

Why Do Apartment Housing Policies Fail in Korea? Jeonse-Driven Leverage and Policy Ineffectiveness

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| Abstract |

This study investigates how jeonse-based leverage influences apartment prices and contributes to the ineffectiveness of housing policies in South Korea. Employing a Nonlinear Autoregressive Distributed Lag (NARDL) model and the Oaxaca - RIF decomposition within a control-function framework, the analysis uses monthly data for three regional groups: (i) the Seoul area, (ii) the Seoul metropolitan area, and (iii) the five other major metropolitan cities, covering the period from January 2012 to December 2025. The empirical results show that apartment price dynamics differ substantially across regions. Jeonse deposits, interest rates, CPI, and supply-side variables exert heterogeneous long-run effects. The findings also suggest that common explanatory variables become less effective outside Seoul, providing evidence of policy ineffectiveness in Korea's real estate market.

Therefore, this paper suggests that the government refrain from relying on uniform, short-term demand-suppressing policies, ineffective supply regulations,

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and tax policies that discourage homeowners from selling their properties. Instead, housing policies require more long-term oriented and region-specific designs that explicitly account for jeonse-based leverage.

- Key Words: Jeonse leverage, policy ineffectiveness, Nonlinear Autoregressive Distributed Lag (NARDL) model, Oaxaca-RIF decomposition method, and control-function approach.

I . Introduction

[Statement of the Problems]

The *jeonse*, or *chonsei*, system is a unique housing lease arrangement in Korea in which tenants provide a lump-sum deposit equivalent to approximately 50 - 70 percent of the dwelling's market value instead of paying monthly rent, typically under a two-year contract. Originating in the late Japanese colonial period and expanding rapidly after the 1960s, this system functioned as an alternative financing mechanism during Korea's high-growth era, when financial markets were relatively underdeveloped.

However, a growing body of literature, including the IMF (2025) and S. Y. Bae (2026), raises concerns that jeonse deposits contribute to rising household debt and stimulate excessive housing demand. In addition, the recent surge in jeonse-related fraud has generated serious social concerns, particularly for younger and future generations. Furthermore, the substantial leverage embedded in jeonse deposits also poses persistent challenges to policy effectiveness by weakening the transmission mechanism of monetary policy. Most notably, during the Moon administration (2017 - 2022), more than twenty short-term and *ad hoc* housing policy measures were implemented, yet most failed to achieve their intended objectives.

[Aims of the Study]

This study investigates (i) how jeonse deposits drive fluctuations in apartment prices and (ii) how high-leverage conditions undermine the effectiveness of housing-policy instruments. In doing so, the study develops a more comprehensive framework for understanding the interaction between housing finance and housing-market outcomes in Korea.

[Methodology]

This study employs a Nonlinear Autoregressive Distributed Lag (NARDL) framework to analyze the relationship between jeonse-based leverage and apartment price dynamics in Korea, with particular attention to asymmetric shocks, regional heterogeneity, and the effectiveness of housing policy instruments. In addition, the Oaxaca - RIF (Recentered Influence Function) decomposition with the control-function approach is applied to assess the contribution of policy variables across different leverage groups. This combined approach allows the study to identify both dynamic effects and distributional differences in apartment prices.

The analysis uses various monthly data for three regional groups: (i) the Seoul area, (ii) the Seoul metropolitan area, including Incheon and Gyeonggi Province, and (iii) the five other major metropolitan cities, covering the period from January 2012 to December 2025.

[Contribution of the Study]

This study contributes to the literature in three important ways. First, it conceptualizes jeonse deposits as a form of leverage embedded in the apartment market, rather than merely as a rental mechanism. Second, it provides empirical evidence that jeonse-based leverage significantly affects both the level and volatility of apartment prices. Third, it shows that high-leverage conditions systematically weaken or distort the effectiveness of conventional housing policies, particularly those relying on short-term

regulatory interventions. By explicitly incorporating leverage into the analysis, this study advances a more comprehensive framework for understanding housing-market dynamics in Korea.

[Structure of the Study]

The remainder of the paper is structured as follows. Section 2 reviews the literature on the jeonse-leverage effect on apartment prices and policy ineffectiveness. This section also introduces related methodologies. Section 3 reviews the data sources, descriptive statistics, and econometric framework. Section 4 presents the empirical analysis the NARDL model and the Oaxaca - RIF decomposition in the control-function framework. Section 5 concludes with policy implications and directions for future research.

II. Review of Literature

1. Jeonse-Leverage Effect on Apartment Price and Policy Ineffectiveness

For more than half a century, apartments have represented not only a form of residence for urban Koreans but also a major vehicle for investment and wealth accumulation among ordinary households in large cities, including Seoul and its surrounding areas. According to *Statistics Korea's Housing Census (2015 - 2023)*, the number of apartments in Seoul reached 1.887 million units, accounting for 59.8 percent of the city's total housing stock. In 2023, multi-family houses reached 0.95 million units, or 30.1 percent; single-family detached houses for 0.292 million units, or 9.2 percent; and housing located in non-residential buildings stood at 0.027 million, or 0.9 percent. By tenure type, owner-occupied housing accounted for 44.1 percent, jeonse for 25.4

percent, and monthly rental housing for 28.0 percent.

The asset-pricing approach to housing can be traced mainly to the user-cost and asset-market models of owner-occupied housing developed by Hendershott and Slemrod (1982) and Poterba (1984). In this framework, housing prices are determined by expected rents or housing services, interest rates, tax treatment, expected capital gains, and financing conditions. In Korea, however, financing conditions cannot be fully understood without considering the jeonse system. Because jeonse deposits provide landlords and homebuyers with a large amount of interest-free funds, they may function as an additional source of leverage beyond conventional mortgage finance.

