



EVALUATION OF FACTORS LEADING TO FORMATION OF PRICE-BUBBLES IN THE REAL ESTATE MARKET OF LITHUANIA

Audrius DZIKEVIČIUS¹, Lukas KAZLAUSKAS², Šarūnas BRUZGĖ³

*Department of Finance Engineering, Faculty of Business Management, Vilnius Gediminas Technical University,
Saulėtekio al. 11, LT-10223 Vilnius, Lithuania*

E-mails: ¹audrius.dzikevicius@vgtu.lt; ²lukas.kazlauskas1@gmail.com;

³sarunas.bruzge@vgtu.lt (corresponding author)

Received 27 October 2014; accepted 28 March 2015

Abstract. Recently, real estate market has been discussed more frequently in the framework of economic analysis. The global economic crisis of 2008 has demonstrated the severity of financial shock that can be caused by inconsiderate investments in the real estate market. The present article analyses business cycles and the phenomenon of a price-bubble in that context. Drawing on the analysis of reference literature we identify the main reasons that can lead to fluctuations of prices in the real estate market. Finally, drawing on correlation and regression analysis we determine which factors have the strongest influence on the Lithuanian real estate market.

Keywords: business cycle, real estate price bubble, financial crisis, Lithuanian real estate market, correlation and regression analysis.

JEL Classification: C20, E32.

VEIKSNIŲ, LEMIANČIŲ LIETUVOS NEKILNOJAMOJO TURTO RINKOS BURBULO FORMAVIMĄSI, VERTINIMAS

Audrius DZIKEVIČIUS¹, Lukas KAZLAUSKAS², Šarūnas BRUZGĖ³

*Vilniaus Gedimino technikos universitetas, Verslo vadybos fakultetas, Finansų inžinerijos katedra,
Saulėtekio al. 11, LT-10223 Vilnius, Lietuva*

El. paštas: ¹audrius.dzikevicius@vgtu.lt; ²lukas.kazlauskas1@gmail.com; ³sarunas.bruzge@vgtu.lt.

Įteikta 2014-10-27; priimta 2015-03-28

Santrauka. Pastaruoju metu nekilnojamojo turto (toliau – NT) rinka vis dažniau tampa ekonominės analizės objektu. 2008 m. pasaulinio masto ekonominė krizė parodė, kokio dydžio finansinį šoką gali sukelti neapdairus investavimas į NT rinką. Straipsnyje analizuojamas verslo ciklas, pastarojo kontekste nagrinėjamas kainų burbulo fenomenas. Literatūros analizės metu išskiriamos pagrindinės priežastys, galinčios sukelti NT rinkos kainų svyravimus. Naudojant koreliacinę regresinę analizę, siekiama išsiaiškinti, kurie veiksniai turi stipriausią poveikį Lietuvos NT rinkai.

Reikšminiai žodžiai: verslo ciklas, nekilnojamojo turto kainų burbulas, finansų krizė, Lietuvos nekilnojamojo turto rinka, koreliacinė regresinė analizė.

Introduction

Housing, whilst fulfilling one of the basic needs of a human being, is also an attractive target for investing. During the recent twenty years the real estate prices have risen more than twofold in Lithuania (VĮ Registrų centras 2014). That, combined with other factors, such as inflation and fluctuations in exchange rates, leads to a situation where real estate remains a remarkable investment tool mitigating exogenous and endogenous factors. The increasing popularity of the real estate market has made it evolve into a huge and difficult to control resource allocation system. As experienced in the past, that system has repeatedly endured economic shocks.

In 2008, the world was shaken by far the biggest financial crisis since the Great Depression that started with real estate price-bubble and ended with painful collapse of the financial sector. Although the centre of the crisis was located in USA, the economies of the remaining continents owing to globalisation were also hit hard. Unemployment grew, budget deficits went up, inflation and public debts increased (Davulis 2011; Rakauskienė 2009). Whilst exerting economic effects on many countries the crisis has also made bankers and financiers doubt their economic knowledge. The downturn of 2008 is a remarkable illustration of the impact that the real estate market and inconsiderate investing may have on national economies. To sum it up, it can be stated that the global economic framework went through one more cycle.

