

The Impact of VAT Incentives and Macroeconomic Variables on Residential Property Sales Growth (A Case Study in Indonesia)

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Abstract

To support the recovery of Indonesia's residential property market following the COVID-19 pandemic, the government implemented Government-Borne Value Added Tax (VAT DTP) incentives to stimulate housing demand. However, empirical evidence regarding the effectiveness of this policy under different macroeconomic conditions remains limited. This study examines the effects of residential property price growth (IHPR Growth), inflation, the BI policy rate, Government-Borne VAT incentives, and the COVID-19 pandemic on residential property sales growth in Indonesia. Quarterly time-series data from 2018Q1 to 2025Q4 were analyzed. Prior to estimation, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests confirmed a mixture of I(0) and I(1) variables with no variable integrated of order two. Accordingly, the Autoregressive Distributed Lag (ARDL) model was employed to estimate both short-run and long-run relationships. The Bounds Test confirmed the existence of cointegration among the variables. The results show that IHPR Growth and Government-Borne VAT incentives have positive and significant effects on residential property sales growth, while inflation has a delayed negative effect. In contrast, the BI policy rate and the COVID-19 dummy are statistically insignificant. These findings highlight the positive role of Government-Borne VAT incentives in supporting residential property sales during the post-pandemic recovery. This study contributes by applying a dynamic ARDL framework and using IHPR Growth as a more appropriate explanatory variable for residential property sales growth.

Keywords: Autoregressive Distributed Lag (ARDL), Government-Borne VAT, Housing Market, IHPR Growth, Residential Property Sales Growth.

1. Introduction

The residential property sector plays a significant role in Indonesia's economy by supporting construction and real estate activities while reflecting changes in broader macroeconomic conditions. In Indonesia, the growth of the property sector is highly dependent on the performance of the real estate and construction industries. These two sectors not only provide housing and physical infrastructure but are also sensitive indicators to changes in macroeconomic conditions. The property market's proven ability to expand and contract reflects its adaptation to macroeconomic cycles and response to policy interventions. Based on Indonesia's GDP data, the growth trajectory of the construction and real estate sectors follows broader economic trends, particularly in terms of resilience and speed of recovery after the severe shock of the COVID-19 pandemic.



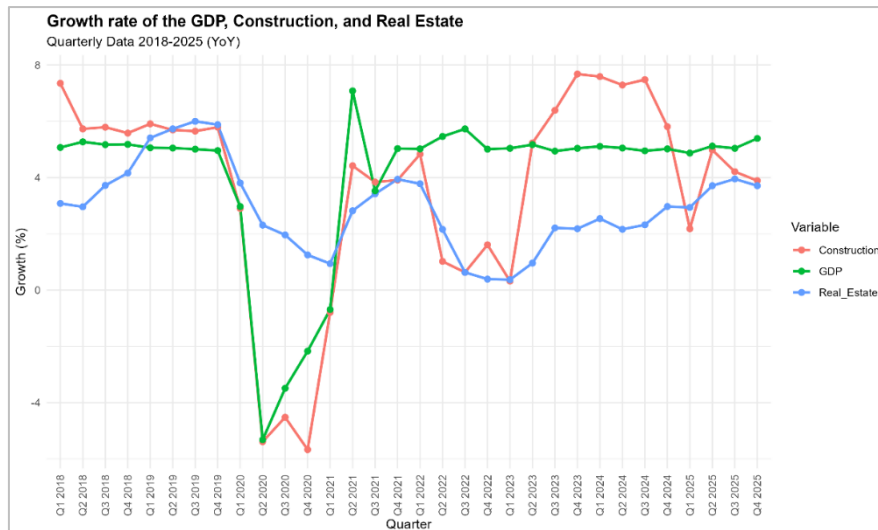


Figure 1. Growth Rate of the GDP, Construction, and Real Estate
Source: Processed data, 2026

The growth rate graph shows that the construction and real estate sectors experienced significant contraction during the COVID-19 pandemic in 2020, with the contraction in the construction sector even deeper than the national Gross Domestic Product (GDP) (BPS, 2025b). This indicates that the property sector is sensitive to economic shocks. Entering the recovery period, particularly since 2021, the construction sector has shown quite sharp growth, followed by gradual improvements in the real estate sector.

In 2021 also coincided with the enactment of a government policy to accelerate economic recovery and boost public purchasing power, namely the Government-Borne Value Added Tax (VAT DTP) policy in the housing industry sector. The Regulation of the Minister of Finance (PMK) of the Republic of Indonesia, specifically Number 21/PMK.010/2021, initially outlined this incentive. It pertains to the Value Added Tax on the transfer of landed houses and apartment units, which is covered by the government for the 2021 fiscal year. The incentive was then implemented in 2021, parts of 2022 and 2023, and was extended until 2025 with other PMK.

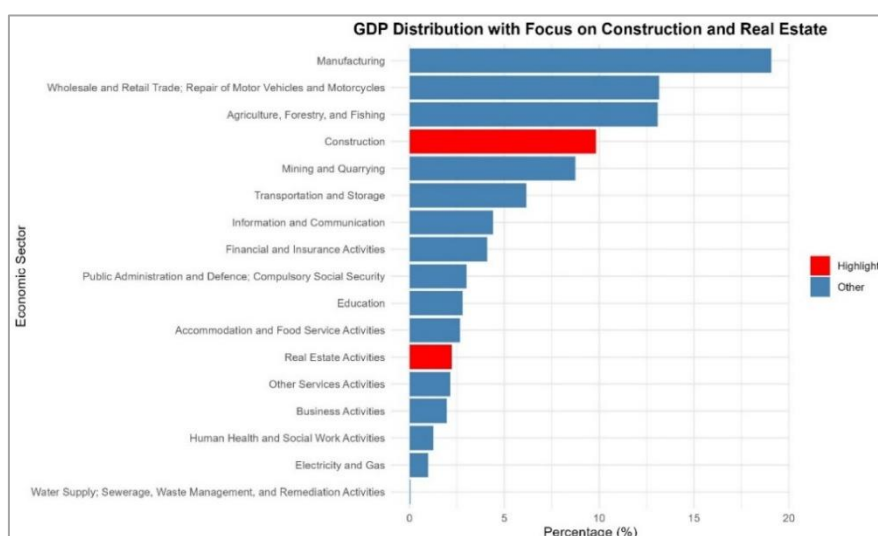


Figure 2. GDP Distribution by Economic Sector (Construction and Real Estate)
Sources: Processed data, 2026

