Comparing the Impact of Interest Rates on Household Loans between Credit Cooperatives and Banks

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Abstract

This study examined the determinants of household debt from the perspective of financial institutions. Our research analyzed the causes of household debt utilizing personal data from 794,100 borrowers in South Korea from December 2019 to December 2022 to compare credit cooperative members' loan characteristics with those of bank borrowers. The results reveal several insights. First, bank borrowers decreased their borrowings as interest rates rose, but there was no significant relationship between interest rates and loan amounts for credit cooperative borrowers. Second, personal credit loans are more sensitive to interest rates than mortgage loans. Finally, we segmented the age groups into those in their 20s-30s, 40s-50s, and 60 years or older, revealing that older age groups were more sensitive to interest rate changes. The implications of this study are that credit cooperatives, built on relationship lending, may encounter fewer information asymmetry issues than commercial banks. Credit cooperatives play a similar role to banks in household loans, but it is different from banks in terms of regional-based relationship banking.

Keywords: Monetary policy, Credit cooperatives, Relationship banking, Bank, Household debt
JEL classification: E52, G21, G23, H31, P13

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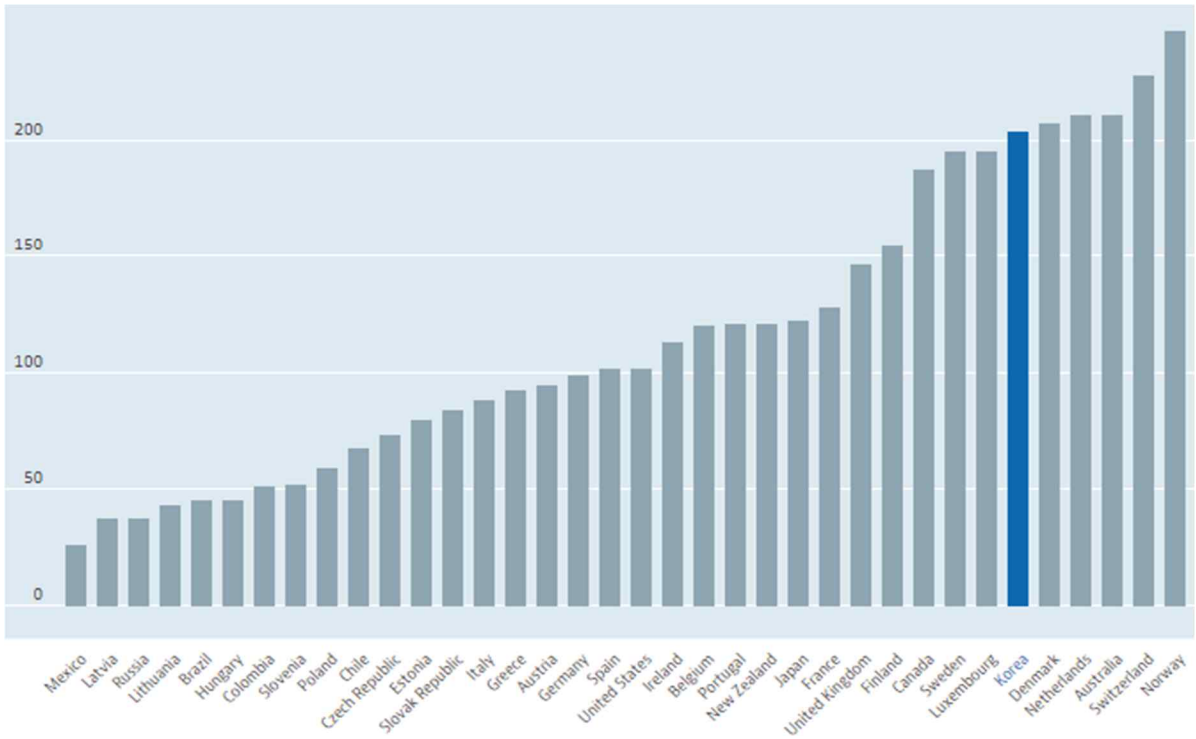
I. Introduction

Household debt refers to household financial obligations, including interest and principal payments. The post-pandemic era has shown an upward global trend in household debt, primarily driven by increased liquidity and the consequent surge in asset prices. As of 2022, South Korea's household debt-to-net disposable income ratio reached 204%, ranking sixth among OECD countries. South Korea's household debt mainly comprises personal and mortgage loans. Personal credit loans are granted based on borrowers' income and credit, while mortgage loans are secured against assets like homes or deposits. Household loans can be categorized into loans provided by banks, credit cooperatives, and other institutions.

<Fig. 1> Household debt (% of net disposable income)



Source: OECD Data (2022)

By the end of 2022, Bank of Korea presented that South Korean credit cooperatives held 14% of total deposits and 20% of total loans. Banks accounted for 72% of household debt in 2022, credit cooperatives for 24%, and other institutions for 4%. As credit cooperatives are the second largest provider of household loans, it is important to closely examine the unique loan characteristics of cooperatives comparing to banks.

South Korea has maintained a policy of raising its base rate since August 2021. This decision

came from the need to control increased liquidity after the pandemic. South Korea has also consistently mirrored interest rate trends set by the United States. This increased base rate has had a pronounced effect on household debt. The debt burdens associated with home loans with floating rates have grown as interest rates have surged. In response, this study analyzed how rising interest rates impact borrowers' existing debt, differentiating between banks and credit cooperatives.

Previous studies have examined the determining factors of debt by aggregating household debt as a total amount (Kim, 2021; Lee et al., 2018; Kang & Lee, 2021). In contrast, this paper takes a different approach by analyzing the impact of interest rate fluctuations on individual borrowers, using the borrower as a unit of observation. Additionally, it explores the distinct characteristics of loans from banks and financial cooperatives, categorizing them into different financial products, personal credit loans and mortgage loans. The analysis is further broken down by age group to account for individual characteristics.

The implication of this study can be summarized as follows. First, this study is the first to compare the impact of interest rates on household debt between banks and credit cooperatives by analyzing data from 794,100 borrowers. As noted by Diamond (1984), financial intermediaries have attempted to resolve information asymmetry issues through credit assessment and post-loan management. Credit cooperatives, built on cooperative principles, rely on relationship lending. Due to their foundation in relationship lending, financial cooperatives are more acquainted with borrowers and thus can easily assess their reputation. This could potentially lead to less information asymmetry than larger banks. The research reveals that borrowers who obtained new loans from credit cooperatives were not influenced by interest rates.

Second, this study is the first attempt to categorize loans into personal and mortgage loans, providing novel insights into the differences in lending characteristics based on the financial product type. In South Korea, household debt is primarily divided into personal and mortgage loans, each with unique features and purposes. The analysis showed that personal credit loans are more sensitive to interest rates than mortgage loans.

Third, this study uncovers variations in interest rate sensitivities among different age groups. Analyzing individuals at the personal level allowed us to determine borrowers' decision-

making process. We divided age groups into 20s-30s, 40s-50s, and 60 years or older, uncovering that older age groups are more sensitive to interest rates.

