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RESEARCH ON HOUSING BUBBLES IN THE CAPITALS OF THE BALTIC AND CENTRAL EUROPE*

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Abstract

Economic prosperity was not only the Baltic states, other Central European countries in the region, such as Poland, Slovakia, the Czech Republic and Slovenia also faced worldwide growth - boom in housing prices which exceeded most analysts' forecasts and rational expectations. Therefore, this article examines and assesses how the global financial crisis, what started in the housing sector, affected similar economic development level countries by the calculation of price to income method approach for housing bubble size estimation in the Baltic countries and Central European countries capitals. Obtained results reveal that housing prices boom mostly affected the Baltic States capitals. The largest housing bubble of all Central European capitals was formed in Warsaw. Improvement of the economic situation, rising inhabitants income, decreasing unemployment, rising prices for construction and profitability of housing investment, at the same time rising issuance of housing loans is creating a highly favourable conditions for the housing price bubble formation.

Keywords: housing bubble, price to income method.

JEL Classification: G01, G19, G20, G21

Introduction

As rapid globalization is taking place, during the past few decades considerable number of scientists (Björklund & Söderberg, 1999; Case & Shiller, 2003; Helbing, 2003; Belinskaja & Rutkauskas, 2007; Khumpaisal & Chen, 2009; Goodman & Thibodeau, 2008; Tupėnaitė & Kanapeckienė, 2009; Èadil, 2009; Azbainis, 2009; Kuodis, 2004; Vanichvatana, 2007; Macdonald, 2010) focus on analysis of housing bubbles, identification of their causes, development of methods for calculation of the extent of housing bubbles, because formation and later inevitable collapse of price bubbles historically caused significant problems for sustainable development of the economy. The latest example is the global financial crisis of 2008, which started from collapse of the price bubble in the real estate market of the USA. During the economic boom housing prices were growing rapidly not only in the Baltic States but in many other European countries as well. Baltic and Central European countries (Poland, Slovakia, Czech Republic, Hungary, and Slovenia), which joined the European Union in the same year (2004) also faced the property housing prices boom, which was taking place around the world. Thus, it is very important to examine and assess how the global financial crisis affected the housing sector in countries with similar level of economic development.

The purpose of the present article is to establish and compare extents of housing bubbles in capitals of Baltic and Central European countries.

Research methods – systematic literature analysis, logical comparative and generalization analysis, mathematical statistics methods.

Evaluation of the real estate bubble using the price to income method

Mostly in scientific literature three main methods of evaluation of bubbles are discussed – the fundamental factors which have an impact to housing supply and demand method, price to rent method and price to income method. There are no clear indications when and under what circumstances each method should be applied, as there is no method suitable for all cases. After analyzing the situation of the country the method is chosen individually, it is possible to introduce additional variables to better describe the current situation of the market. Besides it was noticed that not all countries fully or at least partially supply the indicators necessary for the methods of analysis of the current situation in the country. The chosen method of price to income shows that the price of housing is dependent on the income of residents, i.e. the price of housing cannot grow rationally if the residents have no income. The research uses not specific prices of housing, but a quarterly index of the prices of housing, as well as income, which is the average monthly salary expressed in quarterly indexes after deducting taxes. Salary of one person is chosen for the research as income of a household can reflect incorrect or inaccurate information, as income in the same household can

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be calculated for a market player, who is not a housing market player, e.g.: an unemployed person who has no plans of employment and no intentions of buying housing in the nearest future. The research does not evaluate the inflation of the analyzed countries as it affects both the prices of housing and the income. The statistical indicators of each country necessary for the applied method were collected from the statistical and real estate agency data bases of the individual countries.

Indexes are calculated using the formulas of the price to income method. The salary and housing price index is calculated using the following formulas (Abzainis, 2009):

$$V_t^{index} = \frac{V_t \cdot V_{t-1}^{index}}{V_{t-1}} \quad (1)$$

here - V_{t-1}^{index} - average housing price index for *t-1* period, $V_{2000:I}^{index} = 100$, V_t - average housing price for *t* period, V_{t-1} - average housing price for *t*-1 period.

The index of average salary after deducting taxes is calculated in the following way:

$$INC_t^{index} = \frac{INC_t \cdot INC_{t-1}^{index}}{INC_{t-1}} \quad (2)$$

here - INC_{t-1}^{index} - index of average monthly salary after deducting taxes for *t-1* period, $INC_{2000:I}^{index} = 100$, V_t - average monthly salary after deducting taxes for *t* period, V_{t-1} - average monthly salary after deducting taxes for *t-1* period.

