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## Influence of Macroeconomic Factors on Prices of Real Estate in Various Cultural Environments: Case of Slovenia, Greece, France, Poland and Norway

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### Abstract

Based on the multiple linear regression model, we investigating which of the observed macroeconomic factors: the unemployment rate, the current account of the country stock index, gross domestic product and industrial production are significantly associated with property prices in relation to the different cultural environments: Slovenia, Greece, France, Poland and Norway. We found that there are statistically significant correlations between the prices of residential real estate and selected macroeconomic factors. The results show a distinct pattern that applies to France, Greece, Norway and Poland, where the price of real estate observed statistically significantly associated with unemployment. In the case of Slovenia, the results show that a statistically significant relationship reflects only to a share index. That is illustrated by the finding that prices in Slovenia on an annual basis, between the observed cultural environments in the observed time interval, most declined.

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**Keywords:** Real estate, Slovenia, Poland, Greece, Norway, prices of real estate, macroeconomic factors

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## 1. Introduction

Real estate market and real estate prices are closely linked with general economic cycles (Quigley, 1999; Wang, 2003). Numerous researches as Hon-Chung (2009), Ludwig and Slok (2004), Case et al. (2005), Bardham et al. (2007), Goodhard and Hofmann (2007) and Zhang and Wu (2008) have revealed that among macroeconomic factors related to the real estate prices, the key factors were gross domestic product (GDP), unemployment, share index, current account of a country, demographic factors, household income, interest rate, industrial production and consumption of households. In accordance with the data of the Institute of Macroeconomic Analysis and Development (2015), the biggest influence on the price of real estate have factors associated with GDP, unemployment, current account of a country, domestic demand and share index. We follow the conclusions of Hon-Chung (2009) who said that depending on various influences of the mentioned factors on the real estate price, the results of individual researches could not be generalized to all countries and regions with different environments, but had to be considered separately. Moreover, in the opinion of Mavrodiy (2005) the prices of real estate and activity in the real estate market are connected with the economic development of an individual country. Hong-Yu and Kuentai (2011) on the other hand determined that the prices of real estate in the capitals differed considerably from the prices of real estate in other smaller cities and that it was the prices of real estate in the capitals, which created the real estate market. As in other observed countries, the most expensive real estate can be found in bigger cities. (Mavrodiy, 2005; Himmelberg et al., 2005).

In the research we are interested in the links between the price of apartments and observed macroeconomic variables in different social environments, i.e. the capitals of Slovenia, Greece as a southern member of the EU, France as a western member of the EU, Norway as a northern and Scandinavian country (non-member of the EU) and Poland as an eastern member of the EU. In the article we derive from hypothesis that selected variables: unemployment, share index, current account of a country, industrial production and GDP, in the capitals of the observed countries: Slovenia, Greece, France, Poland and Norway, are linked to the prices of residential real estate and that mutual correlations in various observed cultural and economic environments differ from each other.

### 1.1. Macroeconomic factor

As a strong factor, which fundamentally influences the prices of apartments, a household income is most frequently mentioned (European Central Bank, 2013). As stated by Paiella (2007) there is a strong correlation between property and consumption, which means that an increase of property value also increases property of households. Reichert (1990) studied influence of interest rates, household incomes, employments and migrations on the prices of apartments on a national level and within a region. He discovered that the largest influence on the prices on a national level had interest rates of mortgage credit, whereas on a regional level the largest influence on the prices had migration of population, employment and household incomes. In the opinion of Bardhan et al. (2007), the key factor which influences the demand for real estate is the GDP. Zull Kepili Izati and Masron (2011) also researched development of prices of real estate and GDP. In their survey, they comparatively studied the connection between real estate prices, growth of foreign investments and GDP in Malaysia and South Korea. They established that the growth of GDP and prices of real estate was higher in South Korea as a consequence of a parallel higher growth of foreign investments. In the U.S.A., the relations between the prices of real estate, index of real estate price and GDP were studied by Valadez (2010). He determined that there was a statistically significant connection between the price index of real estate and GDP, but he did not find a cause for this connection. The results of a research carried out by Giussani et al. (1993), on the other hand, showed that GDP linked also to the price of business real estate. Authors studied factors, which affected the price of business real estate rental in European cities. The study based on an analysis of supply and demand. They established that GDP and unemployment were statistically significantly connected with the prices of business real estate rental. D'Arcy et al. (1994) also arrived to similar conclusions after researching factors linked to the price of business real estate rental in 20 European cities in the period from 1982 to 1993. The outcomes of the research have shown that GDP and unemployment are the most important factors linked to the price of business real estate rental in the selected cities. Chin (2003) researched influence of macroeconomic factors on the price of business real estate rental during the period from 1988 to 2001 in five cities of Southeast Asia: Singapore, Hong Kong, Taipei, Kuala Lumpur and Bangkok. In his study, he included the following macroeconomic factors: GDP, credit interest rate, consumer price index, scope of production,

