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PROCESSES OF ECONOMIC DEVELOPMENT: CASE OF LITHUANIAN REAL ESTATE SECTOR

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Abstract. The enlargement of the EU has impacted development of housing market in Lithuania as well as in other Central and Eastern countries. The country was significantly influenced by favorable landing and expansion of private sector credit. Hence, Lithuania experienced the period of the financial and asset price boom, which was followed by economic downturn, and consequently, the burst of price bubble. This paper aims to reveal relationships among demand and supply side determinants and housing prices. Hence, the question is being raised if fundamental determinants affect housing prices. The growing dependence of Lithuania on energy resources leads us towards another research question. We will test if housing prices are linked to energy prices. Regression analysis tool, we believe, allows revealing if fundamental determinants are equally important.

Keywords: fundamental determinants, house prices, energy prices, growth, Lithuania.

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JEL Classifications: M20, M21

1. Introduction

The enlargement of the EU has impacted development of housing markets in all Central and Eastern countries. The market was significantly influenced by expansion of private sector credit and favorable landing in the region. Hence, the growth of housing prices has been observed in 2004–2007 in almost all countries. Lithuania, as well as other countries experienced the period of the financial and asset price boom that was followed by economic downturn and consequently the burst of price bubble. Analysis of determinants of housing prices requires careful examination.

This paper aims to reveal relationships among demand and supply side determinants and housing prices. In order to reveal if and how demand and supply side determinants impact housing prices in Lithuania we will raise and test a set of hypotheses. The first group of hypotheses is focused on relationships between house prices and fundamental supply and demand side factors. The second group of hypotheses is focused on relationships between house prices and energy prices. The remainder of the paper is organized as follows. In section 2 the overview of relevant literature is analyzed. In section 3 the overview of determinants impacting housing prices in Lithuania are discussed. In section 4 the methodology and results are presented and final part concludes.

2. Overview of the literature

The researches linked to the determinants of housing prices are seen as vast and growing trend in the scientific literature. Prevailing literature suggests that in industrialized economies house prices are related to a set of macroeconomic variables, market specific conditions and financing characteristics (Glindro *et al.* 2011), consistent patterns of economic development as well have to be taken into account (Dudzevičiūtė 2013; Laužikas, Krasauskas 2013; Vosylius *et al.* 2013; Mačiulis, Tvaronavičienė 2013; Tvaronavičienė 2014). Notably, demand and supply factors, that have longer-term and shorter-term influence, are distinguished (Tsatsaronis, Zhu 2004). The main demand-side factors include the growth in household disposable income, the average level of interest rates, gradual shifts in demographics and permanent shifts of the tax system.

According to scholars, disposable income and interest rates are seen as key factors determining housing prices (Hilbers *et al.* 2008). The rise of income has led to the increase of housing prices in different countries. Hence, scholars argue that demand for housing is impacted by real household income and wealth (Sutton 2002). On the other hand, the role of interest rates is dual: mortgage rate determines financing costs, while the risk-free interest rate services as an indicator of opportunity costs. Notably, a lot of attempts were made in order to investigate the causal relationship between macroeconomic variables, financing characteristics and house prices. One stream of scholars has investigated the link in one direction. The explorations carried out by Borio *et al.* (1994) conclude that there is a relatively close link between the ratios of private credit to GDP and asset price movements. Some scholars argue that causality is not that straightforward (Dubauskas 2011; Šimelytė, Antanavičienė 2013). Some authors e.g., Goodhart and Hofmann (2008,) claim that “the effect of property prices on credit appears to be stronger than the effect of credit on property prices”.