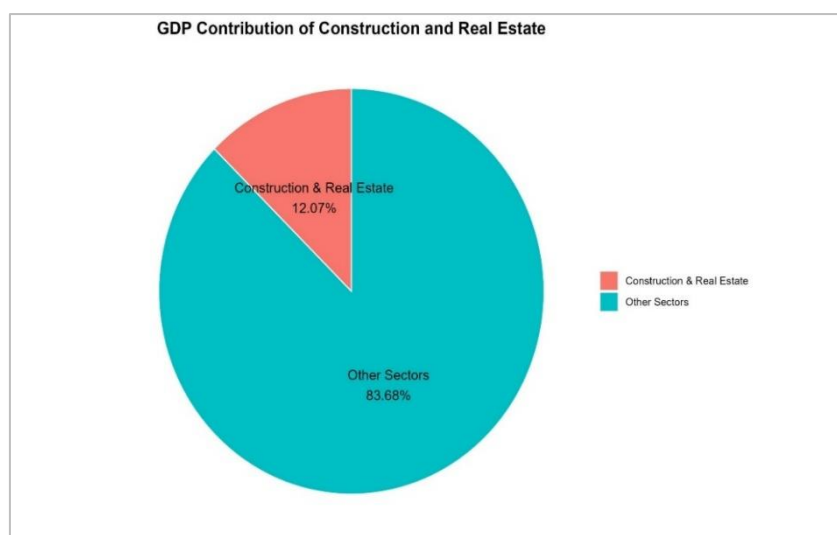


Figure 3. GDP Contribution of Construction and Real Estate
Sources: Processed data, 2026

Based on Figure 2, the distribution of GDP by economic sector based on current prices in 2025, it can be seen that the contribution of the construction and real estate sectors is relatively smaller compared to other main sectors such as manufacturing and trade (BPS, 2025a). Nevertheless, both industries maintain a crucial influence on the national economy, especially due to their links with other sectors and the consequent multiplier effect. In aggregate (Figure 3), the construction and real estate sectors contribute approximately 12.07 percent to GDP, indicating that the property sector has a relatively large distribution proportion, approaching that of the agriculture and trade sectors (BPS, 2025a). Therefore, the dynamics of this sector are relevant for further study, particularly in the context of the influence of government policies and macroeconomic conditions on residential property sales growth.

The growth of the property sector not only influences property development but also drives demand and activity in other sectors. The case of China shows that the property sector has a strong influence on economic growth through its linkages with other sectors and the expansion of domestic demand. However, this sector is also highly dependent on its own final demand, so a decline in property demand can slow overall economic development (Huang et al., 2021).

Macroeconomic factors such as inflation and policy interest rates play a significant role in shaping housing market dynamics and real estate investment returns. Rising inflation will impact purchasing power and expectations about the profitability of property investments. Similarly, rising interest rates affect borrowing costs, particularly mortgage financing, which will reduce households' ability to access housing credit.

Evidence from REIT markets supports these relationships. Previous study examined markets in Japan, Singapore, and China, showing that inflation contributes significantly to variations in real estate investment performance, while interest rates have a stronger long-term impact through their influence on financing conditions and housing affordability (Fang et al., 2016).

The importance of interest rates in determining housing demand is not limited to Asian markets but also applies to Saudi Arabia. Previous research shows that fluctuations in policy interest rates can indirectly affect housing demand through changes in credit availability and broader pricing conditions. In addition to affecting housing demand, interest rates also alter

the present value of expected cash flows from properties (Al Obaid, 2020). As another studies, this influences asset valuation, transaction activity, market risk, and ultimately investor decision-making in the real estate sector (Brooks & Tsolacos, 1999).

Furthermore, nominal property prices are a fundamental determinant of demand in the housing market. As prices fluctuate, affordability and access to external financing also change, which in turn influences potential buyers' willingness to transact (Astawa & Suaryana, 2024). A study in the Hong Kong real estate market demonstrated a positive relationship between property price levels and transaction volume, particularly in conditions where land values exhibit greater volatility relative to building replacement costs (Wong et al., 2012).

The property sector, while playing a vital part in the economy, is also significantly susceptible to external disruptions like the COVID-19 pandemic. During the pandemic, public consumption and income declined, leading to weaker house prices and property transaction volumes in various regions (Del Giudice et al., 2020). Under such circumstances, the government needs to support the recovery of the property sector through fiscal incentives. In Indonesia, the Government-borne VAT (PPN DTP) policy was implemented to provide economic stimulus, particularly for the residential property sector.

Given the importance of fiscal intervention in supporting the residential property sector, several studies have attempted to evaluate the effectiveness of the Government-Borne Value Added Tax (VAT DTP) policy in Indonesia. Existing evidence suggests that the policy has contributed to increasing residential property demand, improving the performance of the real estate sector, and creating additional employment opportunities. However, these findings are primarily based on qualitative analyses and policy evaluations, leaving limited empirical evidence on how VAT incentives influence residential property sales from a quantitative perspective (Aizar & Wijaya, 2022). Other studies have focused on the implementation of the VAT DTP policy by identifying administrative constraints, regulatory challenges, and implementation issues. Although these studies provide valuable recommendations for improving policy implementation, they do not examine whether the incentive significantly affects residential property sales or how macroeconomic conditions may strengthen or weaken its effectiveness (Puspitasari, 2022).

More recently, the economic impacts of VAT DTP have been assessed using an Input-Output approach, showing that the policy generated positive effects on economic output, employment, and the real estate sector. Nevertheless, the analysis emphasizes economy-wide multiplier effects rather than residential property sales, does not explicitly incorporate key macroeconomic variables such as residential property prices, inflation, and the BI policy rate, and is limited to the early implementation period of the incentive (Silaban & Irawan, 2024). As a result, existing studies provide only a partial understanding of how fiscal incentives influence the residential property market in Indonesia.

At the same time, the broader international literature has consistently shown that residential property sales are influenced by changes in property prices, inflation, and interest rates. However, these studies generally examine macroeconomic determinants without considering temporary fiscal interventions such as Government-Borne VAT incentives. Consequently, there remains limited empirical evidence explaining how fiscal policy and macroeconomic conditions jointly shape residential property sales in Indonesia, particularly in the context of the post-pandemic recovery.

This study seeks to address these limitations in several ways. Rather than focusing solely on the effectiveness of VAT incentives or individual macroeconomic variables, it examines the interaction between residential property price growth, inflation, the BI policy rate, Government-Borne VAT incentives, and the COVID-19 pandemic in explaining residential

property sales growth. In addition, this study employs residential property price growth (IHPR Growth), which is more conceptually consistent with the dependent variable than the Residential Property Price Index (IHPR) level. Furthermore, unlike earlier studies that rely primarily on qualitative analysis or static empirical models, this study applies the Autoregressive Distributed Lag (ARDL) approach to capture both the short-run adjustments and long-run equilibrium relationships among the variables using quarterly time-series data from 2018Q1 to 2025Q4.

