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THE IMPACT OF MACROECONOMIC FACTORS ON REAL ESTATE PRICES: EVIDENCE FROM SPAIN AND CROATIA

Abstract

Purpose: The paper deals with the comparison of real estate price trends in two European markets such as Spain and Croatia, well-known tourist destinations. Trends in macroeconomic variables in the period from 2013 to 2022 were considered, such as the house price index, overdue mortgage or rent payments, direct investment, production in construction, real GDP per capita, average adjusted wage per employee and unemployment rate. The aim of this study is to compare real estate prices in these two countries with regard to macroeconomic variables.

Methodology: The applied methodology is based on the model averaging technique, which has been used in a few previous similar research studies.

Results: The obtained results point to the fact that real estate price movements are strongly negatively influenced by the unemployment rate in both observed countries.

Conclusion: The real estate prices in Croatia are strongly negatively influenced by arrears on mortgage or rent payments, while in Spain, they are strongly positively influenced by production in construction. Recommendations for further research refer to research that would cover a wider range of Southeast European countries with common characteristics of strongly developed tourism.

Keywords: Determinants of real estate prices, macroeconomic factors, real estate market, model averaging technique

1. Introduction

The growth of real estate prices has been a trend in the last few years in all tourist destinations in Europe. Many studies have been conducted on the subject of the real estate market in order to determine what factors most influence price changes. While Spain and Croatia demonstrate a similar orientation towards tourism, additional research is important to determine which variables influence real estate prices in each country and whether these variables align or differ between the two countries.

Concerning the examination of price dynamics within the Spanish real estate market, one of the focal countries in this analysis, inflation is currently experiencing a notable increase, aligning closely with trends observed across the Eurozone. In response to this scenario, European regulatory bodies have decided to increase the nominal interest rate, or Euribor, as a measure to manage inflationary pressures. These macroeconomic policy decisions exert multifaceted impacts, influencing, firstly, the cost associated with mortgage loans in Spain. Additionally, they affect broader economic indicators such as growth rates and job creation. Consequently, the rate of escalation of property market prices in Spain is predicted to slow down, which can be attributed to the limited availability of mortgage financing. However, the trajectory of property prices in Spain has exhibited an unconventional pattern since the start of the pandemic, showing increased activity amid international economic uncertainty.

The real estate market in Croatia has experienced significant growth in recent years, with property prices reaching unprecedented levels. Apart from the entry into the Eurozone, what strongly influences the growth of real estate prices in Croatia is the developed tourism industry, which is now opening its doors to foreigners who want to engage in tourism in the Republic of Croatia. In addition, COVID-19 and remote work have prompted many EU citizens to buy real estate in Mediterranean countries. Similarly to Spain, there is a strong influence of inflation growth on the prices of goods and services and thus on the real estate market.

The subject of this research analyzes the real estate markets in Spain and Croatia, focusing on real estate prices and macroeconomic variables typically used in similar research, namely: direct mortgage or rent payments, investments, production in construction, real GDP per capita, average adjusted wage per employee and unemployment rate. Therefore, the null and alternative hypotheses are established as follows: The null hypothesis posits that none of the selected variables significantly influence housing prices, while the alternative hypothesis asserts that at least one variable has a non-zero coefficient that impacts housing prices.

Given that the real estate market is renowned for its high volatility within the economy, the relationship between real estate prices and macroeconomic factors has garnered substantial attention from both researchers and policymakers in recent decades. For economists who subscribe to the notion that government policies can effectively manage the economy, the real estate market emerges as a crucial instrument in this management process. Consequently, this analysis seeks to shed light on whether the price trends in real estate can be elucidated by macroeconomic fundamentals. Considering the plethora of studies conducted in transitional economies, we can discern how the findings in this country compare to those in nations of similar development levels.

Conversely, the econometric methods employed to scrutinize the determinants of real estate can be categorized into several groups: vector autoregressive models (VAR models), error correction models (ECM) approaches, panel regression, and simple and multiple linear regression. This study will employ a methodology founded on the model averaging technique; to the best of our knowledge, this method has been infrequently utilized in prior research addressing this subject in other countries.

