

The influence of subsidized housing loans on prices on the real estate market in the Republic of Croatia

Sandra Klarić ¹, Petra Popek Biškupec ², Marin Pajić ³

¹Veleučilište Baltazar Zaprešić, Ul. Vladimira Novaka 23, Zaprešić, Republika Hrvatska, sandra.klaric@gmail.com

²Veleučilište Baltazar Zaprešić, Ul. Vladimira Novaka 23, Zaprešić, Republika Hrvatska, pbiskupec@bak.hr

³Veleučilište Baltazar Zaprešić, Ul. Vladimira Novaka 23, Zaprešić, Republika Hrvatska, mpajic@bak.hr

Abstract

The real estate market in the Republic of Croatia is characterized by high demand and rising real estate prices. The main question has arisen from questioning the justification of subsidized loans. Subsidizing housing loans were presented as a state aid measure aimed at providing housing for citizens, which will have a demographic effect and encourage urban regeneration. Due to high real estate prices, the question of the real effect of subsidies arises.

The goal of this paper is to analyse the connection between subsidized housing loans and the phenomenon of accelerated growth of real estate prices. The empirical part of the paper includes analysis of real estate prices before and after the subsidy program and analysis of correlations between banks' lending activities and real estate prices.

The results of the analysis show an increase in banks' lending activity and an increase in the number of sale transactions and increase of real estate prices since the beginning of the announcement of the housing loan subsidy program. The growth trend of these variables is preceded by the growth of demand in the real estate market. The data show a high correlation between real estate prices and lending activities of banks.

The paper contributes to the decision makers to improve future policy strategies and using state aid measures.

Keywords

credit activity, real estate market, subsidized loans

Introduction

The Act on Housing Loan Subsidization in Croatia was adopted in 2017 with the aim of solving the housing issue of citizens under crediting conditions that are more favourable compared to market conditions. This law has had the purpose of encouraging the demographic renewal of society, urban regeneration and reducing the number of young families leaving cities in Croatia. The state, through the Agency for Legal Transactions and Real Estate Brokerage, subsidizes the borrower for housing loans that citizens take out from credit institutions for the purchase of an apartment or house, or for the construction of a house. Subsidies range from 30% to 51%, depending on the development index of the individual municipality or city where the property that is the subject of the subsidy is located (Act on Housing Loan Subsidization, 2017).

However, with the introduction of subsidies to solve the housing issue, at the same time, there was an intense increase in the demand for buying real estate. The increase in demand also caused an increase in real estate prices, which calls into question the real value of subsidies, considering that for the same real estate, buyers pay a much higher price than before the introduction of the subsidy program.

According to the data of the Central Bureau of Statistics, since the beginning of the application of the Act on Housing Loan Subsidization, there has been a trend of increasing residential real estate prices in the Republic of Croatia. The subject of this paper is to analyse the impact of subsidized housing loans and the movement of residential real estate prices on the real estate market, bringing them into connection with the credit activity of banks. The aim of this paper is to investigate the influence of subsidized housing loans on the price movement of residential real estate on the real estate market in the Republic of Croatia. The research includes an analysis of real estate price trends before and after the subsidy program, as well as an analysis of the correlation between banks' credit activity and residential real estate price trends.

Research hypothesis is that subsidized housing loans caused the increase in real estate prices on the real estate market in the Republic of Croatia.

The paper is based on research, collection and analysis of data and it consists of a theoretical and analytical part. The correlation analysis confirmed the positive connection between the volume of subsidized housing loans and the real estate prices.

1. The real estate markets and the subsidy program

The real estate market is a specific market where various types of real estate are traded, and it is specific because of social sensitivity. Therefore, the regulation of the real estate market is subject to various strategic and political measures. The state influences the real estate market through the tax system, supervision of the construction sector, various incentive measures and other legal regulations (Lovrinčević and Vizek, 2008). Since 2020, the nominal residential real estate prices in European Union have accelerated rapidly and in 2022 the prices reached the highest growth rate of the last 20 years. This trend worries experts and regulators in view of the accumulation of the problem of over-indebtedness of the population and overheating of the economy. The mentioned phenomena preceded the development of the global financial crisis of 2008 (Lang et al, 2022).