Discussions in the prevailing literature distinguish the obvious importance of demographics for the demand of housing. The main underlying premise adopted by scholars is that high rates of the net migration and increases in population shares impact housing demand (Cerny *et al.* 2005; Balkytė, Tvaronavičienė 2011; Radović Marković 2011). Koetter and Poghasyan (2010) confirm that “increasing demand due to population and income growth increases equilibrium real estate prices”. Notably, population in the 25-44 years age range is seen as the measure more explicitly reflecting the migration effect (Stecenson 2008, Radović Marković 2011; Šileika, Bekerytė 2013). Meanwhile, Maennig and Dust (2008) state, that “growth in population numbers has no significant price effects, whereas declining population numbers lead to significant negative effect”. The observations reveal that in some countries like Japan and Germany, house prices decline due to a low share of households of individuals in their thirties (Girouard *et al.* 2006).

Glaeser *et al.* (2005) note that too often scholars attempt to understand housing prices only by focusing on demand-side factors, while ignoring supply-side factors. Hence, supply-side factors have to be taken into consideration. The main supply-side factors include the availability and cost of land, the cost of construction and investments in the improvement of the existing housing stock. Accessibility of financial capital and indebtedness of business companies have their own implications (Baikovs; Zariņš 2013). Besides that, tough rules and building regulations as well as slow administrative procedures are seen as constrains of supply (Girouard *et al.* 2006). Discussions in the prevailing literature emphasize that house prices are seen as local phenomenon (Himmelber *et al.* 2005). The study carried out by Egert and Mihaljek (2007) has indicated factors specific to Central and Eastern Europe (CEE). According to scholars, development of housing market institutions, in particular banking sector, has led to the development of housing markets and housing environments. A main underlying premise adopted by authors is that the EU accession process has impacted demand which has led to the growth of the housing prices. Hence, house prices in CEE are determined by fundamental factors such as, GDP per capita, real interest rates, housing credit, demographic factors as well as transition specific factors.

3. The determinants of housing prices in Lithuania

To see how development of economy impacted real estate market, we overview key trends shaping different patterns. Lithuania became an independent state in 1990, what has led to radical political, social and

economic changes. On the other hand, Lithuania's accession to the EU in 2004 has impacted liberalization of trade due to a number of unilateral decisions and treaties. Notably, in 2004-2008 Lithuania as well as other Baltic States enjoyed very strong economic growth. A close look at Figure 1 allows observing, that from 2003 to 2007 GDP grew on average by almost 7% and was higher than the EU average. Statistical data on GDP allows concluding that the growth of Lithuania's economy in 2003-2007 was interrupted by global financial crisis, what has led to the sharp cumulative output decline in all Baltic States.

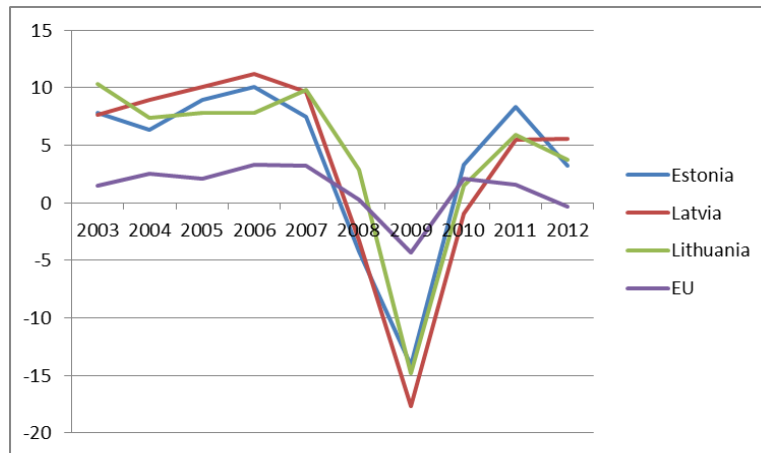


Fig.1. GDP growth rate (%)

Source: Eurostat

Economy growth of Lithuania in 2003-2007 impacted changes in labor market. For instance, unemployment rate decreased significantly (Figure 2). In 2007 unemployment rate was the lowest and reached 3.8% (Šileika, Bekerytė 2013). Hence, in the period of economy growth, wage growth and income tax reduction boosted household disposable income.

