



Determinants of Residential Property Price in Selected Asian Countries: A Sys-GMM Approach

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Abstract

This study analyzes the determinants of residential property prices in 13 selected Asian countries. Key variables include the residential property price index, GDP per capita reflecting economic conditions, real interest rates impacting borrowing costs, inflation affecting purchasing power), population growth influencing housing demand, energy consumption reflecting demand pressures, and the Gini Index measuring income inequality. The research employs the System Generalized Method of Moments (Sys-GMM) for dynamic analysis of these endogenous variables. The results indicate that property prices are significantly influenced by prior price levels. Furthermore, GDP per capita, inflation, and population growth positively affect property prices, underscoring the roles of economic growth and demographic factors in shaping the property market. Higher GDP growth enhances household purchasing power, while population growth increases housing demand. Conversely, energy consumption negatively impacts property prices, reflecting cost pressures from rising energy demand. Interestingly, the real interest rate and Gini index do not significantly influence residential property prices, suggesting these factors may not directly affect price dynamics in the studied countries. These findings emphasize the need for policies that support economic stability and sustainable growth to enhance property market competitiveness. Policymakers should prioritize energy efficiency and inclusive economic development to ensure long-term resilience in the property sector. Sustainable economic policies are essential to strengthen the region's property market and effectively manage growing energy demands.

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Introduction

Population growth tends to drive an increase in demand for houses, highlighting the crucial role of the property market in economic performance and its significant impact on individual well-being (Latif, 2015). Purchasing a house represents the largest investment for most households, with returns on property investments often exceeding those of other asset classes. Houses also constitute a major component of individual wealth, as fluctuations in property prices can greatly influence the economy and shape consumer spending patterns (Anundsen et al., 2016).

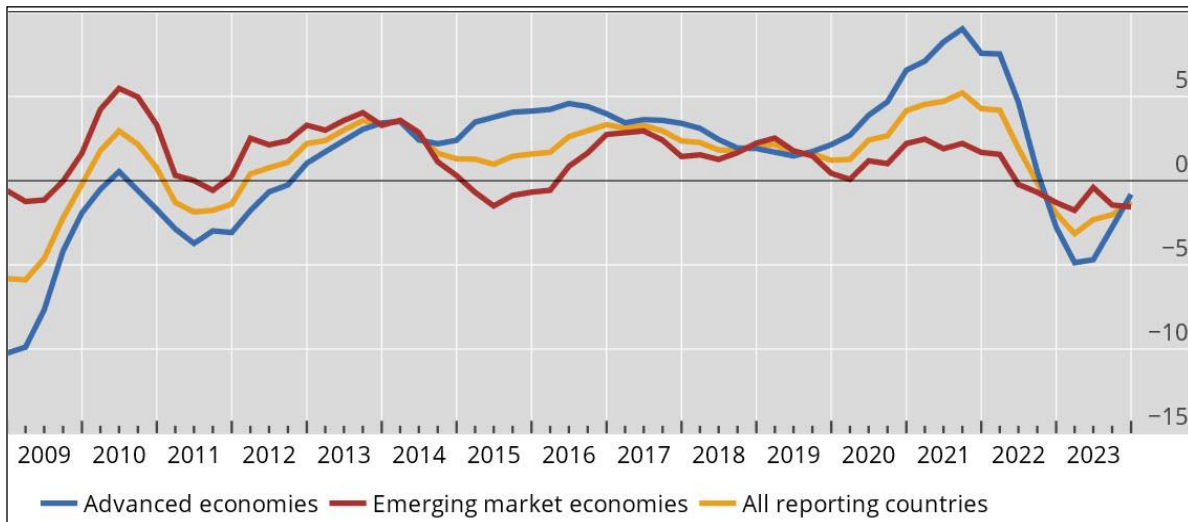
Changes in asset values are influenced by various events, one of which was the 2008 global crisis, commonly referred to as the subprime mortgage crisis. This crisis originated from an asset price bubble that affected multiple sectors, ultimately leading to a recession (Duca et al., 2011). Consequently, the housing sector and financial stability were significantly shaken, jeopardizing the domestic economy. According to McDonald & Stokes (2013), the Federal Reserve's interest rate policy between 2001 and 2004, which involved lowering the federal funds rate, contributed to the formation of the housing price bubble. Additionally, the decline in population growth significantly impacts the demand for property, creating an imbalance in property supply. During the pandemic, Australia experienced a decrease in housing demand due to a decline in population during this period (CBRE, 2020).

Property prices can be analyzed from both the supply and demand perspectives. The supply side relates to property development, where excessively high house prices can trigger a crisis in the financial sector, as buyers reliant on credit may struggle to meet their payment obligations. This situation can lead to defaults, which in turn may cause issues within the financial sector (Cohen & Karpavičiūtė, 2017). Conversely, high demand for property, combined with speculative behavior, may result in a rapid increase in the Residential Property Price Index (RPPI). If the RPP continues to rise unchecked, conditions resembling a property bubble may also emerge (Amador-Torres et al., 2018).