In recent period, the real estate market in the Republic of Croatia has been characterized by very high demand, which is concentrated in the big cities of Croatia and the surrounding area. Citizens, especially young families, migrate from smaller towns to larger ones with the aim of increasing the standard of living. The supply of new apartments does not follow the demand for them. On the other side, the loan subsidy program that started in 2017, accelerated the turnover on the real estate market and since then prices have been rising rapidly.

The trend of increasing real estate prices, which started intensively a few years ago, was not stopped even by the pandemic crisis. Contrary to economic expectations, most European countries did not experience a drop in residential real estate prices. Hoesli and Malle (2021) analyse the impact of pandemic on prices of real estate on European markets. The authors found that in the residential sectors there was no significant decrease in real estate prices. Duca and Ling (2020) estimated short-run and long-run movements in capitalization rates and risk premia for commercial real estate prices. The analysis showed that there was a strong boost in commercial real estate prices, and that macroprudential regulation could limit the increase in real estate prices. The phenomenon of real estate price increase was accelerated by rapid growth of real estate investment funds. These investment funds have made huge impact at the real estate markets in euro area countries and contributed to boosting the upturn trends for commercial real estate prices (Daly et al., 2023)

According to the Institute of Economics Zagreb (2021) the number of sales transactions has increased significantly since 2015 which is characterized by the exit from the recession caused by the global financial crisis. Since the beginning of the subsidy program, sales transactions have grown to a greater extent than in previous years. In 2020 which was to be expected, a decline in sales transactions was recorded as a result of the crisis caused by the pandemic. This downward trend was partly influenced by the lockdown, because of which the construction of new apartments was stopped.

According to the data of the Agency for Transactions and Mediation in Immovable Properties (2021), public invitations to citizens to apply for subsidizing housing loans have been implemented in six cycles since 2017. Until 2021, mostly once a year except in 2020, when two cycles were conducted in March and September. So far, a total of 22194 subsidized housing loans have been approved, and during the subsidy period, 3923 children were born (according to the latest available data from September 2021), that is, 13,146 children (up to 18 years old) were registered for an additional year of subsidy per child, which shows the demographic effect these state measures. In the last round of the subsidy program, which lasted from 29.03. until May 24, 2021. The average amount of the subsidized loan was EUR 76,000.00, and the average repayment term is 22 years. The average age of the loan beneficiary is 33 years, and the average monthly instalment or annuity is EUR 378,00 or HRK 2.835,00 (the exchange rate 7,5), of which the monthly subsidy is EUR 125,00 or HRK 937,50 (the exchange rate 7,5) effective interest rate averages 2.17%, and nominal interest rate 2,07% per year (Agency for legal transactions and real estate mediation, 2021). After comparing the real estate price growth and the dynamics of subsidy program, it could be conducted that there is a connection between these two variables. Kunovac and Žilić (2021) find that the introduction of the subsidy disrupted the usual monthly dynamics of housing transactions, which became highly concentrated in the month in which subsidy applications were submitted. The analysis was made for the period from 2015 to the end of 2019. Applying the event study method, the authors conclude that real estate prices increased in the period of introduction of the subsidy. By applying the built-in rules of subsidizing housing loans, which refer to the limits of the subsidy amount, the result is that for smaller and older apartments, a higher price increase is recorded, which coincides with the introduction of the subsidy. Tica (2020) conducted the research for the period 2003 to 2019 in order to

identify the key factors in the movement of the residential real estate price index in Croatia. The results indicated that there are differences in the factors that explain the movement of residential real estate prices in Zagreb compared to the Adriatic and the rest of Croatia. In the period after the start of the housing loan subsidy program, a statistically significant increase in the prices of residential real estate in Zagreb was identified, which could not be explained by other variables in the model.