The applied methodology is based on the model averaging technique, which has not been used often in previous research on real estate prices. The obtained results point to the fact that the movement of real estate prices best describes and is most closely related to unemployment and late mortgage or rent payments. The first part provides an overview of the results of empirical studies which examined real estate price determinants. The second part describes the data and defines the variables which will be included in the model. The third part describes the methodology that was used for data modeling, and subsequently moves on to the analysis of the empirical results. The last part of the study summarizes the most important results of the analysis which was carried out.

2. Theory review

In the last few decades, numerous authors have dealt with the real estate industry and researched what affects the movement of real estate prices. Different macroeconomic variables were examined in different countries, such as gross domestic product, GDP (Adams & Fuss, 2010), interest rates, budget ratio, mortgage rate, industrial production, consumption of households foreign direct investment, real shares price, income and inflation rate, (Lovrinčević & Vižek, 2008, Grum & Govekar, 2016), trade, unemployment rate (Kotseva and Yanchev, 2017), construction costs and number of households (Pashardes & Savva, 2009; Sivitanies, 2015), the current account balance (Allen et al., 2016), the price of business real estate (Giussani et al., 1993), and others. The influence of these macroeconomic variables was examined with the help of different methodologies such as Ordinary Least Squares (OLS), the multiple linear regression model (Grum and Govekar, 2016; Gas-

pareniene et el., 2017), the Analytic Hierarchy Process (APH) (Tupenaite et al., 2017), the ECM model (Lovrinčević & Vižek, 2008; Weiner & Fuers, 2015), Structural Vector Auto Regression (SVAR) (Dumičić et al., 2012), and the model averaging technique (Radonjić et al., 2019). Most of the authors agreed that many of these macroeconomic variables influence the movement of real estate prices, but there are also authors that prove the opposite relationship. The movement of real estate prices affects the movement of macroeconomic variables. The authors such as Mavrodiy (2005), Hon-Chung (2009) and Grum and Govekar (2016) claimed that the prices of real estate and activity are different in different countries due to a specific environment. GDP and unemployment are the most important factors linked to the price of business real estate rental (Chin, 2003).

In reference to Spain, there are several authors that indicate previous evidence. Authors Álvarez-Román and Garcia-Posada (2021) evaluate whether real house prices in Spain are justified by their long-run fundamentals, such as per capita real income, unemployment rate and population density. They assess house price overvaluation across the 50 Spanish regions in the period from 1985 to 2018. As overvaluation is mostly explained by high household leverage and the business cycle. Zhenyu and Taltavull (2020) examine the macroeconomic determinants that affect International Capital Flows towards the Spanish real estate market over the period from 1995 to 2017. This paper notes that another reason for the increase in Spanish real estate prices is the association with Spanish economic growth. It suggests that as GDP growth rates increase, the flow of capital into the real estate sector will rise, potentially increasing the willingness to purchase Spanish real estate and driving up prices. Lourenco and Rodrigues (2014) present a significant expansion of residential investment since 2000, well above GDP dynamics. An indicator of excess housing stock suggests that around 30% of dwellings in Spain were excess in 2006. From 2007 onward, there was a sharp contraction of residential investment in Spain, which is distinct from the less pronounced evolution of GDP. Ghirelli et al. (2023) provide a metric to measure the synchronization of housing price cycles across Spanish cities and study changes in city-level price synchronization over time. They focus on the period from the first quarter of 1989 to the first quarter of 2018. In this study, the authors show that differences in population growth and economic structure are key factors in explaining the evolution of house price synchronization across Spanish cities.

