

## LOAN-TO-VALUE POLICY AND DEMAND FOR MORTGAGE FINANCE: EVIDENCE FROM INDONESIA

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ARTICLE INFO	ABSTRACT
<b>Accepted</b> : 02-08-2023	Demand for mortgage finance showed a slowdown. And also, property residential sales showed a slowdown. As is well known, most consumers buy property residential is financed by mortgage finance. Through LTV policy, the Bank of Indonesia wants to stimulate demand for mortgage finance and also property residential sales to could boost economic growth sustainably. A question is whether changes in the LTV ratio could boost economic growth sustainably and whether other factors are affecting demand for mortgage finance. This article sees the question by considering what the impacts are in both lower-middle-income and higher-middle-income provinces. By regressing the statistical model Fixed Effect Model (FEM) and Random Effect Model (REM), the result shows that LTV policy is affecting positively the demand for mortgage finance, particularly in lower-middle-income provinces. When the LTV ratio increased, the demand for mortgage finance in lower-middle-income provinces is higher than the demand for mortgage finance in higher-middle-income provinces. Moreover, mortgage finance reflects normal goods for higher-middle-income provinces while reflecting inferior goods for lower-middle-income provinces. On the other hand, higher mortgage interest lowers the demand for mortgage finance, particularly in lower-middle-income provinces.
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### Introduction

Home becomes a basic human need. Along with massive urbanization, significant population growth and intensified land use for the central area of government, trade, industry, and other projects caused the supply of houses to be limited. Urbanization is a transformation from rural to industrial life (Guan, Wei, Lu, Dai, & Su, 2018). Urbanization is considered a complex socioeconomic change. Many factors cause urbanization, including economic, political, social, and geographical factors (Lim & Nugraheni, 2017).

Household preferences to choose the type of house they like are limited. Factors that influence households' preference in getting the type of house they like include: 1) The supply of single-family housing in urban suburbs is more than the inventory of homes in urban centers; 2) housing prices in the suburbs are more reasonable compared to house prices in the city center; 3) Suburban houses have a lower population density compared to downtown homes. In addition, urban centers appeal to the younger generation regardless of preference (Lim & Nugraheni, 2017).

Meanwhile, the demand for houses is highly dependent on economic growth and the stability of economic conditions in a country (Andini & Falianty, 2022). Economic growth is a very important main indicator in an economy. Strengthening economic growth and economic stability can improve credit facilities. Meanwhile, credit facilities and housing demand have a strong relationship (Hanişoğlu & Azer, 2017). The demand for housing, as a basic human need, requires large funds from savings and loans. So, an increase in mortgages has led to an increase in demand for homes (Fauzia, Rahayu, & Nugroho, 2019).

In Q4-2019, Indonesia's real GDP growth was recorded at 4.96 percent, continuing to slow from the highest growth of 6.50 percent since 2015 (see Figure 1.1). Many factors cause economic growth to slow down, both from global and domestic factors. Meanwhile, along with the slowdown in economic growth, demand for mortgages and sales of rental properties also slowed. In quarter 4-2019, mortgage demand growth only touched 4.95 percent year-on-year, from the highest growth of 21.52 percent in quarter 3-2013 (Ardely & Ekananda, 2022). Along with the slowdown in mortgage demand, residential property sales also showed a slowdown. In Q4-2019, residential property sales growth only touched 1.19 percent year-on-year, from the highest growth of 224.01 percent in Q1-2015 (see Figure 1).

