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A Study on the Changes in MBS Prepayment Rates During the COVID-19 Pandemic

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Abstract

Purpose: This study aims to examine how the COVID-19 pandemic, as an exogenous shock, affected prepayment behavior in the Korean mortgage-backed securities(MBS) market and to empirically identify how financial-market uncertainty influences borrower repayment decisions. **Research design, data and methodology:** This analysis utilizes monthly pool-level data (2004.06~2024.12) on MBS issued by the Korea Housing Finance Corporation, with the constant prepayment rate(CPR) as the dependent variable. A 2-step System GMM model is employed, incorporating COVID-19 period dummy variables, interest-rate spread, housing-price index, consumer prices, stock index, seasoning period, and seasonal moving dummies as control variables. **Results:** The empirical findings reveal that prepayment levels declined overall during the COVID-19 period, associated with heightened liquidity-holding strategies among households due to income and employment instability. In addition, the market-volatility indicator(VIX) shows a statistically significant negative relationship with prepayment, indicating a pronounced suppressing effect during the early and middle stages of the pandemic, which later weakened. **Conclusions:** The influence of COVID-19 is assessed as a short-term shock, suggesting that future crisis responses require more sophisticated policy frameworks that consider financial psychology and market uncertainty.

Keywords : MBS Prepayment, COVID-19, VIX, Borrower Behavior, 2-step System GMM

JEL Classification Code : G21, G15, E44, C33

1. Introduction

Mortgage-Backed Securities(MBS) are a type of asset-backed security issued on the basis of residential mortgage loans, serving as a key financial instrument that supports liquidity provision for financial institutions and contributes to the stability of the housing finance market. In Korea, the MBS market began to take full shape after 2004, led primarily by the Korea Housing Finance Corporation (KHFC). As long-term datasets have accumulated, MBS in Korea have evolved from policy-driven products to becoming components of institutional investors' portfolios.

In particular, long-term CMO-type(multi-tranche structured securitization) products dominate the market, characterized by differentiated tranche-level cash flow allocations. Within such structures, prepayments on underlying mortgage assets represent a crucial factor that reshapes the balance of cash flows across tranches. Consequently, changes in prepayment rates have a direct impact on the risk exposure and performance of financial institutions with heterogeneous liquidity needs, such as long-term bond investors, insurers, pension funds, and banks.

Traditionally, studies on prepayment have focused primarily on the direction of "increases." When interest rates

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decline, borrowers tend to prepay, shortening the duration of long-term investors' assets and amplifying reinvestment risk. However, a decline in prepayment may conversely intensify liquidity-coverage-ratio(LCR) compliance pressures for banks and short-term liquidity-dependent institutions, potentially translating into a broader liquidity risk for the financial system. Thus, the core risk in the MBS market is not merely whether prepayment rises or falls, but rather the extent to which its realized trajectory deviates from expectations and the fundamental drivers behind such deviations.

From this perspective, the COVID-19 pandemic presents a new problem for prepayment research as a major exogenous shock that has fundamentally disrupted global financial markets. COVID-19 was not merely a public health crisis; it simultaneously triggered supply-chain breakdowns, household income instability, asset price adjustments, inflationary pressures, and economic contraction. It may also have imposed psychological burdens on financial decision-making among households.

Existing research in economics and behavioral finance suggests that households confronted with heightened uncertainty perceive it as risk, exhibiting behavioral patterns such as reduced consumption, cash hoarding, liquidity preference, and heightened loss-aversion. Because prepayment effectively converts future income obligations into current expenditures, such behavior implies that prepayment may be suppressed in environments where uncertainty has surged dramatically.

Accordingly, this study seeks to examine how MBS prepayment behavior has been affected during the COVID-19 pandemic, using pool-level data from June 2004 to December 2024. The empirical model incorporates not only macroeconomic variables but also the volatility index (VIX) as a proxy for market uncertainty to explore the interaction between economic incentives and psychological drivers. Furthermore, the pandemic period is segmented into early, intermediate, and late phases to test how uncertainty-driven prepayment suppression evolves over time and whether such behavioral changes constitute temporary reactions or persistent shifts.