3. Data description

This paper uses annual data from 2013 to 2022. The data were collected from the Eurostat database. The dependent variable is the House price index that captures price changes of all residential properties purchased by households (flats, detached houses, terraced houses, etc.), both new and existing, independently of their final use and their previous owners. Only market prices are considered, self-build dwellings are therefore excluded. The land component is included. The data is expressed as an annual average index 2015=100, showing the three-year percentage change and the annual average rate of change. The independent variables are Arrears on mortgage or rent payments, Direct investment[1], Production in construction, Real GDP per capita[2], Average full time adjusted salary per employee, and Total unemployment rate[3], as shown in Table 1. All variables are collected for two observed countries – Croatia and Spain.

Table 1 Macroeconomics variables and symbols

Variable	Symbol
House Price Index (dependent variable)	HPI
Arrears on mortgage or rent payments	AOM
Direct investment	DI
Production in construction	PIC
Real GDP per capita	GDP
Average full time adjusted salary per employee	SALA
Total unemployment rate	UNEM

Source: Created by the authors

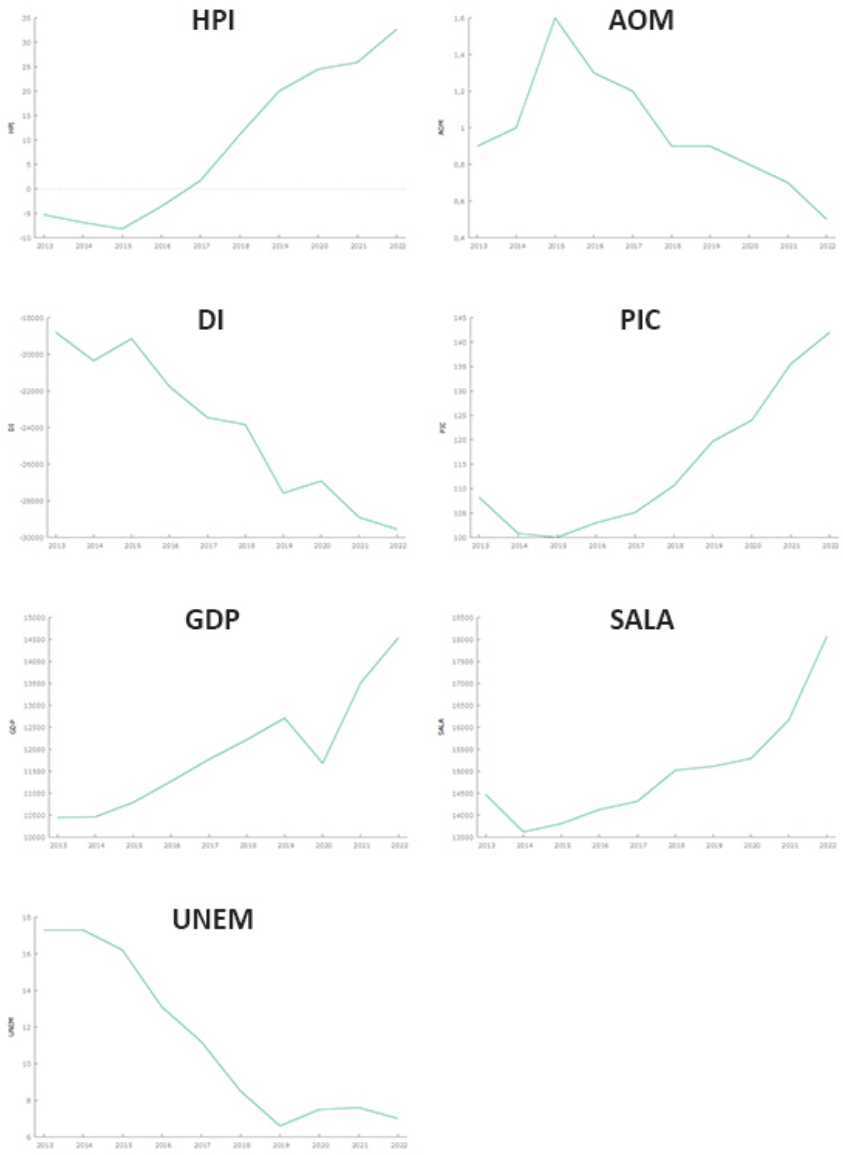
1 Data for the independent variable Direct investment is used as a value in million of units regarding the national currency.