Figure. 1. illustrates the dynamic development of real residential property prices across different economic categories from 2009 to 2023. The price trends in developed economies (represented by the blue line) exhibit more significant fluctuations compared to those in emerging market economies (red line) and the overall aggregate of all reporting countries (yellow line).

At the beginning of the period, prices declined in 2009 due to the global financial crisis, followed by a gradual recovery phase until 2011. This pattern aligns with findings from Case et al. (2012), who noted that property markets in advanced economies typically experience delayed recoveries following significant economic downturns. However, a more pronounced development occurred in 2020, when property prices in advanced economies witnessed a sharp increase, likely in response to

the accommodative fiscal and monetary policies enacted during the COVID-19 pandemic. Research by Gyourko (20) supports this observation, indicating that such policies significantly boosted housing demand and prices during the pandemic.



Source: Bank for International Settlements (2024)
Fig. 1. Development of Real Residential Property Prices

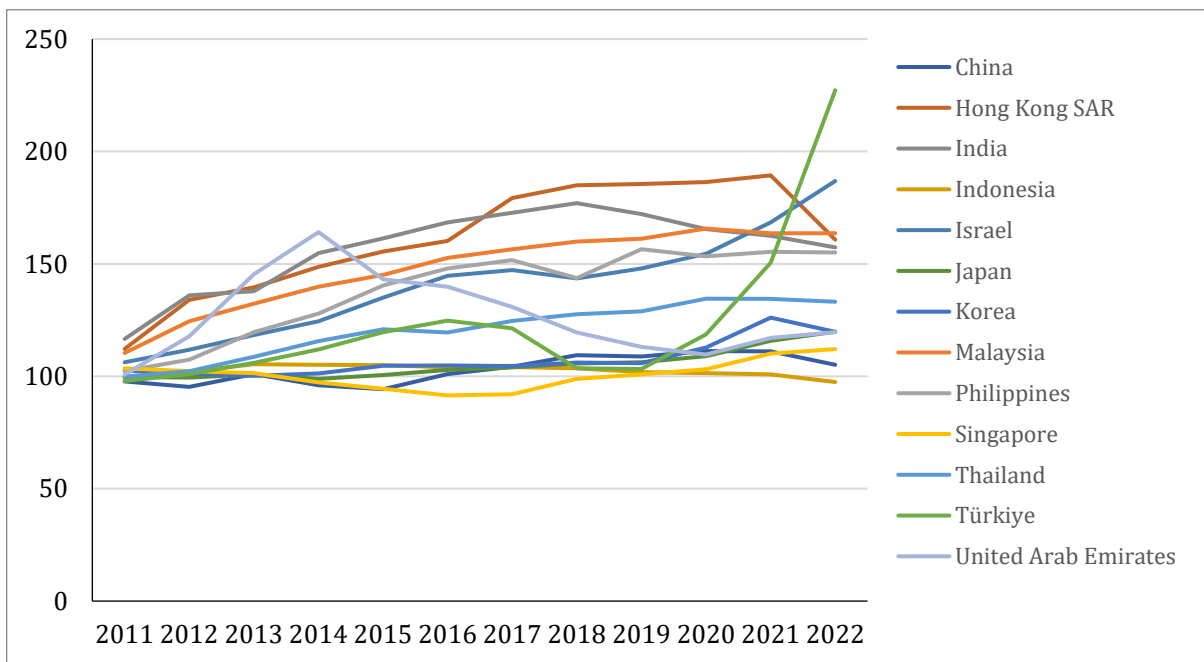
This upward trend was followed by a notable price decline after 2021, corresponding with the tightening of monetary policy in several advanced economies. This phenomenon is consistent with the work of Kholodilin (2020) who found that rising interest rates often lead to decreased affordability and subsequently lower property prices. In contrast, property prices in emerging market economies and those in the overall aggregate of reporting countries exhibited relatively lower volatility. Studies by Liu (2021) have shown that emerging markets tend to have more stable property price trends due to different economic fundamentals and less exposure to global financial shocks.

Despite minor fluctuations, price trends in these two categories tended to be more stable than those in developed economies throughout the observed period. This stability is further corroborated by research from Amador-Torres et al. (2018), which highlights that emerging markets often experience less pronounced price swings due to their unique economic structures and demographic trends.

Figure 2. presents data on the Residential Property Price Index (RPPI) across several Asian countries from 2011 to 2022, revealing considerable variations in property market dynamics. In Hong Kong, the RPPI exhibited rapid growth, increasing from 112.1547 in 2011 to a peak of 189.3652 in 2021 before declining to 160.7623 in 2022. Israel also demonstrated strong growth, with the RPPI

reaching 186.8648 in 2022. In India, the RPPI followed an upward trend, rising from 116.5977 in 2011 to 168.4199 in 2021, although it experienced a slight decrease to 157.4219 in 2022.