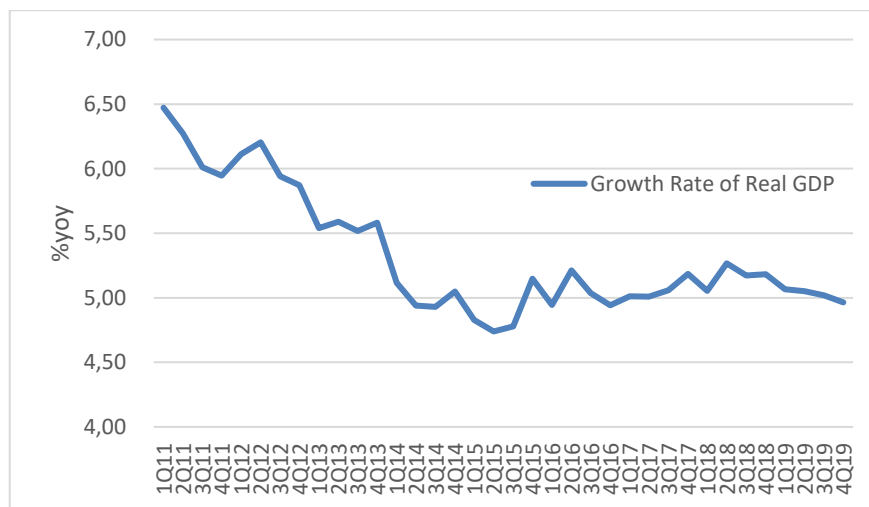


Figure 1  
Indonesia's real GDP growth

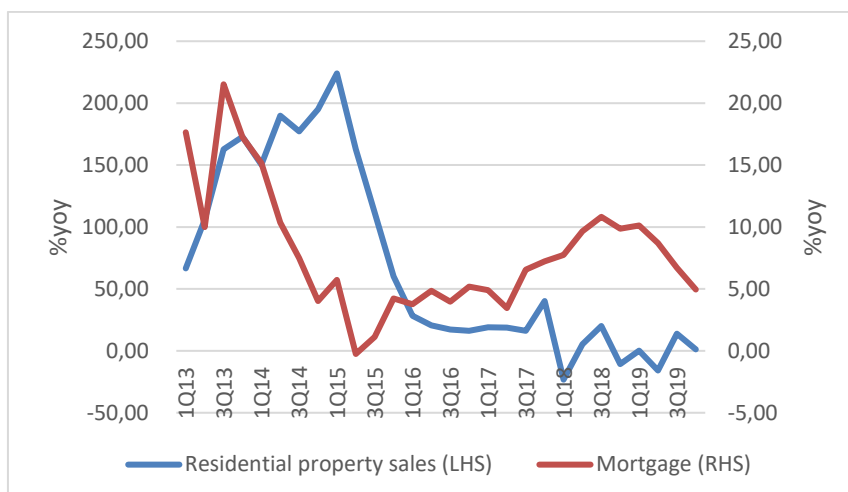
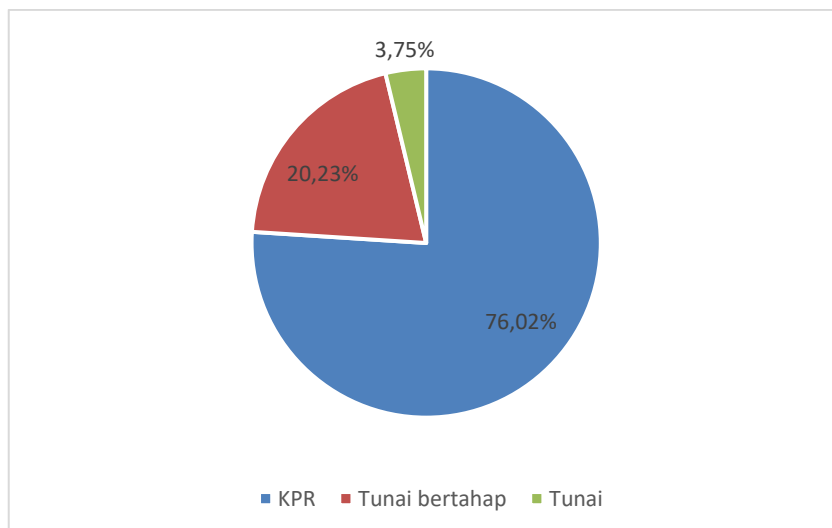


Figure 2  
Residential Property Sales and Mortgage Requests in Indonesia

As is known, the majority of residential property purchases in Indonesia are financed by mortgage facilities. As of quarter 4-2019, the majority of consumers buying residential property financed by mortgages showed 76.02 percent, while the rest with gradual cash and cash of 20.23 and 3.75 percent respectively (Indonesia, 2020) (see Figure 1.3). Therefore, the decline in mortgage demand led to a decrease in residential property sales.