Although the share of jeonse has declined relative to monthly rental housing, it continues to play an important role in housing finance and investment behavior. The use of jeonse deposits to finance housing purchases has contributed to persistent housing-price increases and has become an important source of distortion in the Korean housing market. K. H. Kim (2004) argued that the jeonse system functions as an implicit housing finance mechanism, while Jing, Park, and Zhang (2022) show that jeonse deposits operate as a credit mechanism embedded in the housing market and can amplify housing-price increases. J. W. Kim (2013) also notes that the jeonse system developed under financial repression, enabling landlords to accumulate funds for housing investment without heavy reliance on mortgage finance. Similarly, Park and Pyun (2020) show that the deposit-to-rent ratio rises with the landlord's return on property investment.

Consequently, jeonse deposits encourage gap investment and speculative behavior, thereby weakening or even neutralizing government real estate policies. This pattern is consistent with the policy ineffectiveness proposition, as reflected in the limited effectiveness of the 27 real estate policy measures introduced during the Moon administration era (2017 - 2022). H. S. Lee (2025, May 20), citing a KRIHS study, reports that a 1 percent increase in jeonse prices leads to an approximately 0.655 percent increase in housing prices,

while a 1 percent increase in gap investment is associated with a 0.179 percent increase in housing prices in the Seoul metropolitan area. These findings suggest that jeonse-based financing significantly amplifies housing-market volatility.

H. H. Bae (2024) further argues that the pre-sale of apartments and deposit-only rental agreements are two distinctive features of the Korean housing market that facilitate household financialization and high-leverage investment. In this context, the main sources of policy ineffectiveness stem from demand - supply mismatches, balloon effects, lock-in effects, and unintended market distortions. Hsieh et al. (2025) find that government real estate policies have been ineffective, while Kim and Lee (2011) argue that supply-price controls are more effective than regulatory policies. Kim and Oh (2020) also show that LTV and DTI shocks affect housing prices, household bank loans, and macroeconomic variables, suggesting that the complex interaction between housing finance and macroeconomic conditions may prevent policy measures from achieving their intended outcomes.

2. NARDL and Oaxaca-RIF Decomposition

(1) NARDL

This study employs an Autoregressive Distributed Lag (ARDL) model, which is useful for handling variables integrated of order $I(0)$ and $I(1)$ and is suitable for small-sample, single-equation analysis. Instead of estimating a potentially misspecified system of equations using Structural Vector Autoregression (SVAR) model or (Vector Error Correction Model) VECM, this study adopts a single-equation approach and applies the bounds testing technique to examine the existence of a long-run, or cointegrating, relationship among the variables. This framework allows us to analyze both the long-run equilibrium relationship and short-run dynamics associated with

the leverage effect of jeonse deposits on housing demand in Korea.

Although many studies examine the social and demographic determinants of homeownership, relatively few focus on its macroeconomic foundations (Akinwate et al., 2024). In particular, the role of jeonse deposits as an explanatory factor for housing-market volatility remains insufficiently examined. Since jeonse deposits may operate as a leverage mechanism within the Korean housing market, a structural reassessment of the jeonse system is warranted, along with consideration of its gradual downsizing or transition to a safer financial and guarantee framework.

A number of studies have applied ARDL-type models to housing-market analysis. Bui (2019), for example, uses an ARDL model to examine the relationship between financial development and economic growth in Vietnam. Katrakilidis and Trachanas (2021) employ a nonlinear ARDL (NARDL) model to capture asymmetric effects, showing that positive and negative shocks may have different short-run and long-run impacts. This suggests that when policy variables such as interest rates or LTV regulations have direction-dependent effects, nonlinear specifications may provide a more appropriate modeling framework.

Lee (2010) analyzes the long-run and short-run relationship between housing prices and jeonse prices in Korea using a VECM framework. Shin, Yu, and Greenwood-Nimmo (2014) also emphasize that economic variables may respond asymmetrically, highlighting the importance of NARDL modeling for interpreting policy effects. Similarly, Park (2024) applies an ARDL model and finds that demand-side factors such as mortgage lending, interest rates, and household disposable income play a dominant role in determining housing prices, while the direct effect of jeonse prices is limited. However, this finding may understate the indirect role of jeonse as a leverage mechanism embedded in the housing market.

(2) Oaxaca-RIF Decomposition

This study further applies the Oaxaca - RIF (Recentered Influence Function) decomposition, a refined extension of the traditional Oaxaca - Blinder approach, to assess how housing-price variables contribute across different jeonse-based leverage groups. The Oaxaca - RIF decomposition separates intergroup differences into an explained component, attributable to observable characteristics, and an unexplained component, reflecting structural, behavioral, or unobserved effects. Unlike the conventional Blinder - Oaxaca decomposition, which focuses mainly on mean differences, the RIF-based approach allows distributional statistics as well as the mean to be analyzed.

The purpose of this decomposition is not to estimate the leverage effect directly in a regression sense, but to quantify how policy-related variables operate under different levels of jeonse-based leverage. Following the framework of Firpo, Fortin, and Lemieux (2011) and Jann (2008), Group 1 denotes households or regions with relatively high jeonse leverage, while Group 2 denotes those with relatively low jeonse leverage. This classification may be based on the jeonse-to-price ratio, J/P , where J represents the jeonse deposit and P represents the housing sale price.

The difference in housing-acquisition outcomes between the two groups can be decomposed into two parts. The explained component captures the portion attributable to differences in observable explanatory variables, such as mortgage rates, borrowing conditions, jeonse deposits, and macroeconomic factors. If the jeonse-to-price ratio explains a substantial share of the gap, this suggests that jeonse-based leverage plays an important role in shaping housing demand and prices. The unexplained component captures differences in coefficients across groups and may reflect heterogeneous behavioral responses, speculative expectations, institutional asymmetries, or region-specific housing-market effects.