2 The indicator is calculated as the ratio of real GDP to the average population of a specific year.

3 Data for the independent variable Total unemployment rate refers to unemployed people between the ages of 15 and 74.

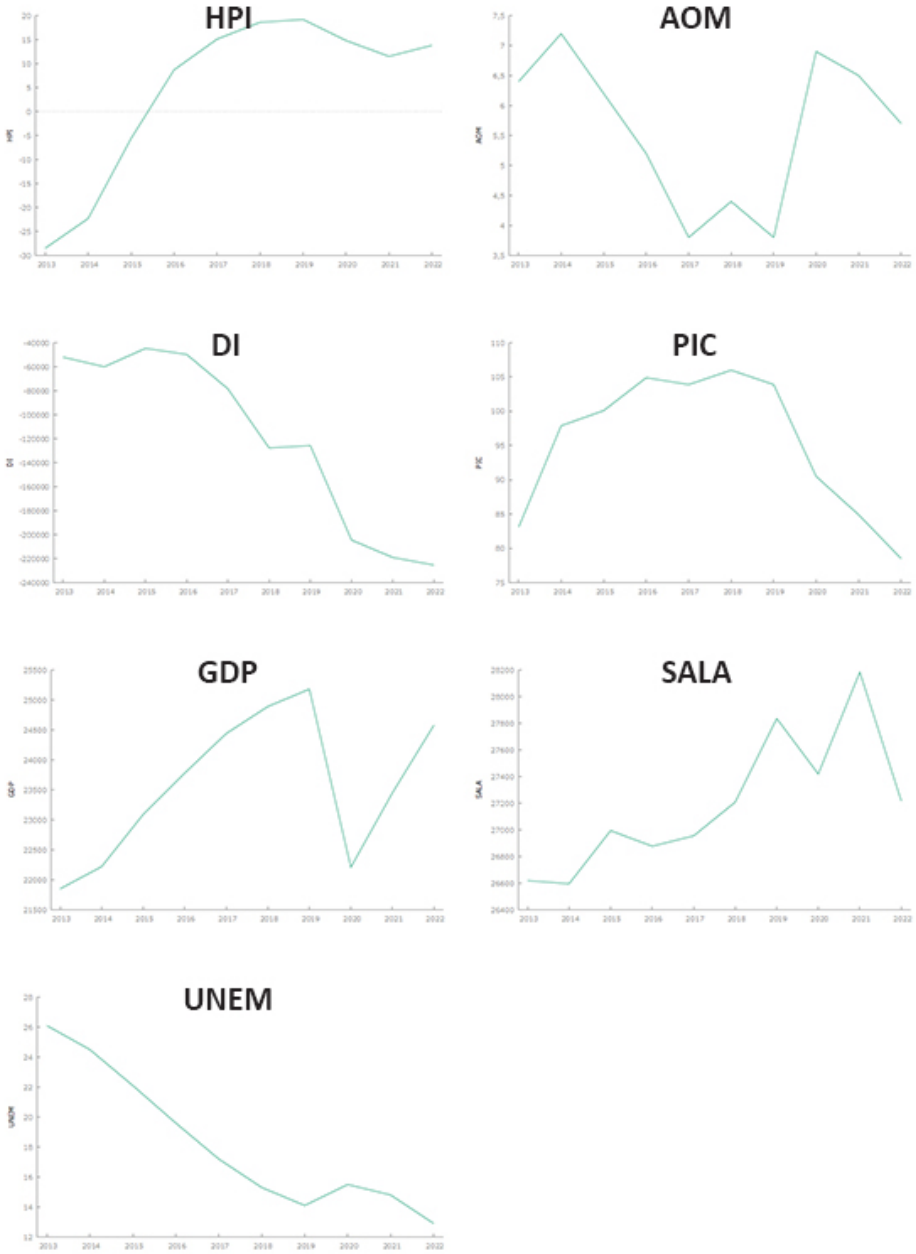
The first step in creating a model is to see the trends for the observed periods. Figures 1 and 2 show the trends for Croatia and Spain, respectively.