unemployment and surface of a business premise. He found that the key factors connected with the price of real estate rental were the surface of the business premise and credit interest rate.

A comparison with European studies is quite interesting as they demonstrate that the key factors, which influence the rental price of real estate are: GDP, scope of production and rate of unemployment. These factors, however, are not linked to the price of business real estate rental in case of five Asian cities (Chin, 2003). Ping-Ma (2010) researched the influence of movement of real estate prices on the economy of China or GDP. By using an empirical analysis, he proved that an increase of investments into real estate significantly influenced the increase of GDP. In author's opinion, such result is understandable as more than 11% of GDP are investments into real estate. His prediction for the near future when he expects a renewed growth of real estate prices in China as well as the United States and Europe is quite interesting. Shen and Liu (2004) proved on a sample of 14 Chinese cities between 1995 and 2002 that it was possible to explain real estate prices with population growth, unemployment rate, consumer price index, household income, construction costs and amount of real estate on the market. A similar study was conducted by Zhou (2005) in the period between 2001 and 2004 on an example of Chinese cities: Beijing, Shanghai, Tianjin and Chongqing. He discovered that household income, bank loans and number of sold apartments were statistically significantly linked with the price of apartments in Beijing, household incomes and number of sold apartments were crucial in creation of prices in Tianjin, whereas the most important factors connected with the price of apartments in the cities of Shanghai and Chongqing were expected prices of apartments and costs of construction. In researches of certain authors such as Stiglitz (2011), Shiller and Case (1988), Shiller et al. (2010), it was the expectations of potential buyers which were the key factor, statistically significantly connected with the movement of real estate prices. Ho and Wong (2008) discovered that the prices of real estate or houses in Hongkong were statistically significantly influenced by their demand. Akbari and Aydede (2012) determined that the prices of real estate in some developed countries had increased significantly by the end of 2008 in comparison to the increase of the income per capita. They concluded that the low interest rate was the cause for the increase of prices as low interest rate enabled a purchase of real estate despite low financial resources of a buyer. Greiber and Setzer (2007) also established that monetary policy was linked to the development in the real estate market through interest rate and liquidity. This was confirmed by Ahearne et al. (2005), who researched the real estate price in 18 industrialised countries and discovered a strong link between monetary policy and real estate prices. They established that interest rate was the main factor related to the demand for real estate. Jacobsen and Bjorn (2005) also came to a similar conclusion in their research as they established that interest rate, unemployment rate, household income and scope of residential real estate construction were the most important factors, which were statistically significantly connected with Norwegian real estate prices.

Glaeser et al. (2010) discovered in the observed period between 1996 and 2006 that the prices of real estate had increased by 53% in relation to the prices of basic necessities, however, low interest rates could only explain a fifth of the price. Goodhard and Hofman (2007) researched the connection between the amount of money, loans, price of real estate and economy in industrialised countries in the period from 1980 to 2002. The research showed statistical significance between the prices of real estate, amount of money, loans and macroeconomic effects. Loans were significantly connected with the amount of money and real estate prices, while real estate prices were connected with loans and amount of money. Gerlach and Peng (2005) also proved in their study that real estate prices were connected with bank loans and not vice-versa. Zhang et al. (2006) confirmed statistically significant and positive link between the real estate prices and bank loans in their research carried out on Chinese real estate. The same was demonstrated by Liang and Gao (2007), as they determined the connection between monetary policy and real estate prices.