An implication of this study is that financial cooperatives' relationship-based lending mitigates interest rate sensitivity as borrowers base their loan decisions on factors beyond just interest rates. Thus, credit cooperatives play its role in lending household loan in a different way than banks do.

The paper is structured as follows: Chapter 2 introduces the literature, Chapter 3 explains the data and models, and Chapter 4 presents the analysis results. Chapter 5 summarizes the overall content of the paper and presents discussions regarding its implications.

II. Literature Review

2.1 Household debt

In 2010, South Korea's household debt-to-GDP ratio was ranked 14th among 43 major countries. However, by the end of the fourth quarter of 2022, it had surged to the third position, reaching 105%, behind Switzerland (128%) and Australia (118%). Even when focusing on non-mortgage loans within household debt, South Korea's debt-to-GDP ratio remained high at 37%, a significant figure compared to countries like the United States (25%) and Australia (21%) (Lee & Kang, 2023).

Accumulating excessive household debt can hinder long-term economic growth and exacerbate wealth inequality. Research indicates that a rapid increase in household debt is linked to a decline in the GDP growth rate (Mian and Sufi, 2009; Mian et al., 2017; Nyholm & Voutilainen, 2021). According to data from the Bank of Korea, South Korea's household debt is primarily rising among high-income groups (Lee & Kang, 2023). By the end of 2022, the top quintile of income distribution constituted 37% of total income, yet they held 53% of the overall outstanding loans. This discrepancy highlights a higher borrowing rate compared to income level.

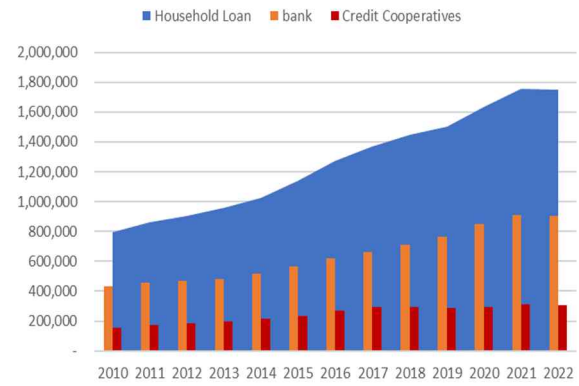
In South Korea, individuals frequently turn to a diverse array of institutions for loans, including banks, credit cooperatives, savings banks, credit card companies, and insurance firms. As of 2022, non-bank financial institutions accounted for 28% of the total household debt, with credit cooperatives playing a significant role within this sector, comprising 86% of non-bank entities. Of the total household loans, the banking sector claims the share at 72%, followed by credit cooperatives at 24%, with other institutions making up the remaining 4%.[3]

Mortgage loans represent the largest portion of individual loans. Mortgage loans provided by banks are backed by property collateral, suggesting that borrowers often face fewer credit restrictions. Consequently, there is less motivation to seek loans from non-bank financial institutions, which may offer higher interest rates than banks. For instance, as of December 2022, bank-issued mortgage loans constituted 71% of total banks' household loans, totaling 644 trillion KRW. In contrast, mortgage loans from non-bank financial institutions amounted

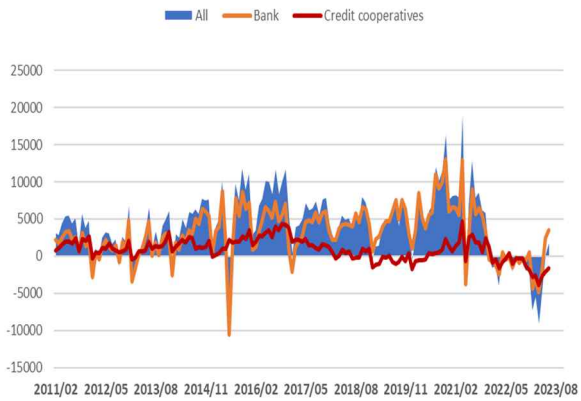
[3] Bank of Korea

to 110 trillion KRW, comprising 32% of non-bank financial institutions' household loans. This data reveals that banks primarily focus on mortgage loans in household lending, while non-bank financial institutions prioritize personal credit loans.[4]

<Fig. 2> Household loans from banks and financial cooperatives (accumulated)



<Fig. 3> Household loans from banks and financial cooperatives (increase)



Source: Bank of Korea

Various factors influence household debt, with interest rates and real estate prices being widely acknowledged as the most significant drivers in South Korea (Kim, 2021; Lee et al., 2017; Kang & Lee, 2021). Additionally, government policies significantly impact household debt (Kim, 2021).

Different factors can influence household loans from banks and credit cooperatives. Generally, individuals with lower credit ratings often face challenges when seeking bank loans. In contrast, credit cooperatives typically operate within specific geographical regions, which reduces information asymmetry between institutions and borrowers. During the 1960s, a period characterized by relationship banking, institutions like Saemaulgeumgo (MG Community Credit Cooperatives) could determine borrowers' motivations and characteristics owing to their deep community involvement. This enabled them to provide loans of appropriate amounts without relying solely on credit assessments (Lee, 2015).

The research findings on the determinants of household loans from banks and non-bank financial institutions were as follows. Interest rates and real estate demand have been identified as the most influential factors affecting household loans (Kim, 2021; Lee et al., 2017; Kang &

[4] Bank of Korea

Lee, 2021). In addition to these factors, household loans are also influenced by rising employment rates, increased disposable income, and growth in deposit sizes (Kang & Lee, 2021). Furthermore, a study by Park & Lee (2014) analyzed factors such as financial institutions' delinquency rates, corporate bond yields, and the ratio of household loans to deposit banks, all contributing to determining the amount of household loan within credit cooperatives.

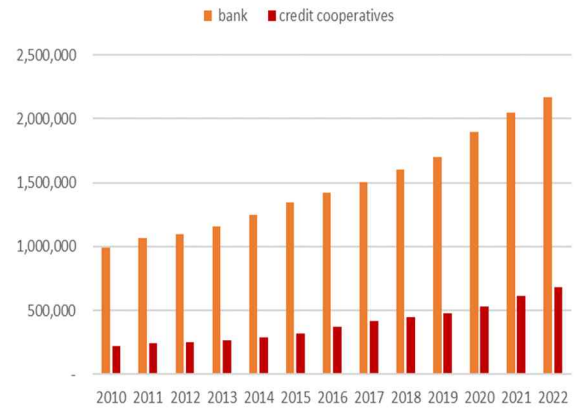
Interest rates are pivotal in determining the amount of household loans, although their impact on non-bank financial institutions is somewhat constrained. In a comparative analysis of pre- and post-financial crisis eras, Kim (2021) noted that the long-term influence of monetary policy on household loans diminished after the financial crisis. A study by Kim et al. (2013) examined the effects of interest rates on household loans from banks and non-bank financial institutions, observing that interest rate shocks to banks are relatively milder but exhibit persistence. However, non-bank financial institutions experience more pronounced but less enduring interest rate shocks. Additionally, Lee et al. (2017) suggested that overdraft accounts within non-bank financial institutions are notably influenced by employment rates, the rental price index, and stock yield rates.

