012*** (0.0028)
Non-bank Credit Loan Balance (1 Million Won)	0.055*** (0.00045)	0.075*** (0.00045)
Constants	33.0*** (0.080)	29.7*** (0.097)
Job Dummy	O	O
Age Group Dummy	O	O
Financial Institute Fixed Effect	O	O
Observations	736,379	736,379
R <sup>2</sup>	0.629	0.633

Note: 1) Statistical Significance level: \*\*\*p<0.01, \*\*p<0.05, \*p<0.1, 2) Standard errors in parentheses.



TABLE A3—EFFECTS OF CUTTING THE INTEREST RATE CAP ON THE DEFAULT RATE (DID)

Variables	Dependent Variable: Default Dummy	
	(1)	(2)
DID Effect	-0.0022** (0.00099)	
DID Effect (Credit grade 1-3)		0.00043 (0.0013)
DID Effect (Credit grade 4-7)		-0.0024** (0.0010)
DID Effect (Credit grade 8-10)		-0.027*** 0.0011
After cutting down Interest Rate Cap (After Treatment Dummy)	0.0012 (0.0010)	0.0011 (0.0010)
Non-bank Credit Loan Dummy (Treated Dummy)	0.0012 (0.00085)	
Non-bank Credit Loan Dummy (Credit grade 1-3)		0.0040*** (0.00099)
Non-bank Credit Loan Dummy (Credit grade 4-7)		0.0024** (0.0010)
Non-bank Credit Loan Dummy (Credit grade 8-10)		0.054*** (0.0030)
Credit Score/100	-0.018*** (0.00023)	-0.018*** (0.00033)
Annual Income (1 Million Won)	-0.00078*** (0.00014)	-0.00059*** (0.00014)
Credit Card Usage (1 Million Won)	-0.00018*** (0.000015)	-0.00015*** (0.000015)
Debit Card Usage (1 Million Won)	0.000067*** (0.0000070)	0.000063*** (0.0000070)
BOK Base Rate (%)	-0.0091*** (0.0018)	-0.0089*** (0.0018)
Bank Loan Balance (1 Million Won)	-0.00055*** (0.000035)	-0.00057*** (0.000035)
Bank Credit Loan Balance (1 Million Won)	0.00052*** (0.00011)	0.00055*** (0.00011)
Non-bank Credit Loan Balance (1 Million Won)	0.0035*** (0.00018)	0.0037*** (0.00018)
Constants	0.17*** (0.0032)	0.18*** (0.0039)
Job Dummy	O	O
Age Group Dummy	O	O
Financial Institute Fixed Effect	O	O
Observations	736,379	736,379
R <sup>2</sup>	0.017	0.018

Note: 1) Statistical Significance level: \*\*\*p<0.01, \*\*p<0.05, \*p<0.1, 2) Standard errors in parentheses.

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