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Source: Bank for International Settlements (2024)
Fig. 2. Residential Property Price Index in Asian Countries

In contrast, China displayed more pronounced fluctuations, with the RPPI peaking at 111.2144 in 2020, only to drop to 105.0432 in 2022. This volatility aligns with findings from Liu (2021) which indicate that rapid urbanization and economic shifts in China significantly impact property prices. Indonesia's RPPI remained relatively stable, experiencing a decline from 99.2897 in 2011 to 97.4461 in 2022. This stability is consistent with the observations made by Kholodilin (2020), who noted that Indonesia's property market has shown resilience amid regional economic fluctuations.

Meanwhile, South Korea demonstrated steady growth, with the RPPI reaching 126.0981 in 2021 before experiencing a minor decrease to 119.7681 in 2022. This trend is supported by research from

the Emerging Trends in Real Estate report, which highlights South Korea's robust property market driven by urban demand and investment opportunities. Malaysia and the Philippines exhibited consistent growth, with Malaysia's RPPI reaching 165.7071 in 2020 and slightly stabilizing at 163.6338 in 2022. This growth trajectory is echoed in studies that emphasize the positive impact of economic reforms and foreign investment in these countries.

Conversely, Turkey experienced a notable surge in 2022, with the RPPI reaching 227.2557, reflecting rapid growth in the property market. This surge is corroborated by findings from the Global Real Estate Transparency Index, which indicates that Turkey's property market is becoming increasingly attractive to investors due to favorable economic conditions and demographic trends. Overall, this data highlights the diversity of market conditions among selected countries in the region.

Property price developments in Asia between 2011 and 2022 reveal interesting and complex trends influenced by various economic, social, and environmental factors. The Residential Property Price Index (RPPI) in Asian countries during this period has been a significant research subject, particularly due to the complexity of the factors affecting it. Growth in Gross Domestic Product (GDP) is positively associated with the RPPI, as an increase in GDP enhances purchasing power and stimulates demand for property, subsequently contributing to rising housing market prices. This finding aligns with research conducted by Wibawani et al. (2016) which indicates that every 1% increase in GDP leads to a significant rise in the RPPI. However, research by Kholodilin (2020) illustrates that the impact of GDP on property prices is not always consistent, as it can vary depending on the local economic conditions and government policies. This suggests that, in specific contexts, economic growth may not always be directly proportional to increases in property prices.

Kholodilin (2020) noted that interest rate cuts in some Asian countries could lead to a surge in property prices. In contrast, a study by Amador-Torres et al. (2018) suggests that low interest rates do not necessarily lead to increases in the Residential Property Price Index (RPPI), especially in contexts of high inflation, which can erode purchasing power and raise questions about the effectiveness of monetary policy in specific settings. This implies that fluctuations in the real interest rate (RIR) significantly impact the RPPI.

Inflation, another critical variable, has a negative impact on the RPPI. Amador-Torres et al. (2018) found that high inflation dampens property demand, while Kusumawati (2020) noted that in countries with controlled inflation, the RPPI has continued to grow due to urbanization-driven demand. This illustrates that inflation's effects vary across countries, with policies playing a critical role in influencing the RPPI. Energy consumption and the Gini index are also essential factors. Liu (2021) found that while high energy consumption is tied to economic growth, it can negatively affect

property values if not managed effectively. Additionally, Piketty (2014) argues that high-income inequality can reduce access to affordable housing, exerting downward pressure on the RPPI. This suggests that social inequality may hinder inclusive property market growth.

Although several studies have examined the relationship between various economic factors and the Residential Property Price Index (RPPI), such as Chen (2021) and Kholodilin (2020) the results still show inconsistencies. Chen (2021) highlights the importance of economic growth and inflation in influencing property prices, whereas Kholodilin (2020) emphasizes the influence of interest rates and population. However, both studies fail to fully incorporate factors such as energy consumption and social inequality, which also shape RPPI outcomes.

Therefore, this study aims to fill the gap by simultaneously analyzing the effect of GDP per capita, real interest rate, inflation, population, energy consumption, and Gini index on residential property prices in Asian countries. Unlike previous research, which often focused on a limited set of variables or specific countries, this study adopts a more comprehensive approach by integrating multiple economic and social factors.

One significant research gap is the lack of studies that simultaneously consider both macroeconomic and social variables in the context of Asian residential property markets. Most existing literature tends to isolate individual factors, such as GDP or interest rates, without examining their interactions or collective impact. This holistic view is expected to contribute significantly to the literature, particularly in clarifying the relationships between variables that have not been thoroughly examined or were only partially addressed in earlier studies.

The selection of the research period from 2011 to 2022 is strategic, as it encompasses critical phases in the dynamics of the property market, including the recovery following the global financial crisis and the significant impact of the COVID-19 pandemic. Many prior studies have concentrated on shorter time frames or specific economic events, limiting their ability to capture long-term trends and cyclical patterns. Additionally, there is a lack of research that investigates how global economic shifts and regional policies affect residential property prices over extended periods. Furthermore, the extended period also encapsulates shifts in demographic trends, technological advancements, and international trade dynamics that potentially influence the real estate market. The thorough examination of these longer temporal stretches provides a unique opportunity to observe the resilience of property markets against economic shocks and the efficacy of policy interventions.