2.2 Credit cooperatives

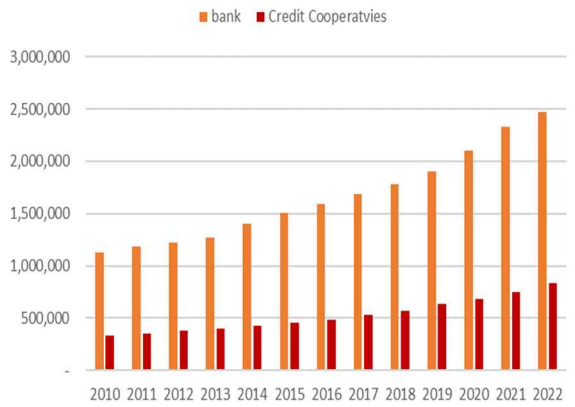
2.2.1 Korean credit cooperatives

In South Korea, various credit cooperatives exist, such as "Saemaeulgeumgo" (MG Community Credit Cooperatives), "Nonghyup" (National Agricultural Cooperative Federation), "Sinhyup" (National Credit Union Federation of Korea), and "Suhyup" (National Federation of Fisheries Cooperatives). These cooperatives primarily focus on enhancing their members' economic and social well-being by providing credit using funds pooled by members. Regional-oriented cooperatives, such as MG Community Credit Cooperatives and Credit Union, foster a sense of community among local members and actively contribute to developing regional economies. However, function-specific cooperatives like Nonghyup, Suhyup, and Sanrim Cooperative have established associations around specific sectors to elevate those sectors' economic, social, and cultural status. They also help promote equitable growth within the national economy (Financial Services Commission, 2023b).

<Fig. 4> Banks and financial cooperative Lending



<Fig. 5> Banks and financial cooperative Deposit



Source: Bank of Korea

By the end of 2022, South Korean credit cooperatives held 14% of the total deposits and 20% of the overall loans in the country. These loans can be further categorized into household and corporate loans, including personal credit loans and home mortgages. South Korean credit cooperatives' assets had accumulated 1,137.7 trillion KRW (844 billion USD) by the first quarter of 2023. These credit cooperatives' primary source of funds is deposits, with loans constituting about two-thirds of their fund allocation.

Credit cooperatives provide preferential tax treatment based on administrative regions, allowing individuals to join cooperatives in their areas. While this has notable advantages, it also imposes limitations on expanding cooperatives' business scope. South Korean credit cooperatives engage in many activities, including credit operations, member welfare services, public projects, member education, projects commissioned by central authorities, and activities designated as part of their operations by government regulations. Notably, credit cooperatives are more prevalent in regional areas than in the capital city, Seoul. Their business model emphasizes relationship banking, leading to distinctive financial practices compared to traditional banks. These credit cooperatives are often crucial in supporting underserved population segments, making significant contributions to financial inclusion by serving individuals who may not receive adequate services from mainstream banks.

2.2.2 Comparison between commercial banks and credit cooperatives

A credit cooperative is established when members contribute capital to form a credit cooperative. Only members are eligible to obtain loans from their cooperative (Halkos & Tzeremes, 2007). The fundamental objective underlying the formation of financial cooperatives is to provide affordable financial services to low-income individuals and small-scale entrepreneurs (Aduda & Obondy, 2021). In contrast to commercial banks, where shareholders have voting rights commensurate with their financial investments, in credit cooperatives, each member holds a single vote, regardless of their capital contributions. This model diverges from commercial banks, which prioritize profit maximization and often only include a limited number of substantial shareholders among their ranks, thereby pursuing the objective of consumer surplus maximization (Angelini, 1998). Research conducted by Murro and Peruzzi (2018) highlighted that the proliferation of cooperative banks in Italy is critical to mitigating income inequality. Individuals with low creditworthiness who struggle to borrow money from banks but can faithfully repay loans can borrow through relationship banking. Consequently, credit cooperatives help mitigate income inequality by allowing such diligent individuals to borrow and repay loans reliably.

According to Diamond (1984), financial intermediaries face significant transaction costs due to information asymmetry. To combat this, intermediaries employ strategies like credit assessments and post-loan management. Credit cooperatives, rooted in local communities, have a nuanced understanding of borrower information, setting them apart from conventional banks. Operating on cooperative principles, financial cooperatives embrace relationship banking, enabling them to provide loans to individuals with slightly lower credit ratings but robust economic activities at more competitive interest rates. Their deep understanding of borrowers and swift reputation assessments decrease information asymmetry compared to major banks. As a result, cooperatives have the flexibility to independently set interest rates for their members' loans, diverging from the rates established by traditional bank(Park & Lee, 2014). Research conducted by Ferri et al. (2014) analyzed 4,352 banks across 12 European countries, revealing that cooperative banks are less responsive to short-term interest rate fluctuations. Moreover, they exhibit reduced business cycle volatility, even during crisis periods such as from 2008 to 2011.

III. Data and Methodology

This study utilized the CreDB system, provided by the Korea Credit Information Services (KCIS), to examine credit data at the individual borrower level. CreDB is a platform for accessing South Korean individual credit and financial information. It is a comprehensive database incorporating personal, corporate, and insurance details, enabling interconnected analyses across various data points. For this research, we excluded corporate and insurance data and specifically concentrated on individual borrowers' credit data, segmented by financial sector. In this context, "individual borrower" means an individual, other than a corporate entity.

Our analysis was based on a representative 5% sample of credit transactions from the entire population, as recorded by KCIS. The data spanned from December 2019 to December 2022, covering 37 reference months (YM), with each month's data representing end-of-month loan balances. We organized the dataset at the individual borrower level as panel data to examine the impact of borrowers' monthly credit status and loan conditions in a cross-sectional manner. The dataset was then structured into loan sectors and loan types. Loan sectors were further divided into domestic banks and credit cooperatives, while loan types were categorized into personal credit loans and mortgage loans.

Furthermore, we used the monthly macroeconomic indicators of interest rates, inflation, exchange rates, and housing prices to account for potential fluctuations in economic conditions across different periods. Incorporating these variables was intended to address borrowers' temporal peculiarities, providing a more holistic insight into how macroeconomic conditions influence them.

These variables can be grouped into three main categories. Firstly, we employed variables reflecting borrowers' credit status, including outstanding loan balances and new loan amount compared to the previous month. Within our dataset of 23,245,796 observations, we identified 794,100 unique borrowers after eliminating duplicates.

Moreover, to examine borrowers' demographic traits, we classified them into distinct age brackets: individuals in their 20s and 30s, 40s and 50s, and those 60 or older, treating these age groups as a categorical variable.