Accordingly, this study aims to examine the dynamic effects of residential property price growth (IHPR Growth), inflation, the BI policy rate, Government-Borne VAT incentives, and the COVID-19 pandemic on residential property sales growth in Indonesia. By estimating both the short-run dynamics and long-run equilibrium relationships, this study is expected to provide a more comprehensive understanding of the factors influencing residential property sales and to enrich the empirical evidence on the effectiveness of fiscal incentives in Indonesia's residential property market.

2. Literature Review

2.1. Residential Property Price Growth and Housing Demand

Residential property price growth reflects the rate of change in housing prices over time and serves as an important indicator of housing market dynamics. Unlike the Residential Property Price Index (IHPR), which measures the price level at a given point in time, residential property price growth captures the direction and magnitude of market appreciation or depreciation across periods. From the perspective of the property market cycle, changes in residential property prices are closely associated with fluctuations in housing demand, investment expectations, and macroeconomic conditions (Edelstein & Tsang, 2007). Furthermore, demand theory states that the quantity demanded of a good is inversely related to its price, *ceteris paribus*. Theoretically, demand theory states that the quantity demanded of a good move inversely to its price, assuming other factors remain constant. This is known as the law of demand, whereas when prices rise, quantity demanded falls, and vice versa (Mankiw, 2021). However, the strength of this inverse relationship varies across markets or types of goods. To measure this, we use the concept of price elasticity of demand, which is the proportional change in quantity demanded in response to a proportional change in price. The market is said to be elastic if demand is highly responsive to price changes, and inelastic if it is only slightly responsive (Mankiw, 2021).

In the residential property market, home purchase decisions are heavily influenced by price dynamics due to affordability and the ability to obtain mortgage financing. However, evidence from Saudi Arabia suggests that housing demand tends to be price inelastic. This means that decreases in property prices are not necessarily accompanied by a proportional increase in demand. Income growth and population growth have a stronger impact on housing demand than price changes themselves (Al Obaid, 2020). Similar findings also emerge from Malaysia, where rising residential property prices in that country, driven by demographic growth and accommodative low interest rates, have strengthened demand and stimulated housing market activity (Trofimov et al., 2018).

2.2. Macroeconomic Determinants

Macroeconomic conditions also contribute to shaping the residential property market. High inflation will impact on the housing sector by weakening consumers' real purchasing power and influencing expectations about future investment returns. Meanwhile, policy

interest rates play a central role in determining the cost and accessibility of mortgage financing. Several real estate studies have shown that sustained low interest rates generally stimulate housing market activity and contribute to higher property prices. This is because cheaper credit reduces financing constraints and encourages home purchases and property investment (Hromada, 2024; Hubbard & Mayer, 2009).

Similar evidence has also been reported in Central and Eastern Europe. Research covering Poland, Bulgaria, the Czech Republic, Hungary, Romania, and Slovakia found that macroeconomic variables, including GDP growth, inflation, benchmark interest rates, and unemployment, are closely associated with residential property market performance. The study shows that changes in these macroeconomic indicators influence residential property prices and housing affordability, suggesting that a stable macroeconomic environment plays an important role in supporting the residential property market across these transition economies (Neverauskienė et al., 2025).

Earlier evidence from Central and Eastern European transition economies also indicates that residential property prices are largely determined by macroeconomic fundamentals. Residential property prices tend to increase alongside improvements in per capita income, while higher real interest rates generally suppress housing demand through rising financing costs. In addition, housing credit expansion, demographic changes, and institutional development in housing and mortgage markets play important roles in supporting residential property market development. These findings suggest that macroeconomic conditions influence the housing market not only through demand-side factors but also through improvements in financial systems and market institutions during the economic transition process (Égert & Mihaljek, 2007).

More recent evidence from the Czech Republic provides further support for the relationship between financing conditions and residential property market performance. Lower mortgage interest rates improve households' access to housing finance and stimulate residential property demand, which subsequently contributes to higher residential property prices. The study also shows that regional economic conditions are closely associated with differences in residential property values, indicating that local economic performance remains an important determinant of housing market dynamics across regions (Hromada, 2024).

Evidence from research on REIT markets in Japan, Singapore, and China shows that high inflation depresses property investment returns, while prolonged interest rate fluctuations produce more lasting effects by changing financing costs and consumer purchasing power (Fang et al., 2016). Furthermore, research in Türkiye strengthens the evidence that interest rate fluctuations indirectly affect housing demand through mortgage financing mechanisms (Kader et al., 2022). By applying the Vector Error Correction Model (VECM), they show that changes in nominal and real interest rates affect residential property demand by altering mortgage credit expansion. These findings suggest a clear transmission path from monetary policy to housing market outcomes. Similar evidence also exists in Malaysia, where an environment characterized by relatively low borrowing costs and rising inflation is associated with faster residential property price growth. This reflects stronger market demand and investment activity (Trofimov et al., 2018).

Although existing research has not found a direct relationship between inflation and residential property sales volume, related research suggests that real estate assets can serve as an inflation hedge, especially when inflation is low. In such situations, property profits are relatively protected from the erosion of unexpected price increases (National & Low, 2000). Interestingly, some studies show that short-term inflationary pressures can actually boost property returns, suggesting a positive relationship under certain market conditions (Chu &

Sing, 2004). India also provides a relevant example, the research found that when the property market is doing well, typically reflected in rising prices and profitable investments, sales also increase in both the mid-range and luxury segments. Of course, demographic factors and macroeconomic conditions continue to influence these dynamics. (Udupa, 2023).

2.3. Fiscal Policy and Property Sector

Fiscal and monetary policies complement each other in regulating property market conditions. According to public finance theory, government tax incentives can reduce the effective costs of acquisition and direct ownership. This lowers the threshold for people entering the property market, allowing transactions to proceed more quickly. Previous empirical studies also show that well-designed fiscal incentive programs can effectively stimulate housing demand when targeted at an economically meaningful threshold (Huangfu et al., 2024).

Tax incentives are often used as a tool to stimulate economic activity and investment, including in the property sector. For example, tax policies that reduce the tax burden on property buyers lower transaction costs, thus providing a direct incentive to buyers. With lower effective prices resulting from tax incentives, property demand increases, driving growth in sales of homes and other property units (Daly, 2025).