2. Data and methodology

According to Vizek et al (2021), in the recent few years the number of sales transactions has increased, both as the value of sales transactions. In 2020 it was recorded a decrease in the number of purchase transactions by 13,9%, but the value of purchase transactions decreased by a slight 1,26% compared to the previous year, which means that prices, regardless of the decrease in the number of purchase transactions, increased compared to the previous year. The city of Zagreb recorded the largest number of sales transactions. In 2020, compared to 2019, medial prices grew by 5,52%, while in 2019 compared to 2018 medial prices grew by 7,80%, which means that in 2020 prices grew more slowly than in 2019. The highest median price in 2020 was recorded the Split-Dalmatia County followed by the city of Zagreb.

The real estate market since 2012 until the end of 2015 was recovering from the recession caused by the global financial crisis. Since 2016 real estate prices begins to rise with occasional negative growth rates in certain time sequences. Since 2017 price growth on the real estate market has been accelerating. According to data of Croatian Bureau of Statistics (2021) the trend of the three-month rates of change in the prices of residential buildings in the Republic of Croatia showed a significant increase in prices, which was followed by a drop until the third quarter of 2015 in which there were positive changes in the growth rate. Until the announcement of the loan subsidy program at the beginning of 2017, prices recorded a negative growth rate, what is visible in the second and fourth quarters of 2016. In the first quarter of 2017 a significant increase in prices was recorded, which continued to rise during the following years. Negative rates of price change were recorded in the second quarter of 2018 and the third quarter of 2020. Negative rates of price change slightly reduced the overall growth rate until the second quarter of 2021. Since the end of 2015 until

the second quarter of 2021, the prices of residential buildings in the Republic of Croatia increased by 39%.

The price indices for residential buildings (Croatian Bureau of Statistics, 2022) show that since the end of 2015 until the second quarter of 2021 the prices of new buildings increased by 19%, while the prices of existing buildings increased by 43% in the same period. The largest increase in the prices of new buildings was recorded in the first quarter of 2019, and the largest increase in the prices of existing buildings was recorded in the third and fourth quarters of 2017. The biggest drop in the prices of new buildings, or a negative growth rate, was recorded in the first quarter of 2015, and for existing buildings in the fourth quarter of 2012.

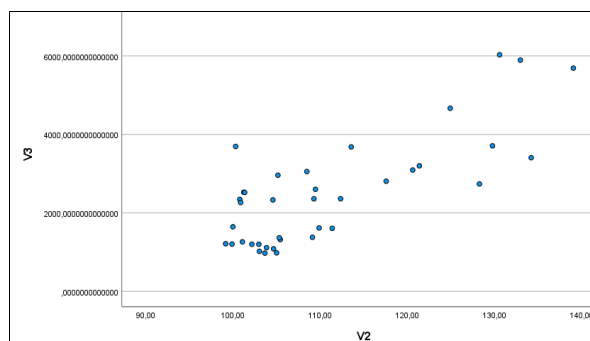
The city of Zagreb records a high increase of 55% in prices since the end of 2015 until the second quarter of 2021. The highest growth rate in Zagreb was recorded in the second quarter of 2019 and 2021, the highest negative growth rate was recorded in the second quarter of 2013. In the same period, real estate prices on the Adriatic rose by 34%. The highest growth rate in the area was recorded in the first quarter of 2019, and the highest negative growth rate in the fourth quarter of 2012. In the rest of the Republic of Croatia, prices rose by 22% in the same period. The highest growth rate was recorded in the second quarter of 2017. while the biggest drop in prices was recorded in the fourth quarter of 2014.

Finally, there is a visible gap in the prices of real estate compared to the period before the subsidy program began. It is important to point out that the start of subsidizing loans is announced months in advance, and with the first announcement, prospective loan beneficiaries start looking for real estate. So, the price movement should be observed throughout the whole year starting from the beginning of the year when the decision for subsidy program was made.

The data were analysed using correlation analysis. According to Pauše (1993), if one wants to determine the nature of the relationship between the dependent variable and the independent variable, the same can be done by performing a regression analysis. In this case, a linear regression analysis was applied, whereby the contracted amounts of housing loans were observed as a dependent variable (variable V2) and the price indices of residential real estate as an independent variable (variable V3). Figure 1 shows the distribution of data on the amount of subsidized housing loans in relation to the price index and the associated linear function. From the regularity of the distribution of points in the scatter plot, it can be

concluded that the variables are correlated, that is, that there is a positive correlation.