(Abdullahi, Abbas, & Abdullahi, 2018) his research showed that one of the main factors affecting the homeownership rate is the ease of requirements in the process of obtaining residential property financing. The LTV ratio is part of the ease of requirements for obtaining residential property financing. Changes in the LTV ratio will affect changes in the down payment ratio for residential property purchases or better known as the Down-Payment (DP) ratio (Luangaram & Thepmongkol, 2022). With a higher LTV ratio, lower DP ratio, and increased willingness to pay from consumers, especially low-income households. Thus, based on these arguments, Bank Indonesia (central bank) –as an economic agent from the government side in the monetary sector– uses Loan-to-Value (LTV) policy instruments to increase growth in mortgage demand and also residential property sales. The LTV ratio is a ratio that shows the comparison between the value of credit or financing provided by conventional and sharia commercial banks to the value of collateral based on the latest assessment results such as property at the time of credit or financing (Ayuningtyas, 2021).



Gambar 3  
Pembelian Properti Residensial

Bank Indonesia first released its LTV policy in March 2012. Bank Indonesia implements LTV policy because it reflects on the financial crisis that occurred in the United States in 2008. The crisis had a comprehensive impact not only on economic activity in developed economies but also in emerging markets and developing economies. The crisis occurred due to many non-credible debtors given (subprime mortgages) and caused the property sector to experience a price bubble. Therefore, the crisis is the focus of Bank Indonesia so that the surge in property prices in Indonesia does not cause a similar price bubble that can cause an economic recession (Sasikirono, Sumanto, Sudana, & Meidiaswati, 2019).

LTV policy is a reflection of countercyclical policy. The countercyclical policy works when the business cycle of an economy is in contraction. So, if residential property sales are slowing down due to slowing mortgage demand, Bank Indonesia raises the LTV ratio to encourage mortgage demand as well as residential property sales. In addition, LTV policy is also an implication of expansionary monetary policy so that economic activity can immediately recover or return to a higher level when the business cycle is deteriorating. Not only that but raising the LTV ratio is also a reflection of Bank Indonesia's credit easing policy and better known as an accommodative monetary policy with the aim of credit relief can increase demand.

Many studies only show that the government can control mortgage demand to stabilize financial conditions and lower the debt ratio in households by lowering the LTV ratio (Shin & Kim, 2017). So, reflecting on the first global financial crisis in the United States, the bursting of the residential property price bubble caused many developed economies to experience a recession, even the impact on developing economies. Many countries are worried about unnaturally soaring residential property prices. In the end, by having a large ability, the government can control the demand for residential property by lowering the LTV ratio, so that the down payment ratio burdened

by households will be relatively high. It is expected that with the lowering of the LTV ratio, mortgage demand will gradually shrink, and residential property prices will also fall.

However, when the residential property industry is sluggish, there have not been many studies that strengthen the argument that an increase in the LTV ratio can drive mortgage demand while boosting residential property sales. Therefore, this study seeks to identify whether an increase in the LTV ratio can increase mortgage demand and also wants to find out if there are other factors besides the LTV ratio that affect mortgage demand.

Meanwhile, (Tarne, Bezemer, & Theobald, 2022) in their research using a sensitivity analysis approach confirmed that Loan-to-Value (LTV) and Debt to Income (DTI) policies have a strong influence on the residential property market. Thus, the policy causes housing loan debtors to move to the secondary market so it is not right on target to control house price growth. Therefore, similar to creditors in the primary market, housing loan creditors in the secondary market need to be regulated to maximize the effectiveness of government policies (Kinghan, McCarthy, & O'Toole, 2022).

## **Method**

This study used analysis units at the provincial level across Indonesia to see the impact of LTV policies on mortgage demand. Total observations amounted to 680 units from 34 provinces throughout Indonesia during the period of the first quarter of 2015 to the fourth quarter of 2019.  $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6,$  and  $\beta_7$  is parametric coefficients, and  $e$  is error.