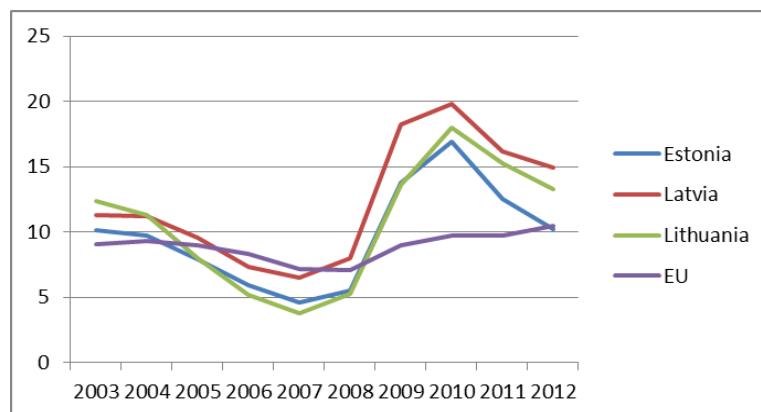


Fig.2. Unemployment rate (%)

Source: Eurostat

The Baltic countries responded to economic crisis through internal adjustment of prices and wages. Consequently, unemployment rose sharply in Lithuania and in 2010 reached the highest rate – 17.9%. It is noticeable, that unemployment rate grew significantly in all Baltic States and was higher than the EU average (Figure 2). Taking into considerations recent surveys, unemployment in Lithuania is still only approaching the natural unemployment rate (Bank of Lithuania 2013). On the other hand, unemployment rate of young population and increasing outward migration are seen as the major issues.

Different studies conclude that low real interest rates and favorable lending standards impacted the growth of demand for housing in all Baltic States (Bukeviciute, Kosicki 2012; Purfield, Rosenberg 2010; Kuodis, Ramanauskas 2009; Dubauskas 2011; Tvaronavičiene *et al.* 2013). Notably, bank lending and a

corresponding acceleration of domestic demand were distinguished as the key drivers of growth (Purfield, Rosenberg 2010; Dubauskas 2011). To generalize, we can conclude that, investment and employment increased in non-tradable sectors, in particular in real estate, construction, retail and financial services. On the other hand economic crisis has triggered decline of wages and diminished private consumption.

Notably, the growth and decline of country's economy has been shaping real estate market. According to Ivanauskas *et al.* (2008) development of real estate market in Lithuania can be described by different patterns. For instance, the first stage of development (1992-2002) is described as the rise of commercial real estate market. Notably, acceleration of real estate market was impacted by privatization processes, which have led to the development of service sectors. The growth of demand for residential real estate is seen as a common feature for the second stage of development (2002-2005). The scholars conclude that by the third stage of development (2005-2006) the housing market had reached its summit. As it was indicated above, the development was triggered by variety of factors, including low interest rates and favorable landing, globalization patterns (Dubauskas 2011; Šimelytė, Antanavičienė 2013; Tvaronavičienė *et al.* 2013; Vosylius *et al.* 2013).