Thus, the Oaxaca - RIF decomposition provides a mechanism-based framework for identifying how much of the observed intergroup difference is associated with jeonse-based leverage and related policy variables. However, few studies have applied the Oaxaca - RIF decomposition to housing-price analysis. Chung and Ann (2023), for example, examine regional differences in housing prices using the conventional Blinder - Oaxaca decomposition.

III. Data Sources and Econometric Manipulations

1. Data Sources and Descriptive Statistics

This study uses monthly data on apartment price index, jeonse deposits index (12-month lagged), along with key macroeconomic variables such as the mortgage rate (int), Industrial Production Index (ipi), and inflation measured by the Consumer Price Index (cpi). A dummy variable is used to catch macroprudential effect from the government's stable housing price policy. The dummy variable takes a value of 1 (easing) when policies increase borrowing capacity—such as higher LTV ratio or DTI ratio, deregulation of restricted areas, expanded borrower eligibility, higher loan limits, or relaxed Debt Service Ratio (DSR)—thereby loosening borrowing constraints and expanding credit. It takes a value of -1 (tightening) when the borrowing constraints are tightened. Otherwise, it takes a value of 0.¹⁾ The data are

1) The Korean mortgage regulation exhibits a cyclical pattern of easing, tightening, and re-tightening, with a notable structural shift toward stricter credit constraints following the introduction of DSR regulations (Source: Various Press Releases by the Financial Service Commission, FSC). Specifically, Korea's mortgage regulations were eased during (1) 2014.08.01~2017.06.18, (2) 2022.08.01~2023.03.01, and (3)

categorized into three regions: (i) the Seoul area (ii) the Seoul metropolitan area (including Incheon and Gyeonggi Province), and (iii) the five other major metropolitan cities. All variables were transformed using natural logarithms.

Regarding data sources, monthly data on the Industrial Production Index (ipi), Consumer Price Index (cpi), and two supply-side variables—construction costs (cost) and construction permits (permit)—are obtained from the *Korean Statistical Information Service* (KOSIS). Data on the apartment price index, jeonse deposit index, and jeonse-to-price ratios are obtained or calculated from the *Korea Real Estate Board* (KREB), a public institution responsible for producing official real estate statistics. KREB was originally established as the *Korea Appraisal Board* in 1969 and was renamed the Korea Real Estate Board in 2020.

Table 1 reports the descriptive statistics for all variables used in the analysis, including means, standard deviations, standardized standard deviations, maximum values, and minimum values. The standardized standard deviation is calculated as the standard deviation divided by the mean. A notable finding is that the log growth rate of average apartment prices was highest in (iii) five other metropolitan cities, followed by the (ii) Seoul metropolitan area, and (i) Seoul area. However, in terms of volatility, the standardized standard deviation was highest in Seoul at 0.28, while the five other metropolitan cities also showed a similarly high level of volatility at 0.27.

The five other metropolitan cities also show the largest fluctuation in the jeonse deposit index, at 56,880, far exceeding that of Seoul and its surrounding areas. This suggests that housing-market instability is not confined to Seoul and that jeonse deposits may serve as an important channel through which volatility is amplified in regional housing markets.

2023.03.02~2025.06.27, whereas they were tightened during (1) 2017.06.19~2018.09.12, (2) 2019.09.13~2019.12.15, and 2019.12.16~2022.07.31 in terms of DSR reinforcement, 2025.06.28~2025.10.14, and again from 2025.10.15 on ward. This dummy variable was manually constructed based on FSC press releases, with the assistance of artificial intelligence in organizing the policy time line.

<Table 1> Descriptive Statistics for the Variables Used

Variables	Average (a)	Standard Deviation (b)	(b/a)	Maximum Value	Minimum Value
lnp1	4.367	0.120	0.028	4.594	0.120
lnp2	4.426	0.070	0.015	4.695	0.125
lnp3	4.593	0.125	0.027	4.804	0.079
lndeposit1	0.109	3.868	35.486	4.031	0.109
lndeposit2	0.130	4.012	30.861	4.244	0.130
lndeposit3	0.075	4.266	56.880	4.457	0.075
lnpermit1	10.092	0.842	0.083	11.626	7.521
lnpermit2	11.348	0.855	0.075	12.790	8.981
lnpermit3	10.538	0.924	0.087	11.866	7.492
lnint	1.295	0.187	0.144	1.646	0.970
lniip	4.616	0.082	0.017	4.812	4.450
lnspi	4.615	0.075	0.016	4.767	4.513
lncost	4.611	0.173	0.037	4.888	4.401

2. Econometric Manipulation

(1) Stationarity

Before estimation, preliminary econometric procedures are conducted, particularly stationarity tests, because this study uses time-series data from January 2012 to December 2025. Stationarity is examined using the Augmented Dickey - Fuller (ADF) and Phillips - Perron (PP) unit-root tests. As reported in Table 2, variables such as lnpermit1 - lnpermit3 and lniip are stationary at the 1 percent significance level of α in both tests, whereas all other variables are nonstationary. However, these nonstationary variables become stationary at the 1 percent level after first differencing. Since the ARDL framework allows for a mixture of I(0) and I(1) variables, all variables can be appropriately included in the model.