This extended time span allows for a more in-depth analysis of residential property price fluctuations and the influence of various economic policies during these periods, addressing another gap in the literature regarding the temporal dynamics of property markets. By focusing on a diverse

set of 13 Asian countries, this study aims to provide a more comprehensive understanding of the factors affecting property prices in this dynamic region, while offering relevant policy recommendations for regional policymakers.

Furthermore, the extended period also encapsulates shifts in demographic trends, technological advancements, and international trade dynamics that potentially influence the real estate market. The thorough examination of these longer temporal stretches provides a unique opportunity to observe the resilience of property markets against economic shocks and the efficacy of policy interventions. Such insights are crucial for developing strategies that ensure sustainable growth and stability in the housing sector across Asia

Literature Review

Property is defined as all structures above and below ground that a person owns (Ling & Archer, 2024). Property can be classified into four categories based on its purpose: Residential, Commercial, Industrial, and Special-Purpose. Prices in the property sector are consistently influenced by the law of supply and demand, although other factors also affect property supply and demand. Consequently, certain sentiments will impact property prices. Due to this law, lower prices typically lead to higher market demand and reduced supply, while higher prices result in lower demand and increased supply.

There is an equilibrium point, which is the meeting point between supply and demand, so it is also called the market price. However, the law of supply and demand only applies if factors outside the price are considered unchanged (*ceteris paribus*). The increase in property prices every year is always influenced by macroeconomic factors. Macroeconomics is a factor related to broad economic phenomena that can affect households, companies, and markets simultaneously (Mankiw, 2014). Recent studies have reinforced this understanding, indicating that macroeconomic indicators such as GDP growth, inflation, and interest rates play critical roles in shaping property prices. For instance, a study by Zhang et al. (2021) highlights that GDP growth significantly correlates with rising property values across various markets, suggesting that economic expansion boosts purchasing power and, consequently, housing demand. Moreover, research by Galster & Lee (2021) demonstrates that inflationary pressures can lead to increased property prices, as higher costs of living drive demand for real estate as a hedge against inflation. Additionally, a systematic review by Smith et al. (2023) emphasizes that fluctuations in interest rates directly impact housing affordability and investment behavior, thereby influencing overall market dynamics. These findings collectively underscore the importance of macroeconomic factors in determining property price trends.

According to Case & Shiller (2003), Gross Domestic Product (GDP) is the total market value of all final goods and services produced in a given period by factors of production located in a country. GDP also often reflects per capita income or the average income of the population. An increase in Indonesia's GDP can also indicate an increase in people's purchasing power, which will increase the demand for houses in Indonesia and increase house prices. Recent theories, such as those proposed by Borio And Zabai (2021), emphasize the importance of not just GDP growth but also the composition of growth—specifically, the quality of economic growth. They argue that sustainable economic growth, characterized by productivity improvements and technological advancements, is more likely to lead to stable increases in property prices. Furthermore, the role of financial markets in shaping real estate dynamics has been highlighted; as financial conditions improve, access to credit becomes easier, further driving up housing demand and prices.

Additionally, the increasing recognition of the impact of wealth inequality on housing markets has gained traction in recent literature. According to Piketty (2014), disparities in income and wealth can significantly affect housing accessibility, thereby influencing overall demand and property values. This suggests that while GDP growth is crucial, addressing income inequality may also be essential for fostering a stable and equitable housing market.

According to (Suseno & Astiyah, 2009) inflation is a sustained increase in the money supply or liquidity within an economy, resulting in a general rise in prices. High inflation raises property prices, driving up the Residential Property Price Index (RPPI). Conversely, if house prices increase due to high demand, inflation may rise since the property sector significantly influences the economy. Hence, inflation and RPPI can mutually impact each other.

Inflation is also affected by changes in interest rates. A fall in interest rates encourages an increase in demand for credit, as borrowing costs become lower. As a result, the money supply in society increases, which can trigger an increase in consumption and demand for goods and services. If not matched by an increase in production, this condition will increase inflationary pressures in the economy.

According to Glaeser & Gyourko (2003) in their study, the increasing population in urban areas contributed to an increase in housing demand, which had an impact on house prices. They emphasized that cities with rapid population growth tend to experience rising property prices. Similarly, Liu (2021) found that rapid urbanization in Asia, often accompanied by population growth, escalates housing demand and positively impacts the RPPI.

Properties that are more energy efficient can reduce operating costs for their owners. When energy costs are reduced, the financial attractiveness of a property increases, which can contribute

to an increase in property prices. Gillingham et al. (2009) explains that reduced energy costs can increase the purchasing power of owners, making them more likely to invest in repairs or property value improvements. High income inequality can adversely affect quality of life and social stability, which may subsequently impact the housing market. When individuals feel marginalized, they may hesitate to invest in housing, reducing demand and potentially lowering the RPPI. Research by Durlauf & Fafchamps (2005) shows that social injustice can affect perceptions of the environment and investment in property.