2. Literature Review and Research Hypotheses

2.1. Literature Review

In the United States, extensive research has been conducted to explain the mechanisms of MBS prepayment. Richard and Roll(1989) argued that prepayment is driven not by a single factor but by a combination of elements such as loan seasoning, seasonality, burnout effects, and refinancing incentives. Schwartz and Torous(1989) analyzed that prepayment tends to increase when market interest rates fall below contract mortgage rates, strengthening borrowers' incentives to refinance. Subsequently, Chinloy(1991) and Spahr and Sunderman (1992) emphasized that the relative spread between current market rates and contractual mortgage rates explains refinancing propensity more effectively than the interest-rate level alone, thereby shaping the direction of subsequent research. Conversely, Schorin(1992) reported that macroeconomic variables—including unemployment—do not have statistically significant effects on prepayment. Collectively, these studies indicate that U.S.-based prepayment literature has historically placed primary emphasis on interest-rate determinants.

In China, MBS prepayment exhibits patterns similar to the U.S. in that it increases alongside widening mortgage-rate spreads. However, unlike the U.S. case, macro-level indicators—such as unemployment and equity market conditions—also demonstrate meaningful explanatory power. Deng and Liu(2009) found that rising unemployment increases borrowers' need to reduce repayment burdens, thereby raising prepayment likelihood, whereas equity-price appreciation tends to suppress prepayment as investment alternatives become more attractive.

In Korea, early studies such as Yoo(2004) employed VAR models and suggested that the spread between contract and market rates may suppress prepayment in the short run. Jeon et al.(2011) later adopted a multivariate approach—including refinancing motives, loan maturity, burnout effects, unemployment, seasonality, and housing price fluctuations—and demonstrated that prepayment is jointly driven by a diverse set of factors. Park et al.(2011) confirmed that the mortgage-rate spread, loan maturity, housing-price growth, and transaction volume positively affect prepayment. Choi et al.(2011), using a VAR framework, found that declining market interest rates, rising housing prices, and increasing default rates elevate prepayment, whereas the KOSPI index is statistically insignificant. Park et al.(2013) using a VECM framework, confirmed that while higher market interest rates reduce prepayment, factors such as interest-rate spreads, business cycle indicators, auction-to-sale ratios, and default rates may contribute to increases in prepayment. Han et al.(2015) found that mortgage interest rates exert a negative effect on prepayment, and short-term rate variables such as CD 91 are not statistically significant.

Later studies expanded toward borrower-level micro analysis, incorporating variables such as income, age, and creditworthiness. Lee et al.(2019), analyzing Loan-Level Dataset, reported that interest-rate spreads, loan size, and DTI were positively associated with prepayment, whereas LTV and loan maturity showed negative relationships.

Cho et al. (2021), applying VAR analysis to domestic

MBS data from 2006 to 2017, showed that new mortgage rates, apartment prices, and unemployment are central determinants of prepayment. Prepayment increased when interest rates fell and housing prices rose, and unemployment was also positively associated with prepayment. Yoon(2023) demonstrated heterogeneity in repayment behavior based on borrower age and income: prepayment occurred more frequently among younger and high-income borrowers, whereas the elderly and low-income groups exhibited significantly lower levels.

Since 2021, domestic scholarship has gradually expanded its focus beyond prepayment itself toward adjacent topics such as mortgage default and issuance-rate spreads. Consequently, empirical studies directly examining changes in MBS prepayment during the COVID-19 pandemic remain scarce. Although WU et al.(2025) provides an analysis similar in scope, that study relies only on data up to 2022 and thus cannot assess longer-run dynamics. Against this backdrop, the present study aims to fill this gap by employing time-series data that span both the pandemic and its aftermath.

This study builds on the analytical framework of WU et al.(2025) and seeks to provide substantive additional contributions by extending the sample period. While WU et al.(2025) empirically documented a decline in MBS prepayment during the COVID-19 pandemic, the limited observation window precluded an assessment of whether borrower behavior recovered in the post-pandemic period. To address this limitation, the present study employs updated monthly data through December 2024 and re-examines the same hypotheses by incorporating the post-pandemic phase. In doing so, this study more clearly identifies whether the impact of COVID-19 represented a temporary adjustment and thereby complements the existing literature.