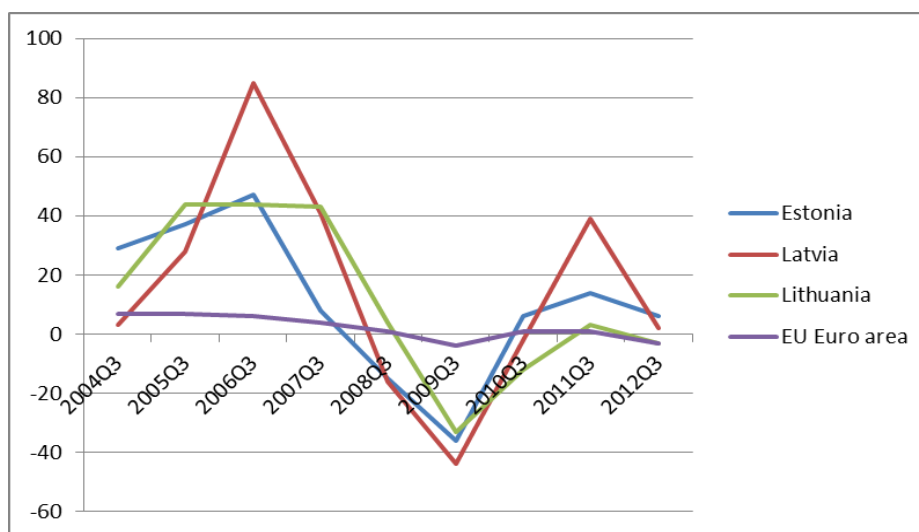


Fig.3. Changes of residential property price indicators

Source: European Central Bank

Analysis of data, indicating changes of residential property prices in Baltic States, allows concluding that in 2003-2008 prices grew higher than in the EU Euro area. The observation of recent surveys indicate that strong correction of house prices started in 2007-2008 and was particularly pronounced from mid-2008 to mid-2010 (Bukeviciute, Kosicki 2012).

4. Methodology and results

The above discussions lead to the conclusion that different demand and supply side factors determine housing prices. In our research we will focus on such: interest rates, disposable income, unemployment, inflation, GDP per capita, population and construction cost index. Additionally, our research will focus on energy prices. Before verifying the hypotheses formulated below, let us explain why energy prices are taken into consideration. Notably, all Baltic States have a high level of import dependency on such energy resources like gas and oil, which are imported exclusively from Russia (Karnitis 2011). Taking into consideration recent trends, we can conclude, that Lithuania's energy dependence has increased significantly. For instance, in 2000 it was 59.82% and in 2010 it was 81.92% (Eurostat). In comparison to other Baltic States, the increase of energy dependence in Lithuania was the highest (Karnitis 2011; Miškinis *et al.* 2013). Starting in 2010 Lithuania imports a significant amount of electricity due to decommissioning of Ignalina nuclear power plant and fluctuations in domestic supply and prices. We need to point, that recent scientific surveys confirm that energy security issues affect development of key economic sectors of any country (Janeliunas 2008; Karnitis 2011; Tvaronavičienė 2012, Lankauskienė, Tvaronavičienė 2012; Vosylius *et al.* 2013, Dudzevičiūtė 2013; Miškinis *et al.* 2013, Tvaronavičienė 2014). A close look at Figure 4 and Figure 5

confirms that growth of gas and electricity prices for household consumers was higher in Lithuania in 2003-2008. Hence, the increase of energy prices significantly affects disposable income of households. In that context, association arises about interrelationships of energy prices and real estate prices.

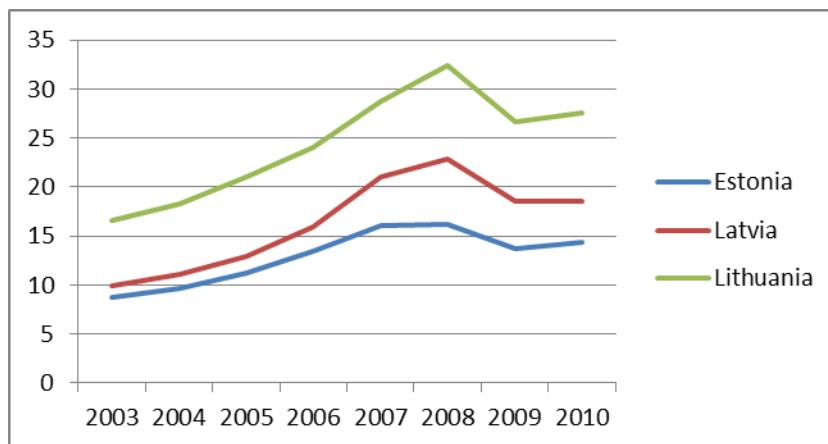


Fig.4. Gas prices for household consumers (EUR/Gigajoule)