Real estate experts and analysts of the economy observing the recent rapid growth of Lithuanian economy and increasing performance on the real estate market have noticed some starting elements of a new real estate boom. The purpose of this article is to signal about another potential downturn of the country's economy and building-up of a real estate bubble in the Lithuanian market.

The article discusses the following **problem**: which economic factors exert the largest influence to the real estate market of Lithuania?

The **object** of the article – macroeconomic indicators of Lithuania covering the period 2003–2013.

The **purpose** of the article – to identify the factors affecting the real estate market and to practically assess the theoretical assumptions on formation of real estate price-bubble in the Lithuanian real estate market. To address the above purpose the following **objectives** have been set:

- To analyse academic literature and identify the key factors affecting the real estate market;
- To analyse the causes of the real estate bubbles;
- To conduct correlation and regression analysis;
- To sum up the obtained results.

1. Concept of a business cycle

The history of economics contains no records of any country's economy growing without fluctuations (Samuelson,

Nordhaus 2010). In the long run, the national product is constantly growing, however, in the short run it faces ups and downs from time to time. Historic analysis of cyclic economical development started at the beginning of 19th century. The first economists that placed more emphasis on business cycles were L. S. Sismondi, K. Roberthus, T. Malthus (Urbonas 2011). The definition of a business cycle was first introduced by the American scholars A. Burns and W. Mitchell. They define a business cycle as a type of shifts in a nation's performance involving many economic activities. In other words, business cycles refer to regular fluctuations of national or regional economy (Girdzijauskas et al. 2009b).

A business cycle covers four stages (Razauskas 2009):

1. Boom – the peak of the business cycle. The national product reaches its peak, unemployment rate is small, productivity is at its maximum.
2. Decline – a period when the production starts declining and the unemployment level starts rising. The aggregate demand is falling as well and the economy is contracting.
3. Crisis – the lowest point of a business cycle. The aggregate demand severely lags behind the production capacities, domination of stagflation is possible.
4. Recovery – a stage where the national economy start recovering. The unemployment level is falling, the productivity is growing, the aggregate demand is increasing.

Valkauskas (2012) states that the duration of an economic cycle may range from one to twelve years. Guessing of the future business cycle is very complicated. When the economy is at its recession, neither its duration nor its severity are known; moreover, the effects of a crisis are different in different sectors of the economy, which makes the assessment of a country's economic situation even more difficult (Dziukevičius, Vetrov 2012).

Every business cycle is driven by different factors, therefore a few approaches towards explaining this theory may be found in economic literature. One of such approaches deals with a real business cycle. According to Dobrescu and Paicu (2012), the theory of a real business cycle focuses on technological shocks or other disturbances on the supply side which are identified to be the main causes for fluctuations in the development of a country's economy. However, this business cycle model disregards shifts of the economy related to financial, political or social factors. In other words, this theory takes account of more natural volatilities of the economy. The present article will not analyse real business cycle theory further due to a rather narrow viewpoint followed with regard to economic fluctuations.

Other business cycle theories involve reasoning by famous economists such as L. Mises, F. Hayek, M. Friedman and J. M. Keynes explaining that anomalies in the economy

are caused by economic or political factors. The Austrian school of economic thought explains business cycles by using a central bank's interest rate as the basis (Luther, Cohen 2014). They claim that by setting lower interest rates a central bank causes a wave of crediting and, hence, malinvestments. Resources are re-allocated between sectors which leads to price bubbles (Hayek 1931). The Keynes' followers claim that economic downturns result from contraction of the aggregate demand, which in turn reduces income of businesses and lead to higher unemployment (Harvey 2014). Monetarists point to growing amount of money in circulation followed by inflation as the main reason of fluctuations. Growing inflation hampers growth of national product and evolves into a downturn period (Friedman, Schwartz 1963).

Drivers of a business cycle are very often intertwined with the financial sector. According to Racickas and Vasiliauskaitė (2012), the main causes of a financial crisis may lie in:

1. Macroeconomic policy. Currency devaluation, loss of currency reserve and collapse of a fixed currency exchange rate may cause financial disharmony of varying degrees.
2. Financial panic. That emerges when bank clients start massively withdrawing their deposits from the commercial banks. Due to fractional reserve system banks are not able to repay all deposits on time and go bankrupt.
3. Moral hazard. This phenomenon builds up when banks and financial institutions disregard possible implications and engage in risky activities that can lead to catastrophic consequences.
4. Speculative attack. A speculative attack is a situation where a large part of investors expect devaluation of a currency and start selling it (thereby causing devaluation of the currency).
5. Bubble burst. As the bubble bursts the return of investments falls to zero, the majority of institutions face bankruptcy risk, which, in turn, may lead a country to depression.