2.2. Research Hypotheses

The COVID-19 pandemic was not merely a public health crisis; it constituted an exogenous shock that simultaneously disrupted economic activity and the functioning of financial markets. In Korea, prolonged social distancing and business-restriction policies led to income losses particularly among self-employed and service-sector households, a rise in unemployment, and widespread liquidity stress. Under such circumstances, financial consumers were more likely to prioritize cash preservation over debt reduction.

The pandemic also likely affected borrowers' psychological and behavioral responses. As uncertainty persisted, households may have shifted away from conventional financial decision-making and adopted more conservative and defensive strategies. Specifically, instability in income and employment could have prompted borrowers to delay or alter repayment plans that had been initially scheduled. Moreover, even within a low-interest-rate environment, refinancing incentives may not have been fully activated. For many borrowers, maintaining existing loans may have been perceived not merely as a financial choice, but as part of a survival-driven strategy.

Given these considerations, it is critical to examine not only whether prepayment declined during the pandemic but also whether such changes were temporary or persistent. If prepayment behavior does not return to pre-pandemic patterns following the end of COVID-19, and liquidity-preserving behavior remains dominant, this would indicate a long-lasting effect. Conversely, if prepayment determinants revert to traditional factors—such as interest rates and housing prices—the pandemic's influence may be interpreted as a short-term, transient shock.

Accordingly, this study segments the COVID-19 period into early, middle, and late phases to analyze the trajectory of prepayment patterns and empirically tests how uncertainty interacted with borrower behavior by incorporating the VIX as a proxy for market instability. Based on this framework, the following hypotheses are established:

H1: MBS prepayment decreased during the COVID-19 period. (Pandemic-period change)

H2: Higher financial-market uncertainty is associated with lower MBS prepayment. (Effect of uncertainty)

H3: The change in prepayment behavior during COVID-19 was temporary. (Persistence of the pandemic effect)

3. Research Methodology

3.1. Data

This study focuses on MBS issued by the Korea Housing Finance Corporation(KHFC), using monthly data spanning June 2004 to December 2024. Key variables—such as pool-level monthly prepayment rates, weighted-average contract interest rates, and elapsed periods—were extracted from KHFC's monthly statistical reports (Monthly Bulletin). Market interest rates(new mortgage loan rates) were obtained from the Bank of Korea's Economic Statistics System, while the nationwide apartment price index was sourced from KB Real Estate. In addition, consumer price index(CPI) data and the KOSPI index were collected from the National Statistics Portal.

To capture market instability, the Chicago Board Options Exchange(CBOE) Volatility Index(VIX) was employed, obtained through the Federal Reserve Economic Data (FRED) database. VIX measures the expected 30-day volatility implied in S&P 500 option prices and serves as an indirect proxy for financial-market uncertainty and risk

perception.

All variables were processed in monthly frequency. To enhance estimation reliability, several variables were seasonally adjusted or log-transformed to mitigate scale-related distortions. In addition, unit root tests were conducted for all variables, and those found to contain a unit root were differenced to achieve stationarity before being used in the analysis.

3.2. Variable Definitions

Prepayment refers to the act in which a borrower repays part or all of the outstanding principal of a long-term loan—such as a residential mortgage—prior to the contractual maturity date. The most widely used indicators for measuring prepayment are the Single Monthly Mortality Rate(SMM) and the Conditional Prepayment Rate(CPR), the latter being an annualized measure.

SMM represents the proportion of principal prepaid in a given month relative to the scheduled outstanding balance for that month. In practice, the amount of prepaid principal is calculated as the difference between the scheduled end-of-month balance and the actual end-of-month balance, which is then divided by the scheduled balance. The corresponding formula is given in Equation (1).

$$\text{SMM} = \frac{\text{scheduled balance} - \text{actual balance}}{\text{scheduled balance}} \quad (1)$$

While SMM is useful for capturing short-term fluctuations in repayment behavior, its monthly volatility makes it less suitable for assessing long-term trends. Accordingly, CPR—an annualized measure derived under the assumption that monthly prepayment persists at a constant rate—is more commonly used in financial-market analysis.