Previous research has shown that macroeconomic factors, such as Gross Domestic Product (GDP) per capita and inflation, have a significant influence on residential property prices. For example, research by Wibawani et al. (2016) found that every 1% increase in GDP is positively associated with an increase in property prices, which supports the results of this study that also emphasizes the important role of GDP per capita. On the other hand, research by Kholodilin (2020) notes that the effect of real interest rates on property prices is not always consistent, depending on the local economic context, which suggests that in some cases, fluctuations in interest rates may result in different impacts on the property market. In addition, a study by Tatan and Wong (2021) highlighted that social factors, such as demographics and consumer preferences, have more influence on property prices compared to economic factors, which contradicts the focus of this research which emphasizes economic variables. Thus, this study seeks to make a novel contribution by simultaneously analyzing the various factors that influence residential property prices in Asian countries, as well as exploring the complex relationships between these variables.

Furthermore, the relationship between energy consumption and RPPI has gained increasing attention. Research indicates that higher energy consumption can reflect economic growth and increased demand for housing; however, it can also lead to higher operational costs for property owners, potentially exerting downward pressure on property values if energy costs rise significantly. Liu (2021) found that while energy consumption is tied to economic development, its management is crucial to maintaining property value. This study seeks to make a novel contribution by simultaneously analyzing the various factors that influence residential property prices in Asian countries, including the impact of energy consumption, as well as exploring the complex relationships between these variables.

Method

The study used data from 2011 to 2022 from 13 Asian countries: China, Hong Kong, India, Indonesia, Israel, Japan, South Korea, Malaysia, Philippines, Singapore, Thailand, Turkey, and the

United Arab Emirates. Meanwhile, the variables used include residential property price, GDP per capita, interest rates, inflation, population, energy consumption, and the Gini index. The data used were obtained from several sources, namely the Bank for International Settlements (BIS), World Bank, Our World in Data, and World Inequality Database. Variable descriptions are described in Table 1.

Table 1. Variable Descriptions

Variable	Notation	Description	Unit	Source
Residential property price	RPPI	Residential property price index	Index	BIS
Gross domestic product per capita	GDPPC	GDP per capita is gross domestic product divided by midyear population	US\$	World Bank
Interest rate	RIR	Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator	%	World Bank
Inflation	INF	Inflation is measured using the consumer price index which reflects the annual percentage change in the average cost of consumers	%	World Bank
Population	POP	Estimated population at mid-year	People	World Bank
Energy consumption	ENERGY	Primary energy consumption	TWh	Our World in Data
Gini index	GINI	Gini index	Index	World Inequality Database

The choice of research method in this study using the System Generalized Method of Moments (Sys-GMM) is based on a number of relevant considerations. First, this method is well suited to analyze the dynamic relationship between variables in panel data, which covers 13 Asian countries over the period 2011 to 2022. As such, Sys-GMM is able to handle endogeneity issues that often arise in economic analysis, resulting in more accurate estimates. In addition, this method allows researchers to control for other variables that may affect property prices, such as GDP, inflation, and interest rates, and provides a deeper understanding of the interactions between these factors. This study considers the possibility of a causality effect, where residential property prices in the past may affect residential property prices in the future. Therefore, the proposed model is as follows:

$$\begin{aligned}
 RPPI_{i,t} = & \beta_0 + \beta_1 RPPI_{i,t-1} + \beta_2 \ln GDPPC_{i,t} + \beta_3 RIR_{i,t} + \beta_4 INF_{i,t} + \beta_5 \ln POP_{i,t} \\
 & + \beta_6 \ln ENERGY_{i,t} + \beta_7 GINI_{i,t} + \varepsilon_{i,t}
 \end{aligned}
 \tag{1}$$

Where $RPPI_{i,t}$ is residential property price, $RPPI_{i,t-1}$ is lag residential property price, $\ln GDPPC_{i,t}$ is the natural logarithm of GDP per capita, $RIR_{i,t}$ is the interest rate, $INF_{i,t}$ is the inflation rate, $\ln POP_{i,t}$ is the natural logarithm of population, $\ln ENERGY_{i,t}$ is the natural logarithm of energy consumption, $GINI_{i,t}$ is Gini index, β_0 is constant, $\beta_1 - \beta_7$ are regression coefficients 1 to 7, i is a number of countries, t is time, and $\varepsilon_{i,t}$ is the error term.

In analyzing Equation 1, this study employs a dynamic panel regression method using the Generalized Method of Moments (GMM) approach. This method is chosen due to its flexibility, requiring only a few assumptions about the moment conditions (Chaussé, 2010). The type of GMM used in this study is the System GMM (Sys-GMM), developed by Arellano & Bover (1995) and Blundell & Bond (1998). Several statistical tests must be conducted when using the GMM method, including the autocorrelation test and the instrument validity test (Roodman, 2009).