<Table 2> Results of the Stationarity (Unit Root) Test

Variables	ADF		PP[z(rho)]	
	Test stats.	ρ value (MacKinnon)	Test stats.	ρ value (MacKinnon)
lnp1	1.272	0.994	0.282	0.973
lnp2	0.104	0.966	-0.746	0.890
lnp3	-1.754	0.403	-2.977	0.498
lndeposit1	-2.118	0.237	-4.276	0.290
lndeposit2	-2.355	0.154	-3.460	0.321
lndeposit3	-2.324	0.164	-4.240	0.306
lnpermit1	-7.824	0.000***	-88.544	0.000***
lnpermit2	-7.946	0.000***	-88.748	0.000***
lnpermit2	-7.489	0.000***	-82.132	0.000***
lnint	-1.818	0.371	-5.074	0.321
lnipi	-4.716	0.000***	-31.524	0.000***
lncpi	-1.773	0.998	0.998	0.998
lncost	0.998	0.994	0.385	0.989

• Note: 1% and 5% critical values with number of obs=167 are -3.488 and -2.886.

(2) Nonlinearity

In a conventional cointegration approach, the linear ARDL model proposed by Pesaran and Shin (1999) and used by many scholars, including Akinwate et al. (2024), Akkay (2021), Katrakilidis & Trachanas (2012), and Park (2024). The general form of the ARDL model is defined as,

$$\psi(L)y_t = \alpha_0 + \alpha_1 w_t + \beta'(L)x_t + u_t \quad (\text{Eq. 1})$$

Where $\psi(L) = 1 - \sum_{i=1}^{\infty} \psi_i L^i$ and $\beta(L) = \sum_{i=1}^{\infty} \beta_i L^i$, with (L) being the lag operator and y_t and x_t are dependent and independent variable(s), while w_t being a vector of deterministic variables such as the intercept, seasonal dummies, time trends or other exogenous variables with fixed lags. u_t indicates

the error terms. However, nonlinearity has often found among the variables in the cointegration regression. In such cases, nonlinear asymmetric technique should be used, as suggested by Pesaran, shin, & Smith (2001), Shin, Yu, & Greenwood-Nimmo (2014), and Akinwate et al. (2024).

Then, $\beta'(L)x$ becomes $\sum \gamma_j^+ x_{t-j}^+ + \sum \gamma_j^- x_{t-j}^-$, which contains asymmetric responses. The null hypothesis of symmetry (nonlinearity) is examined in nonlinear ARDL model using a Wald test,

$$H_0 : \gamma^+ = \gamma^-, H_A : \gamma^+ \neq \gamma^-$$

Table 3 illustrates the results of the Wald test from the NARDL regressions of the variables used.

<Table 3> Results of the Wald Test

Variables	Test stats.	Probability>F
lndeposit1	481.03	0.000***
lndeposit2	175.77	0.000***
lndeposit3	310.66	0.000***
lnpermit1	10.24	0.002***
lnpermit2	640.20	0.000***
lnpermit3	147.84	0.000***
lnint	2.41	0.122
lnapi	13.49	0.000***
lnipi	0.34	0.559
lncost	0.27	0.337

The results indicate that lnint, lnipi, and lncost reject the null hypothesis of symmetry, suggesting the presence of nonlinearity effects in these variables. This finding suggests that the NARDL framework is more appropriate for this study. Once nonlinearity is established, the nonlinear framework can capture asymmetric effects that a linear model would otherwise fail to capture. In particular, it allows the analysis to capture cases

in which increases in the jeonse-to-price ratio generate strong leverage effects, while decreases produce only weak reverse responses.

(3) Endogeneity

The housing-price model may suffer from endogeneity for several reasons, particularly due to reverse causality between housing prices, and the jeonse deposits, or macroprudential policy variables such as LTV and DTI regulations. These relationships may generate a policy-endogeneity problem. As a result, the estimated coefficients on these variables may appear weak, statistically insignificant, or even incorrectly signed. For instance, interest rates are also not purely exogenous, since monetary policy may respond to macroeconomic and financial-market conditions, including developments in the housing market.

The NARDL model is useful in the presence of potential endogeneity because its dynamic specification incorporates lagged variables, separates short-run from long-run effects, and distinguishes between positive and negative shocks. In this respect, the NARDL framework also helps mitigate concerns about simultaneity bias by incorporating lagged dependent and explanatory variables. For instance, we have used `Indeposit_lag12_pos` and `Indeposit_lag12_neg`, which are 12-period lagged (one year) `Indeposit` variables. The other explanatory variables are likewise incorporated either as lagged variables or as positive and negative partial-sum decompositions, while `lnpermit` is specified with a 24-month lag to reflect delayed supply-side effects. According to the *Ministry of Land, Infrastructure and Transport's* housing statistics press release, housing permits are a leading indicator of future supply, and their market effects may appear with a lag of around two years or more.

In the Oaxaca - RIF decomposition, endogeneity or simultaneity may also be a serious concern because the method is typically based on unconditional

quantile regressions (UQR) of the following form:

$$RIF(Y; q_\tau) = X\beta_\tau + u \quad (\text{Eq. 2})$$

where τ represents the i th quantile. If some X variables are endogenous, then the estimated contribution of those variables to the quantile gap may be biased. The simplest and most practical solution would be to use lagged X variables. To mitigate simultaneity bias, the Oaxaca - RIF decomposition is estimated using lagged explanatory variables. This specification reduces the possibility that contemporaneous housing prices mechanically influence explanatory variables such as the jeonse deposits, interest rates, and macroprudential policy indicators.

As a robustness check for potential endogeneity in the Oaxaca - RIF decomposition, this study applies a control-function framework, using first-stage residuals. Following Wrenn et al. (2017), potentially endogenous variables are first regressed on instrumental variables, lagged dependent variables and exogenous controls, and the resulting residuals are then included in the RIF decomposition equations. The statistical insignificance of these residual terms in all apartment-price equations suggests that endogeneity is not a serious concern (see Table 8).