Figure 1 Variable trends for Croatia



Source: Created by the authors

Figure 2 Variable trends for Spain



Source: Created by the authors

Given that both Croatia and Spain have a significant share of GDP in tourism, for the purposes of this paper we use annual instead of quarterly data due to seasonal fluctuations. From the attached trends, we can see that Croatia and Spain have very similar trends in individual variables. The dependent variable, the house price index, has followed a positive trend since 2015 for Croatia, or since 2014 for Spain. Since 2015, the variable Arrears on mortgage or rent payments has been decreasing in Croatia year by year, while in Spain, the decline started in 2014. The lowest values in Spain were recorded in 2017 and 2019, but there has been a sudden increase since 2020. The Direct investment variable is very similar for Croatia and Spain and it follows a negative trend. Production in construction has followed a positive trend in Croatia since 2015, while in Spain, there has been a sharp decline since 2020. GDP had a positive trend until 2020 when, due to the pandemic, GDP decreased for both countries. Average full-time adjusted salary per employee follows a positive trend for both countries, while the Total unemployment rate is negative, i.e. decreasing.

Table 2 provides a summary of the descriptive statistics for the defined variables in both countries.

Table 2 Descriptive statistics for the defined variables

	CROATIA				SPAIN			
Variable	**Mean**	**Std_dev**	**Min**	**Max**	**Mean**	**Std_dev**	**Min**	**Max**
HPI	9.19	15.56	-8.2	32.7	4.53	17.31	-28.5	19.2
AOM	0.98	0.32	0.5	1.6	5.61	1.25	3.8	7.2
DI	-24030.1	4020.42	-29551	-18799	-118722	73563.16	-225376	-44657
PIC	114.89	14.86	100	142	95.37	10.25	78.5	106
GDP	11940	1340.59	10450	14540	23569	1203.27	21850	25180
SALA	15000.4	1321.36	13620	18069	27190.3	508.86	26595	28184
UNEM	11.23	4.42	6.6	17.3	18.21	4.62	12.9	26.1

Source: Created by the authors

For the analyzed period, the average House price index is 9.19 in Croatia and 4.53 in Spain. The maximum achievement in Croatia was 32.7 in 2022 and 19.2 in Spain in 2019, and the minimum achievement of -8.2 was recorded in Croatia in 2015 and -28.5 in Spain in 2013. In the same period, an average for Arrears on mortgage was 0.98 in Croatia and 5.61 in Spain, with a minimum of 0.5 and a maximum of 1.6 in Croatia, and a minimum of 3.8 and a maximum of 7.2 in Spain. Direct investment has a negative mean od -2,4030.1 and -118,722 with a minimum of -29,551 and -225,376 and a maximum of -18,799 and -44,657 for Croatia and Spain, respectively. Production in construction has a higher average for Croatia than for Spain. For Croatia, an average is 114.89, with a minimum of 100 and a maximum of 142, while for Spain, an average is 95.37, with a minimum of 78.5 and a maximum of 106. On the other hand, Spain has a higher GDP and Average full time adjusted salary per employee. GDP for Spain averages 23,569, and for Croatia, the average GDP is 11,940. Average full time adjusted salary per employee is 15,000.4 for Croatia and 27,190.3 for Spain. The total unemployment rate for Croatia is 11.23, and for Spain, it is 18.21.

4. Methodology

The specification of the model examining the impact of macroeconomic variables on the House Price Index in Spain and Croatia is based on economic theory, particularly macroeconomic principles. It employs a multiple linear regression model, using the model averaging technique (Radonjić et al., 2019) based on Freedman's paradox (Freedman, 1983). This model incorporates one or two possible combinations of macroeconomic indicators, with time lags ranging from zero to three. We used a longer lag because the effects of housing price determinants are present over a longer time (Mallick and Mahalik, 2015). Steel (2020) interprets the rapid growth in the use of model averaging methods in economics as an acknowledgment of the significant benefits that can be achieved by adopting

principled approaches as a powerful methodology for addressing uncertainty.