The analysis methods used are descriptive statistical analysis and regression analysis using the Fixed Effect Model (FEM) and Random Effect Model (REM) methods. Descriptive statistical analysis was carried out to see the distribution of data and the relationship between the variable value of Commercial Bank Credit to Households for residential ownership as a variable tied to the variable value of Gross Regional Domestic Income (GRDP) in the Real Estate sector, per Capita Income, Residential Property Price Index (IHPR), and the average lending rate of Commercial Banks to Households for residential ownership as a control variable.

Meanwhile, the first regression analysis method was chosen using FEM because, in addition to conducting classical tests more supportively, this method can measure the work of independent variables against dependent variables even though they do not have a close (significant) relationship (Allison, 2009). Also, regression analysis using the FEM method can explain ideally because the resulting intercepts will vary in each cross-section but the slope does not change and the presence of dummy variables can make it appear that there are differences in treatment between intercept data (Gujarati, 2012).

Meanwhile, the second regression model using REM and the addition of other independent variables, namely dummy low-middle-income provinces and upper-middle-income provinces will be tested. Dummy provinces are used as time-invariant variables

where variables have the same influence over time. The number of dummies that are more than one does not reduce the number of degrees of freedom so the estimation results obtained are more efficient.

**Results and Discussion**

By the hypothesis that has been built, LTV policy has a strong influence on the residential property market. Figure 4.1 shows that demand for mortgages, both in lower-middle-income and upper-middle-income provinces, continues to increase every quarter. The increase in mortgage demand in lower-middle-income provinces was faster than the increase in upper-middle-income provinces. This indicates that the increase in the LTV ratio provides a larger consumer surplus in lower-middle-income provinces compared to upper-middle-income provinces. Meanwhile, figure 4.2 shows that each control variable has a strong relationship to mortgage demand. Real Estate sector GDP, per capita income, loan-to-income ratio, and CPI each have a positive relationship to mortgage demand while mortgage interest rates have a negative relationship.

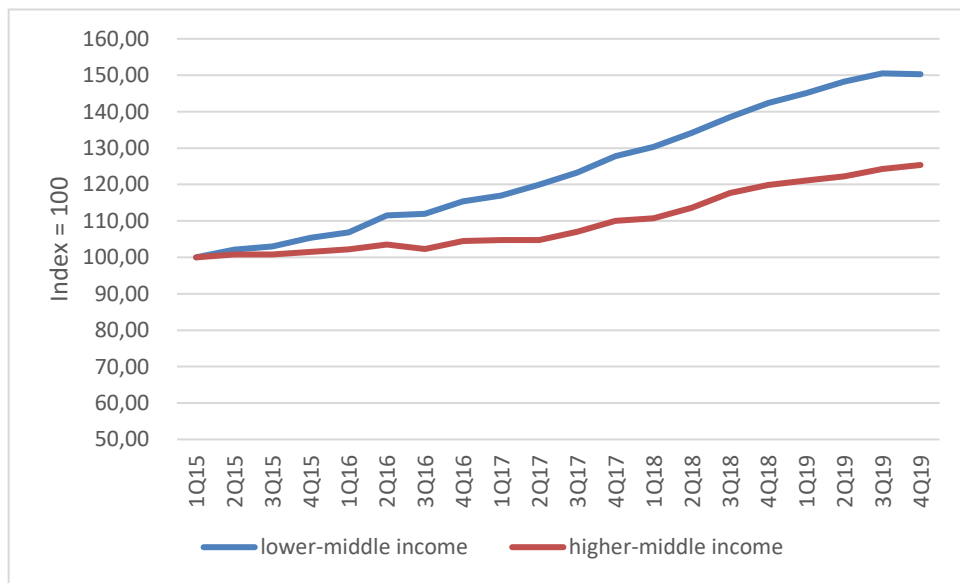


Figure 1  
Changes in LTV Policy on Mortgage Demand in Lower- and Upper-Middle-Income Provinces