Source: Eurostat

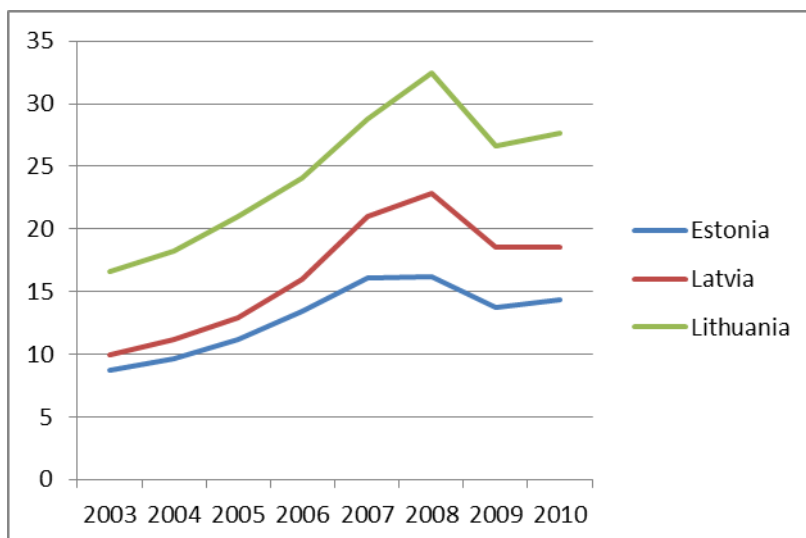


Fig.5. Electricity prices for household consumers (EUR/kWh)

Source: Eurostat

Our empirical analysis is based on a regression model, which tests hypotheses raised. The relationship between independent variable Y (housing price) and X (indicated in the hypotheses) can be estimated by application of simple linear regression model:

$$\bar{y}_x = b_0 + b_1x, \tag{1}$$

here:

b_0 ir b_1 – regression coefficients.

In our research house price is calculated as one square meter price of average 55 m2 flat in the Old Town of Vilnius provided by www.ntspekuliantai.lt. Notably, real estate prices in Vilnius attracted considerable attention of various researchers. For instance, Burinskienė *et al.* (2011) investigated effects of quality of life on the price of real estate. In particular scholars aimed to reveal why differences of the quality of life exist. The research took into consideration such factors as home, work, leisure, safety and health, center and

aesthetics. Accordingly, different research methods, i.e. survey of residents and examination of socio-economic factors were applied. Obtained results and insights allowed scholars concluding that the price of real estate was mostly affected by the prestige of Vilnius district (Burinskienė *et al.* 2011). Hence, prices in the Old Town remain 2.5 times higher than in other districts. The survey carried out by Raslanas *et al.* (2006) aimed to compare housing prices in the South East London and Vilnius. The scholars took into considerations a set of factors impacting prices: flat size, flat conditions, and construction type. Meanwhile, Ambrasas and Stankevicius (2007) investigated peculiarities and various factors, impacting housing market in Vilnius. On the other hand, not going deep into elaborate discussions regarding non-fundamental determinants, influencing housing prices, the authors of this paper will focus on demand and supply-side fundamental determinants. Firstly, the analysis of scientific literature allows us to formulate the following hypotheses, regarding fundamental determinants:

Hypothesis 1: The decrease of interest rates will be positively associated with the growth of real estate prices.

Hypothesis 2: The growth of disposable income will be positively associated with the growth of real estate prices.

Hypothesis 3: The decrease of unemployment rate will be positively associated with the growth of real estate prices.

Hypothesis 4: The growth of inflation rate will be positively associated with the growth of real estate prices.

Hypothesis 5: The growth of GDP per capita will be positively associated with the growth of real estate prices.

Hypothesis 6: The growth of population will be positively associated with the growth of real estate prices.

Hypothesis 7: The growth of construction costs will be positively associated with the growth of real estate prices.

The hypotheses were tested taking into consideration country level data for the period of 2003- 2011, which are provided by the European Commission and the Lithuanian Department of Statistics. Table 1 provides obtained data for associations between house prices and selected variables.