Price bubbles should be monitored since this phenomenon increasingly emerges in the economic environment.

2. Price bubble

Knowing that bursting of price bubbles may lead to crises or depression, this anomaly requires deeper analysis and research into characteristics of price bubbles. Belinskaja (2007) claims that the very definition of a price bubble is not that important as "bursting" of the bubble and the ensuing consequences. According to Holzhey (2013), there is no precise definition of a price bubble in the economic literature. A price bubble exists when the market price of a certain good is significantly larger than its price determined by

fundamental factors. In other words, if the price of a good starts rising sharply without influence of any fundamental factors it can be reasonably presumed that the market is affected by a price bubble. Such changes of prices can be driven by misleading information about the fundamental price of the good. As stated by Evanoff *et al.* (2012) one of the main drivers of a price bubble, hence, are irrational expectations of consumers.

According to Raškinis (2009), each bubble matures through five stages:

1. Building-up of a bubble. Price of a stock, supply or a service starts growing sharply.
2. Fear of the bubble (doubt). At this state investors start fearing the potential bubble, which temporarily restricts growth of prices.
3. Zenith of the bubble. At the peak of the bubble the price of a stock or a product reaches its highest point and the majority of investors expect uninterrupted growth.
4. Bursting of the bubble. Major investors pull out of the market and the prices fall.
5. Massive panic. Due to sudden fall of prices the majority of investors attempt to exit the market.

As stated by professor Tyc (2013), the formation of a price bubble is driven by economic, institutional and psychological factors. Very often, the effect of synergy between all these factors determine the size of the emerging bubble, i.e. these factors are cumulative. It should be emphasised that actions of individual consumers guided by their logics and rationality sometimes may lead to undesirable outcomes that can be harmful to the society.

Girdzijauskas, Štreimikienė (2009a) claim that price bubbles may build-up in the markets of stock, real estate, precious metals and energy resources. Price bubble of stock form when speculators spot slight surge of prices. Expecting the prices to rise in the future the investors start massively buying the stock thereby increasing their demand and, hence, pushing the prices up. Bubbles in the real estate market form when prices start growing consistently. In normal situation, the real estate price should increase with inflation or growth of wages, while inconsistent growth can be regarded as a signal pointing towards existence of a price bubble.

Evanoff *et al.* claim (2012) that owing to their huge negative effect bubbles of the stock market and the real estate receive a great deal of attention from central banks. However, most often the bubbles are identified upon their "bursting", since in some cases prices might fall after some period of time from their recent peak without causing the economic downturn.

As real estate price bubbles have huge destructive potential it is important to understand the factors leading to their formation and how to identify them.

3. Features specific to formation of real estate bubbles

So far the economists have not been able to agree on unambiguous principles guiding formation of real estate bubbles. Further below we provide a list of factors leading to building-up of real estate bubbles as identified by different authors. (Table 1).

The majority of economists (White 2009; Davulis 2012; Rakauskienė, Krinickienė 2009; Juhas 2013; Scott 2010; Radun 2009) blame the expansionary monetary policy pursued by the federal reserve system (FED) for the real estate price bubble that the United States of America experienced in 2008. A low interest rate set by the FED has instigated a huge number of malinvestments. Low interest rate has served as a cash flow allocation tool and saturated the real estate market with financial capital. This infringes the principle of free competition model, since capital should flow to the most profitable sectors of economy without being controlled by anyone. The companies such as Fannie Mae and Freddie Mac engaged in reselling of housing loans were buying housing loans from commercial banks and reselling them to entities which were considered too risky by the banks, which, on the