FIGURE 1: THE SCATTER GRAPH OF RESIDENTIAL REAL ESTATE IN RELATION TO THE REAL PRICE INDEX



V2 – The real estate price index

V3 – The volume of subsidized loans

Source: Own elaboration

The relationship between two quantities can be quantified using the Pearson correlation coefficient. Correlation will show how much a change in the value of one variable affects the value of another variable (Papić, 2008). The closer the absolute value of the correlation coefficient is to zero, the weaker the connection between the observed variables.

The correlation analysis was performed in Microsoft Excel and the correlation coefficient $r=0.78$ was calculated. For $r>0$, there is a positive correlation, which implies that as the value of one variable increases, the value of the other variable increases on average, and if the correlation coefficient is $r>=0.5$, the correlation is said to be significant (Pauše, 1993).

The established coefficient means that the amounts of subsidized housing loans are positively correlated with the real estate price, and it is to be expected that when new subsidy program is announced, the real estate prices will also increase.

TABLE 1: THE CORRELATION BETWEEN REAL ESTATE PRICES AND THE AMOUNT OF SUBSIDIZED HOUSING LOANS

Variable	Variable2	Correlation	Statistic	Statistic		Notes
				Count	Lower C.I.	
V2	V3	,781	38	,615	,881	

Missing value handling: PAIRWISE, EXCLUDE. C.I. Level: 95.0

Source: Own elaboration

After the correlation was conducted, the regression analysis confirmed the impact of subsidized housing loans on real estate price increase.

The values of the dependent variable PE (real estate prices) are related to the values of the independent variable SL (subsidized loans) as follows:

$$PE_i = \alpha + \beta SL_i + e_i \quad (i = 1, \dots, n) \quad (1)$$

where PE_1, PE_2, \dots, PE_n are the values of the independent (predictor) variable SL, e_1, e_2, \dots, e_n are unknown error components added to the linear connection. These are random variables that are assumed to be mutually independent and that they all have normal distribution with expectation 0 and the equal variance σ^2 . The α and β are unknown parameters of the assumed relationship and they are supposed to be estimated.

TABLE 2: MODEL SUMMARY

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,781 ^a	,610	,600	7,22714

a. Predictors: (Constant), V3

Source: Own elaboration

Coefficient of determination R^2 , as an indicator of the representativeness of the regression model, confirms the robustness of the model. Although it is considered that the coefficient of determination should be as close as possible to 1, in practice the limit of representativeness is considered up to 0.6, due to the complexity of the phenomena. Therefore, the model is accepted, given that the representativeness is greater than 60%.

TABLE 3: MODEL SUMMARY

Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	2946,07	1	2946,07	56,404	<,001 ^b
	Residual	1880,33	36	52,23		
	Total	4826,40	37			

Predictors: Constant, the amount of subsidised loans

Source: Own elaboration

The coefficient of variation of the regression, which represents the percentage of the standard error of the regression from the arithmetic mean of the variable y is less than 30%, so the model is representative. According to the analysis of variance, there is no significant difference between the arithmetic means, so the samples belong to the same population.

TABLE 3: COEFFICIENTS

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	94,86	2,43		39,02	<,001
V3	,006	,001	,781	7,51	<,001

Dependent Variable: V2

Source: Own elaboration

The analysis confirmed that change in level of subsidized housing loans affect the real estate prices in positive direction. Both variables strive in the same direction.

3. Conclusion

After the correlation analysis, a positive connection between the increase in subsidized loans for the purchase of real estate and the prices of residential real estate was confirmed. The correlation coefficient of 0,78 confirms a strong positive association. The regression analysis confirmed the significance of the influence of the level of subsidies on the growth of real estate prices. The conducted research proves that the subsidy measures did not achieve the full effect of the population policy, given that the real value of the purchased real estate is significantly higher than what it would be if there were no subsidy program. Because of the above, the question arises of the justification of applying the subsidy model in this way. Based on the research results, decision makers and policy makers can shape future measures that will realize the planned strategies on a more significant scale.

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