## **2. Methodology and instruments**

By using multiple linear regression models, we have determined the connection between the selected macroeconomic factors: unemployment, share index, current account of a country, industrial production and GDP with the price of residential real estate. The connection between the prices of residential real estate and selected variables in the capitals of the selected countries has been determined by a mathematical model of multiple regression. Multiple regression analysis is a method, which expresses the ratio between regression coefficients and independent variables, which describe characteristics of individual real estate (Sirmans et al., 2006). The basic set is represented by the data on the price of a square metre of residential real estate – apartments in the capitals of the selected economic, social and cultural environments in a defined period of time from 2003 to June 2012 (Trading

economics, 2012; Statline, 2012).

The unit of statistical observation is the price of a square metre of residential real estate in the capitals of selected economic, social and cultural environments. The dependent variable in the research is the price of a square metre of residential real estate (CSN) in Euros. Other independent variables with which we analyze the explained variability of the price of a square metre of residential real estate (CSN) are unemployment (UN), share index (SI), current account of a country (CAC), industrial production (IP) and gross domestic product (GDP).

### 3. Results and discussions

By using multiple linear regression models, we have determined the connection between the selected macroeconomic factors: unemployment, share index, current account of a country, industrial production and GDP with the price of residential real estate. The connection between the prices of residential real estate and selected variables in the capitals of the selected countries has been determined by a mathematical model of multiple regression. Multiple regression analysis is a method, which expresses the ratio between regression coefficients and independent variables, which describe characteristics of individual real estate (Sirmans et al., 2006). The basic set is represented by the data on the price of a square metre of residential real estate – apartments in the capitals of the selected economic, social and cultural environments in a defined period of time from 2003 to June 2012 (Trading economics, 2012; Statline, 2012).

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For the selected economic, social and cultural environment, we have verified the correlation between the variables, evident from Table 1 and Table 2.

Table 1. Correlation between variables in relation to the different cultural environments

Country	Variable	CSN	UN	CAC	SI	BDP	IP
Slovenia	CSN	1.000	-0.217	0.036	0.426	0.179	0.024
	UN	-0.217	1.000	0.007	-0.170	-0.203	-0.170
	CAC	0.036	0.007	1.000	0.068	-0.010	0.018
	SI	0.426	-0.170	0.068	1.000	0.459	0.167
	GDP	0.179	-0.203	-0.010	0.459	1.000	0.291
	IP	0.024	-0.170	0.018	0.167	0.291	1.000
Greece	CSN	1.000	-0.331	0.185	-0.019	0.069	-0.136
	UN	-0.331	1.000	0.260	-0.064	-0.056	-0.081
	CAC	0.185	0.260	1.000	0.228	0.022	-0.337
	SI	-0.019	-0.064	0.228	1.000	0.047	-0.149
	GDP	0.069	-0.056	0.022	0.047	1.000	-0.131
	IP	-0.136	-0.081	-0.337	-0.149	-0.131	1.000
France	CSN	1.000	-0.486	0.305	0.013	-0.152	-0.021
	UN	-0.486	1.000	-0.277	-0.094	-0.075	0.057
	CAC	0.305	-0.277	1.000	0.212	-0.030	-0.160
	SI	0.013	-0.094	0.212	1.000	-0.045	0.064
	GDP	-0.152	-0.075	-0.030	-0.045	1.000	0.082
	IP	-0.021	0.057	-0.160	0.064	0.082	1.000