(4) Multicollinearity

Finally, multicollinearity appears to be one of the most difficult econometric issues to deal with in the empirical analysis of this study. Given the potential correlation among housing market variables, multicollinearity was checked before interpreting the estimation results. In the NARDL model, multicollinearity was examined using variance inflation factors (VIFs). Since the model includes lagged variables as well as positive and negative partial-sum components, some degree of correlation among regressors is

expected. The VIF results indicate that the $\ln permit$ and $\ln ipi$ variables are highly correlated.²⁾

In the Oaxaca - RIF decomposition model, multicollinearity was also examined using VIFs based on auxiliary OLS regressions that included the same explanatory variables as the RIF regression. VIF values were checked for the full sample as well as separately for the high- and low-jeonse-leverage groups. The VIF results show that the variables in Group 2, the low-jeonse-leverage group, exhibit a higher degree of multicollinearity than those in Group 1.

However, after removing variables with severe multicollinearity and comparing the coefficients of the remaining variables with those used in the NARDL and Oaxaca - RIF decomposition models, the main results remained qualitatively robust across the data sets. Nevertheless, caution is required in interpreting individual coefficient estimates.

IV. Empirical Study

1. NARDL Estimation

We are now turning to the results of NARDL estimation, which captures both short-run and long-run dynamics while allowing for asymmetric effects. This is particularly important in housing markets, where high and low jeonse leverage may have different impacts on apartment price. Table 4 through Table 6 present the estimation results.³⁾ All one period-lagged dependent

2) Due to space constraints, the detailed numerical test results and robust estimations for this section are not reported.

3) $D1.x$ (or $D.x$) represents the first difference of the variable x , $(x_t - x_{t-1})$, while $L1D.x$ and $L2D.x$ represent one-period and two-period lag of the first difference, $(x_{t-1} - x_{t-2})$ and $(x_{t-2} - x_{t-3})$, respectively.

variables in apartment price equations, $L1.lnp$, exhibit strongly negative and statistically significant coefficients. This suggests that the error-correction mechanism is operating: when apartment prices deviate from their long-run equilibrium, they gradually adjust back toward equilibrium in subsequent periods.

In the long-run analysis, first, positive partial-sum component of the 12-month lagged log jeonse deposit variable, $lndeposit_lag12_pos$, is negative and statistically significant only in the second data group, the Seoul metropolitan area, while it is insignificant in the other regions. This result suggests that an increase in the jeonse deposit index is associated with a decline in apartment prices in the Seoul metropolitan area. Although this may appear counterintuitive, it implies that rising jeonse deposits do not always lead to stronger purchase demand.

One possible explanation is that when jeonse deposits rise, some tenants may shift to monthly rental housing, semi-jeonse contracts, smaller housing units, or outer suburban areas. In particular, the second data set, which covers Seoul, Incheon, and Gyeonggi Province, may reflect the effect of high jeonse prices in Seoul and the resulting substitution toward surrounding areas. In addition, periods of rising jeonse deposits may coincide with weakening expectations of future housing-price appreciation. Under such conditions, purchase demand may decline, causing apartment prices to fall even as jeonse deposits rise.

In such circumstances, short-term policy measures designed to reduce jeonse deposits in these regions in the name of livelihood stabilization may not contribute to stabilizing housing prices and may instead generate counterproductive effects.

Second, $lnint_pos$ is negatively associated with apartment price index, while $lnint_neg$ is positively associated only in the Seoul area. The variable, $lnint_pos$ captures periods of rising interest rates. When interest rates rise, the borrowing costs rise, reducing households' purchasing power and

apartment demand, and thereby lowering apartment prices. Conversely, *lnint_neg* captures periods of falling interest rates, which may support apartment prices by lowering financing costs and increasing purchasing power. The conventional government policy measures may function effectively under these conditions.

It is also worth to note that the statistically insignificant coefficients on *lnint_pos* and *lnint_neg* in the five other metropolitan cities do not necessarily imply that interest rates have no relationship with apartment prices. Rather, they suggest that the asymmetric effects of interest-rate changes are not sufficiently strong or consistent to be statistically identified in these regional markets within the estimated NARDL framework.

Third, the CPI variables, *lnspi_pos* and *lnspi_neg*, both exhibit negative effects on the apartment price index in the third data set, which covers the five other major metropolitan cities. This suggests that an increase in CPI may reduce households' housing purchasing power and exert downward pressure on apartment prices. This effect may be particularly strong in regional metropolitan cities outside Seoul and its vicinity, where investment demand is weaker and the income base may be relatively less robust. In these areas, CPI increases are more likely to weaken purchasing power than to stimulate asset-price appreciation.

The negative coefficient of *lnspi_neg* may suggest that declining CPI may reflect weakening regional demand or economic slowdown rather than improved affordability. In the five other major metropolitan cities, both CPI increases and decreases may therefore depress apartment prices: the former by reducing housing purchasing power, and the latter by signaling weaker regional economic conditions.

Fourth, the supply-side variable *lnpermit_lag24_pos*, which represents the positive component of the 24-month lag of construction permit, also shows positive and statistically significant coefficients in the *lnp1* and *lnp2* equations. Similarly, *lncost_pos* exhibits the same effect in the *lnp2* equation.

In the short-run, several asymmetric effects are observed. First, *Indeposit1_lag12_pos* has a negative impact on *lnp1*, while *Indeposit2_lag12_neg* has a positive impact on *lnp2*. This suggests that lagged changes in jeonse deposits affect apartment prices differently across regions and depending on the direction of the shock. Second, unlike in the long run, *lnint_pos* affects only *lnp1*, indicating that the influence of interest rate increases is relatively limited in the short run.

Third, CPI-related variables appear to be significant across all apartment-price equations. Specifically, *lnipi_pos* has a negative impact on *lnp1* and *lnp3*, while its lagged differenced terms negatively affect *lnp2*. Similarly, *lnipi_neg* has a negative impact on *lnp1* and *lnp3*. These results suggest that both positive and negative CPI shocks may reduce apartment prices in the short run.