In line with prior studies, this research adopts CPR as the dependent variable to investigate long-term prepayment patterns and their determinants. The CPR is computed by annualizing the monthly prepayment rate, and its formula is presented in Equation (2) below.

$$\text{CPR} = 1 - (1 - \text{SMM})^{12} \quad (2)$$

The COVID-19 dummy variable is constructed based on the World Health Organization's declaration of the pandemic in March 2020. To capture not merely the onset of viral spread but the point at which economic and financial shocks became observable, the full sample period is divided into four phases. The period prior to the WHO declaration is defined as the pre-COVID phase; the period from the declaration through the pre-vaccination stage is classified as the early phase. The phase following the initial rollout of vaccines—during which containment measures and public-health systems gradually stabilized—is categorized as the intermediate phase, while the period after the declaration of endemic status in May 2023 is defined as the late phase.

The uncertainty variable is measured using the monthly average of the Volatility Index(VIX). The interest-rate spread is calculated as the contractual mortgage rate(pool-level weighted average) minus the market interest rate(new mortgage loan rate). Housing-market conditions are captured through the nationwide monthly apartment price index. Consumer-price index data are used as the inflation variable, while the monthly KOSPI index is employed to account for financial-market conditions. Elapsed period is adjusted to reflect securitization procedures by adding three months to each pool's accumulated maturity. Additionally, a moving-season dummy is included, coded as 1 for months with concentrated residential relocation activity(April, May, October, and November), and 0 otherwise.

Definitions and detailed descriptions of all variables used in this study are summarized in Table 1.

Table 1: Variable Definition

Variable		Definition / Measurement
Dependent	CPR	Annualized value of the monthly prepayment rate
Independent	COV_D	2004. 6~2020. 3 = 0, 2020. 4~2021. 7 = 1, 2021. 8~2023. 5 = 2, 2023. 6~2024. 12 = 3
	VIX	Monthly average of the financial market volatility index
	IRS	Mortgage interest-rate spread (contract mortgage rate – market mortgage rate)
	API	Monthly apartment price index
	CPI	Monthly consumer price index
	KOSPI	Monthly Korean stock price index
	AGE_P	Pool-level elapsed period + 3 months
	MOVE_D	4, 5, 10, 11=1, otherwise= 0

Note: CPR represents the constant prepayment rate, COV_D is a dummy variable distinguishing the COVID-19 periods, and VIX denotes the indicator of market uncertainty. IRS refers to the interest-rate spread between the contract mortgage rate and the market mortgage loan rate, whereas API represents the apartment price index, CPI denotes the consumer price index, and KOSPI indicates the Korean composite stock price index. AGE_P captures the elapsed period of each MBS pool, and MOVE_D is a seasonal dummy variable indicating months with higher residential mobility. KOSPI 1980.01.04 = 100, CPI 2020 = 100.

3.3. Research Model

To investigate the impact of COVID-19 on MBS prepayment behavior, this study first establishes a baseline panel-data model and then extends the regression specification by sequentially incorporating interaction terms. The individual observation unit is each MBS pool, denoted by i, and to mitigate reverse causality concerns, key

independent variables are lagged and measured at $t-1$.

In the baseline model, a COVID-19 dummy variable is incorporated to capture the pandemic effect, while control variables include the mortgage interest-rate spread, nationwide apartment price index, elapsed period, seasonal dummy, consumer price index, and stock market index.

$$CPR_{i,t} = \alpha + \beta_1 COV\_D + \beta_2 X_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

In the extended model, the market volatility index (VIX) is incorporated as an additional explanatory variable to examine whether uncertainty played a role in the change in prepayment behavior during the COVID-19 period. VIX reflects financial-market risk perception and investor anxiety, and is therefore interpreted as a factor that may indirectly influence prepayment decisions. The extended panel-regression model is specified as follows.

$$CPR_{i,t} = \alpha + \beta_1 COV\_D + \beta_2 VIX + \beta_3 X_{i,t-1} + \varepsilon_{i,t} \quad (4)$$

COVID-19 dummy and VIX is included to capture the combined effect of the pandemic period and market uncertainty. The significance of this term is evaluated through a t-test on the coefficient $\beta 3$.

$$CPR_{i,t} = \alpha + \beta_1 COV_D + \beta_2 VIX + \beta_3 (COV_D \cdot VIX) + \beta_4 X_{i,t-1} + \varepsilon_{i,t} \quad (5)$$

4. Results

4.1. Analysis of MBS Prepayment Rates During the COVID-19 Period

As shown in Table 2, the estimated coefficient for the early COVID-19 dummy is −0.6749 and statistically significant, indicating a negative effect. This suggests that immediately after the onset of the pandemic, heightened financial-market instability and simultaneous income and employment shocks weakened borrowers' capacity to prepay, redirecting their financial priorities from debt reduction to liquidity preservation.