Lastly, we applied macroeconomic data, including indicators associated with monetary policy, such as household lending and COFIX rates. Additionally, we included variables like the KOSPI(Korea Stock Price Index) 200, the KB Housing Price Index, the Consumer Sentiment Index, and real estate policy indicators. This data was sourced from the Bank of

Korea's Economic Statistics System (ECOS) and publications from the Ministry of Land, Infrastructure, and Transport.

<Table 1.> Variable Description

Variables	Description	Source
Borrowers' credit status		
Balanced loan(accumulated)	Borrowers' current household debt	Korea Credit Information Services (CreDB)
New loan(increased)	The amount of new loans taken out in a month ($Balanced\ \ Loan_{t}$ - $Balanced\ \ Loan_{t-1}$)	
Financial product	Loan product codes to differentiate between credit loans, home equity loans, policy mortgages, etc.	
Sector	Bank or Credit Cooperatives	
Borrowers' information		
Gender	Male, female	Korea Credit Information Services (CreDB)
Age	Separated into three groups: 20s-30s, 40s-50s, and 60+	
Macro-economic Variables		
Lending rate (for balanced, new)	Household lending rate	Bank of Korea (ECOS)
COFIX (for balanced, new)	A weighted average of banks' funding rates	
KOSPI 200	An indicator of the increase or decrease from the baseline of 200 stocks representative of the KOSPI market	
House Price Index	KB House Price Index	
Consumer Sentiment Index	Consumer Sentiment Index	
LTV policy	Real estate policy easing dummy (pre 2022/8 = 0, post 2022/8 = 1)	Ministry of Land, Infrastructure, and Transport

Note: This table presents the description and source of variables.

Table 2 summarizes the characteristic of loan variables used in the analysis, including the number of observations and the average total loan balance over the entire period. It also presents the average monthly sum of loan balances, categorized by sector, gender, and age group.

<Table 2.> Loan Variables

Group	Variables	Observations	**Total Loan** (1000 KRW)
Sector	Bank	16,293,149	1,850,874,789,888
	Credit cooperatives	6,952,647	553,342,750,620
Gender	Male	14,538,732	1,632,416,301,056
	Female	8,707,064	771,801,284,608
Age	20s-30s	4,371,943	378,651,934,720
	40s-50s	12,823,852	1,461,802,369,024
	Over 60	6,050,001	563,763,281,920

Note: This table presents the characteristic of borrowers' data from CreDB.

Examining the sector breakdown, banks account for 16,293,149 observations (70.09%), while credit cooperatives comprise 6,952,647 cases (29.91%). Regarding loan balances, these sectors accumulate roughly 1,850 trillion KRW (76.96%) for banks and approximately 553 trillion KRW (23.04%) for credit cooperatives. This implies that the banking sector maintains higher loan balance regarding the number of cases. In terms of gender distribution, there are 14,538,732 cases for males (62.54%) and 8,707,064 cases for females (37.46%). These loan balances amount to approximately 1,630 trillion won (67.86%) for males and roughly 772 trillion won (32.14%) for females, indicating that males have a relatively higher loan balance.

Delving deeper into the data on age groups, we discover that the 20s-30s age group accounts for 4,371,943 cases (38.36%), the 40s-50s age group encompasses 12,823,852 cases (11.64%), and the 60 and above age group consists of 6,050,001 cases (50.00%). Regarding loan balances within these age brackets, the 20s-30s age group has balances of approximately 379 trillion won (15.77%), and the 40s-50s group has about 1,460 trillion won (60.76%). Those 60 and over hold roughly 564 trillion won (23.47%). When comparing loan balances to the number of cases, notable trends emerge. The 20s-30s and the 60 and above age groups exhibit relatively lower loan balances than their case numbers, indicating that their loan amounts are not significantly large relative to their case volumes. In contrast, the 40s-50s age group stands out,

with loan balances exceeding half of the total loan balance relative to the number of cases. This suggests that individuals in their 40s-50s maintain larger loan amounts than others.

This study employs a panel fixed effects model to investigate the factors influencing individual-level household debt. This approach is chosen to account for the impact of diverse borrower characteristics. The fundamental model is outlined as follows:

$$\ln HL_{it} = \beta_1 \mathrm{LR}_t \text{ or } \mathrm{COFIX}_t + \beta_2 \mathrm{KOSPI}_t + \beta_3 \mathrm{HP}_t + \beta_4 \mathrm{CSI}_t + \beta_5 LTVpolicy_t + \mathrm{Time}_t + \alpha_i + \varepsilon_{it} \quad (1)$$

Equation (1) is structured as follows: $\ln HL_{it}$ represents the natural logarithm of an individual borrower's household debt, with "i" denoting the borrower and "t" signifying the specific month. LR_t refers to the loan interest rate, where the specific interest rate used as the dependent variable depends on whether it relates to the outstanding balance or a new loan. COFIX_t represents the weighted average of banks' funding rates, and its application mirrors that of loan interest rates, depending on whether it applies to a balance or a new loan. KOSPI_t represents the KOSPI 200 index, and HP_t stands for the housing price index derived from the KB Housing Price Index. CSI_t signifies the Consumer Sentiment Index, while $LTVpolicy_t$ is a housing policy dummy variable. Its value is set to 1 from August 2022 onwards and 0 for previous months. Time_t serves as a time fixed effect and α_i factors in the individual characteristics of the borrower "i".

The macroeconomic data utilized in this study were obtained from the Bank of Korea. And loans were segmented into credit and collateral loans to evaluate their unique impacts on macro variables. Furthermore, the data was divided into banks and credit cooperatives to explore the distinctive traits of credit cooperatives. Additionally, the analysis was stratified by age group, acknowledging that financial behaviors differ across age groups due to varying life stages.

<Table 3> shows the basic statistics of loan balances and macro control variables. The mean of all loan balances is about 134.6 million KRW, ranging from a minimum of 10,000 KRW to a maximum of 5.425 billion KRW. The average credit loan balance is about 32.86 million KRW, with a minimum of 10,000 KRW and a maximum of 550 million KRW. The average mortgage balance is approximately 127.27 million KRW, with a minimum of 10,000 KRW and a maximum of 1.62 billion KRW.

When comparing loan balance size, mortgage loans have higher balances on average than credit loans. However, regarding loan balances by industry, the average bank loan balance is about 113.6 million KRW, with a minimum of 10,000 KRW and a maximum of 3.9 billion KRW. For credit cooperatives, the average loan balance is about 105.5 million KRW, with a minimum value of 270,000 KRW and a maximum value of 5.425 billion KRW.