In Indonesia, Government-Borne VAT (VAT DTP) represents one of the most important fiscal measures introduced following the COVID-19 pandemic. Previous Indonesian studies consistently report positive economic impacts of the policy. Qualitative evidence suggests that VAT DTP increased residential property demand, strengthened real estate activity, and supported employment creation (Aizar & Wijaya, 2022). Policy evaluations further highlight the importance of improving implementation mechanisms to maximize policy effectiveness (Puspitasari, 2022). Meanwhile, Input-Output analysis indicates that VAT DTP generated multiplier effects on national output and employment although its influence on residential property sales has not yet been examined empirically (Silaban & Irawan, 2024).

2.4. COVID-19 and Property Market

The Covid-19 pandemic is an exogenous factor that significantly altered the behavior of the residential property market through increased uncertainty and shifts in consumer preferences. A dedicated study on the impact of the pandemic has identified changes in transaction patterns, a digital approach to property sales, and a shift in demand from short-term to long-term rentals. Consumer behavior and economic crisis theories can be used to understand the market response to the pandemic and its impact on property sales growth (Marona & Tomal, 2020).

Research in Wuhan, China, the initial epicenter of the pandemic, shows that the pandemic led to a decline in the volume and size of home transactions, primarily due to the suspension of sales activities by property companies and the home quarantine policies imposed by the local government. However, this negative effect was temporary, with consumer confidence and homebuying demand remaining relatively stable, leaving home prices largely unaffected in the short term (Zeng & Yi, 2022). Similarly, in Chicago (USA), house price changes during the pandemic varied widely spatially, closely related to the rate of spread of Covid-19 cases and local socioeconomic factors, causing property market volatility to be uneven (Li & Kao, 2022).

3. Methods

This study employs a quantitative approach using quarterly time-series data covering the period from the first quarter of 2018 to the fourth quarter of 2025, resulting in 32 observations. Residential property sales growth is used as the dependent variable, while residential property price growth (IHPR Growth), inflation, the BI policy rate (BI Rate), the Government-Borne Value Added Tax incentive (VAT DTP), and the COVID-19 pandemic are included as explanatory variables. Data on residential property sales growth, residential property price growth, inflation, and the BI policy rate were obtained from official publications of Bank Indonesia. Meanwhile, the Government-Borne VAT incentive and the COVID-19 pandemic were represented using dummy variables based on the implementation period of the policy and the occurrence of the pandemic.

Since this study employs quarterly time-series data, the statistical properties of each variable were examined before estimating the empirical model. The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were used to identify the order of integration of each variable. These tests are vital as the Autoregressive Distributed Lag (ARDL) approach requires that the variables be integrated at either level, $I(0)$, or first difference, $I(1)$, while variables integrated of order two, $I(2)$, are not permitted in the ARDL framework (Pesaran et al., 2001).

The VAT DTP dummy variable is compiled based on the policy implementation period stipulated in the Regulation of the Minister of Finance of the Republic of Indonesia concerning the Government-Borne VAT incentive for residential property purchases. The dummy variable is assigned a value of 1 (one) during the policy implementation period from Q1-2021 to Q4-2025, with the exception of Q4-2022 and Q1 to Q2-2023. The COVID-19 dummy variable is assigned a value of 1 (one) during the period from Q2-2020 to Q2-2023, in accordance with the period stipulated by Presidential Decree Number 11 of 2020 concerning the Determination of the Public Health Emergency of Corona Virus Disease 2020 (COVID-19), Presidential Decree Number 12 of 2020 concerning the Determination of the Non-Natural Disaster of the Spread of Corona Virus Disease 2019 (COVID-19) as a National Disaster, Presidential Decree Number 24 of 2021 concerning the Determination of the Factual Status of the Corona Virus Disease 2019 (COVID-19) Pandemic in Indonesia, and Presidential Decree Number 17 of 2023 concerning the Determination of the End of the Corona Virus Disease 2019 (COVID-19) Pandemic Status in Indonesia, and is assigned a value of 0 (zero) outside of that period.

Data on residential property sales growth, IHPR growth, average inflation, and average quarterly interest rates were obtained from Bank Indonesia publications. All data used is secondary data sourced from official state institutions to ensure consistency, reliability, and comparability of data between research periods.

3.1. Model Specification

The relationship between residential property sales growth and its determinants is specified as follows:

$$\begin{aligned} Sales\ Growth_t = & \beta_0 + \beta_1 IHPR_Growth_t + \beta_2 Inflation_t + \beta_3 BI_Rate_t + \beta_4 VAT_DTP_t \\ & + \beta_5 COVID19_t + \varepsilon_t \end{aligned}$$

This study employs the Autoregressive Distributed Lag (ARDL) model (Pesaran et al., 2001). The model was selected because the variables exhibit different orders of integration based on the unit root tests, making conventional regression approaches less appropriate. In addition, ARDL allows the short-run adjustment process and the long-run equilibrium relationship to be estimated simultaneously within a single model. Another practical advantage of this approach is its ability to produce reliable estimates when the number of

observations is relatively limited, which is consistent with the quarterly dataset used in this study. The general form of the ARDL model is expressed as follows:

$$Y_t = \alpha + \sum_{i=1}^p \phi_i Y_{t-i} + \sum_{j=0}^q \beta_j X_{t-j} + \varepsilon_t$$

where Y_t denotes residential property sales growth, X_t represents the explanatory variables, α is the intercept, ϕ and β are the estimated parameters, and ε_t is the disturbance term.

3.2. Estimation Procedure

The estimation was conducted through several stages. After confirming the stationarity properties of the variables, the optimal lag structure was determined using the Bayesian Information Criterion (BIC). This criterion was selected because it generally provides a more parsimonious model specification than the Akaike Information Criterion (AIC), particularly when the sample size is relatively small. The selected lag specification was subsequently used in the ARDL estimation and cointegration analysis.

The existence of a long-run relationship among the variables was then examined using the Bounds Testing procedure (Pesaran et al., 2001). Evidence of cointegration indicates that residential property sales growth and its determinants move together in the long run despite possible short-run fluctuations. Once the long-run relationship had been confirmed, the long-run coefficients and the unrestricted error correction model (UECM) were estimated to evaluate both the equilibrium relationship and the short-run adjustment process.

To assess the reliability of the estimated model, several diagnostic tests were subsequently performed. Serial correlation was examined using the Breusch-Godfrey test, heteroskedasticity using the Breusch-Pagan test, residual normality using the Jarque-Bera test, functional specification using the Ramsey RESET test, and multicollinearity using the Variance Inflation Factor (VIF). The diagnostic tests were used to verify that the estimated model did not suffer from serial correlation, heteroskedasticity, non-normal residuals, model misspecification, or serious multicollinearity, thereby supporting the reliability of the estimated coefficients. All statistical analyses were performed using R statistical software version 4.6.0 (R Core Team, 2026).