Table 1. Results of correlation – regression analysis

| | r | P-value | R ² | t _{st} | t _{kr} | b ₀ | b ₁ |
|--------------------|------------|---------|----------------|-----------------|-----------------|----------------|----------------|
| Interest rates | -0,583468 | 0,0464 | 0,340435 | -2,27189 | 2,2621571 | 2388,08 | -146,943 |
| Disposable income | 0,727724 | 0,0073 | 0,529582 | 3,276704 | 2,2621571 | 166,87 | 4,51 |
| Unemployment rate | -0,74822 | 0,0051 | 0,559833 | -3,56632 | 2,2621571 | 3092,41 | -115,232 |
| Inflation rate | 0,765511 | 0,0027 | 0,586007 | 3,762319 | 2,2621571 | 1194,99 | 176,67 |
| GDP per capita | 0,849718 | 0,0005 | 0,722021 | 5,096463 | 2,2621571 | -158,226 | 1,14031 |
| Population | -0,7064911 | 0,1401 | 0,499129 | -3,15677 | 2,2621571 | 12964,96 | -3,41 |
| Construction costs | 0,3750681 | 0,2941 | 0,140676 | 1,279474 | 2,2621571 | -2287,68 | 38,81 |

Source: Authors' calculations

The first hypothesis about interrelations of interest rates and real estate prices was tested taking into consideration Central bank interest rates annual data and house prices. The obtained results allow us to provide the following interpretations. First, the magnitude of the correlation coefficient indicate, that the associations between house prices and interest rates are slightly above average. On the other hand the direction of correlation coefficient implies that house prices are increasing while interest rates are decreasing. Notably, the obtained P value (0.0464) is lower than 0.05 and allow us to interpret, that the relationship between house prices and interest rates is statistically significant. Meanwhile, the coefficient of determination (0.340435) implies that thirty four percent of price changes can be explained by changes of interest rates. The linear regression model:

$$\text{Housing price} = 2388.08 - 146.943 \times \text{interest rates}$$

It implies that the decrease of interest rates by 1% will increase the price of one square meter by 146.943 EUR. Hence, the conclusion we can draw is that the hypothesis was verified.

The second hypothesis about interrelations of average disposable income amounts and real estate prices was verified. A closer look at the correlation coefficient allow us conclude that the associations between house prices and disposable average income are strong. Hence, large values of the house prices tend to be associated with the large values of average disposable income and imply that house prices are increasing while average disposable income rates are increasing. The obtained P value (0.0073) is lower than 0.05 and allow us to confirm, that the relationship between house prices and disposable average income is statistically significant. Meanwhile, the coefficient of determination (0.529582) implies that fifty two percent of price changes can be explained by changes of average disposable income. The linear regression model:

$$\text{Housing price} = 166.87 + 4.51 \times \text{disposable income}$$

It implies that the increase of disposable income by 1 EUR will increase the price of one square meter by 4.51 EUR.

The third hypothesis about interrelations of unemployment rate and real estate prices allows us to interpret the following. The first, the magnitude of the correlation coefficient allow us conclude that the associations between house prices and unemployment rates are strong. The second, the direction of correlation coefficient implies that house prices are increasing while unemployment rates are decreasing. Hence, the obtained P value (0.0051) is lower than 0.05 and allow us to confirm, that the relationship between house prices and unemployment rate is statistically significant. Meanwhile, the coefficient of determination (0.559833) implies that fifty five percent of price changes can be explained by changes of unemployment rate. The linear regression model:

$$\text{Housing price} = 3092,41 - 115,232 \times \text{unemployment rate}$$

It implies that the decrease of unemployment rate by 1% will increase the price of one square meter by 115.232 EUR. Hence, the conclusion we can draw is that the third hypothesis was verified.

The fourth hypothesis about interrelations of inflation rate and real estate prices was verified. Taking into consideration, the magnitude and direction of the correlation coefficient we can conclude that the associations between house prices and inflation rate are strong. Hence, large values of the house prices tend to be associated with the large values of inflation rate and imply that house prices are increasing while inflation rates are increasing. Meanwhile, the obtained P value (0.0027) is lower than 0.05 and allow us to interpret, that the relationship between house prices and inflation rates are statistically significant. On the other hand, the coefficient of determination (0.586007) implies that fifty eight percent of price changes can be explained by changes of inflation rate. The linear regression model:

$$\text{Housing price} = 1194,99 + 176,67 \times \text{inflation rate}$$

It implies that the increase of inflation rate by 1% will increase the price of one square meter by 176,67 EUR.