<Table 3.> Summary Statistics

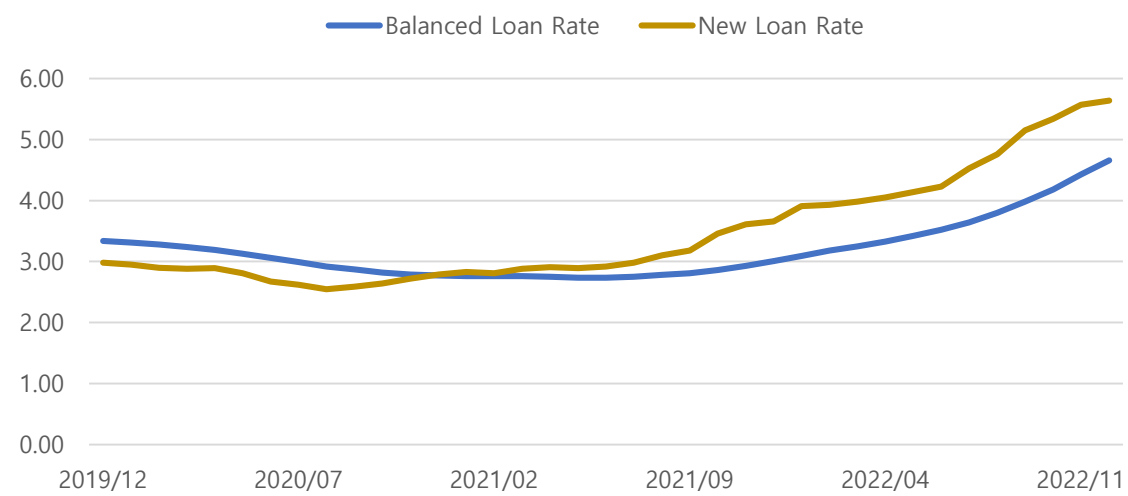
Variables	Mean	Min	Max	Std.Dev.	Obs
Loan variables					
Balanced loan (1,000 KRW)	103,425.9	10	5,425,000	139908.2	23,245,796
New loan (1,000 KRW)	32,859.8	10	550,000	39081.2	15,469,206
Balanced loan (mortgage) (1,000 KRW)	127,270.3	10	1,620,000	113580.9	7,776,590
Balanced loan (bank) (1,000 KRW)	113,598.3	10	3,900,000	133,612.2	16,293,149
Balanced loan (credit cooperatives) (1,000 KRW)	105,148.3	270	5,425,000	174,906.2	4,798,362
Macro-economic variables					
Lending rate (balanced loan)	3.18	2.74	5.64	0.90	23,245,795
Lending rate (new loan)	3.47	2.55	5.64	0.49	23,245,795
COFIX (balanced loan)	1.57	1.02	3.52	0.61	23,245,795
COFIX (new loan)	1.62	0.80	4.34	1.01	23,245,795
KOSPI200	2,605.35	1,786.75	3,259.14	424.84	23,245,795
House price	91.93	80.05	100.87	3.57	23,245,795
Consumer Sentiment Index	95.86	73	111	9.53	23,245,795

Note: This table presents the summary statistics of the variables.

Regarding the macro control variables, the average lending rate is 3.18 based on the balance and 3.47 based on new loan amounts. As depicted in Figure 5, the interest rate declined until May 2021, followed by an increase. The average COFIX rate is 1.57 on a balance basis and 1.62 on a new lending basis, with a lower standard deviation for the balance basis than the new lending basis. Conversely, the average KOSPI 200 index value is approximately 2,605, displaying monthly variations with a difference of 1472.39 between the maximum and minimum values and a standard deviation of 424.84. In the case of the House Price Index, the

average value was 91.93, with the highest month being 100.87 and the lowest month being 80.05. Finally, the Consumer Sentiment Index showed a slightly larger variation over the period analyzed, with a mean of 95.86, a minimum of 73, and a maximum of 111, compared to the variation in the House Price Index.

<Fig. 5> Lending rates of Balanced Loans and New Loans



Source: Bank of Korea

IV. Result Analysis

1. Baseline results

Table 4 presents the findings of the analysis, segmented into banks and credit cooperatives. Regarding loan balances, bank borrowers responded to a 1% interest rate increase by reducing their personal credit loans by 2.6% and mortgage loans by 0.4%. However, individuals borrowing from credit cooperatives exhibited a 3.5% reduction in personal credit loans and a 2% decrease in mortgage loans. Both banks and credit cooperatives showed a clear pattern: rising housing prices led borrowers to increase their loan repayments. Moreover, a higher Consumer Sentiment Index was associated with an increased likelihood of adding new loans.

<Table 4> Baseline Results (outstanding loan balance)

Dependent variable: Outstanding Loan balance	Personal Credit Loan				Mortgage loan			
	Bank		Credit cooperatives		Bank		Credit cooperatives	
Lending rate	-0.026*** (0.001)		-0.035*** (0.001)		-0.004*** (0.000)		-0.020*** (0.001)	
COFIX		-0.020*** (0.001)		-0.027*** (0.00)		-0.005*** (0.00)		-0.018*** (0.001)
KOSPI	0.000*** (0.000)	0.000*** (0.00)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.00)	-0.000*** (0.00)	-0.000*** (0.000)
House price	-0.002*** (0.000)	-0.003*** (0.000)	-0.004*** (0.000)	-0.004*** (0.000)	-0.003*** (0.00)	-0.003*** (0.000)	-0.005*** (0.000)	-0.006*** (0.000)
CSI	0.000*** (0.000)	0.0002*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.00)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
LTV policy	-0.000 (0.001)	0.002*** (0.001)	-0.008*** (0.001)	-0.005*** (0.001)	-0.003*** (0.000)	-0.0003 (0.00)	-0.005*** (0.001)	-0.000*** (0.001)
Constant	10.141*** (0.002)	10.111*** (0.002)	10.034*** (0.003)	9.995*** (0.002)	11.678*** (0.00)	11.676*** (0.00)	11.658*** (0.003)	11.639*** (0.003)
Obs.	10,314,683		3,026,963		5,978,466		1,771,399	
Pop.	447,587		129,882		277,452		82,956	
R2	0.0000	0.0000	0.0018	0.0018	0.0008	0.0008	0.0024	0.0024

Note: This table reports the results of estimating the factors on outstanding balanced loans of borrower from bank and credit cooperative, using panel regression. These analyses employ samples of 447,587 people for bank's personal credit loan, 129,882 people for credit cooperative's personal credit loan, 277,452 people for bank's mortgage and 82,956 people for credit cooperative's mortgage. Time fixed effects are included in all regressions. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5 presents an analysis of new loans. The results reveal that banks exhibit a more pronounced response to a 1% interest rate increase, and borrowers reduce new personal credit loans by 10.4% and mortgage loans by 5.2%. Conversely, when it comes to individuals obtaining loans from credit cooperatives, there does not appear to be a significant connection

between loan amounts and interest rates. This suggests that credit cooperatives offer new loans without consideration for interest rate changes. Similar to the findings from analyzing outstanding balances, an increase in housing prices is linked to a reduction in new loans, while an improvement in consumer confidence is associated with a greater likelihood of seeking new loans.