The coefficients for the middle and late phases of the pandemic are likewise negative and statistically significant (−0.6549, −0.6367). In other words, the impact of COVID-19 was not confined to a particular point in time; rather, it suppressed prepayment levels persistently across the entire pandemic period. These findings imply that MBS prepayment continued to decline throughout the pandemic, with reduced prepayment behavior observable even during the later phase.

Such results further suggest that, when large-scale economic shocks occur, early and immediate policy intervention is necessary, but sustained policy support and market-stabilization efforts must also accompany the process until economic conditions return to normal.

Table 2: Model1 Results[3]

Variable		Model1
Constant		0.0196
COV_D _1		-0.6749***
COV_D _2		-0.6549***
COV_D _3		-0.6367***
d.IRS		11.5586***
d.API		4.9636***
d.CPI		-4.0921***
d.KOSPI		-0.6337***
AGE_P		-0.0004***
MOVE_D		0.0135
AR 1		0.9701***
AR 2		0.1860
P-value	AR (1)	0.0730***
	AR (2)	0.6800
	HANSEN	0.5740
	SARGAN	0.5980
Obs.		35,450

Note: Note: This table presents the 2-step System GMM estimation results for the dependent variable (conditional prepayment rate). COV_D denotes the COVID-19 dummy, defined as 0 for the pre-COVID period, 1 for the early phase, 2 for the middle phase, and 3 for the late phase. d.IRS represents the percentage change in the interest-rate spread (contract mortgage rate – market mortgage rate), where the contract rate refers to the pool-level weighted-average mortgage rate and the market rate refers to the new mortgage loan rate. d.API denotes the percentage change in the nationwide apartment price index; d.CPI represents the inflation rate; and d.KOSPI indicates the rate of return on the KOSPI index. MOVE_D is the moving-season dummy (equal to 1 for April, May, October, and November; 0 otherwise), and AGE_P denotes the actual elapsed period of each pool. AR(1) and AR(2) represent first- and second-order serial correlation tests. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The AR(1), AR(2), Hansen, and Sargan statistics at the bottom of the table report p-values corresponding to each test.

4.2. Impact of Market Uncertainty on Borrower

[3] In assessing the validity of the 2-step System GMM model used in this study, the AR(1) test indicates first-order autocorrelation, whereas the AR(2) test is not statistically significant, suggesting no second-order autocorrelation. The Hansen and Sargan tests both fail to reject the null hypothesis, confirming that the instruments are not over-identified and are valid within the model. The instruments are primarily constructed using lagged terms of the interest-rate spread change, housing price index, COVID-19 dummy, and seasonal moving dummy. VIF values average 1.71, indicating that multicollinearity is not a major concern.

Behavior

This study further examines whether market uncertainty may have influenced prepayment decisions by incorporating the VIX index—used as a proxy for financial-market instability—into the empirical model. The corresponding estimation results are reported in Table 3.

The coefficient for the percentage change in VIX is −0.0284 and statistically significant, indicating that greater market volatility is associated with a decline in prepayment activity. This implies that, as uncertainty intensifies, financial consumers become increasingly risk-averse and prioritize liquidity preservation, thereby delaying or reducing prepayment execution.

In an economic environment characterized by heightened uncertainty, both households and firms tend to adopt cash retention as a strategic response. Because loan repayment inherently involves cash outflow, it is likely to be deprioritized under such conditions. This tendency may be particularly pronounced among self-employed borrowers and financially vulnerable groups whose income streams are more volatile.