The data used in this research was collected from the Eurostat. The collected data is annual, and the observed time series refer to the period from 2013 to 2022.

After the variables have been defined, it is necessary to set up a mathematical equation of the considered multiple regression model for Croatia (1) and Spain (2), using the least squares method in the following form:

$$Y\,(CRO) = C + \beta1X1 + \beta2X2 + \beta3X3 + \beta4X4 + \beta5X5 + \beta6X6 + \varepsilon i, \quad (1)$$

$$Y\,(ESP) = C + \beta1X1 + \beta2X2 + \beta3X3 + \beta4X4 + \beta5X5 + \beta6X6 + \varepsilon i, \quad (2)$$

where:

Y – the House Price Index,
C – a constant,
X1, X2, X3, X4, X5, X6 – annual values of indicators of independent variables,
β1-6 – values of the associated reactivity coefficients,
εi – residual value.

In addition to setting the mathematical equation of the model, the null and alternative hypotheses have also been formulated:

I. Definition of the null hypothesis according to which no regressor variable in the model is significant: H0: $\beta1 = \beta2 = \beta3 = \ldots = \beta n = 0$.

II. Alternative hypothesis: There is at least one non-zero variable: HA: $\beta n \neq 0$.

The tests performed on the variables are the multicollinearity and stationarity test, the extended Dickey-Fuller unit root test and OLS regression analysis.

5. Results

The first test performed is the multicollinearity test, that is, the determination of variables whose mutual collinearity is greater than 80%. Based on the multicollinearity test, it was determined that the relevant independent variables for the Croatian model are Arrears on mortgage or rent payments and Total unemployment rate. Arrears on mortgage or rent payments, Total unemployment rate and Production in construction are relevant independent variables for the Spanish model. We examined possible combinations with one and two independent variables for Croatia, and one, two and three independent variables for Spain, with a time lag ranging from zero to four. We assessed 70 models, and out of 70 models, we chose models whose coefficient of determination is over 0.9, so we have five models for Croatia and four models for Spain, as can be seen in Tables 3 and 4.

Table 3 Assessed models for Croatia HPI_CRO

Dependent	Model	# of variables	Variable	Coefficient	StdError	t-ratio	p-value	R^2	Adj. R^2
HPI	CRO_120	2	AOM	-19.0822	5.61623	-3.398	0.0115	0.9381	0.9205
HPI	CRO_120	2	UNEM	-2.40603	0.23502	-10.24	1.83e-0.5	0.9381	0.9205
HPI	CRO_220	2	log (AOM)	-18.0838	3.30468	-5.472	0.0009	0.9679	0.9588
HPI	CRO_220	2	log (UNEM)	-27.3861	2.56737	-10.67	1.4e-05	0.9679	0.9588
HPI	CRO_420	2	lag (AOM), -1	-6.5805	4.43332	-1.484	0.1883	0.9570	0.9427
HPI	CRO_420	2	lag (UNEM), -1	-3.2105	0.19299	-16.64	3.01e-06	0.9570	0.9427
HPI	CRO_412	1	lag (UNEM), -1	-3.4368	0.26608	-12.92	3.87e-06	0.9468	0.9393
HPI	CRO_512	1	lag (UNEM), -2	-3.31514	0.27568	-12.03	2.01e-05	0.9455	0.9364

Source: Created by the authors

The impact of macroeconomic factors on real estate prices modeled on the House Price Index in Croatia is explained by two single-factor and three double-factor models. The most significant model appears to be the double-factor model with log AOM and log UNEM, as shown in Table 3. The coefficient for AOM is -18.0838, and for UNEM it is -27.3861, with a p-value of 0.0009 for AOM and 1.4e-05 for UNEM. The coefficient of determination is 96.79%, which makes it a statistically significant model.