4. Results and Discussion

4.1. Research Results

4.1.1. Descriptive Statistics

This section presents an overview of the characteristics of the variables employed in the analysis before proceeding to the time-series estimation. Descriptive statistics provide initial information regarding the central tendency and dispersion of each variable, while the graphical presentation illustrates how these variables evolved throughout the observation period. As the study spans the period before, during, and after the COVID-19 pandemic, the descriptive analysis also provides an initial indication of how major economic shocks and policy interventions correspond with movements in the Indonesian residential property market. Table 1 reports the descriptive statistics for the variables used in this study, whereas Figure 4 depicts their quarterly trends from 2018Q1 to 2025Q4, together with the implementation periods of the COVID-19 pandemic and the Government-Borne Value Added Tax (VAT DTP) incentive.

Table 1. Descriptive Statistics of the Variables Used in the ARDL Model

Variable	Obs	Mean	Median	SD	Min	Max
Residential Property Sales Growth	32	-0.041678	0.051950	0.1581118	-0.4319000	0.311600
IHPR Growth	32	0.017895	0.017252	0.0065915	0.0083181	0.036900
Inflation	32	0.027413	0.027867	0.0114848	0.0056667	0.055467
BI Policy Rate	32	0.049590	0.050833	0.0098264	0.0350000	0.062500

Source: Processed data, 2026

As presented in Table 1, residential property sales growth exhibits the highest degree of variation among the observed variables. Based on 32 quarterly observations, the variable records an average growth rate of -0.0417 , with a standard deviation of 0.1581 . The minimum value reaches -0.4319 , while the maximum reaches 0.3116 , indicating considerable fluctuations in residential property transactions throughout the study period. This wide dispersion suggests that housing sales were highly responsive to changes in economic conditions, particularly during periods of uncertainty.

In contrast, residential property price growth (IHPR Growth) displays a relatively stable pattern. The average quarterly growth is 1.79 percent, accompanied by a standard deviation of only 0.66 percentage points. The relatively narrow range between the minimum (0.83 percent) and maximum (3.69 percent) values indicates that residential property prices adjusted more gradually than transaction volumes. This pattern implies that property prices tended to remain relatively resilient despite substantial changes in market activity.

The macroeconomic indicators also show moderate variation during the observation period. Inflation averages 2.74 percent per quarter, with values ranging from 0.57 percent to 5.55 percent, reflecting changing inflationary pressures during the pandemic and the subsequent economic recovery. Meanwhile, the BI policy rate averages 4.96 percent, varying between 3.50 percent and 6.25 percent. These movements capture Bank Indonesia's transition from an accommodative monetary policy during the pandemic to a tighter monetary stance aimed at maintaining price stability following the recovery.

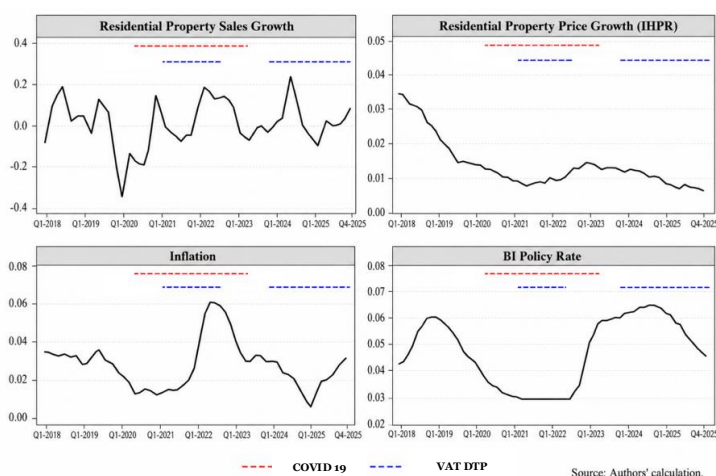


Figure 3. Quarterly Trends in Residential Property Sales Growth, Residential Property Price Growth, Inflation, and the BI Policy Rate in Indonesia (2018Q1-2025Q4)

Source: Author's calculation, 2026

The quarterly trends illustrated in Figure 4 complement the descriptive statistics. Residential property sales growth experienced a pronounced contraction during the COVID-19 period before gradually recovering after economic activity resumed. By comparison, IHPR

Growth followed a smoother trajectory, suggesting that residential property prices responded more slowly to economic shocks than housing transactions. Inflation remained relatively subdued during the early stages of the pandemic, increased markedly during the post-pandemic recovery, and moderated again toward the end of the sample period. A similar adjustment is observed for the BI policy rate, which declined to support economic recovery before increasing as inflationary pressures intensified. The figure also demonstrates that Government-Borne VAT incentive aligned with recovery in residential property market though sales gains varied quarterly.

Overall, the descriptive analysis indicates that the variables exhibit sufficient time variation while remaining consistent with major macroeconomic events affecting the Indonesian housing market. These preliminary findings support the use of a dynamic time-series framework to examine both short-run adjustments and long-run relationships. Before estimating the ARDL model, however, it is necessary to verify the stationarity properties of each variable through unit root testing, which is discussed in the following subsection.

4.1.2. Stationary Test

After examining the descriptive characteristics of the data, the next step is to evaluate the stationarity properties of the variables. This procedure is necessary because the ARDL approach can only be applied when the variables are integrated at level, $I(0)$, at first difference, $I(1)$, or a combination of both. Variables integrated at second difference, $I(2)$, would make the ARDL bounds testing procedure inappropriate. For this reason, the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were conducted before estimating the ARDL model.

Table 2 presents the results of the ADF and PP unit root tests. The ADF test was estimated using one lag and a drift specification, while the PP test was estimated using the Z-tau statistic with a constant specification. The ADF results show that residential property sales growth is stationary at level, as its test statistic is lower than the 5% critical value. In contrast, IHPR Growth, Inflation, and the BI Policy Rate are not stationary at level but become stationary after first differencing. According to ADF results, Sales Growth is stationary $I(0)$, while IHPR Growth, Inflation, and BI Policy Rate are non-stationary $I(1)$.

Table 2. Results of ADF and Phillips-Perron Unit Root Tests

Variable	ADF Level	ADF First Difference	PP Level	PP First Difference	Order of Integration
Residential Property Sales Growth	-3.7357**	-	-4.1286**	-	$I(0)$
IHPR Growth	-2.3017	-3.2298**	-2.9665**	-4.3803**	$I(1)$
Inflation	-2.9164	-2.9771**	-2.1080	-3.3179**	$I(1)$
BI Policy Rate	-2.3637	-3.0060**	-1.6557	-2.5361	$I(1)$

Notes: The ADF test is based on the drift specification with one lag. The PP test is based on the Z-tau statistic with a constant specification. ** indicates stationarity at the 5 percent significance level. The order of integration is determined primarily from the ADF test, while the PP test is used as a robustness check.