The indexes of housing price and monthly salary after deducting taxes is expressed as:

$$PI_t^{index} = \frac{V_t^{index}}{INC_t^{index}} \quad (3)$$

Evaluation of the housing bubble of the capitals of the Baltic States

The last decade saw the constant rise of real estate prices in three Baltic States, Lithuania, Latvia and Estonia, the prices started dropping during the global financial crisis and after reaching the price peak. When prices are constantly rising not in proportion to income of residents, the real estate market faces a situation called real estate price bubble in economic literature. The phenomenon when the prices reach their peak and start dropping suddenly is called bursting of the housing bubble in economic literature.

The research analyzes the economic indicators for the capitals of the Baltic States from 1st quarter of 2000 to 2nd quarter of 2010. Applying the chosen method the size of the housing bubble was calculated for the analyzed period in the capitals of the selected countries.

During the theoretical research it was noticed that the majority of scientists calculate the data of statistical indexes before starting the empirical studies: the average, the standard deviation, the maximum and minimum values. The calculated statistical indicators of the average, the standard deviation, and the maximum and minimum values (see Table 1) confirm that the growth of the price of housing was not in proportion to the growth of salary. As these indexes differ greatly the beginnings of a housing bubble can be already discerned.

Table 1. Statistical data of indexes of salary and the price of housing for Vilnius, Riga and Tallinn

Indeksas	Minimum value	Maximum value	Average	Standard deviation
Vilnius, 2000:I Q - 2010: II Q				
Index of salary after deducting taxes	100.00	243.31	153.79	51.30
Housing price index	86.60	379.90	198.46	100.03
Riga, 2000:I Q - 2010: II Q				
Index of salary after deducting taxes	100.00	404.59	215.16	96.34
Housing price index	89.87	402.53	187.62	102.22
Tallinn, 2000:I Q - 2010: II Q				
Index of salary after deducting taxes	91.41	340.74	192.42	73.18
Housing price index	98.08	561.54	315.73	143.32

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Table 1 shows that the statistical data for all three analyzed capitals are different. But both the standard deviation (143.32 %) and the range of change of the index of the price of housing (from 98.08 % to 561.54 %) are greatest for Tallinn in comparison to the data for Vilnius and Riga. The change of salary in Tallinn during the analyzed period was not great (from 91.41 % to 340.74 %).

We could conclude that the housing bubble is biggest in Tallinn as compared to the other two capitals. The statistical data on the prices of housing and salary for Riga are very similar, only the standard deviation for the price of housing is slightly bigger than the standard deviation of salary, therefore according to the available statistical information we can conclude that a rather small bubble of housing prices had formed in Riga or conversely the housing bubble was big, but after reaching the peak of the housing price index the housing prices had to plummet. The statistical data of the index of the price of housing for Vilnius are almost all higher than the data of the index of salary. It is obvious that the growth of the prices of housing (from 86.6 % to 379.9 %) was not in proportion to the growth of salary (from 100 % to 243.31 %). As these indexes differ greatly the beginnings of a housing bubble can already be discerned. However these statistical data for the capitals reflect only very abstract information, as the specific quarterly data is not taken into account, the change of individual indicators is not analyzed. In order to calculate the size of the housing bubble the research needs to compare the indexes of the price of housing and salary in the capitals, calculate the correlation of these two indicators for the analyzed period. The obtained results and summarized notes are presented in Table 2.

Table 2. Summary of housing bubbles in the capitals of the Baltic States

Capital	Size of the bubble, %	Summary
Vilnius	47.11	The highest value of the housing bubble in Vilnius was recorded in the middle of 2006. The biggest difference between the prices of housing and salary had formed then. Though later the prices of housing continued to grow slightly, the growth of salary was somewhat bigger. After the bubble burst the prices of housing reached the level of prices of the end of 2005 in the 2nd quarter of 2010.
Riga	44.30	The housing price bubble was smallest in Riga out of all capitals of the Baltic States. The biggest housing bubble in this city had formed in the 3rd quarter of 2006. The consequences of the bursting of the housing price bubble in Riga were the most significant. In the 3rd quarter of 2009 the housing prices dropped almost to the initial value of the analyzed period (1st quarter of 2000). While the salary decreased very slightly.
Tallinn	52.28	The biggest housing bubble of all of the capitals of the Baltic States had formed in Tallinn during the analyzed period between the 1st quarter of 2000 and the 2nd quarter of 2010. It formed in the 3rd quarter of 2006. Until this quarter the housing prices had grown several time more than the salary. When the bubble burst in the middle of 2010 the prices reached the prices of the beginning of 2005.