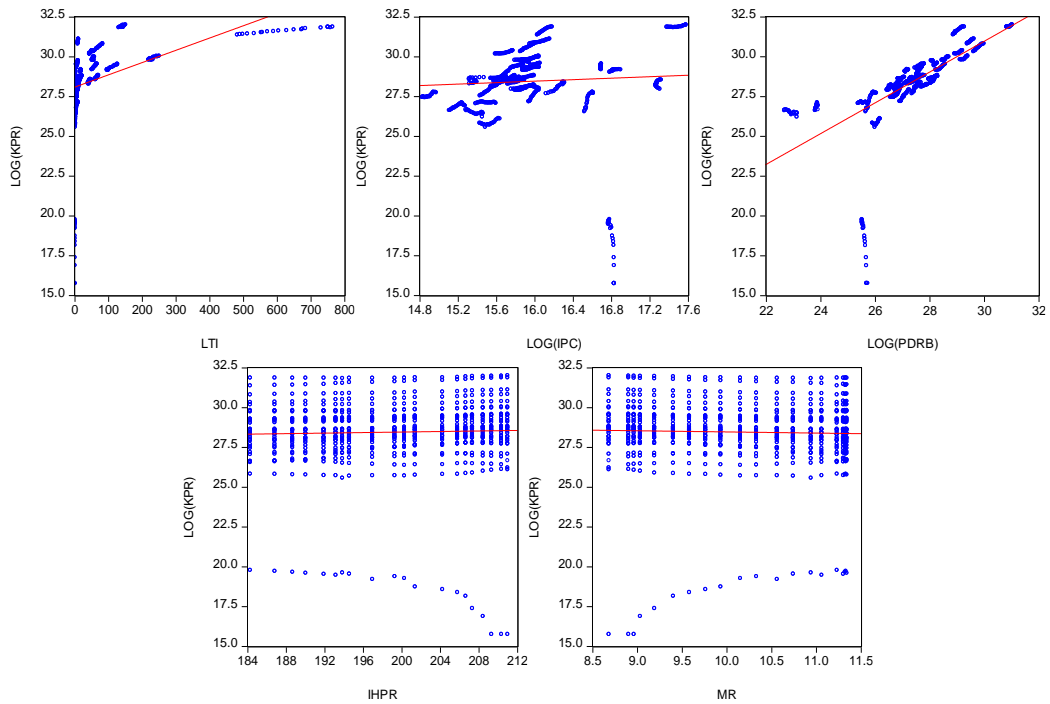
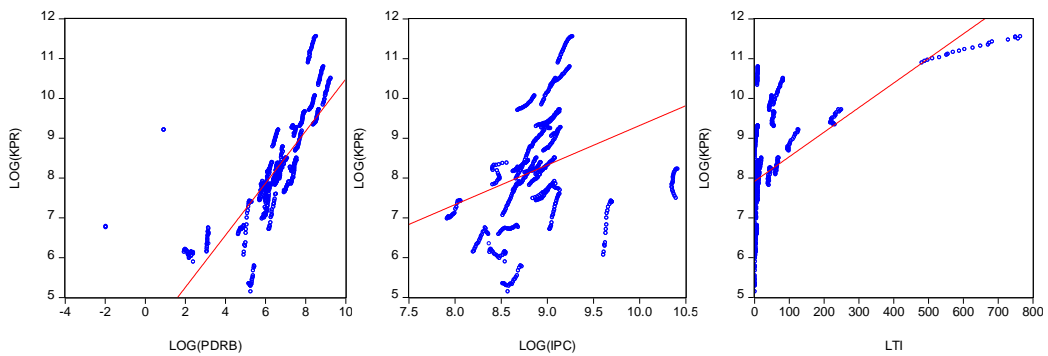


Figure 2  
Descriptive statistics for the entire province

The positive relationship between the real estate sector GDP and per capita income indicates that mortgages reflect normal goods. The increase in income led to an increase in demand for mortgages. In addition, an increase in the loan-to-income ratio and IHPR led to a larger portion of mortgage demand. Meanwhile, the increase in mortgage rates caused a decrease in mortgage demand. This is mainly due to the increase in mortgage interest rates above the willingness to pay from consumers. Thus, in addition to changes in the LTV ratio, other factors can affect mortgage demand. Figure 4.3 shows that each control variable has a strong relationship to mortgage demand in lower-middle-income provinces. Real Estate sector GDP, per capita income, loan-to-income ratio, and CPI each have a positive relationship to mortgage demand while mortgage interest rates have a negative relationship.