Table 4 Assessed models for Spain HPI_ESP

Dependent	Model	# of variables	Variable	Coefficient	StdError	t-ratio	p-value	R^2	Adj. R^2
HPI	ESP_130	3	AOM	-0.207457	1.42727	-0.1454	0.8892	0.9655	0.9483
HPI	ESP_130	3	PIC	0.477688	0.111138	4.298	0.051	0.9655	0.9483
HPI	ESP_130	3	UNEM	-3.52220	0.154974	-22.73	4.75e-07	0.9655	0.9483
HPI	ESP_121	2	AOM	-3.16420	1.33952	-2.362	0.0502	0.9219	0.8995
HPI	ESP_121	2	UNEM	-3.12114	0.444727	-7.018	0.0002	0.9219	0.8995
HPI	ESP_123	2	PIC	0.492927	0.087944	5.605	0.0008	0.9654	0.9555
HPI	ESP_123	2	UNEM	-3.54895	0.188683	-18.81	2.98e-07	0.9654	0.9555
HPI	ESP_223	2	log (PIC)	54.9915	10.0940	5.448	0.0010	0.9459	0.9304
HPI	ESP_223	2	log (UNEM)	-66.9303	4.75363	-14.08	2.16e-06	0.9459	0.9304

Source: Created by the authors

The impact of macroeconomic factors on real estate prices modeled on the House Price Index in Spain is explained by four double-factor models and one triple-factor model. The most significant model appears to be the double-factor model with PIC and UNEM, as shown in Table 4. The coefficient for PIC is 0.492927, and for UNEM it is -3.54895, with a p-value of 0.0008 for PIC and 2.98e-07 for UNEM. The coefficient of determination is 96.54%, which makes it a statistically significant model.

6. Discussion

The aim of this study is to compare real estate prices between Croatia and Spain with regard to macroeconomic variables. In terms of the Spanish real estate market, in this study, we estimate that the dependent variable, the House Price Index, has followed a positive trend since 2014. The variable Arrears on mortgage or rent payment was declining until 2019, but from 2020 onwards, a sudden increase has been observed. Production in construction in Spain shows a sharp decline since 2020. GDP in Spain showed a positive behavior until 2019, but decreased very sharply in COVID-19 pandemic, in 2020. Currently, Spanish GDP stood at 6.4% and 5.8% in 2021 and 2022, respectively. The average full-time adjusted salary per employee follows a positive trend, while the total unemployment rate is negative. Thus, our results obtained from Spain in our OLS model that includes HPI= AOM+UNEM+PIC (in Table 1, see macroeconomics variables and symbols) for Spain are relevant. However, if we exclude the Arrears on mortgage or rent payments variable from the Spanish model (HPI = PIC + UNEM), we get better results with the coefficient of determination. The obtained results in this second model point to the fact that real estate price movements are strongly influenced by the behavior of unemployment and Production in construction in Spain. Thus, a downward trend in unemployment would reactivate domestic demand for housing and, together with an increase in construction production costs due to higher raw materials, transportation, and financing costs, would lead to higher prices in the Spanish real estate market.

Croatia and Spain are famous touristic destinations that have a significant share of GDP and show very similar trends of individual variables in our research. The dependent variable, the House Price Index in Croatia has followed a positive trend since 2015, and the variable Arrears on mortgage or rent payments has been decreasing year by year.