Result and Discussion

This section presents the estimation results. The descriptive statistics in Table 2 provide an overview of the data characteristics from 156 observations. The Residential Property Price Index (RPPI) has an average of 125.81, with a minimum value of 91.49 and a maximum of 227.26, indicating substantial variation in residential property prices. The average GDP per capita is 22,231, ranging from 1,285 to 67,949, reflecting significant differences in economic well-being across regions. The real interest rate averages 2.40%, with a minimum of -4.55% and a maximum of 9.99%, showing considerable fluctuations in real interest rates, while inflation rates range from -2.08% to 72.31%, with an average of 3.49%, indicating inflation instability in some regions.

Table 2. Descriptive Statistics

Variable	Obs.	Min	Max	Mean
RPPI	156	91.49	227.26	125.81
GDPPC	156	1285	67949	22231
RIR	156	-4.55	9.99	2.40
INF	156	-2.08	72.31	3.49
POP	156	5183688	1417173173	268393379
ENERGY	156	217.5	44516.3	4904.6
GINI	156	0.37	0.62	0.52

Table 2 also shows that the population size has vast variation, with an average of 268,393,379 people, a minimum of 5,183,688, and a maximum of 1,417,173,173. Then, energy consumption averages 4,904.6, with a range from 217.5 to 44,516.3, suggesting substantial disparities in energy usage. The Gini Index, which measures income inequality, has an average of 0.52, with a minimum of

0.37 and a maximum of 0.62, highlighting that income inequality is fairly high in most of the analyzed regions.

Next, Table 3 reports the correlation matrix among the determinants of residential property prices. Based on the correlation matrix, residential property prices in the 13 Asian countries have a positive relationship with inflation and income inequality, suggesting that both tend to rise as property prices increase. In contrast, per capita income, population, energy consumption, and interest rates show negative or weak correlations with RPPI, indicating a relatively small or inverse relationship between these variables and property prices.

Table 3. Correlation Matrix

	RPPI	lnGDPPC	RIR	INF	lnPOP	LnENERGY	GINI
RPPI	1						
lnGDPPC	-0.11	1					
RIR	-0.02	-0.36	1				
INF	0.28	-0.18	-0.13	1			
lnPOP	-0.12	-0.77	0.23	0.15	1		
lnENERGY	-0.32	-0.32	0.04	0.05	0.80	1	
GINI	0.31	-0.51	0.13	0.15	0.17	-0.10	1

Fig. 3. presents a map of Asia's average residential property price index distribution. The residential property price index distribution shows the variation in property prices across Asian countries. Countries colored blue have an average property price index between 100.6 and 104.4, reflecting relatively low prices, such as Singapore, Indonesia, and China. Countries with moderate property prices (yellow color), such as Japan, South Korea, Thailand, Turkey, the Philippines, Israel, and the United Arab Emirates, have an average index between 104.4 and 143.1. Meanwhile, countries colored in red, such as Malaysia, India, and Hong Kong, have a higher average property price index, between 143.1 and 156.9, indicating that property prices are higher in these countries. This map illustrates the significant differences in property prices across the Asian region, with some countries showing significantly higher prices than others.

The average residential property price index depicted in the map is calculated using a composite of several key indicators including local market data, consumer purchasing power, and housing supply dynamics within each country. The indices are designed to reflect the affordability and investment attractiveness of residential properties in each region. Variations in the index are influenced by a wide range of economic, political, and social factors. For instance, countries with higher property price indices typically exhibit strong economic growth, higher income levels, and robust foreign investment in the real estate sector. Conversely, regions with lower indices might be influenced by softer economic conditions, lower income scales, or higher interest rates which

constrain borrowing and purchasing power. This mapping not only demonstrates the broad spectrum of housing affordability in Asia but also highlights regional economic disparities and living standards.