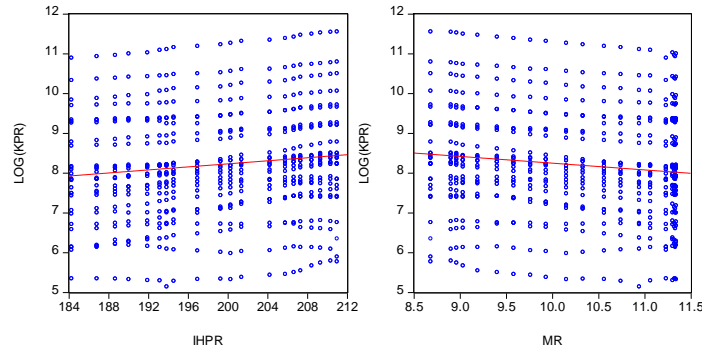
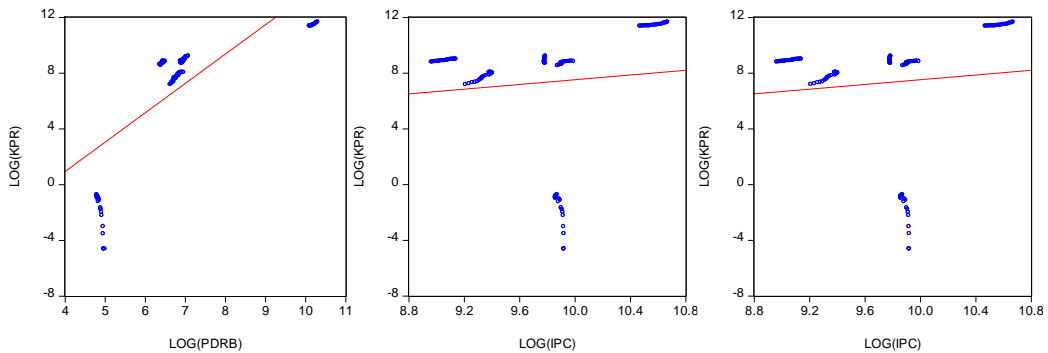


Figure 3  
Descriptive statistics for lower-middle-income provinces

The positive relationship between the real estate sector GDP and per capita income indicates that mortgages reflect normal goods in lower-middle-income provinces. The increase in income led to an increase in demand for mortgages. In addition, the increase in loan-to-income ratio and IHPR has led to a larger portion of mortgage demand in lower-middle-income provinces. Meanwhile, the increase in mortgage rates led to a decrease in mortgage demand in lower-middle-income provinces. This is mainly due to the increase in mortgage rates above the willingness to pay from consumers in lower-middle-income provinces. Thus, in addition to changes in the LTV ratio, other factors can affect mortgage demand.

Meanwhile, figure 4.4 shows that each control variable has a strong relationship with mortgage demand in upper-middle-income provinces. Real Estate sector GDP, per capita income, and loan-to-income ratio each have a positive relationship to mortgage demand while IHPR and mortgage interest rates have a negative relationship.





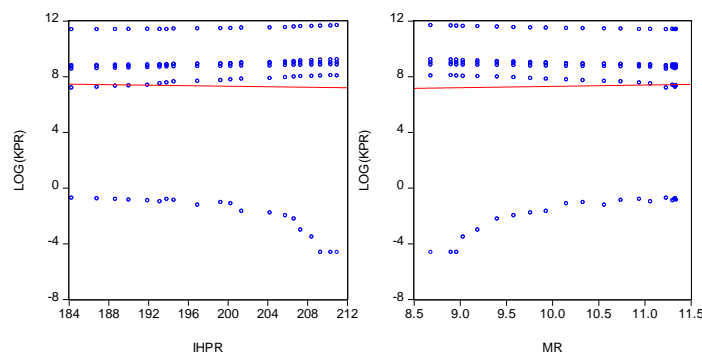


Figure 4  
Descriptive statistics for upper-middle-income provinces

The positive relationship between the real estate sector GDP and per capita income indicates that mortgages reflect normal goods in upper-middle-income provinces. The increase in revenue led to an increase in demand for mortgages. In addition, an increase in the loan-to-income ratio has led to a larger portion of mortgage demand in upper-middle-income provinces. However, the movement of IHPR is contrary to the demand for mortgages in upper-middle-income provinces. The decline in IHPR led to an increase in demand for mortgages. Meanwhile, the increase in mortgage rates led to a decrease in mortgage demand in upper-middle-income provinces. This was mainly due to the increase in mortgage rates above the willingness to pay from consumers in upper-middle-income provinces. Thus, in addition to changes in the LTV ratio, other factors can affect mortgage demand.