Table 3: Model2 Results[4]

Variable		Model2
Constant		-0.0217***
COV_D_1		-0.1184***
COV_D_2		-0.1566***
COV_D_3		-0.1117***
d.VIX		-0.0284***
d.IRS		6.7982***
d.API		3.1669***
d.CPI		-7.9320***
d.KOSPI		-0.2534***
AGE_P		-0.0004
MOVE_D		0.0410***
AR 1		0.8477***
AR 2		0.2428
P-value	AR (1)	0.0200***
	AR (2)	0.9100
	HANSEN	0.1900
	SARGAN	0.1420
Obs.		35,450

Note: This table reports the 2-step System GMM estimation results for the dependent variable (conditional prepayment rate). COV_D denotes the COVID-19 dummy, defined as 0 for the pre-COVID period, 1 for the early phase, 2 for the middle phase, and 3 for the late phase. d.VIX represents the percentage change in market volatility; d.IRS denotes the percentage change in the mortgage interest-rate spread (contract mortgage rate – market mortgage rate), where the contract rate refers to the pool-level weighted-average mortgage rate and the market rate refers to the new mortgage loan rate. d.API is the monthly change in the nationwide apartment price index; d.CPI indicates the inflation rate; and d.KOSPI represents the KOSPI rate of return. MOVE_D is the moving-season dummy (coded as 1 for April, May, October, and November; 0 otherwise), and AGE_P indicates the actual elapsed period for each pool. AR(1) and AR(2) refer to first- and second-order serial correlation tests. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The AR(1), AR(2), Hansen, and Sargan statistics at the bottom of the table report the corresponding p-values.

4.3. Interaction Effect Between COVID-19 and Market Uncertainty

To examine more precisely how financial-market uncertainty affected prepayment decisions across different stages of the pandemic, this study estimates an extended model that incorporates interaction terms between the COVID-19 phase dummy and changes in VIX. This specification is adopted as the final analytical model, and the results are presented in Table 4.

According to Table 4, the interaction coefficients between the early COVID-19 phase and VIX, and between the middle phase and VIX, are −0.0248 and −0.1976, respectively, both of which are statistically significant and negative. This indicates that in the initial outbreak period and at the height of the pandemic, greater market instability significantly reduced the likelihood of prepayment. In contrast, the same effect is not statistically supported for the late COVID-19 phase.

These results suggest that the pandemic exerted a short-term influence on borrowers' repayment strategies, and that heightened uncertainty functioned as a factor suppressing prepayment behavior. However, the diminishing significance of this effect over time implies that as crisis conditions ease, prepayment behavior is likely to revert toward its pre-pandemic pattern.

When the COVID-19 dummy periods are combined with the interest rate environment, it can be observed that after the outbreak of COVID-19, the government maintained a low-interest-rate stance to stimulate economic activity and stabilize financial markets, and began raising the policy rate in August 2021. Around December 2022, the economy entered a high-interest-rate phase, and since 2023, a

[4] In assessing the validity of the 2-step System GMM model used in this study, the AR(1) test indicates the presence of first-order autocorrelation, whereas the AR(2) test is not statistically significant, suggesting that no second-order autocorrelation exists. The Hansen and Sargan tests both fail to reject the null hypothesis, confirming that the instruments are not over-identified and are valid within the model. The instruments are primarily constructed using lagged terms of the interest-rate spread change, base rate, apartment price index change, coincident index change, COVID-19 dummy, market volatility index, and the interaction term between the COVID-19 dummy and market volatility. VIF results show an average value of 1.67, indicating that multicollinearity is not a major concern.

persistent high-interest-rate environment has prevailed as the rate-hiking stance effectively became entrenched.

Consistent with these changes in the interest rate environment, the effect of market uncertainty was found to be strong during the ultra-low interest rate period and the interest rate tightening transition period (the early and middle COVID-19 dummy phases), whereas it was not statistically significant during the persistent high-interest-rate phase (the late COVID-19 dummy phase). In particular, the late COVID-19 period in this study (June 2023–December 2024) coincides with a persistent high-interest-rate environment, and from this point onward, the coefficient on market uncertainty (VIX) lost its statistical significance.

These findings suggest a transition from a phase in which prepayment decisions were primarily explained by uncertainty-related factors to a phase in which interest burden and the level of interest rates themselves became more important constraints. Accordingly, under the recent high-interest-rate environment, changes in market uncertainty (VIX) appear to have a relatively limited influence on prepayment decisions, whereas borrowers' interest burden plays a more central role in shaping prepayment behavior.