Finally, the construction-cost variables also have significant effects across the apartment-price equations. In particular, *lncost_neg* has a positive impact on *lnp2* and *lnp3*, whereas *lncost_pos* has a negative impact on *lnp1*. This implies that construction-cost shocks affect apartment prices asymmetrically and that the direction of the effect differs across regional housing markets.

<Table 4> Results of NARDL Estimation (lnp1)

lnp1	Coef.	Std. Err.	t	P> t
ADJ				
lnp1				
L1	-0.083	0.016	-5.01	0.000***
LR				
<i>Indeposit1_lag12_pos</i>	0.019	0.338	0.06	0.954
<i>Indeposit1_lag12_neg</i>	0.127	0.158	0.81	0.421
<i>lnpermit1_lag24_pos</i>	0.029	0.013	2.22	0.028**
<i>lnpermit1_lag24_neg</i>	-0.000	0.008	-0.07	0.941
<i>lnint_pos</i>	-0.421	0.138	-3.05	0.003***
<i>lnint_neg</i>	0.162	0.080	2.02	0.045**
<i>lnipi_pos</i>	0.365	0.202	1.81	0.073*
<i>lnipi_neg</i>	0.407	0.189	2.16	0.083*

lnp1	Coef.	Std. Err.	t	P> t
lnpci_pos	-0.847	0.697	-1.21	0.227
lnpci_neg	0.613	1.164	0.53	0.598
lncost_pos	0.102	0.258	0.40	0.692
lncost_neg	-3.257	1.951	-1.67	0.098*
SR				
lnp1				
LD.	0.848	0.083	10.11	0.000***
lndeposit1_lag12_pos				
LD	-0.142	0.084	-1.69	0.094*
lndeposit1_lag12_neg				
D1.	0.076	0.028	2.65	0.009***
lnpermit1_lag24_pos				
D1	-0.004	0.002	-1.90	0.060*
lnint_pos				
LD.	0.186	0.096	1.93	0.056*
lnipi_pos				
D1.	-0.034	0.019	-1.73	0.086*
LD.	-0.027	0.012	-2.14	0.035**
lnpci_pos				
D1.	0.371	0.143	2.58	0.010***
lnpci_neg				
LD.	-0.039	0.245	-1.65	-0.100*
lncost_neg				
LD.	0.066	0.332	1.99	0.049**
L2D.	0.063	0.322	1.97	0.052*

▪ Note1: Adj. R²=0.783, Log likelihood=763.24, Root MSE=0.002 Note2: ***, **, and * denote the variables are significant at 1%, 5%, and 10% of critical value of α , respectively. Note3: In the short-run, only variables with at least 10% of statistical significance are reported.

<Table 5> Results of NARDL Estimation (lnp2)

lnp2	Coef.	Std. Err.	t	P> t
ADJ				
lnp2				
L1	-0.091	0.014	-6.22	0.000***

LR				
Indeposit2_lag12_pos	-0.520	0.241	-2.16	0.033**
Indeposit2_lag12_neg	0.127	0.125	1.02	0.310
Inpermit2_lag24_pos	0.020	0.009	2.31	0.023**
Inpermit2_lag24_neg	-0.003	0.006	-0.53	0.597
lnint_pos	-0.030	0.104	-0.29	0.769
lnint_neg	-0.046	0.060	-0.77	0.442
lnipi_pos	0.516	0.155	3.31	0.001***
lnipi_neg	0.284	0.138	2.08	0.041**
lnpci_pos	-4.388	0.603	-7.19	0.000***
lnpci_neg	0.803	0.896	0.90	0.372
lncost_pos	0.932	0.208	4.47	0.000***
lncost_neg	0.059	1.403	0.04	0.966
SR				
lnp2				
LD.	0.778	0.085	9.091	0.000***
Indeposit2lag12_pos				
D1	0.117	0.049	2.35	0.020**
lnipi_pos				
LD.	-0.027	0.011	-2.51	0.014**
lnipi_neg				
D1.	-0.030	0.016	-1.82	0.072*
L2D.				
lnpci_pos	-0.029	0.138	-2.11	0.037**
D1.	0.398	0.129	3.07	0.003***
LD.				
lncost_pos	0.029	0.137	2.12	0.037**
L2D.	0.097	0.054	1.79	0.073*

• Note1: Adj. $R^2=0.888$, Log likelihood=795.23, Root MSE=0.002 Note2: ***, **, and * denote the variables are significant at 1%, 5%, and 10% of critical value of α , respectively. Note3: In the short-run, only variables with at least 10% of statistical significance are reported.

<Table 6> Results of NARDL Estimation (lnp3)

lnp3	Coef.	Std. Err.	t	P> t
ADJ lnp3				

L1	-0.054	0.014	-3.72	0.000***
LR				
Indeposit3_lag12_pos	0.249	0.491	0.51	0.614
Indeposit3_lag12_neg	-0.172	0.217	-0.81	0.421
Inpermit3_lag24_pos	-0.019	0.011	-1.63	0.112
Inpermit3_lag24_neg	0.003	0.009	0.43	0.671
lnint_pos	0.241	0.187	1.30	0.198
lnint_neg	-0.154	0.094	-1.68	0.104
lnipi_pos	0.769	0.280	2.74	0.007***
lnipi_neg	0.239	0.219	1.09	0.277
lnpci_pos	-5.476	1.184	-4.63	0.000***
lnpci_neg	-3.018	1.472	-2.04	0.044**
lncost_pos	0.570	0.451	1.26	0.209
lncost_neg	2.938	2.211	1.13	0.187
SR				
lnp3				
LD.	0.804	0.088	9.07	0.000***
lnipi_pos				
D1.	-0.029	0.015	-1.93	0.056*
LD.	-0.021	0.089	-2.46	0.015**
lnpci_pos				
D1.	0.198	0.104	1.91	0.059*
LD.	0.192	0.107	1.80	0.074*
L2D	0.262	0.106	2.45	0.016**
lnpci_neg				
L2D.	-0.378	0.170	-2.22	0.029**
lncost_pos				
D1	0.087	0.049	1.78	0.078*

▪ Note1: Adj. $R^2=0.892$, Log likelihood=833.25, Root MSE=0.001 Note2: ***, **, and * denote the variables are significant at 1%, 5%, and 10% of critical value of α , respectively. Note3: In the short-run, only variables with at least 10% of statistical significance are reported.