Poland	CSN	1.000	-0.405	0.150	0.330	-0.091	0.274
	UN	-0.405	1.000	-0.125	-0.034	-0.215	-0.421
	CAC	0.150	-0.125	1.000	0.344	0.420	-0.065
	SI	0.330	-0.034	0.344	1.000	0.426	-0.161
	GDP	-0.091	-0.215	0.420	0.426	1.000	-0.341
	IP	0.274	-0.421	-0.065	-0.161	-0.341	1.000
Norway	CSN	1.000	-0.259	-0.155	-0.076	-0.005	-0.133
	UN	-0.259	1.000	-0.278	0.091	-0.108	0.072
	CAC	-0.155	-0.278	1.000	-0.098	-0.031	0.187
	SI	-0.076	0.091	-0.098	1.000	-0.016	-0.029
	GDP	-0.005	-0.108	-0.031	-0.016	1.000	-0.015
	IP	-0.133	0.072	0.187	-0.029	-0.015	1.000

From Table 1 it is evident that between the variables is not a strong correlation, as no absolute value is not greater than 0.9. In Slovenia, it shows the strongest correlation between the price of real estate and the stock exchange index (0.426), followed by the correlation between the price of real estate and unemployment (-0.217). For Greece it shows the strongest correlation between the price of real estate and unemployment (- 0.331), followed by the current account of the country (0.185). Similar results are also seen in France and Norway. The strongest correlation between the price of real estate and unemployment (-0.405) between variables can also be seen in Poland, interestingly, followed by the correlation between the prices of real estate and the stock exchange index (0.330).

Table 2. Coefficient of determination

Country	Variable	Regres. koefi. ( $\beta$ )	T statistics	Significance level	
Slovenia	$\alpha$	0.110	2.120	0.042	
	UN	-0.149	-0.929	0.360	
	CAC	0.007	0.044	0.965	
	SI	*	0.960	2.705	0.011
	GDP		-0.021	0.119	0.764
	IP		-0.049	-0.303	0.764
Greece	$\alpha$	0.140	4.073	0.000	
	UN	*	-0.105	-2.246	0.030
	CAC		0.290	1.967	0.056
	SI		-0.410	-0.272	0.787
	GDP		0.050	0.337	0.738
	IP		-0.163	-1.109	0.274
France	$\alpha$	0.024	10.087	0.000	
	UN	*	-0.309	-3.976	0.000
	CAC		0.184	1.462	0.150
	SI		-0.033	-0.266	0.792
	GDP		-0.189	-1.565	0.124
	IP		0.006	0.050	0.960
Poland	$\alpha$	0.036	1.395	0.175	

	UN	*	-0.389	-2.261	0.032
	CAC		0.101	0.553	0.585
	SI		0.317	1.845	0.077
	GDP		-0.186	-1.845	0.319
	IP		0.126	0.628	0.536
Norway	$\alpha$		0.026	6.524	0.000
	UN	*	-0.172	-2.668	0.010
	CAC	*	-0.002	-2.005	0.049
	SI		-0.071	-0.597	0.553
	GDP		-0.049	-0.411	0.683
	IP		-0.067	-0.548	0.586

\* Connection between variables is statistically significant ( $p < 0.05$ )

The results show that in all countries, except for Slovenia, shows a statistically significant variable is linked to unemployment in the case of Norway, the variables linked to the current account of the country, while Slovenia is characterized by a variable linked to the index. The higher is share index, higher is price of a square metre of residential real estate. On the basis of sample data we have discovered that if the share index increased for one unit, the price of a square metre of residential real estate on average increased for 0.96 unit.