Table 4: Model3 Results[5]

Variable		Model3
Constant		-0.0134
COV_D_1		-0.1131***
COV_D_2		-0.1712***
COV_D_3		-0.1992***
d.VIX		-0.0169
COV_D_1* d.VIX		-0.0248***
COV_D_2* d.VIX		-0.1976***
COV_D_3* d.VIX		0.0035
d.IRS		10.9372***
d.API		4.6649***
d.CPI		-9.5944***
d.KOSPI		-0.3369***
AGE_P		-0.0003***
MOVE_D		0.0476***
AR 1		0.5191***
AR 2		0.5104***
P-value	AR (1)	0.0340***
	AR (2)	0.1280
	HANSEN	0.5270
	SARGAN	0.5460
Obs.		35,450

Note: This table reports the 2-step System GMM estimation results for the dependent variable (conditional prepayment rate). COV_D is the COVID-19 dummy (0 = pre-COVID, 1 = early phase, 2 = middle phase, 3 = late phase). d.VIX represents the percentage change in the CBOE Volatility Index and is used as a proxy for financial-market uncertainty. COV_D_1 × d.VIX, COV_D_2 × d.VIX, and COV_D_3 × d.VIX denote interaction terms between the COVID-19 phase dummy and d.VIX. d.IRS is the percentage change in the mortgage interest-rate spread (contract mortgage rate − market mortgage rate), where the contract rate refers to the pool-level weighted-average mortgage rate and the market rate refers to the new mortgage loan rate. d.API is the monthly change in the nationwide apartment price index; d.CPI denotes the inflation rate; and d.KOSPI represents the rate of return on the KOSPI index. AGE_P indicates the actual elapsed period for each pool, and MOVE_D is the moving-season dummy (coded as 1 for April, May, October, and November; 0 otherwise). AR(1) and AR(2) refer to first- and second-order serial correlation tests. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The values for AR(1), AR(2), Sargan, and Hansen tests at the bottom of the table represent the corresponding p-values at the 1%, 5%, and 10% significance levels.

5. Conclusions, Limitations, and Future Research

5.1. Conclusions

This study empirically investigates how the unprecedented shock of COVID-19 affected prepayment behavior in the Korean MBS market and further examines how uncertainty in financial markets shaped borrowers' repayment decisions. In addition, it assesses whether behavioral changes observed during the pandemic were temporary adjustments or reflected a more lasting shift in financial decision-making patterns.

The key findings are as follows.

First, MBS prepayment levels declined overall during the COVID-19 period. The pandemic represented a multifaceted crisis involving employment shocks, income contraction, and economic slowdown, under which households likely prioritized liquidity retention as a primary strategy. Rather than reducing debt through early repayment, borrowers appear to have adopted conservative behavior focused on holding cash to prepare for future uncertainty.

Second, VIX—a proxy for financial market instability and psychological factors showed a statistically significant

[5] In assessing the validity of the 2-step System GMM model used in this study, the AR(1) test indicates the presence of first-order autocorrelation, whereas the AR(2) test result is not statistically significant, suggesting that no second-order autocorrelation exists. Both the Hansen and Sargan tests fail to reject the null hypothesis, confirming that the instruments are not over-identified and are valid within the model. The instruments are primarily constructed using lagged terms of the interest-rate spread change, apartment price index change, coincident index change, the COVID-19 dummy, the market volatility index, and the interaction term between the COVID-19 dummy and the market volatility index. VIF values average 2.10, indicating that multicollinearity is not a major concern.

negative association with prepayment. This finding confirms that, in addition to conventional determinants such as interest rates and housing prices, non-traditional variables reflecting market stability and investor sentiment also play a critical role in shaping prepayment decisions. As uncertainty rises, prepayment becomes perceived as a riskier choice, and liquidity-preserving behavior is favored.

Third, the reduction in prepayment under heightened uncertainty appears to be a short-term effect rather than a lasting change. While uncertainty significantly constrained prepayment during the early and middle phases of the pandemic, its influence diminished in the later phase. This suggests that once external shocks recede, borrower behavior gradually returns to the normal trajectory driven primarily by traditional economic factors.

By empirically identifying how external shocks influence prepayment decisions, this study provides a foundation through which financial institutions and MBS issuers may better anticipate prepayment risk and establish proactive response strategies during future economic or financial crises.