In addition, the bounds test is conducted to examine whether a long-run, or cointegrating relationship exists among the variables in the NARDL model, following Pesaran, Shin, and Smith (2001).

H0: no long-run relationship, HA: long-run relationship exists

Table 7 reports the results of the bounds test for each NARDL model, using the critical values and approximate p-values provided by Kripfganz and Schneider (2020). In all NARDL models, the null hypothesis of no long-run relationship is rejected at the 1 percent significance level, confirming the existence of a long-run, or cointegrating, relationship among the variables.

<Table 7> Results of the Bounds Test

NARDL models	Test statistics	Test results
NARDL with ln _p 1	F=3.255, t=-5.012	Reject H0
NARDL with ln _p 2	F=4.136, t=-6.223	Reject H0
NARDL with ln _p 3	F=3.367, t=-3.722	Reject H0

▪ Note: Do not reject H0 if either F or t stats are closer to zero than critical values for I(0) variables (if either p-value > desired level for I(0) variables). Reject H0 if both F and t stats are more extreme than critical values for I(1) variables (if both p-values < desired level for I(1) variables.)

3. Results of Oaxaca-RIF Decomposition

Finally, Table 8 presents the results of the Oaxaca - RIF decomposition using the control-function approach, based on the mean differences between the high- and low-jeonse-to-price ratio groups. First, the difference in the jeonse-to-price ratio between the two groups is -0.028, and 78.0 percent of this difference is explained by the variables used in the ln_p1 equation for the Seoul area. However, the explained share declines to 69.8 percent for ln_p2, the Seoul metropolitan area, and to 42.7 percent for ln_p3, the five other major metropolitan cities.

In this sense, the jeonse-to-price ratio provides a key channel through which policy ineffectiveness can be understood. Since the jeonse-to-price ratio reflects the extent to which apartment purchases can be financed through

tenant deposits, regional differences in this ratio imply that the leverage effect of jeonse is not uniform across housing markets. Therefore, nationwide policies such as LTV, DTI, and supply regulations may produce different outcomes depending on the local structure of jeonse financing and the degree of jeonse-based leverage.

The declining explained share outside Seoul suggests that common explanatory and policy variables become less effective in accounting for regional housing-market differences. These policies may fail to fully capture regional variation in jeonse-based leverage, thereby weakening their effectiveness and generating unintended market outcomes.

Second, the policy dummy variable is weakly statistically significant with a negative sign in the $\ln p1$ and $\ln p3$ equations, suggesting that the policy period is associated with a modest decline in apartment prices with easing borrowing constraints in these markets. The effect of regulatory easing may have been offset by higher interest rates, weak economic conditions, increased housing supply, or deteriorating market sentiment. These findings provide further evidence of policy ineffectiveness in Korea's real estate market. However, since the statistical significance is weak, this result should be interpreted with caution.

Third, the substantial unexplained component also suggests that conventional explanatory variables used in the literature, such as mortgage rates, income, inflation, and supply-side variables, are insufficient to fully account for the observed disparities in apartment prices. Instead, the results imply that structural differences, including finance-specific and Korea-specific institutional factors affecting housing prices, may play a dominant role.

Finally, none of the first-stage residual variables, vhat_ratio1 , vhat_ratio2 , and vhat_ratio3 , is statistically significant in the apartment-price equations. This suggests that potential endogeneity in the equations is not a serious concern.

<Table 8> Results of Oaxaca_RIF Decomposition

lnp1	Cefficient	z(p> z)
<overall>	4.430	463.95***
group1	4.449	886.91***
group2	-0.186	-17.60***
difference	-0.228	-16.79***
explained	(78.0%)	-
unexplained	0.041 (22.0%)	5.09*** -
<explained>		
Indeposit1_lag12	0.072	0.000***
dummy	-0.008	0.010***
lnint	-0.004	0.066*
lnipi	-0.008	0.000***
lncpi	-0.060	0.000***
lncost	-0.131	0.000***
vhat_ratio1	-0.006	0.110
<unexplained>		
lnint	0.099	0.000
lncpi	0.833	0.057
lncost	0.398	0.016
vhat_ratio1	-0.006	0.110
lnp2	Cefficient	z(p> z)
<overall>		
group1	4.395	615.88***
group2	4.587	505.53***
difference	-0.192	-16.65***
explained	-0.250 (69.8%)	-12.93*** -
unexplained	0.058 (30.2%)	3.43*** -
<explained>		
lnint	0.005	0.045**
lnipi	-0.020	0.000***
lncpi	0.068	0.035**
lncost	-0.295	0.000***

vhat_ratio2	-0.004	-0.311
<unexplained>		
lnipi	-80.017	-3.97***
lncost	39.911	4.35***
vhat_ratio2	-0.004	0.170
lnp3	Cefficient	z(p> z)
<overall>		
group1	4.605	1181.77***
group2	4.688	473.16***
difference	-0.082	-7.75***
explained	-0.130 (42.7%)	-6.76*** -
unexplained	0.047 (57.3%)	2.50** -
<explained>		
lndeposit3lag12	-0.013	0.001***
dummy	-0.004	0.054*
lnint	0.005	0.028**
lnipi	-0.022	0.000***
lnipi	0.133	0.003***
lncost	-0.224	0.000***
vhat_ratio3	-0.004	0.182
<unexplained>		
lnint	0.076	0.000***
lnipi	0.346	0.021**
lncost	-1.086	0.050**
vhat_ratio3	-2.208	0.333

▪ Note1: ***, **, and * denote the variables are significant at 1%, 5%, and 10% of critical value of α , respectively. Note2: Only significant variables (at least 10% of α) are reported. Note3: RIF=mean, group1=lower jeonse-leverage ratio, group2=higher jeonse-leverage ratio.