Source: Processed data, 2026

The PP test gives broadly similar evidence for most variables. Residential property sales growth is stationary at level, while Inflation becomes stationary after first differencing. IHPR Growth appears stationary at level under the PP test, although the ADF test classifies it as $I(1)$. This difference is relatively minor because the PP statistic for IHPR Growth at level is only slightly below the 5 percent critical value. In such cases, using the ADF result as the primary basis is a more conservative choice, particularly for a small quarterly sample.

A more noticeable difference appears in the BI Policy Rate. The ADF test indicates that the BI Policy Rate becomes stationary after first differencing, whereas the PP test does not reject the unit root at first difference. This result does not automatically imply that the BI Policy Rate is integrated of order two. The ADF and PP tests correct serial correlation in different ways: the ADF test includes lagged differences in the test equation, while the PP test applies a non-parametric correction to the test statistic. With a limited sample of 32 quarterly observations and a policy rate series that changes gradually over time, it is not unusual for the two tests to produce slightly different conclusions.

For the purpose of model selection, the ADF test is used as the main reference because it provides a clearer integration pattern across the variables. The PP test is retained as a robustness check to assess whether the general conclusion is sensitive to an alternative unit root testing procedure. Most importantly, the combined evidence does not provide a strong basis to classify any variable as $I(2)$. The variables are therefore treated as a mixture of $I(0)$ and $I(1)$, which satisfies the requirement for applying the ARDL framework. This result supports the subsequent use of the ARDL bounds testing approach to examine the long-run relationship among residential property sales growth, IHPR Growth, Inflation, the BI-Rate, VAT DTP incentives, and the COVID-19 dummy.

4.1.3. ARDL Estimation

After confirming that the variables are integrated at either $I(0)$ or $I(1)$, the next step is to estimate the ARDL model. The lag structure was selected using the Bayesian Information Criterion (BIC), which is suitable for a relatively small sample because it tends to produce a more parsimonious specification. Based on this criterion, the optimal model selected in this study is $ARDL(1,0,2,0,1,1)$. This specification includes one lag of residential property sales growth, no lag for IHPR Growth, two lags for inflation, no lag for the BI policy rate, one lag for the VAT DTP incentive, and one lag for the COVID-19 dummy.

The selected ARDL model is statistically significant at the 5 percent level, as indicated by the F-statistic probability of 0.0259. This suggests that the explanatory variables jointly contribute to explaining variations in residential property sales growth. The model has an R-squared value of 0.5953, implying that approximately 59.53 percent of the variation in residential property sales growth is explained by the variables included in the model. Although the adjusted R-squared is lower at 0.3823, this remains reasonable given the relatively small number of observations and the inclusion of lagged variables.

Table 3. Selected ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	p-value
Intercept	-0.8289	0.3045	-2.722	0.0135
Sales Growth(-1)	-0.2578	0.2252	-1.145	0.2664
IHPR Growth	14.4922	6.3505	2.282	0.0342
Inflation	5.6795	4.7017	1.208	0.2419
Inflation(-1)	7.0885	6.9815	1.015	0.3227
Inflation(-2)	-15.0764	5.7865	-2.605	0.0174
BI Rate	10.1171	6.2313	1.624	0.1209
VAT DTP	0.2336	0.1018	2.294	0.0334
VAT DTP(-1)	-0.0840	0.1024	-0.820	0.4222
COVID-19	-0.0268	0.1342	-0.200	0.8439
COVID-19(-1)	0.0559	0.1230	0.455	0.6546

Model diagnostics: R-squared = 0.5953; Adjusted R-squared = 0.3823; F-statistic = 2.795; Prob(F-statistic) = 0.0259.

Source: Processed data, 2026

In the selected ARDL specification, IHPR Growth has a positive and statistically significant coefficient. This suggests that residential property price growth is associated with higher residential property sales growth within the estimated dynamic structure. The VAT DTP incentive also shows a positive and statistically significant coefficient, indicating that the fiscal incentive contributed to improving residential property sales during the observation period. Inflation shows a mixed pattern across lags, with the second lag carrying a negative and significant coefficient. This result suggests that inflationary pressures may affect residential property sales with some delay rather than immediately.

The BI policy rate has a positive but statistically insignificant coefficient. This result should not be interpreted as evidence that higher policy rates increase residential property sales. Rather, it indicates that changes in the policy rate did not produce a statistically clear effect on residential property sales during the study period. The COVID-19 dummy is also statistically insignificant in the selected model, suggesting that after controlling for macroeconomic variables and fiscal incentives, the direct pandemic dummy does not independently explain residential property sales growth.

A. Bounds Test for Cointegration

The ARDL Bounds Test was conducted to examine whether a long-run relationship exists among the variables. The result is reported in Table 4. The F-statistic is 5.5217, with a p-value of 0.0020, indicating rejection of the null hypothesis of no cointegration. This confirms the presence of a long-run equilibrium relationship among residential property sales growth, IHPR Growth, inflation, the BI rate, VAT DTP incentives, and the COVID-19 dummy.

Table 4. ARDL Bounds Test for Cointegration

Test	Statistic	p-value
Bounds F-test	5.5217	0.0020

Null hypothesis: No cointegration

Source: Processed data, 2026

The existence of cointegration provides empirical support for estimating both the long-run coefficients and the short-run adjustment model. This is important because the residential property market is likely to respond differently to changes in macroeconomic conditions and policy incentives over time. Some variables may affect sales immediately, while others may require several quarters before their impact becomes visible.

B. Long Run Estimation

The long-run coefficients are presented in Table 5. The results show that IHPR Growth has a positive and statistically significant effect on residential property sales growth. The coefficient of 11.5215 is significant at the 5 percent level, suggesting that residential property price growth is positively associated with residential property sales growth in the long run. This result indicates that rising property prices may reflect stronger market expectations, improved buyer confidence, or increased investment motivation rather than simply reducing affordability.

VAT DTP also has a positive and statistically significant long-run coefficient. The coefficient of 0.1189 is significant at the 5 percent level, indicating that the Government-Borne VAT incentive is associated with higher residential property sales growth. This result supports the view that fiscal incentives can stimulate residential property transactions by reducing the effective acquisition cost faced by buyers.