Meanwhile, the results of panel data regression using FEM and REM to see the impact of changes in the ratio of LTV to mortgage demand are as follows:

**Table 1**  
**Statistical Test Results of the Effect of LTV Policy on Mortgage Demand**

	<i>Fixed Effect Model</i>		<i>Random Effect Model</i>
	Ln (Mortgage Demand in Lower-Middle Income Provinces)	Ln (Mortgage Request in upper-middle-income provinces)	Ln (Mortgage Request)
Constant	17.0696 (0.0000)	-4.3126 (0.6418)	-2.0008 (0.6208)
Ln (PDRB sektor Real Estate)	-0.0013 (0.7287)	0.0908 (0.9083)	0.0144 (0.5006)
Ln (Per capita income)	-1.3428 <sup>a</sup> (0.0000)	0.8644 (0.2999)	0.7318 <sup>b</sup> (0.0615)
Rasio <i>Loan to Income</i>	0.0006 <sup>a</sup> (0.0000)	0.0232 <sup>a</sup> (0.0073)	0.0019 <sup>a</sup> (0.0031)
IHPR	0.0185 <sup>a</sup> (0.0000)	0.0069 (0.5205)	0.0100 (0.1406)
Mortgage interest	-0.0609 <sup>a</sup>	0.0319	0.0035

rates	(0.0000)	(0.7676)	(0.9573)
DUMMY_LTV	0.0336 <sup>a</sup>	-0.0189	-0.0184
	(0.0000)	(0.7847)	(0.6736)
DUMMY_PROV			1.5093 <sup>c</sup>
			(0.0607)
<i>R-squared</i>	0.9945	0.9888	0.1619
Number of observations	340	340	680
Catatatan: <sup>a</sup> significant of 1%			
<sup>b</sup> significant on 5%			
<sup>c</sup> significant on 10%			

The results of the regression equation above have sufficiently established a linear and non-linear relationship between mortgage demand, both in lower-middle-income and upper-middle-income provinces.

First, the increase in LTV ratio and mortgage demand, especially in lower-middle-income provinces, has a positive and significant relationship. This is by the results of previous research: Hwang et al. (2011). However, the increase in LTV ratio and mortgage demand, especially in upper-middle-income provinces, has a negative and insignificant relationship.

Second, per capita income and overall mortgage demand have a positive and significant relationship. This is by previous research: Roland E. Ubogu (1988). A 1 percent increase in per capita income led to a 0.73 percent increase in mortgage demand. This explains that mortgages reflect normal goods for all provinces. If revenues rise, it causes an increase in demand for mortgages.

However, per capita income and demand for mortgages, especially in lower-middle-income provinces, have a negative and significant relationship. A 1 percent increase in per capita income led to a 1.34 percent decrease in mortgage demand. This explains that mortgages reflect inferior goods for lower-middle-income provinces. If income rises, it causes a decrease in demand for mortgages.

Third, the LTI ratio and overall mortgage demand have a positive and significant relationship. A 1 percent increase in the LTI ratio led to an increase in mortgage demand of 0.19 percent, according to previous studies: Roland E. Ubogu (1988) and Hwang et al (2011).

Fourth, IHPR and mortgage demand, especially in lower-middle-income provinces, have a positive and significant relationship. This is by previous research: Dajcman, S. (2020). A 1-level increase in IHPR caused an increase in mortgage demand by 1.85 percent.

Fifth, mortgage rates and mortgage demand, especially in lower-middle-income provinces, have a negative and significant relationship. This is consistent with previous research: Follain and Dunsky (1997). A 1 percent drop in mortgage rates led to a 6.09 percent increase in mortgage demand.