Evaluation of the housing bubble of the capitals of Central European countries

Central European countries, such as Slovakia, the Czech Republic, Poland and Slovenia, joined the European Union the same year as the Baltic States (Lithuania, Latvia, and Estonia) analyzed above. All these countries joined the European Union on 1 May 2004. Continuing the research applying the price to income method it is relevant to analyze the size of the housing bubble had formed in the capitals of the Central European countries. These countries are similar to the Baltic States both in terms of GDP per capita and other economic indicators. However after joining the European Union the economy of some countries grew and remained rather stable during the global economic crisis, the economy of other countries shrank significantly. After joining the European Union some countries (Slovakia – 1 January 2009, Slovenia – 1 January 2007) introduced the common currency of the European Union – the euro. And that means that after becoming members of the European Union these countries became economically stronger and met the requirements set by the European Union to introduce the euro. Euro has been introduced only in Estonia (from the beginning of 2011) out of the Baltic States analyzed above.

The research covers economic indicators of the capitals of the Central European countries analyzed in the research from the 1st quarter of 2003 to the 2nd quarter of 2010, as not all the statistical data bases of the analyzed countries provide the data from 2000 (Poland, the Czech Republic do not provide the housing price indicators from 2000). The research uses the indexes of housing prices and salary, there will be no significant

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difference if the selected period will be from 2003, as it is known that the housing bubble in the majority of the European countries started forming in the beginning of 2004. Applying the chosen price to income method the size of the housing bubble that had formed in Bratislava, the capital of Slovakia, Prague, the capital of the Czech Republic, Warsaw, the capital of Poland, and Ljubljana, the capital of Slovenia, was calculated. Another Central European country – Hungary – does not provide the necessary data neither in the statistical data bases of the country nor in other statistical information websites, therefore it will not be analyzed in greater detail.

As in the case of the capitals of the Baltic States the statistical indicators of the capitals of the Central European countries are calculated. Table 3 presents the statistical data of indexes (the average, the standard deviation, the maximum and minimum values) for Ljubljana, Prague, Bratislava, and Warsaw.

Table 3. Statistical data of indexes of salary and the price of housing for Ljubljana, Prague, Bratislava and Warsaw

Index	Minimum value	Maximum value	Average	Standard deviation
Ljubljana, 2003: I Q – 2010: I Q				
Index of salary after deducting taxes	100.00	149.64	124.50	16.06
Housing price index	100.00	194.41	153.50	32.21
Prague, 2003: I Q – 2010: I Q				
Index of salary after deducting taxes	100.00	170.59	133.79	18.46
Housing price index	100.00	180.08	129.44	28.43
Bratislava, 2003: I Q – 2010: I Q				
Index of salary after deducting taxes	100.00	178.02	140.39	20.94
Housing price index	97.96	178.67	132.45	26.70
Warsaw, 2003: I Q – 2010: I Q				
Index of salary after deducting taxes	100.00	144.86	120.92	15.62
Housing price index	100.00	251.67	181.92	57.23

As can be seen from Table 3 the calculated statistical data are rather unstable. However we can state that the situation in the capitals of the Central European countries was more stable in comparison with the statistical information for the capitals of the Baltic States. Only the statistical index data for Warsaw differ slightly from all the other capitals, the situation somewhat closer to that in the capitals of the Baltic States. A big difference between the change of the housing price index and the salary is seen in Warsaw, as all calculated variables, including the standard deviation of the housing price (57.23 %), average (181.92 %), and other data, are quite higher than the calculated salary variables. It can be concluded that Warsaw had the biggest housing bubble out of all analyzed capitals of the Central European countries. The indexes of salary and housing price are quite similar in the capital of the Czech Republic. The average of salary (129.44 %) is even slightly higher than the average of housing prices (133.79 %). It can be stated that there was no big contrast between the growth of housing prices and salaries in this city, as it has a strong influence on the formation of the housing bubble, and even if it had formed during some period, later this difference levelled out. However other presented statistical data show that a housing bubble had formed in Prague. The statistical data for Bratislava are very similar to those for Prague. Thus the housing prices and the salary changed in the capitals of these countries in a similar manner. The calculated statistical data for Ljubljana a slightly more different, it appears that the values of the housing price index were higher than the values of the salary index almost in all respects. The standard deviation of the housing price index (32.21 %) was two times higher than the standard deviation of salary (16.06 %), which means that the spread of the housing price index close to the average was much greater than that of the salary index. This means greater real estate investment risk, which means that a housing price bubble had formed in this country according to the calculated statistical information.