Inflation has a negative but statistically insignificant coefficient. This suggests that although inflation may weaken purchasing power, its long-run effect on residential property sales is not statistically clear in this model. The BI policy rate shows a positive but insignificant coefficient, while the COVID-19 dummy is also insignificant. These findings suggest that after accounting for residential property price growth and VAT DTP incentives, monetary policy and pandemic-period effects do not independently explain long-run sales growth in a statistically significant manner.

Table 5. Long-Run ARDL Coefficients

Variable	Coefficient	Std. Error	t-Statistic	p-value
Intercept	-0.6590	0.2326	-2.8325	0.0106
IHPR Growth	11.5215	4.6851	2.4592	0.0237
Inflation	-1.8352	3.6402	-0.5042	0.6200
BI Policy Rate	8.0432	5.0054	1.6069	0.1246
VAT DTP	0.1189	0.0553	2.1504	0.0446
COVID-19	0.0231	0.0846	0.2736	0.7874

Source: Processed data, 2026

C. Short Run Dynamics

Following the evidence of cointegration, the short-run adjustment process was estimated using the Restricted Error Correction Model (RECM). The results are reported in Table 6.

Table 6. Error Correction Model (Short-run Dynamics)

Variable	Coefficient	Std. Error	t-statistic	p-value
Δ Inflation	5.6795	3.3547	1.693	0.1029
Δ Inflation(-1)	15.0764	3.8435	3.923	0.0006***
Δ VAT DTP	0.2336	0.0737	3.170	0.0040***
Δ COVID-19	-0.0268	0.0890	-0.301	0.7659
ECT(-1)	-1.2578	0.1903	-6.611	<0.001*

Model statistics: $R^2 = 0.6999$, Adjusted $R^2 = 0.6399$, F-statistic = 11.66, Prob(F) < 0.001

Source: processed data, 2026

The estimated error correction term (ECT) is negative and statistically significant at the one percent level, confirming that residential property sales growth converges toward its long-run equilibrium after short-run disturbances. The coefficient of -1.2578 indicates a relatively rapid adjustment process. Because the coefficient is slightly smaller than -1 , the adjustment is likely to occur through a short-run overshooting mechanism before the system returns to its long-run equilibrium. In other words, temporary deviations from equilibrium are corrected within a relatively short period, although the adjustment is not strictly monotonic.

The short-run coefficients also reveal that the Government-Borne VAT (VAT DTP) incentive has an immediate positive effect on residential property sales growth. The coefficient of the first-differenced VAT DTP variable is positive and statistically significant, indicating that the policy stimulated housing transactions during the quarter in which the incentive was implemented. This finding suggests that reducing transaction costs through tax incentives encouraged buyers to accelerate residential property purchases.

Inflation displays a different pattern. While the contemporaneous change in inflation is not statistically significant, the first lag of the differenced inflation variable is positive and significant at the five percent level. This result implies that changes in inflation require time to influence residential property transactions, possibly because households and developers

adjust their expectations gradually rather than immediately following changes in the general price level.

The change in the COVID-19 dummy is not statistically significant in the short run. This suggests that, once residential property prices, macroeconomic conditions, and the VAT DTP incentive are taken into account, the pandemic period itself no longer exerts an independent effect on residential property sales growth. Instead, its influence appears to be transmitted indirectly through broader economic conditions and policy responses captured by the other variables included in the model.

Overall, the RECM results indicate that short-run movements in residential property sales are primarily associated with fiscal policy interventions and lagged inflation dynamics, while deviations from the long-run equilibrium are corrected rapidly through a stable adjustment mechanism.

D. Diagnostic Tests

To ensure that the estimated ARDL model is statistically reliable, several diagnostic tests were conducted. The results are presented in Table 7. The Breusch-Godfrey test produces a p-value of 0.3630, indicating no evidence of serial correlation. The Breusch-Pagan test yields a p-value of 0.2960, suggesting that the residuals are homoscedastic. The Jarque-Bera test also fails to reject the null hypothesis of normally distributed residuals, with a p-value of 0.6572.

The Ramsey RESET test produces a p-value of 0.8883, indicating no evidence of model misspecification. In addition, all VIF values are well below the conventional threshold of 10, with the highest value recorded for the COVID-19 dummy at 2.6026. These results suggest that the model does not suffer from serious multicollinearity.

Table 7. Diagnostic Test Results

Diagnostic Test	Statistic	p-value / Value	Conclusion
Breusch-Godfrey Serial Correlation Test	0.8274	0.3630	No serial correlation
Breusch-Pagan Heteroskedasticity Test	11.8390	0.2960	Homoscedastic residuals
Jarque-Bera Normality Test	0.8396	0.6572	Residuals are normally distributed
Ramsey RESET Test	0.1193	0.8883	No functional form misspecification
VIF: IHPR Growth	-	1.7918	No multicollinearity
VIF: Inflation	-	1.5258	No multicollinearity
VIF: BI Policy Rate	-	2.4825	No multicollinearity
VIF: VAT DTP	-	1.5202	No multicollinearity
VIF: COVID-19	-	2.6026	No multicollinearity

Source: Processed data, 2026

Overall, the diagnostic results confirm that the estimated ARDL model satisfies the main econometric assumptions. The absence of serial correlation, heteroskedasticity, non-normal residuals, functional form problems, and severe multicollinearity supports the reliability of the estimated short-run and long-run coefficients. These results provide a sound basis for discussing the economic implications of residential property price growth, macroeconomic conditions, VAT DTP incentives, and the COVID-19 pandemic for residential property sales growth in Indonesia.

4.2. Discussion

The empirical findings indicate that residential property price growth and the Government-Borne Value Added Tax (VAT DTP) incentive are the main factors associated with residential property sales growth in Indonesia, whereas inflation, the BI policy rate, and the COVID-19 dummy do not exhibit statistically significant long-run effects. These findings suggest that the Indonesian residential property market responds more strongly to changes in market confidence and fiscal support than to broad macroeconomic conditions alone.

The positive relationship between residential property price growth and residential property sales appears to reflect favorable market expectations rather than a deterioration in housing affordability. Under normal demand theory, higher prices are expected to reduce demand. However, the housing market differs from ordinary consumer goods because residential property also serves as a long-term investment asset. Rising property prices may therefore be interpreted as a signal of future capital gains, encouraging households and investors to enter the market before prices increase further. Similar evidence has been reported in Malaysia, where rising residential property prices accompanied stronger market activity during periods of favorable macroeconomic conditions (Trofimov et al., 2018). Likewise, evidence from India indicates that periods of appreciating property values are generally followed by higher residential transactions, particularly when supported by positive economic expectations (Udupa, 2023).