In conclusion, when analyzing banks and credit cooperatives regarding new loans, credit cooperatives do not appear to be significantly affected by changes in interest rates. This finding is consistent with prior research on credit cooperatives (Ferri et al., 2014), suggesting that credit cooperatives are built on a relationship banking foundation. Despite having lower credit ratings, credit cooperatives provide loans at more favorable interest rates to individuals engaging in sound economic activities.

<Table 5> Baseline Results (New loan, MoM)

Dependent variable: New loan (MoM)	Personal credit loan				Mortgage loan			
	Bank		Credit cooperatives		Bank		Credit cooperatives	
Lending rate	-0.104*** (0.014)		0.042 (0.041)		-0.052*** (0.015)		-0.014 (0.047)	
COFIX		-0.075*** (0.010)		-0.012 (0.030)		-0.040*** (0.011)		-0.041 (0.035)
KOSPI	-0.000** (0.000)	-0.000 (0.00)	0.000** (0.000)	0.000* (0.00)	-0.000* (0.00)	-0.000 (0.00)	-0.000 (0.000)	-0.000 (0.000)
House price	0.001 (0.001)	-0.002** (0.001)	-0.009 (0.004)	-0.005* (0.003)	-0.005* (0.001)	-0.006*** (0.000)	-0.010** (0.005)	-0.008** (0.003)
CSI	0.000 (0.001)	0.000 (0.001)	-0.003 (0.002)	-0.003 (0.002)	-0.001 (0.001)	0.001 (0.001)	0.004* (0.003)	0.005* (0.003)
LTV policy	0.082*** (0.020)	0.090*** (0.021)	-0.191*** (0.054)	0.130** (0.058)	0.038** (0.021)	0.047** (0.023)	0.035 (0.067)	0.088 (0.072)
Constant	9.322*** (0.062)	9.411*** (0.056)	8.954*** (0.172)	8.792*** (0.153)	10.394*** (0.067)	10.429*** (0.061)	9.519*** (0.224)	9.442*** (0.203)
Obs.	319,475		48,081		171,533		22,191	
Pop.	153,544		25,551		81,615		12,586	
R2	0.0134	0.0128	0.0005	0.0003	0.0005	0.0005	0.0009	0.0008

Note: This table reports the results of estimating the factors on new loan (MoM) of borrower from bank and credit cooperative, using panel regression. These analyses employ samples of 153,544 people for bank's personal credit loan, 25,551 people for credit cooperative's personal credit loan, 81,615 people for bank's mortgage and 12,586 people for credit cooperative's mortgage. Time fixed effects are included in all regressions. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

2. Detailed analysis by age group

Table 6 analyzes borrowers' personal credit loan balances segmented by age group. When interest rates increase by 1%, those in their 20s to 30s who borrowed from banks tend to repay 0.4%, those in their 40s to 50s repay 3.2%, and those aged 60 and above repay 4.2%. However, for those in their 20s to 30s who borrowed from credit cooperatives, a 1% interest rate increase results in a repayment increase of 2.6%, while the 40s to 50s age group repay 2.9%, and those aged 60 and above repay 4.4%. It is worth noting that banks and credit cooperatives share a pattern regarding older borrowers (aged 60 and above) exhibiting the highest sensitivity to interest rate changes, followed by those in their 40s to 50s and then 20s to 30s.

The analysis reveals that when the KOSPI (the Korea Composite Stock Price Index) rises, borrowers in their 20s to 50s who take personal credit loans from banks tend to increase their loan balances. However, those borrowing from credit cooperatives and borrowers aged 60 and older tend to repay their loans when the KOSPI rises. Conversely, when housing prices increase, borrowers in their 20s to 30s who take personal credit loans from banks tend to expand their loan balances. Yet, those who borrowed from credit cooperatives and borrowers over 40 repay their personal credit loans. These findings suggest that the relationship between stock market performance and borrowing behavior varies between banks, credit cooperatives, and different age groups.

Table 7 provides an analysis of new personal credit loans by age group. The results indicate that a 1% increase in loan interest rates would lead to a 7% reduction in new personal credit loans for those in their 20s to 30s who obtained bank loans. Similarly, people in their 40s to 50s would reduce new loans by 12.6%, while those 60 and above would decrease new loans by 13.7%. This suggests that new loans are more sensitive to interest rate changes than balanced loans. This is because balanced personal credit loans come with a fixed interest rate for six months to one year, while new loans are subject to immediate interest rate adjustments. However, the analysis reveals that individuals over 60 are the most responsive to interest rate changes, followed by those in their 40s to 50s, then 20s to 30s.

For individuals in their 20s to 50s who obtained credit cooperative loans, interest rate changes had no significant impact on new personal credit loans. In other words, these age groups appeared to be relatively insensitive to interest rate fluctuations when applying for new

personal credit loans from credit cooperatives. However, individuals 60 and older exhibited a different pattern. For this age group, a 1% increase in interest rates resulted in a 4.4% reduction in new personal credit loans. This implies that the older generation considers interest rates when applying for new personal credit loans from credit cooperatives. Moreover, the effects of the Loan-to-Value (LTV) policy were observed in personal bank loans for individuals in their 20s to 50s but were not evident for credit cooperative personal credit loans or individuals 60 or over.

Table 8 presents an analysis of balanced mortgage loans categorized by age group. Notably, a 1% increase in interest rates led to varying responses among age groups. For individuals in their 20s to 30s who take mortgage loans from banks, this rate increase resulted in a 7.3% rise in loan balances. In comparison, those obtaining loans from credit cooperatives in the same age group saw a more modest 2.5% increase in their balances. This distinction may be attributed to favorable policies aimed at supporting first-time homebuyers and the option to select fixed interest rates for mortgage loans, which make these loans more appealing during periods of rising interest rates. Conversely, when interest rates increased by 1%, individuals in their 40s to 50s showed a 1.1% and 1% decrease in mortgage loan balances for banks and credit cooperatives, respectively. The response was more significant for those 60 and older, with a 2.7% decrease for bank mortgage loans and a 3% decrease for credit cooperative mortgage loans. This data suggests that older age groups are more sensitive to interest rate fluctuations and tend to reduce their mortgage loan balances when interest rates rise.

Table 9 presents the results of the analysis of new mortgage loans. Interestingly, it shows that individuals in their 20s to 30s and those 60 and above did not demonstrate a significant correlation between interest rates and new loan amounts. However, for those in their 40s to 50s borrowing from banks, a 1% increase in interest rates led to an 8.7% decrease in new mortgage loans. These findings suggest that except for people in their 40s to 50s obtaining new mortgage loans, interest rates do not significantly impact the decisions of individuals in other age groups.