Fifth, after the policy of increasing the LTV ratio, the demand for mortgages in lower-middle-income provinces is greater than the demand for mortgages in upper-middle-income provinces. This is by previous research: Daodi et al (2019). Meanwhile, table 4.2 describes intercepts in each lower-middle-income province and upper-middle-income province. This explains how big the demand for mortgages in each province is if there are no other factors. In lower-middle-income provinces, the provinces with the highest demand for mortgages reflected in the highest intercepts are West Java (3.0752); East Java (2.7150); and Banten (2.1322) while the provinces with the lowest intercepts were West Sulawesi (-3.1297); North Maluku (-2.6642); and Maluku (-2.5363).

**Table 2**  
**intercept in lower-middle- and upper-middle-income provinces**

Lower-middle-income provinces		Lower-middle-income provinces	
Province	Intercept	Province	Intercept
Aceh	-0,6466	Kalimantan Timur	3,0374
Bali	1,2354	Kepri	1,8038
Banten	2,1322	Papua	1,4725
Bengkulu	-1,1048	Riau	1,1578
DIY	-0,1229	Kalimantan Utara	-8,2615
Gorontalo	-1,8878	DKI Jakarta	0,7898
Jambi	-0,0196		
Jawa Barat	3,0752		
Jawa Tengah	1,4963		
Jawa Timur	2,7150		
Kalimantan Barat	0,0009		
Kalimantan Selatan	0,8504		
Kalimantan Tengah	1,6939		
Kepulauan Babel	-0,7837		
Lampung	-0,1463		
Maluku Utara	-2,6642		
NTB	-0,6647		
NTT	-2,2107		
Papua Barat	-0,2128		
Sulawesi Barat	-3,1297		
Sulawesi Selatan	1,4244		
Sulawesi Tengah	-0,3577		
Sulawesi Tenggara	-0,4377		
Sulawesi Utara	0,2139		
Sumatera Barat	-0,1666		
Sumatera Selatan	0,8680		

Sumatera Utara	1,3865
Maluku	-2.5363

In addition, in upper-middle-income provinces, provinces with the highest demand for mortgages reflected in the highest intercepts are East Kalimantan (3.0374) and Riau Islands (1.8038) while provinces with the lowest intercepts are North Kalimantan (-8.2615) and DKI Jakarta (0.7898).

The majority of provinces in eastern Indonesia have lower intercepts compared to western Indonesia. This indicates uneven infrastructure development throughout Indonesia. Infrastructure development in eastern Indonesia is slower than in western Indonesia.

### Conclusion

Based on the results of this study, statistically shows that when the LTV ratio increases, the demand for mortgages in middle-low-income provinces is greater than the demand for mortgages in upper-middle-income provinces. In addition, other factors affect mortgage demand, such as GDP in the Real Estate sector, per capita income, IHPR, and mortgage interest rates. Per capita, income has a positive effect on mortgage demand throughout the province. This explains that mortgages reflect normal goods in all provinces. This means that an increase in revenue leads to an increase in demand for mortgages. Meanwhile, in lower-middle-income provinces, if there are no other influencing factors, then the provinces that have the highest demand for mortgages reflected in the highest intercepts are West Java, East Java, and Banten while the provinces with the lowest intercepts are West Sulawesi, North Maluku, and Maluku. In addition, in upper-middle-income provinces, provinces with the highest demand for mortgages reflected in the highest intercepts are East Kalimantan and Riau Islands while provinces with the lowest intercepts are North Kalimantan and DKI Jakarta.

The majority of provinces in eastern Indonesia have lower intercepts compared to western Indonesia. This indicates uneven infrastructure development throughout Indonesia. Infrastructure development in eastern Indonesia is slower than in western Indonesia. It can be seen that the contribution of the real estate sector in provinces in the western part of Indonesia is higher than in provinces in the eastern part of Indonesia. Reflected in the contribution of the real estate sector to GRDP, it is mainly in Banten province, followed by the provinces of Yogyakarta Special Region and DKI Jakarta. Meanwhile, the contribution of the real estate sector to the lowest GDP was in North Maluku, followed by Maluku and East Kalimantan.

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