The Direct investment variable is very similar for Croatia and Spain and it follows a negative trend. Production in construction has followed a positive trend in Croatia since 2015. GDP recorded a positive trend until 2020 when, due to the pandemic, GDP decreased for both countries. The average full-time adjusted salary per employee follows a positive trend for both countries, while the Total unemployment rate is negative, i.e. decreasing. Thus, our results obtained from Croatia in our OLS model that includes HPI = log AOM + log UNEM (in Table 2, see macroeconomics variables and symbols) for Croatia are relevant. The obtained results in the model point to the fact that real estate price movements are strongly negatively influenced by the behavior of unemployment and the Arrears on mortgage or rent payments, which reduce income for commercial banks, can threaten financial stability, damage a household's future creditworthiness, and reflect the extent of financial difficulties faced by households and the distributional effects within an economy. They may also indicate that households are unable (or unwilling) to move to more affordable dwellings. Arrears are thus associated with diminished labor mobility, which may reduce the speed at which an economy recovers from a recession (for more details, see Gerlach-Kristen & Lyons, 2015). Buiter (2010) also argues that changes in house price impact consumption, as real estate can be used as collateral for consumer loans. Housing prices are determined by income per capita real interest rates and credit availability (Egert & Mihaljek, 2007). Grum and Govekar (2016) show that higher unemployment is associated with lower residential property prices in Greece, France, Poland and Norway. This in the line with the results of our research in Croatia and Spain. Both countries are EU countries that struggled with the 2008 crisis. Croatia, like other transitional countries still has many economic challenges (see Radonjić et al. (2019) for Montenegro, Stanković (2022) for Bosnia and Herzegovina). We proved that production in construction has a positive impact on real estate prices in Spain, as expected and claimed before (see Ma et al., 2017).

7. Conclusion

The study analyzes Croatia and Spain in the light of real estate prices and measures the impact of various macroeconomic variables on the volatility of those prices. Our research applied the model averaging technique to time-lagged variables in various combinations, following similar studies referenced in the literature. In the first step, we included variables such as Arrears on mortgage or rent payments, Direct investment, Production in construction, Real GDP per capita, Average full-time adjusted salary per employee and Total unemployment rate. After the multicollinearity test, we conclude that the independent variables relevant for the Croatian model are Arrears on mortgage or rent payments and Total unemployment rate. Independent variables Arrears on mortgage or rent payments, Total unemployment rate and Production in construction are relevant for the Spanish model. After applying more than 70 models, we found that the unemployment rate has a strong negative impact on house prices in Croatia and Spain, a finding that is corroborated by numerous other researchers and across various countries.

Our results are in the line with other research studies and most of them confirmed that when unemployment is high in a country, the real estate industry experiences a downturn, resulting in less construction activity, fewer loans granted to businesses and households, and an overall stifling of economic development. Production in construction in Spain shows a sharp decline since 2020 and confirms our assumptions that growth of the real estate industry is strongly influenced by the expansion of the construction industry. Arrears on mortgage or rent payments should have a negative influence on real estate prices, which is confirmed for Croatia in our research. Delays in payments lead to non-performing loans, prompting financial institutions to exercise greater caution when approving loans. This, in turn, reduces demand for real estate, causing real estate prices to decline.

At the end of 2023, real estate prices in both Croatia and Spain increased significantly. Both countries are strongly tourist-oriented. Spain had a strong rise in prices when the Euro was introduced back in 2002. Since then, there has been significant growth in real estate prices, excluding the years of global crisis in 2008 and 2009. Croatia, on the other hand, recorded a substantial increase in real estate prices, which was further intensified by its entry into the Eurozone in 2023. Inflationary pressures, present in all EU countries, also contributed to this trend.

However, several limitations warrant consideration. Firstly, the reliance on historical data may restrict the ability of the study to capture sudden

market shifts or structural changes. Additionally, the focus on macroeconomic variables may overlook nuanced local dynamics or regional variations within Croatia and Spain, potentially limiting the generalizability of findings. Recommendations for further research suggest exploring a broader range of Southeast European countries with similar characteristics of strong tourism sectors. Such studies could offer deeper insights into the interplay between tourism, macroeconomic variables, and real estate dynamics, thus facilitating more comprehensive policymaking and market forecasting in the region. Additionally, exploring the long-term implications of economic integration, such as Croatia's entry into the Eurozone, on real estate markets warrants further investigation to inform future decision-making processes. Further research could analyze some additional factors, such as geopolitical tensions, global economic trends, cultural differences, regulatory measures, digital platform industry, environmental sustainability, consumer behavior and risk propensity in investment that could influence the observed dynamics of real estate prices in Croatia and Spain.

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