Table 1. Drivers for real estate bubbles as identified by different authors

Author	Drivers for a bubble
Renigier-Biłożor and Wiśniewski (2013)	1. Unemployment level. 2. Number of population. 3. National income. 4. Personal consumption.
Burinskienė et al. (2011), Šliupas, Simanavičienė (2010)	1. Number of issued loans. 2. Number of constructed apartments. 3. Consumer confidence index. 4. Interest rate on housing loans. 5. Change of the real GDP. 6. Inflation. 7. Real wage. 8. Unemployment level. 9. Number of population. 10. Stock market index. 11. Labour force.
Holt (2009)	1. Low interest on housing loans. 2. Low short-term interest rates. 3. Milder terms of crediting. 4. Irrational expectations of investors.
Leika, Valentinaitė (2007)	1. Increases of consumers' income. 2. Tax benefits. 3. Expectation and speculative activities. 4. Development of financial markets. 5. „Seller's market“.
Ramanauskas (2011)	1. Banks' borrowing from foreign markets. 2. Public expenditure. 3. Interest rates applied by commercial banks. 4. Trade with foreign countries.
Simanavičienė, Keizerienė (2011)	1. Gross domestic product. 2. Inflation. 3. Investments into residential buildings.

other hand, allowed the middle class consumers to acquire housing. Securitisation of loans should have mitigated the risk by redistributing it in varying levels and dispersing it geographically. Owing to securitisation risky loans were duly hidden. However, financial institutions and banks driven by temptation to maximise their profits did not pay sufficient attention to risk assessment.

Knowledge of the factors guiding the real estate prices and close monitoring of these factors enables to identify the existence of a price bubble. Economic literature also suggests certain indexes that facilitate analysis of the real estate market. Azbainis (2009) and Krušinskas (2012) suggest the following indicators for real estate bubbles:

1. Price and income ratio. The ratio of housing price and income is an unbiased, fundamental indicator illustrating the ability of a consumer to purchase a housing.
2. Housing supply. The main focus is on the interest rate, which, if decreasing, promotes demand and increases prices in the short-term perspective. The increased prices improve profitability of companies, attract more manufacturers and increase the supply – the price of the housing then equals construction costs.
3. Price expectations by consumers. As it has been already mentioned, expectations are a key factor leading to formation of bubbles.
4. Buyer's impatience and undertaking of financial risk. Observing growing housing prices buyers get restless and start buying real estate guided by fear that prices might grow further.
5. Credit market. Shifts in the credit market is an important indicator for price analysis.
6. Speculative behaviour. Behaviour of speculators is a remarkable indicator signalling that price increases are irrational.
7. Rent and housing price. If housing rent is bigger than interest rate on housing loans, demand for real estate may increase.

To sum it up, it is appropriate to group the factors affecting the real estate market. Simanavičienė, Keizerienė, Žalgiryte (2012) distinguish between two groups of those factors – direct and indirect.

The authors of the present article consider that the factors should be grouped under three headings: economic, legal and social (Table 2).

4. Correlation and regression analysis

In order to adequately assess the impact of economic factors on the Lithuanian real estate market it is appropriate to perform a correlation and regression analysis. All the input data for the analysis have been obtained from Statistics Lithuania (Statistikos departamentas 2014), real estate experts Ober Haus (Ober Haus 2014) and the Bank

Table 2. Factors affecting real estate market

Economic factors	Political factors	Psychological factors
Growth of the economy. Rapid growth of the gross domestic product may stimulate performance of the real estate market.	Legal restrictions on construction. With heavy bureaucracy in the real estate sector housing supply reduces, consequently prices might grow.	Herd behaviour. When consumers notice more people buying real estate they tend to follow the pattern.
Growth of wages. With increasing income consumers have a tendency of taking larger financial risk.	Growing public investments into the real estate sector. Growing investments suggest that real estate market is booming.	Concern that further growth of prices will make it more difficult to purchase a housing in the future. Hence, growing proportion of people purchase real estate thereby promoting the bubble.
Large housing rent price. When housing rent price exceeds monthly loan payments, purchasing a housing becomes an attractive option.		Positive expectations. Consumers might think that sound economic situation of a country will never end. Such euphoria eliminates fear of financial risk.
Rising inflation. When the inflation is rising, the purchasing power of a currency is eroding. To avoid that, households invest money into real estate.		
Reduction of interest rate. As central banks set smaller interest rates credits become cheap, which, in turn, increases real estate demand.		

of Lithuania. The correlation and regression analysis will allow us to identify the factors that are most closely related with the Lithuanian real estate market.