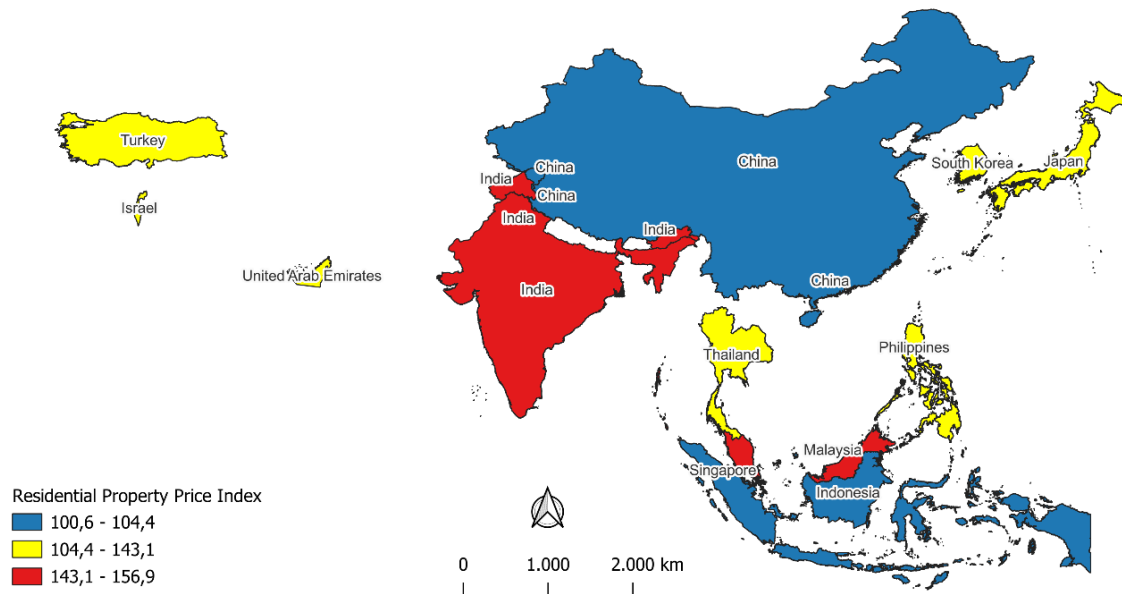


Fig. 3. Average Residential Property Price Index

Specification testing was conducted in the GMM method to assess the validity of the instruments used in the model. The validity of these instruments is tested using the Sargan test, where a $p\text{-value} > \alpha$ indicates that the instruments in the model are valid. Meanwhile, the presence of serial correlation is evaluated using the Arellano-Bond test on AR(1) and AR(2) to ensure that the estimates obtained are not subject to autocorrelation.

Based on the test results presented in Table 4, the Sargan test statistic shows a $p\text{-value}$ of 0.967, indicating that the instruments chosen in the estimated model are valid. Similar results are also obtained from the Arellano-Bond test, where no autocorrelation is found in the model, as the test statistic for AR(1) is significant, while for AR(2), it is not significant.

Table 4. Specification Test Results

Variable	p-value
Sargan test	0.976
Autocorrelation test (1) / AR(1)	0.049
Autocorrelation test (2) / AR(2)	0.330

Table 5 presents the Sys-GMM estimation results for the determinants of residential property prices in Asia. The estimation results show that the lagged RPPI has a coefficient of 0.893 and is significant, indicating that a 1-point increase in the previous period's residential property price will raise the current property price index by 0.893 points. This result demonstrates a persistent effect in the property market, where property prices tend to follow the trend from the previous period. Furthermore, GDP per capita has a coefficient of 1.015 and is significant, suggesting that an increase of 1 USD in GDP per capita will result in a 1.015-point rise in the property price index. This increase in economic well-being boosts purchasing power and property demand, thereby driving up property prices additionally, the Bond test results confirm the absence of second-order autocorrelation in the model, reinforcing the validity of the underlying assumptions used in the Sys-GMM estimation.

The interest rate has a coefficient of -0.070 but is not significant, indicating that changes in the real interest rate do not significantly impact property prices. Meanwhile, inflation has a coefficient of 0.882 and is significant, meaning that a 1 percent increase in inflation will raise the property price index by 0.882 points. This can be explained by market expectations that asset values, such as property, are likely to appreciate in high-inflation situations. Population has a coefficient of 1.288 and is significant, showing that each increase of one person in population will raise the property price index by 1.288 points, indicating that greater population growth drives higher property demand.

Energy consumption has a coefficient of -2.865 and is significant, indicating that each increase of 1 TWh in energy consumption will decrease the property price index by 2.865 points. This could be related to higher operational costs or negative environmental impacts that make properties less attractive. The Gini Index has a coefficient of 5.098 but is insignificant, implying that income inequality does not affect property prices in this analysis.

Table 5. Estimation Results

Variable	Coef.	Std. Error	z-value	p-value
RPPI _{t-1}	0.893	0.054	16.415	0.000***
lnGDPPC	1.015	0.479	2.120	0.034**
RIR	-0.070	0.469	-0.150	0.881
INF	0.882	0.091	9.660	0.000***
lnPOP	1.288	0.720	1.788	0.074*
lnENERGY	-2.865	1.061	-2.700	0.007***
GINI	5.098	13.792	0.370	0.712

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The Sys-GMM analysis results indicate that residential property prices are significantly influenced by previous-period prices, reflecting a strong persistence effect in price movements. This

finding aligns with Che et al. (2011), who emphasize that property prices tend to follow historical patterns, reflecting stability within the property market. In other words, property market behavior is connected to prior trends, whether through increases or decreases. It offers valuable insights for investors and policymakers when planning investments in the property sector.

GDP per capita demonstrates a significant contribution to property prices, where increased purchasing power boosts housing demand. This finding aligns with studies by Zhang et al. (2016), Huang et al. (2017), and Duan et al. (2021), which show that higher income levels contribute to greater demand for housing. As people's incomes rise, they gain improved financial ability to buy or rent property, thus driving up market prices. This suggests a close positive relationship between individuals' economic status and the dynamics of property prices (Xu, 2017).