The fifth hypothesis tested interrelations of GDP per capita rate and real estate prices. Notably, the magnitude and direction of the correlation coefficient allow us conclude that the associations between house prices and GDP per capita rates are strong. Hence, large values of the house prices tend to be associated with the large values of GDP per capita rates and imply that house prices are increasing while GDP per capita rates are increasing. The obtained P value (0.0005) is lower than 0.05 and allow us to interpret, that the relationship between house prices and GDP per capita rates are statistically significant. Meanwhile, the coefficient of determination (0.722021) implies that seventy two percent of price changes can be explained by changes of GDP per capita rate. The linear regression model:

$$\text{Housing price} = -158,226 + 1,14031 \times \text{GDP per capita}$$

It implies that the increase of GDP per capita rate by 1 EUR will increase the price of one square meter by 1,14031 EUR EUR. Hence, the conclusion we can draw is that hypothesis was verified.

The sixth hypothesis aimed to verify interrelations between the growth of population rate and real estate prices. The magnitude and direction of the correlation coefficient allow us conclude that the associations between house prices and population rates are weak and negative. The obtained P value (0.1401) is higher than 0.05 and allow us to interpret, that the relationship between house prices and population rate is statistically non-significant. Meanwhile, the coefficient of determination (0.499129) implies that forty nine percent of price changes can be explained by changes of population. The linear regression model:

$$\text{Housing price} = 12964,96 - 3,41 \times \text{population rate}$$

It implies that the decrease of population rate by 1 person will increase the price of one square meter by 3,41 EUR. Hence, the conclusion we can draw is that hypothesis was not verified. To generalize, the increase of house prices in 2000-2011 was not necessary driven by decrease of population in Lithuania due to high emigration rate.

The seventh hypothesis aimed to test interrelationship of supply-side variable, in particular construction costs, and housing prices. In our research we used construction costs index provided by the Lithuanian Department of Statistics. The magnitude and direction of the correlation coefficient allow us conclude that the associations between house prices and construction costs are weak and positive. The obtained P value (0.2941) is higher than 0.05 and allow us to interpret, that the relationship between house prices and construction costs is statistically non-significant. Meanwhile, the coefficient of determination (0.140676) implies that fourteen percent of price changes can be explained by changes of construction costs. The linear regression model:

$$\text{Housing price} = -2287,68 + 38,81 \times \text{construction costs}$$

It implies that the increase of construction costs will increase the price of one square meter by 38,81 EUR. Hence, the conclusion we can draw is that hypothesis was not verified. To generalize, the increase of house prices in 2000-2011 was not necessary driven by increase of construction costs.

Energy prices are seen as important determinants of production, impacting its volume, growth rates and quality. To generalize, the growth of energy prices lead to the growth of prices of other goods and services. On the other hand, as it was indicated above, growth of electricity and gas prices negatively affect disposable income of households. Hence, the assumptions about interrelationships of real estate prices and energy prices allow us to formulate the following hypotheses:

Hypothesis 8: The growth of oil prices will be positively associated with the decrease of real estate prices.

Hypothesis 9: The growth of electricity prices will be positively associated with the decrease of real estate prices.

Hypothesis 10: The growth of gas prices will be positively associated with the decrease of real estate prices.

The first hypothesis was tested taking into consideration statistical data from 2000 to 2011. We use data, which are provided by the European Central Bank Table 2 provides obtained data for associations between oil prices and real estate prices. Taking into consideration presented data, we can interpret the following. The magnitude and the direction of the correlation coefficient allow us to confirm that the associations between house prices and oil prices are strong. The obtained P value (0.0051) is lower than 0.05 and allow us to interpret, that the relationship between house prices and oil prices is statistically significant.