All the input data is based on the same time interval – from 2003 to 2013. The data is annual, which means that the sample size for time series of each indicator is also the same, $n = 11$.

OBHI index (obtained from Ober Haus 2014) is used as the variable Y . The variables X are all indicators identified in the theory as having potential to influence prices:

1. Nominal GDP – X_1 ;
2. Rate of inflation – X_2 ;
3. Unemployment level – X_3 ;
4. Average monthly net wage – X_4 ;
5. Direct foreign investments – X_5 ;
6. Completed construction of apartments – X_6 ;
7. Issued permits for construction of apartments – X_7 ;
8. Completed construction works at current prices – X_8 ;
9. Construction of real estate as a percentage of GDP – X_9 ;
10. Interest rate on housing loans – X_{10} .

The relevant calculations have produced the following values (Table 3).

The highest correlation coefficient is recorded between OBHI index and the completed construction works. High correlation coefficients are also recorded with regard to inflation level, completed construction of apartments and issued permits for construction of apartments. Medium correlation coefficients are attributed to the gross domestic product, unemployment level, construction as

a percentage of GDP, monthly wage and direct foreign investments. Relationship with housing interest rate is somewhat weaker.

Once the values of the correlation coefficients are known, we have to assess their significance. The assessment of significance is performed by calculating t-statistic and comparing it with the t-critical value. Having calculated the statistic values of each variable t we obtain the following figures (Table 4).

Once the t-statistic values are calculated, we have to calculate the t-critical value. If $t > t_{\alpha, k}^{kr}$, it means that the size of correlation coefficient is significant. The t-critical is calculated with EXCEL function TINV, where $\alpha = 0.1$ (Table 5).

Table 3. Correlation coefficients

Correlation coefficients				
X_1	X_2	X_3	X_4	X_5
0.64	0.83	-0.52	0.59	0.57
X_6	X_7	X_8	X_9	X_{10}
0.73	0.77	0.89	0.54	0.41

Table 4. Significance of correlation coefficients

t-statistic				
X_1	X_2	X_3	X_4	X_5
2.51	4.39	1.81	2.17	3.67
X_6	X_7	X_8	X_9	X_{10}
3.18	1.91	5.71	2.09	1.34

Table 5. Values of t-statistic

t-statistic				
X_1	X_2	X_3	X_4	X_5
2.51	4.39	1.81	2.17	3.67
X_6	X_7	X_8	X_9	X_{10}
3.18	1.91	5.71	2.09	1.34
t-critical	1.83			

Table 6. Coefficients on the equations of variables

	X_1	X_2	X_4	X_5
a_0	46.73	344.09	151.662	177.12
a_1	4.889	45.209	0.258	0.029
	X_6	X_7	X_8	X_9
a_0	173.094	181.448	102.38	201.7
a_1	0.048	40.923	55.894	9.607

Table 7. Values of F-statistic

F-statistic			
X_1	X_2	X_4	X_5
0.7866	2.4064	0.5869	1.6852
X_6	X_7	X_8	X_9
1.2613	0.4556	4.0736	0.5483

Table 8. Significant F-statistic values

X_1	X_2	X_4	X_5
0.7866	2.4064	0.5869	1.6852
X_6	X_7	X_8	X_9
1.2613	0.4556	4.0736	0.5483
F-critical	2.469		

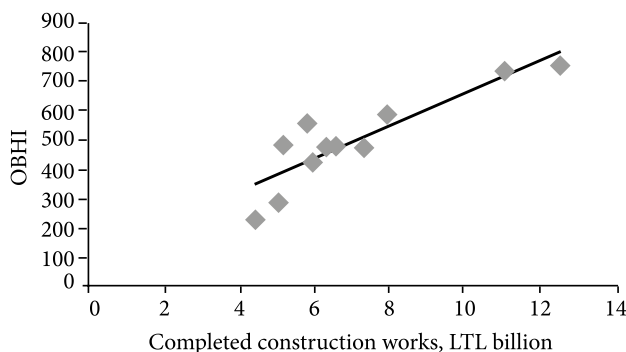


Fig. 1. Distribution of OBHI and completed construction works

The obtained t-critical value reveals that the largest impact on the prices of the Lithuanian real estate market is exerted by the following variables:

1. Gross domestic product;
2. Inflation level;
3. Average monthly net wage;
4. Foreign direct investments;
5. Number of completed constructions;
6. Number of issued permits for construction of apartments;
7. Completed construction works at current prices;
8. Construction as a percentage of GDP.