V. Conclusion

Recently, jeonse-related fraud has gone beyond alarming levels, generating significant economic and social challenges in Korea, particularly for young non-homeowners. Despite these issues, government policy makers are obsessed with, or largely relied on short-term, ad hoc demand-suppressing measures—such as regulations targeting multiple homeowners and detection of housing purchases financed by loans for business purposes—to stabilize the housing market and identifying cases where housing purchases are financed through loans for business purposes. The implementation of as many as 27 *ad hoc* measures during the Moon administration clearly illustrates this reactive approach. These observations highlight the need for a more structural and long-term policy framework.

In this context, this study investigates (i) how jeonse deposits affects apartment prices, and (ii) how such leverage contributes to the ineffectiveness of housing policies. Using NARDL, and Oaxaca - RIF decomposition in control-function approach, several key findings emerge. This approach ensures robustness, captures dynamic and nonlinear relationships, and provides deeper insights into both average effects and distributional heterogeneity in the Korean housing market.

Overall, the empirical results indicate that Korea's apartment price dynamics are shaped by asymmetric shocks, regional heterogeneity, and jeonse-based leverage. The long-run results in the NARDL estimation show that substantial regional differences in the effects of jeonse deposits, interest rates, CPI, and supply-side variables. Particularly, in the Seoul metropolitan area, the jeonse deposit index has a negative effect on apartment price index, suggesting substitution toward monthly rent, semi-jeonse, smaller units, or outer suburbs rather than stronger purchase demand as jeonse deposit increases. Interest-rate shocks are asymmetric, while CPI shocks are especially important in the five other metropolitan cities, where inflation

weakens purchasing power and price declines may reflect weaker regional demand. The bounds test results also support the presence of long-run relationships among the variables.

The Oaxaca - RIF decomposition further supports the role of regional heterogeneity and the jeonse-leverage channel. The explained share declines from 78.0 percent in Seoul to 69.8 percent in the Seoul metropolitan area and 42.7 percent in the five other metropolitan cities, suggesting that common explanatory variables become less effective outside Seoul. Since the jeonse-to-price ratio reflects the extent to which purchases can be financed through tenant deposits, its regional variation implies that jeonse-based leverage operates unevenly across housing markets.

Taken together, these findings support the policy ineffectiveness proposition in Korea's real estate market. Uniform national policies such as LTV and DTI, short-term ad hoc policies designed to suppress apartment demand, and ineffective supply regulations and taxation may fail to reflect regional differences in demand, supply conditions, investment behavior, and jeonse-market structures. Policy endogeneity, balloon effects, and substitution effects may further weaken the intended effects of government intervention. Therefore, improving the effectiveness of housing-market stabilization policies in Korea requires more region-specific policy designs that explicitly account for jeonse-based leverage.

Finally, while the NARDL framework is useful for capturing asymmetric effects, it has limitations in fully accounting for dynamic interactions among endogenous variables. Future studies should therefore employ more advanced system-based methodologies—such as SVAR or VECM—to better capture policy transmission mechanisms and the complex dynamics of the housing market.

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| 국문초록 |

한국의 아파트 주택정책은 왜 실패하는가? 전세 기반 레버리지와 정책무력성에 대한 분석

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본 연구는 전세 기반 레버리지가 한국의 아파트 가격 및 가격변동에 어떠한 영향을 미치며, 주택정책의 무력성 또는 비효과성에 어떻게 기여하는지를 분석한다. 이를 위해 비선형 자기회귀시차분포모형(NARDL)과 통제함수 접근법에 기초한 Oaxaca - RIF 분해방법을 사용하였다. 분석에는 2012년 1월부터 2025년 12월까지의 월별 자료를 사용하였으며, 지역은 (i) 서울 지역, (ii) 서울·인천·경기를 포함한 수도권 지역, (iii) 기타 5대 광역시 지역의 세 집단으로 구분하였다. 실증분석 결과, 동학적 아파트 가격은 지역별로 상당한 차이를 보이는 것으로 나타났다. 전세보증금, 이자율, 소득(산업생산지수), 소비자물가지수(CPI) 및 공급 측 요인들은 지역에 따라 상이한 장기효과를 보이는 것으로 분석되었다. 또한 공통 설명변수들의 설명력은 서울을 벗어날수록 약화되는 것으로 나타났으며, 이는 한국 부동산시장에서 정책 비효과성이 존재함을 보여주는 증거로 해석된다. 따라서, 본 연구는 정부가 획일적이고 단기적인 수요억제 정책, 비효율적인 공급규제, 그리고 주택 매각을 어렵게 만드는 조세 정책에 의존하는 것을 자제하고, 전세 기반 레버리지를 명시적으로 고려하는 보다 장기적이며 지역별로 특성화된 정책설계로 전환할 것을 제안한다.

- 주제어: 전세 레버리지, 정책무력성, 비선형 자기회귀시차분포모형, 재중심화 영향 함수 (RIF) 기반 오하카 분해기법, 통제함수 접근법