Table 2. Results of correlation – regression analysis

| | r | P-value | R ² | t _{st} | t _{kr} | b ₀ | b ₁ |
|--------------------|-----------|---------|----------------|-----------------|-----------------|----------------|----------------|
| Oil prices | 0,7490575 | 0,0051 | 0,5610871 | 2,769502 | 2,262157 | 310,22 | 31,32 |
| Electricity prices | -0,159565 | 0,7059 | 0,025461 | -0,395926 | 2,446911 | 2470,55 | -4178,32 |
| Gas prices | -0,148456 | 0,7260 | 0,022039 | -0,367716 | 2,446911 | 2368,22 | -28,97 |

Source: Authors' calculations

Meanwhile, the coefficient of determination (0.5610871) implies that fifty six percent of price changes can be explained by changes of oil price. The linear regression model:

$$\text{Housing price} = 310.22 + 31.32 \times \text{oil price}$$

It implies that the increase of oil price by 1 EUR will increase the price of one square meter by 31.32 EUR. Hence, the conclusion we can draw is that the hypothesis was not verified. To generalize, the increase of house prices in 2000-2011 was driven by increase of oil prices, what has led to increase of prices of other goods and services.

The second hypothesis was tested taking into consideration statistical data from 2004 to 2011 provided by the European Commission. Table 2 provides correlation coefficients for associations between electricity prices and real estate prices. The obtained results (Table 2) about associations between electricity prices for household consumers and real estate prices allow us to provide the following interpretations. Notably, the magnitude of the correlation coefficient allow us conclude that the associations between house prices and electricity prices are weak. The obtained P value (0.07059) is higher than 0.05 and allow us to interpret, that the relationship between house prices and electricity prices is statistically non-significant. Meanwhile, the coefficient of determination (0.025461) implies that two percent of price changes can be explained by changes of electricity price. The linear regression model:

$$\text{Housing price} = 2470.55 - 4178.32 \times \text{electricity price}$$

It implies, that the increase of electricity price by 1 EUR will decrease the price of one square meter by 4178,32 EUR. Hence, the conclusion we can draw is that the hypothesis was not verified.

The third hypothesis was tested taking into consideration statistical data from 2004 to 2011. We use data, which are provided by the European Commission Table 2 provides correlation coefficients for associations between gas prices and real estate prices. The obtained results about associations between gas prices for household consumers and real estate prices allow us to provide the following. First, the magnitude of the correlation coefficient allow us conclude that the associations between house prices and gas prices are weak. The obtained P value (0.7260) is higher than 0.05 and allow us to interpret, that the relationship between house prices and gas prices is statistically non-significant. Meanwhile, the coefficient of determination (0.022039) implies that two percent of price changes can be explained by changes of gas price. The linear regression model:

$$\text{Housing price} = 2368.22 - 28.27 \times \text{gas price}$$

It implies, that the increase of gas price by 1 EUR will decrease the price of one square meter by 28,27 Euros. Hence, the conclusion we can draw is that the hypothesis was not verified.

Conclusions

The research was based on prevailed scientific literature and analyzed the relationships among supply and demand side determinants and house prices using data from Lithuania for the period of 2000-2011. We tested if and how supply and demand side determinants impact house prices. Our study established strong and positive relationships between house prices and GDP per capita, disposable income and inflation rate. On the other hand, we found that relationships between house prices and such determinants as, construction costs and population rates are weak. Taking into consideration the growth of Lithuania's dependence on energy resources, we analysed the relationships between house prices and energy prices such as gas prices, electricity prices and oil prices. We established strong relationship between house prices and oil prices, what has led to increase of prices of other goods and services. On the other hand, we found that relationships between house prices and energy prices such as, gas prices and electricity prices for household consumers are weak and negative. Hence, the conclusion we can draw is, that the growth of house prices is not driven by electricity and gas prices for household consumers. The limitations of the presented research were related with the scope: the situation of only one country was observed. Nevertheless, we could shed some light on the question if and how fundamental determinants and energy prices are linked to house prices.

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