It has to be emphasised that these factors are not the only factors influencing the real estate market. Other factors, for instance, social and political, are more difficult to quantify. The factors underlined in red are discarded from further analysis because their t-statistic values are lower than the t-critical value.

Having clarified which economic factors have the greatest impact on the real estate price, we can look for a stochastic link between them. First, we draw a trend line for each variable. The general equation is as follows: $\hat{y} = a_0 + a_1 \cdot x$. Coefficients a_0 and a_1 can be derived using EXCEL functions SLOPE and INTERCEPT (Table 6).

Before drawing the trend lines, it is necessary to verify adequacy of these equations. That can be done by calculating F-statistic for each variable (Table 7).

Now we have to check these values by using the F-critical value. For a curve to be considered adequate, the following condition has to be met: $F \geq F^{kr}$. F-critical value is calculated using EXCEL function FINV, where $\alpha = 0.1$ (Table 8).

The comparison of F-critical and F-statistic values reveals that the trend line of only one factor – completed construction works at current prices – is adequate. The trend line illustrates stochastic link between OBHI index and the completed construction works (Fig. 1).

The formula of the trend line $y = 102.38 + 55.894x$ can be used for practical calculations. Using this formula we can answer the question of what will the average OBHI index value be when the completed construction works amount to LTL 10 billion:

$$102.38 + 55.894 \times 10 = 661.32.$$

It is important to note that while a more precise trend line would be drawn by applying logarithmic rather than linear dependency, the precision would improve to a limited extent therefore for the sake of simplicity of calculation we have used a linear dependency. Moreover, it is important to remember that this trend line does not explain why with increasing OBHI index the completed construction works increase. The latter simply explains the stochastic relationship between these variables.

Conclusions

Based on literature overview and empirical analysis it can be concluded that the formation of the real estate price-bubble is driven by the factors of three types: economic, political and psychological. Since 2010, the housing prices have been rather stable, compared to the pre-crisis period, the number of constructed apartments is increasing. Performance of other segments on the real estate market follows a similar pattern. The coefficient of housing prices and income indicates that both personal income and housing prices are on a stable growth track, therefore the Lithuanian real estate market remains stable. The completed correlation and regression analysis leads to a conclusion that the biggest influence on the Lithuanian real estate market is exerted by the following factors:

1. Inflation level;
2. Number of issued permits for construction of apartments;
3. Completed construction works.

The results of the above analysis confirm the conclusions obtained from literature analysis that the real estate market is influenced by shifts in economic growth (gross domestic product), inflation, personal income, foreign revenue, constructed apartments and construction as a percentage of GDP.

The correlation and regression analysis has revealed that there exists a stochastic relationship between OBHI price index and the completed construction works in Lithuania, while unemployment level of Lithuania has little effect on the real estate prices.

The results obtained from the analysis can be applied to assess the state of the Lithuanian real estate market. Quantitative analysis of all indicators influencing the Lithuanian real estate market allows to assess whether the framework of these indicators provides a friendly environment for building-up of real estate price bubble. Monitoring of the factors such as foreign direct investments or issued permits for construction of apartments, enables to assess expectations of both foreign and domestic investors. However, it can not be concluded that all these factors are the only elements influencing the real estate market and that sharp developments of these factors will induce formation of a new real estate bubble.