The significant effect of the VAT DTP incentive reinforces the importance of fiscal policy in stimulating the residential property sector. By lowering the effective transaction cost faced by homebuyers, the policy appears to have encouraged households to accelerate purchasing decisions. The positive effect observed in both the long run and the short run suggests that the incentive not only generated an immediate response but also contributed to sustaining market activity beyond the implementation period. This finding is consistent with the objective of Indonesia's post-pandemic fiscal stimulus, which sought to restore household purchasing power while supporting sectors with strong multiplier effects, including residential property. Previous studies conducted in Indonesia similarly conclude that the VAT DTP program contributed to higher residential property demand and employment during the economic recovery period (Aizar & Wijaya, 2022; Silaban & Irawan, 2024).

Inflation, although theoretically expected to reduce purchasing power and weaken housing demand, does not exhibit a statistically significant long-run effect in this study. One possible explanation is that residential property purchases are generally planned over a relatively long horizon, making households less responsive to temporary fluctuations in consumer prices. The short-run estimation also indicates that inflation affects residential property sales with a lag rather than immediately, suggesting that buyers require time to adjust their expectations before changing investment or purchasing decisions. This delayed response is consistent with the notion that housing decisions are influenced by long-term financial planning rather than short-term price movements.

A more interesting finding concerns the BI policy rate. Although the estimated coefficient is positive, it is not statistically significant, implying that changes in the policy rate do not have a direct and measurable effect on residential property sales growth during the sample period. At first glance, this result appears to contradict conventional monetary theory, which predicts that higher interest rates should reduce mortgage affordability and suppress housing demand. However, several factors may explain why such a relationship is not observed in Indonesia.

First, the observation period covers the post-pandemic recovery, during which accommodative fiscal policies, including the VAT DTP incentive, were implemented alongside

gradual monetary policy normalization. These policy measures may have offset part of the financing burden created by higher interest rates, particularly for households purchasing newly developed residential properties. Consequently, the expansionary effect of fiscal incentives may have weakened the transmission of tighter monetary policy to the housing market.

Second, the Indonesian mortgage market is characterized by relatively stable lending practices and a gradual adjustment of mortgage interest rates. Mortgage contracts are generally dominated by fixed-rate schemes during the initial financing period, while banks often adjust lending rates more slowly than changes in the BI rate. As a result, changes in the policy rate are not immediately transmitted to effective borrowing costs faced by homebuyers. This institutional characteristic reduces the short-term sensitivity of residential property demand to monetary policy adjustments and may explain why the estimated coefficient remains statistically insignificant despite being positive.

A similar mechanism has also been documented in Central and Eastern European housing markets. Studies covering transition economies, including Poland, the Czech Republic, Hungary, Romania, Bulgaria, and Slovakia, show that monetary policy affects housing markets through mortgage financing, but the transmission is often gradual because commercial lending rates adjust with a lag relative to policy rates (Neverauskienė et al., 2025). Evidence from the Czech Republic further indicates that mortgage market conditions and regional economic performance can dominate the direct influence of policy interest rates on housing demand, particularly when strong underlying demand persists (Hromada, 2024). Earlier work in emerging European economies, the pass-through from policy rates to housing prices is neither immediate nor complete because it depends on financial market development, mortgage market structure, and institutional characteristics (Égert & Mihaljek, 2007). Although Indonesia differs from these transition economies, the underlying transmission mechanism provides a useful explanation for why changes in the BI rate do not necessarily translate into immediate changes in residential property transactions.

Finally, the COVID-19 dummy does not exhibit an independent long-run effect once macroeconomic variables and fiscal intervention are incorporated into the model. This finding suggests that the pandemic influenced the residential property market primarily through broader economic channels rather than through the pandemic period itself. Changes in household income, financing conditions, inflation, and government support appear to explain residential property sales more effectively than a simple distinction between pandemic and non-pandemic periods.

Overall, these findings highlight that residential property market performance in Indonesia is shaped by the interaction between market expectations and government intervention. While monetary policy remains vital aspect of the macroeconomic environment, fiscal measures targeted directly at reducing transaction costs appear to generate a more immediate response in residential property sales. This evidence suggests that, during periods of economic adjustment, demand-side fiscal incentives may be more effective than conventional monetary instruments in supporting recovery in the residential property sector.

5. Conclusion

This study examines the effects of residential property price growth, inflation, the BI policy rate, the Government-Borne Value Added Tax (VAT DTP) incentive, and the COVID-19 pandemic on residential property sales growth in Indonesia using the Autoregressive Distributed Lag (ARDL) approach. The empirical results indicate the existence of a long-run

equilibrium relationship among the variables. Residential property price growth and the VAT DTP incentive are found to have a positive and statistically significant effect on residential property sales growth, whereas inflation, the BI policy rate, and the COVID-19 dummy do not exhibit statistically significant long-run effects. The short-run estimation further shows that the VAT DTP incentive stimulates residential property sales immediately, while inflation influences the market with a lagged adjustment process. These findings suggest that fiscal intervention targeted directly at reducing transaction costs plays a more prominent role in supporting residential property demand than broad macroeconomic conditions alone.

From a policy perspective, the results imply that demand-side fiscal incentives can be an effective instrument for stabilizing the residential property market during periods of economic adjustment. Nevertheless, such incentives should remain temporary and conditional rather than permanent. Their continuation should consider improvements in residential property sales, inflation dynamics, and overall macroeconomic stability to avoid creating excessive market dependence on fiscal support. Experiences from several countries also suggest that housing-related stimulus is generally withdrawn gradually as market conditions normalize, allowing the private sector to resume its role without generating abrupt adjustments in housing demand. In this context, coordination between fiscal authorities and Bank Indonesia remains essential to ensure that housing market recovery is accompanied by sustainable macroeconomic stability.

Several limitations should be acknowledged when interpreting these findings. First, the analysis focuses on a limited set of macroeconomic and policy variables and therefore does not explicitly capture other important determinants of housing demand, such as household income, demographic change, mortgage lending conditions, housing supply, or consumer confidence. Second, the analysis is conducted using national-level quarterly data, which may conceal substantial differences across regional housing markets in Indonesia. Third, although the ARDL approach is appropriate for mixed I(0)-I(1) variables and relatively small samples, the limited number of observations, differences between the ADF and Phillips-Perron unit root tests, and the overlap between the COVID-19 period and the implementation of the VAT DTP program should be recognized as methodological constraints. Future studies could address these limitations by incorporating regional panel data, richer measures of household and financial conditions, and longer observation periods to provide a more comprehensive understanding of residential property market dynamics in Indonesia.

6. References

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