Further, Su et al. (2020) support this finding by showing that rising GDP per capita creates an upper-middle-income group with purchasing power capable of influencing property market prices. This group tends to demand better-quality property and preferred locations, strengthening the trend of price increases in this sector (Su et al., 2020; Wang & Lee, 2022). In this context, the positive relationship between GDP per capita and property prices illustrates how regional economic development contributes to a steady increase in property price dynamics.

The interest rate, showing no significant effect on residential property prices, suggests that this factor may not be a primary consideration in property purchasing or investment decisions, as confirmed by Duja & Supriyanto (2019). This may be due to the perception of property purchases as long-term, inflation-resistant investments, meaning short-term interest rate fluctuations may have minimal impact on demand (Tripathi, 2019). Additionally, in some countries, governments provide subsidies or incentives for property purchases, such as low-interest loan programs or down payment assistance, which help maintain property demand stability despite interest rate changes (Braakmann & McDonald, 2020; Krolage, 2023; Wilhelmsson & Warsame, 2024; Wu et al., 2020). Therefore, while interest rates can affect borrowing costs, their impact on residential property prices tends to be less significant than other factors that directly influence purchasing power.

Inflation also has a significant impact on property prices, primarily because it increases construction costs and reinforces the perception of property as a safe asset amid economic instability. This finding aligns with studies by Kuang & Liu (2015), Duja & Supriyanto (2019), and Rehman et al. (2020). Galster & Lee (2021) and Alabi & Fapohunda (2021) highlight that inflation drives up building material and construction costs, prompting developers to adjust selling prices to cover production costs. The increase in property prices is a natural response to rising costs, coupled with the

perception that property serves as an asset capable of preserving value against inflation (Aqsha & Masih, 2018).

Population has a significant positive impact on property prices, as a growing population increases housing demand, particularly in urban areas. This finding is supported by Lin et al. (2014) and Zhu et al. (2018), who emphasize that urbanization and population growth drive increased housing demand. As more people seek housing, demand increases, directly pushing prices upward. However, in some cases, rapid population growth without a corresponding infrastructure increase can lead to oversupply, potentially dampening prices in the short term.

Additionally, Makinde (2014) notes that population growth impacts not only demand but also the need for adequate housing infrastructure. As the population grows, so does the need for suitable and quality housing, keeping residential property demand high, which in turn drives property prices up. In contrast, energy consumption shows a significant negative impact on property prices, with countries with high energy consumption levels facing challenges related to the cost of living, affecting property prices. Energy costs can be a deciding factor in property purchase decisions, as high energy expenses make properties less attractive to potential buyers or renters (Mironiuc et al., 2021; Taltavull de La Paz et al., 2019). Chanda et al. (2023) note that energy-efficient properties are increasingly preferred, driven by growing awareness of environmental sustainability.

The Gini index, found to have no significant effect on residential property prices, suggests that income inequality within a society may not directly impact property price dynamics, consistent with findings by Zhongfei et al. (2016). While the Gini index reflects income distribution and inequality within a society, property prices are more influenced by aggregate purchasing power and the number of people seeking housing rather than income distribution itself (Wang et al., 2018). Generally, the property market is often accessed by middle- and upper-income groups with sufficient purchasing power. Hence, despite high-income inequality in a region, property prices are more determined by the number of potential buyers and overall purchasing power within this market segment (Dewilde, 2022). The Gini index measures income inequality at a given point in time, which may not capture the dynamic changes in economic conditions or shifts in buyer demographics that directly impact property prices. Therefore, while income inequality exists, it may not translate into significant variations in property prices if the majority of transactions are concentrated among those with sufficient purchasing power.

Conclusion

This study highlights the importance of economic variables in influencing residential property prices in 13 selected Asian countries. The results of the analysis using the Sys-GMM method show that property prices are affected by previous-period prices, GDP per capita, inflation, population, and energy consumption, while real interest rates and the Gini index do not have a significant impact. These findings emphasize that property market dynamics are heavily influenced by macroeconomic conditions, requiring special attention from policymakers and stakeholders in formulating strategies for property market stability. Based on the research findings, it is recommended that the government and relevant agencies consider these influential economic factors in formulating housing policies. Stakeholders, including developers and financial institutions, should collaborate to enhance economic development programs that promote GDP growth and purchasing power while ensuring effective inflation control measures. Additionally, improving infrastructure to support urban population growth is essential to prevent supply-demand imbalances. This study has several limitations that need to be considered. First, the analysis only involves 13 Asian countries, so the results may not be generalizable to regions with different economic conditions. Second, the data used is aggregated and may not account for local or specific variables that could influence the property market in each country. Third, this research does not consider external factors, such as government policies that support or hinder the property market, which can affect the analysis results. Therefore, future research is expected to encompass more countries and consider a broader range of variables to provide a more comprehensive picture of the property market.

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