The results of this study suggest that policy responses to external shocks should be differentiated by stage. In the early and middle phases of the COVID-19 crisis, when market uncertainty increases sharply, policy measures aimed at alleviating borrowers' liquidity preference and psychological anxiety play an important role in mitigating the adverse effects associated with a sharp decline in prepayment.

Specifically, the rapid activation of forbearance and maturity extension programs, the expansion of liquidity provision facilities, and clear communication of policy direction are needed to reduce excessive cash hoarding by financial consumers. By contrast, once a tightening cycle becomes entrenched and a persistent high-interest-rate environment is established, policies that directly alleviate interest burdens are likely to exert a more immediate influence on prepayment behavior than uncertainty management. In this phase, greater flexibility in interest rate adjustment mechanisms may serve as a more effective policy instrument.

Such a stage-specific policy framework can help dampen volatility in prepayment risk and enhance the stability of cash flows in the MBS market.

5.2. Limitations

This study has several limitations.

First, because the analysis is based on pool-level data, it cannot directly incorporate micro level borrower characteristics such as income, age, creditworthiness, and loan purpose. As a result, it is difficult to fully explain the heterogeneity in prepayment behavior that may arise across different borrower groups even under the same macroeconomic conditions. Future research should utilize borrower-level(micro-level) data to examine more precisely how responses to uncertainty and policy changes differ according to borrower characteristics.

Second, although this study treats the pandemic period as a single phase, in practice, government policies—such as the introduction of forbearance programs, policy rate cuts, and fiscal transfer payments were implemented at different points in time and with varying intensity. The inability to fully account for the timing and magnitude of these policy interventions remains a limitation of the analysis. Future studies should adopt a more finely segmented policy timeline and analyze the dynamic effects of policy measures in order to more clearly identify the impact of specific policies on prepayment behavior.

Third, the uncertainty variable employed in this study is based on a single proxy, which limits its ability to capture the multiple dimensions of uncertainty. Future research should consider a broader set of measures—including the VIX, the Economic Policy Uncertainty(EPU) index, the domestic implied volatility index(VKOSPI), and news-based uncertainty indicators to test the sensitivity of the results to alternative measures of uncertainty and to provide a more comprehensive analysis.

5.3. Future Research

Based on the foregoing discussion, future research should further examine the following issues.

First, this study employs a long sample period from 2004 to 2024 to analyze changes in prepayment behavior during the COVID-19 pandemic. This approach was intended to capture long-term trends by covering both the pre- and post-pandemic periods; however, such a sample design may have diluted effects that are specific to COVID-19 by mixing normal and crisis regimes. In addition, although the pandemic period is modeled using a dummy variable, future research should restrict the sample to a shorter window around the pandemic (e.g., 2018–2023) and move beyond a dummy-based specification by conducting an explicit before–after comparison of prepayment behavior. This would allow a more precise identification of the pure effect of COVID-19 as an exogenous shock on prepayment decisions.

Second, although the VIX surged both during the 2008 Global Financial Crisis and in the early stage of the COVID-19 pandemic, the macroeconomic environments in the two episodes differed substantially. During the Global Financial Crisis, credit tightening and sharp declines in housing prices impaired borrowers' repayment capacity, making prepayment practically constrained. In contrast, during the COVID-19 pandemic, the financial environment was relatively accommodative due to an ultra-low interest rate stance and active government liquidity provision and fiscal

support, and borrowers were able to make more flexible prepayment decisions amid rising housing prices and the implementation of forbearance programs.

Thus, despite heightened uncertainty in both periods, differences in financial conditions and policy environments likely generated distinct patterns of prepayment behavior. The results of this study suggest that while the decline in prepayment during the COVID-19 period shares certain similarities with the liquidity-preserving crisis responses observed in past financial crises, its underlying mechanism may have differed owing to unique policy settings, including forbearance programs, ultra-low interest rate policies, and government fiscal support. Accordingly, future research should explicitly compare the COVID-19 episode with the Global Financial Crisis in terms of the magnitude, duration, and key drivers of changes in prepayment behavior.

Third, future research should incorporate micro-level data containing individual borrower information in order to more rigorously examine the persistent effects of external shocks on financial consumer behavior. In addition, by broadening the set of uncertainty measures, further studies should pursue the development of early-warning models capable of detecting prepayment risk in advance of potential future financial and economic crises.

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