Model generally indicates that explain the variability in price per square meter of residential property adversely affected by unemployment. Higher is the unemployment, lower is the price per square meter of residential property. The biggest impact between unemployment and the price of residential real estate was observed in the case of the capital city of Poland, where the change in the unemployment rate by one unit causes a change in the price of residential real estate for 0.389 units. Interestingly, the results show the least impact in the unemployment rate and the price of residential real estate in the case of the capital city of Greece, where the change in the index of unemployment by one unit causes a change in residential property prices of 0,105 units and this notwithstanding the fact that the average unemployment rate in Greece between the observed cultures by far the highest (27.2%). The percentage of unemployment among other countries has approximately the same (10%) stands out only Norway, where the percentage of unemployment is very low (3.5%) (Eurostat, 2014). Also in the case of Norway, in addition to unemployment, the price of residential real estate linked to the current account of the state (-0.002), which can be explained by the fact that the northern countries characterized by more than half the population living in owner-occupied housing, this housing repaid a loan or a mortgage, for example. In Sweden the rate is 70.1 per cent, 62.7 per cent in Iceland and Norway 64.9 per cent. On the other hand, is considered to be 2012, owner-occupied homes with a loan or a mortgage lived just over a quarter (27.2%) of the EU-28 (Eurostat, 2014).

The results show that the macro-economic factors associated with residential property prices to a lesser extent than we have expected from the existing research. The reason may lie in the length of the observed time period, as the results, according to Funke (1996), also depend on the length of the observation period. The second reason is attributed to speculation and psychological effects (Temeljotov Salaj et al., 2011). Also, according to Ning and Hoon (2012), the growth of real estate prices linked to speculation. Research has demonstrated that in Beijing in 2007 speculation caused 14.4 percent increase in real estate prices. In the observed period, the real estate prices are twice as high compared with GDP, from which they concluded that real estate prices have not been linked to the GDP is. Even Pornchokchai (2011) believes that speculation on the real estate market an important role in affecting the rise in real estate prices even in the less attractive areas. Rouwendal and Longhi (2008) have found that during the sharp development (growth) in housing prices there is a gap between the economic models that explain the short-term growth patterns and prices between the actual rise in prices. Unlike attach variables to the consumers generally reflects the psychological sense of optimism or pessimism. Until conclusions are similar in their research came as Wong and Hiu (2006), who found that participants in the housing market too often, unrealistic and too optimistic or pessimistic. They derive from the Pygmalionove hypothesis, which assumes that it is a prophecy, exercising themselves (Kobal, 2001).

#### 4. Conclusion

The emphasis of the research was on the statistical-mathematical analysis of a potential influence of particular selected variables, which are related to unemployment, share index, current account of a country, industrial production and gross domestic product (GDP), on the prices of residential real estate in various economic, cultural and social environments, i.e. in Slovenia, Greece, France, Norway and Poland. The implemented research provides an insight into factors connected with the price of residential real estate in different economic, cultural and social environments. Within the scope of the research, we have tested a hypothesis that the selected variables linked to unemployment, share index, current account of the country, industrial production and GDP were related to the prices of residential real estate in the capitals of the selected countries: Slovenia, Greece, France, Norway and Poland. The results of the final multiple regression models for individual selected economic, cultural and social environments have demonstrated that the connection of the variables chosen for the model with the price of residential real estate differed depending on the observed environment. For the capitals of France, Greece, Norway and Poland the results of multiple regression models have shown that the price of residential real estate is linked only to unemployment, while for the rest of the variables incorporated in the model it cannot be claimed that they are related to the price of residential real estate. For the capital of Norway, it was established that in addition to unemployment, the current account of the country was also connected to the price of residential real estate. According to the results of the final regression model, the price of residential real estate in Ljubljana was linked only to share index. Based on the results acquired with the research and our own findings, we can confirm that the selected variables related to unemployment, share index, current account of the country, industrial production and GDP, are linked to the prices of residential real estate in the capitals of the chosen countries: Slovenia, Greece, France, Norway and Poland. In the observed periods, at least one of the selected variables is related to the price of residential real estate in the individual selected and observed environments. Majority of the factors related to the price of residential real estate remains nevertheless unknown in spite of the implemented research. These factors may be a challenge for further research. Considering the results of the research we believe that observation of these variables is essential for explanation, prediction and forecasting of the behaviour of the real estate market, which is important especially for investors (buyers, investors), creditors (banks) and spatial planners (analysis of the most economic use of space).

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