The size of the calculated housing bubble, housing prices in the capitals and notes on comparison of the salary indexes are presented in Table 4.

Table 4. Summaries of the housing bubbles in the capitals of the Central European countries

Capital	Size of the bubble, %	Summary
Ljubljana	30.81	This capital had the smallest housing bubble out of all the analyzed capitals. Slovenia also ranks first among the analyzed countries according to such factors as GDP per capita. This country was the first out of the analyzed countries to introduce the euro. And this means that it met the requirements according to the inflation indicator and other criteria. The biggest housing bubble had formed in Ljubljana in the middle of 2007. When the bubble burst in the 2nd quarter of 2010, the prices reached the level of the 3rd quarter of 2005.
Prague	34.96	The growth of housing prices and salary was most similar between Prague and Bratislava. After restoration of independence in 1993 the Czech Republic and Slovakia retained close relationships with respect to state management and other aspects. It was calculated that the biggest housing bubble in Prague had formed during the 3rd quarter of 2008. In the 2nd quarter of 2010 the housing prices reached the level of prices of the 2nd quarter of 2007.
Bratislava	32.32	Slovakia was the second Central European state to introduce the euro. It is no wonder that the housing bubble in Bratislava was only slightly bigger than in Ljubljana. The biggest housing bubble had formed in the 1st quarter of 2008. The salary continued to grow, and when the housing price bubble burst in the 2nd quarter of 2010, the prices dropped to the level of the end of 2007.
Warsaw	44.02	Out of all the capitals of the Central European countries the biggest housing bubble had formed in Warsaw. The highest value of the housing bubble was recorded in the 1st quarter of 2007. The housing bubble, when the growth of the housing price was much more rapid than the growth of salary, was similar to the situation in Riga. However when the bubble burst, the situation was completely opposite. The prices lower insignificantly, it is likely that the housing market in this capital should shrink some more.

The research performed using the modified price to income method established that the growth of the housing prices had the biggest influence on the capitals of the Baltic States. The Baltic States are slightly behind the analyzed Central European countries with respect to such economic indicators as GDP, average salary, inflation, etc. However it is not the most important factor for formation of the biggest housing bubbles in the capitals of the Baltic States. It was influenced by the tendencies of changes of the said fundamental factors. With improving economic situation, growing income of residents, decreasing unemployment, growing construction prices and profitability of investment into real estate – all of this adds to the formation of the housing price bubble. Irrational factors, such as household expectations, speculations in the housing market, which contribute greatly to the rapid growth of the housing prices, were not analyzed in detail. In the case of some capitals of Central European countries (Bratislava and Prague) it was noticed that the growth of prices was similar due to close cooperation of these countries (import/export ties). It was established that the housing bubble was smallest in the countries which had introduced the euro.

Conclusions

1. In the course of the study it was established that capitals of the Baltic States witnessed the formation of the following housing bubbles: Vilnius – 47.11 percent, Riga – 44.30 percent and Tallinn – 52.28 percent. Central European capitals witnessed the following housing bubbles: Ljubljana – 30.81 percent, Prague – 34.96 percent, Warsaw – 44.02 percent.
2. It was found that in the biggest housing bubble was formed in Tallinn in the third quarter of 2006 (52.28 percent), while the smallest (30.81 percent of a house price) was found in the Slovenian capital Ljubljana in the middle of 2007. However, in the first quarter of 2007 the biggest housing bubble was in Warsaw (44.02) and it was the biggest of all Central European capitals.
3. The study revealed that the biggest collapse of the price bubble took place in the third quarter of 2009 in Riga and prices there fell to the value last seen in the first quarter of 2000. To summarize results of the research, it may be said that the Baltic States experienced the biggest impact of the growth in housing prices.
4. This was affected by trends in changes in fundamental factors, when in the context of improving economic situation, growing income of the population, falling unemployment, growing

construction prices, profitability of investment into housing, and increasing volume of mortgages there emerge conditions, which are particularly favorable for formation of housing price bubbles.

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