<Table 6> Personal Credit Loan (Balanced Loan) by Age Group

Personal Credit loan												
Age	20s~30s				40s~50s				Over 60			
Dependent variable: Balanced Loan of personal credit Loan	Bank		Credit cooperative		Bank		Credit cooperative		Bank		Credit cooperative	
Lending rate	-0.004** (0.002)		-0.026*** (0.000)		-0.032*** (0.001)		-0.029*** (0.001)		-0.042*** (0.001)		-0.044*** (0.001)	
COFIX		-0.002* (0.001)		-0.022*** (0.003)		-0.023*** (0.001)		-0.022*** (0.001)		-0.039**** (0.001)		-0.034*** (0.001)
KOSPI	0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
House price	0.002*** (0.000)	0.002*** (0.000)	-0.004*** (0.000)	-0.004*** (0.000)	-0.001*** (0.000)	-0.002*** (0.000)	-0.003*** (0.000)	-0.003*** (0.000)	-0.009*** (0.000)	-0.009*** (0.000)	-0.005*** (0.000)	-0.005*** (0.000)
CSI	-0.000*** (0.000)	-0.000*** (0.000)	0.001*** (0.000)	-0.001*** (0.000)	0.000* (0.000)	-0.000 (0.000)	0.000*** (0.000)	0.000*** (0.000)	-0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
LTV policy	0.010*** (0.002)	0.010*** (0.002)	-0.005 (0.003)	-0.000* (0.004)	0.001 (0.001)	0.002*** (0.001)	-0.006*** (0.001)	-0.004*** (0.001)	-0.022*** (0.002)	-0.011*** (0.002)	-0.008*** (0.001)	-0.008*** (0.001)
Constant	9.532*** (0.005)	9.526*** (0.000)	10.085*** (0.012)	-10.059*** (0.010)	10.285*** (0.003)	-10.247*** (0.002)	10.044*** (0.004)	10.012*** (0.003)	10.387*** (0.005)	-10.347*** (0.004)	9.963*** (0.003)	9.963*** (0.000)
Obs.	2,548,622		244,249		5,825,127		1,423,642		1,940,934		1,359,072	
Pop.	133,038		12,617		235,338		60,744		79,211		56,521	
R2	0.0014	0.0014	0.0059	0.0059	0.0001	0.0001	0.0015	0.0015	0.0002	0.0002	0.0011	0.0011

Note: This table reports the results of estimating the factors on personal credit loan (balanced loan) of borrower from bank and credit cooperative by different age group, using panel regression. These analyses employ samples of 133,038 people for bank's 20s~30s, 12,617 people for credit cooperative's 20s~30s, 235,338 people for bank's 40s~50s, 60,744 people for credit cooperative's 40s~50s, 79,211 people for bank's over 60, 56,521 people for credit cooperative's over 60. Time fixed effects are included in all regressions. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

<Table 7> Personal Credit Loan (New Loan, MoM) by Age Group

Personal Credit loan												
Age	20s~30s				40s~50s				Over 60			
Dependent variable: new loan of personal credit Loan	Bank		Credit cooperative		Bank		Credit cooperative		Bank		Credit cooperative	
Lending rate	-0.070*** (0.021)		-0.077 (0.122)		-0.126*** (0.019)		0.025 (0.054)		-0.137*** (0.050)		-0.044*** (0.001)	
COFIX		-0.058*** (0.015)		-0.080 (0.092)		-0.089*** (0.014)		-0.038 (0.040)		-0.065* (0.037)		0.048 (0.053)
KOSPI	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000* (0.000)	0.000 (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	0.000 (0.000)
House price	0.002 (0.002)	0.001 (0.002)	-0.001 (0.012)	-0.002 (0.009)	-0.001 (0.002)	-0.006*** (0.001)	-0.007 (0.005)	-0.002 (0.004)	0.015*** (0.005)	0.008** (0.003)	-0.005*** (0.000)	-0.009* (0.005)
CSI	0.001 (0.001)	0.001 (0.001)	-0.013** (0.006)	-0.013** (0.006)	0.000 (0.001)	0.000 (0.001)	-0.005** (0.002)	-0.004* (0.002)	-0.002 (0.002)	-0.002 (0.002)	0.001*** (0.000)	0.001 (0.003)
LTV policy	0.079** (0.002)	0.098*** (0.033)	-0.121 (0.159)	-0.081 (0.171)	0.112*** (0.028)	0.119*** (0.030)	-0.190*** (0.072)	-0.105 (0.077)	-0.033 (0.073)	-0.078 (0.079)	-0.011*** (0.000)	-0.208** (0.100)
Constant	8.888*** (0.102)	8.924*** (0.093)	9.648*** (0.558)	9.634*** (0.505)	9.743*** (0.085)	9.855*** (0.076)	9.070*** (0.230)	8.879*** (0.205)	8.221*** (0.216)	8.435*** (0.191)	-0.000*** (0.000)	8.556*** (0.256)
Obs.	115,790		3,941		172,373		24,527		31,312		19,613	
Pop.	54,146		2,219		83,309		12,596		16,089		10,736	
R2	0.0115	0.0115	0.0006	0.0006	0.0172	0.0154	0.0004	0.0004	0.0172	0.0154	0.0010	0.0010

Note: This table reports the results of estimating the factors on personal credit loan (new loan, mom) of borrower from bank and credit cooperative by different age group, using panel regression. These analyses employ samples of 54,146 people for bank's 20s~30s, 2,219 people for credit cooperative's 20s~30s, 83,309people for bank's 40s~50s, 12,596 people for credit cooperative's 40s~50s, 16,089 people for bank's over 60, 10,736 people for credit cooperative's over 60. Time fixed effects are included in all regressions. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

<Table 8> Mortgage Loan (Balanced Loan) by Age Group

Mortgage loan												
Age	20s~30s				40s~50s				Over 60			
Dependent variable: Balanced Loan of mortgage	Bank		Credit cooperative		Bank		Credit cooperative		Bank		Credit cooperative	
Lending rate	0.073*** (0.002)		0.025*** (0.002)		-0.011*** (0.001)		-0.02*** (0.001)		-0.027*** (0.001)		-0.03*** (0.001)	
COFIX		0.058*** (0.001)		0.016*** (0.002)		-0.010*** (0.001)		-0.016*** (0.001)		-0.025*** (0.001)		-0.03*** (0.001)
KOSPI	-0.000 (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
House price	0.008*** (0.000)	0.008*** (0.000)	-0.005*** (0.000)	-0.004*** (0.000)	-0.003*** (0.000)	-0.003*** (0.000)	-0.000*** (0.000)	-0.005*** (0.000)	-0.006*** (0.000)	-0.007*** (0.000)	-0.000*** (0.000)	-0.006*** (0.000)
CSI	-0.001*** (0.000)	-0.000*** (0.000)	0.000** (0.000)	0.000*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	-0.000*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	-0.000*** (0.000)	0.001*** (0.000)
LTV policy	-0.015*** (0.000)	0.007*** (0.002)	0.008** (0.004)	0.009** (0.004)	-0.003*** (0.001)	-0.001*** (0.001)	-0.000*** (0.000)	0.001*** (0.001)	-0.014*** (0.001)	-0.007*** (0.001)	-0.000*** (0.000)	-0.005*** (0.002)
Constant	-10.788*** (0.000)	10.867*** (0.007)	11.886*** (0.013)	11.918*** (0.011)	11.761*** (0.003)	11.752*** (0.003)	-0.000*** (0.000)	11.727*** (0.004)	11.781*** (0.004)	11.757*** (0.003)	-0.000*** (0.000)	11.481*** (0.004)
Obs.	730,632		137,678		3,541,850		835,365		1,705,984		798,356	
Pop.	41,435		8,066		159,292		39,326		76,725		35,564	
R2	0.0033	0.0033	0.0054	0.0054	0.0003	0.0003	0.0021	0.0021	0.0000	0.0000	0.0001	0.0001

Note: This table reports the results of estimating the factors on mortgage loan (balanced loan) of borrower from bank and credit cooperative by different age group, using panel regression. These analyses employ samples of 41,435people for bank's 20s~30s, 8,066people for credit cooperative's 20s~30s, 159,292 people for bank's 40s~50s, 39,326people for credit cooperative's 40s~50s, 76,725 people for bank's over 60, 35,564 people for credit cooperative's over 60. Time fixed effects are included in all regressions. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

<Table 9> Mortgage Loan (New Loan, MoM) by Age Group

Mortgage Loan												
Age	20s~30s				40s~50s				Over 60			
Dependent variable: new loan of mortgage	Bank		Credit cooperative		Bank		Credit cooperative		Bank		Credit cooperative	
Lending rate	0.002 (0.025)		-0.014 (0.075)		-0.087*** (0.020)		-0.020 (0.064)		-0.015 (0.039)		-0.007 (0.093)	
COFIX		-0.001 (0.019)		-0.066 (0.055)		-0.067*** (0.015)		-0.013 (0.047)		-0.004 (0.030)		-0.075 (0.069)
KOSPI	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000** (0.000)	-0.000** (0.000)	0.000 (0.000)	0.000 (0.000)
House price	-0.005* (0.002)	-0.004** (0.001)	-0.003 (0.008)	-0.001 (0.007)	-0.003 (0.002)	-0.006*** (0.001)	-0.012* (0.006)	-0.012*** (0.001)	-0.005 (0.004)	-0.006** (0.003)	-0.007 (0.009)	-0.003 (0.006)
CSI	-0.000 (0.001)	-0.000 (0.002)	0.005 (0.007)	0.006 (0.007)	0.000 (0.001)	0.000 (0.001)	0.009** (0.004)	0.009** (0.004)	0.003 (0.002)	0.003 (0.002)	-0.001 (0.004)	-0.000 (0.004)
LTV policy	0.029 (0.038)	0.033 (0.041)	0.160 (0.124)	0.256** (0.126)	0.044 (0.029)	0.060* (0.031)	0.051 (0.092)	0.051 (0.098)	0.024 (0.056)	0.014 (0.061)	-0.035 (0.128)	0.078 (0.138)
Constant	10.557*** (0.127)	10.547*** (0.118)	9.862*** (0.544)	9.785*** (0.529)	10.440*** (0.090)	10.498*** (0.081)	9.669*** (0.306)	9.690*** (0.279)	9.856*** (0.169)	9.887*** (0.151)	9.053*** (0.408)	8.846*** (0.365)
Obs.	38,574		2,361		103,912		11,048		29,047		8,782	
Pop	17,399		1,351		49,558		6,211		14,658		5,024	
.R2	0.0001	0.0001	0.0061	0.0032	0.0028	0.0029	0.0004	0.0004	0.0006	0.0006	0.0068	0.0082

Note: This table reports the results of estimating the factors on mortgage loan (new loan, mom) of borrower from bank and credit cooperative by different age group, using panel regression. These analyses employ samples of 17,399 people for bank's 20s~30s, 1,351 people for credit cooperative's 20s~30s, 49,558 people for bank's 40s~50s, 6,211 people for credit cooperative's 40s~50s, 14,658 people for bank's over 60, 5,024 people for credit cooperative's over 60. Time fixed effects are included in all regressions. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

V. Conclusion

Household debt in South Korea has shown a post-pandemic significant surge, prompting concerns regarding its potential impact on economic growth. To address this study analyzes household loans from credit cooperatives, representing the second-largest proportion of household debt in South Korea after banks. An essential aspect of this research is the comparison of interest rate sensitivity in household debt between credit cooperatives and banks using personal data from 794,100 borrowers in South Korea from December 2019 to December 2022. Moreover, the study adopts a detailed approach by segmenting borrowers by age group and loan type, enabling a more comprehensive examination of their distinct influences.

This study's analysis reveals the following results. First, individuals borrowing from banks based on new loan criteria are negatively influenced by interest. However, borrowers obtaining loans from credit cooperatives were not impacted by interest rates, which aligns with the findings of Ferri et al. (2014). According to the theory of financial intermediation, the primary transaction cost incurred by financial intermediaries results from information asymmetry (Diamond, 1984). Thus, financial intermediaries aim to resolve the issue of information asymmetry through mechanisms like credit assessments and post-loan management. Credit cooperatives, which are regionally focused, are likelier to have a deeper understanding of borrowers' information than banks. Grounded in cooperative principles, they rely on relationship-based financing, enabling individuals with relatively lower credit ratings who are sound economic players to access loans at reasonable interest rates.

Second, personal credit loans are more sensitive to interest rates than mortgage loans. In South Korea, household debt is primarily divided into personal and mortgage loans, each with unique features and purposes. The analysis showed that personal credit loans are more sensitive to interest rates than mortgage loans.

Third, individuals 60 and older exhibit the highest level of interest rate sensitivity for both banks and financial cooperatives, followed by those in their 40s to 50s, with the youngest age group (20s to 30s) showing the least sensitivity. This phenomenon can be attributed to the expectation that younger individuals have more time to accumulate income, making them relatively less influenced by interest rates. As individuals age and approach retirement, they tend to become more concerned with income stability, causing them to prioritize interest cost savings.

The key implication of this study is that it sheds light on how community-oriented credit

cooperatives operating regionally impact individual borrowers' decision-making processes through relationship-based finance. Financial cooperatives, rooted in relationship-based finance, often have pre-existing knowledge of borrowers or find it relatively easy to assess their reputations. This characteristic reduces the information asymmetry costs compared to larger banks and, consequently, allows members to consider more factors beyond interest rates when making borrowing decisions.

Expanding the scope of this study to encompass loans from savings banks, credit cards, and insurance companies would allow a more comprehensive comparison of different sectors within the financial industry. Furthermore, future research should consider including an analysis of loans associated with the unique Korean "Jeonse[5]" financing system, which pertains to security deposits for rental properties, potentially adding a distinctive dimension to the research. In addition, investigating the correlation between individuals' income levels and their decision-making processes regarding loans would provide a deeper understanding of the factors influencing borrowing choices. It is expected that similar analyses using household-level data, as demonstrated in this study, will gain prominence in academic and financial research landscapes, further advancing our understanding of consumer borrowing behavior and its implications.

[5] "Jeonse" is a type of deposit when a person rent house only in South Korea.

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