References

- Azbainis, V. 2009. Būsto kainų burbulų vertinimo modeliai. Būsto kainų burbulas Lietuvoje, *Socialinių mokslų studijos* 1(1): 269–287.
- Belinskaja, L.; Rutkauskas, V. 2007. Būsto kainų burbulų sprogimas – problemos vertinimas, *Ekonomika* 79: 7–27.
- Burinskienė, M.; Rudzkiene, V.; Venckauskaitė, J. 2011. Models of factors influencing the real estate price, in *The 8th International Conference “Environmental Engineering”*: Selected papers. Vol. 3. 19–20 May 2011, Vilnius, Lithuania. Vilnius: Technika, 873–878.
- Davulis, G. 2011. Global financial crisis and Lithuania, in *The 1st International Scientific Conference “Practice and research in private and public sector-11”*, 5 May 2011, Vilnius, Lithuania, 28–32.
- Davulis, G. 2012. Lietuvos ekonominė politika globalinės krizės kontekste, *Vadyba* 2(21): 83–93.
- Dobrescu, M.; Paicu, C. E. 2012. New approaches to business cycle theory in current economic science, *Theoretical and Applied Economics* 19(7): 147–160.
- Dzikevičius, A.; Vetrov, J. 2012. Analysis of asset classes through the business cycle, *Business, Management and Education* 10(1): 1–10. <http://dx.doi.org/10.3846/bme.2012.01>
- Evanoff, D. D.; Kaufman, G. G.; Malliaris, A. C. 2012. Asset price bubbles: what are the causes, consequences, and public policy options?, *Chicago Fed Letter* 304: 1–4.
- Friedman, M.; Schwartz, A. 1963. Money and business cycles, *The Review of Economics and Statistics* 45(1): 32–64. <http://dx.doi.org/10.2307/1927148>
- Girdzijauskas, S.; Štreimikienė, D.; Čepinskis, J.; Moskaliova, V.; Jurkonytė, E.; Mackevičius, R. 2009a. Formation of economic bubbles: causes and possible preventions, *Technological and Economic Development of Economy* 15(2): 267–280. <http://dx.doi.org/10.3846/1392-8619.2009.15.267-280>
- Girdzijauskas, S.; Štreimikienė, D.; Mackevičius, R. 2009b. Ekonominių svyravimų logistinė analizė, *Vadyba* 2(14): 75–81.
- Hayek, F. A. 1931. *Prices and production*. 1st ed. New York: Augustus M. Kelly. 162 p.
- Harvey, J. T. 2014. Using the general theory to explain the U.S. business cycle, 1950–2009, *Journal of Post Keynesian Economics* 36(3): 391–414. <http://dx.doi.org/10.2753/PKE0160-3477360301>
- Holt, J. 2009. A summary of the primary causes of the housing bubble and the resulting credit crisis: a non-technical paper, *The Journal of Business Inquiry* 8(1): 120–129.
- Holzhey, M. 2013. Detecting house price bubbles: the UBS Swiss real estate bubble index, *Housing Finance International* 28(1): 19–22.
- Juhas, G. 2013. Securitization – great benefits and potential cause of the global financial crisis, *Megatrend Review* 10(4): 115–125.
- Krušinskas, R. 2012. Research on housing bubbles in the capitals of the Baltic and Central Europe, *Ekonomika ir vadyba* 17(2): 474–479.
- Leika, M.; Valentinitė, M. 2007. Būsto kainų kitimo veiksniai ir banko elgsena Vidurio ir Rytų Europos šalyse, *Pinigų studijos* 2: 5–23.
- Lietuvos Bankas [online], [cited 18 August 2014]. 2014. Available from Internet: <http://www.lb.lt>
- Luther, W.; Cohen, M. 2014. An empirical analysis of the Austrian business cycle theory, *Atlantic Economic Journal* 42(2): 153–169. <http://dx.doi.org/10.1007/s11293-014-9415-5>
- Ober Haus [online], [cited 16 August 2014] 2014. Ober Haus nekilnojamojo turto ekspertai. Available from Internet: <http://www.ober-haus.lt/>

- Racickas, E.; Vasiliauskaitė, A. 2012. Classification of financial crises their occurrence frequency in global financial markets, *Socialiniai tyrimai* 4(29): 32–44.
- Radun, V. 2009. The global economic crisis: causes, dynamics, characteristics, *Megatrend Review* 7(1): 347–358.
- Rakauskienė, O. G.; Krinickienė, E. 2009. The anatomy of a global financial crisis, *Intelektinė ekonomika* 2(6): 116–128.
- Ramanauskas, T. 2011. Analysis of determinants of the boom-and-bust cycle in Lithuania using a macroeconomic model, *Pinigų studijos* 2: 5–23.
- Raškiniš, D. 2009. The phenomenon of financial bubbles: the case study of Lithuania, *Taikomoji ekonomika: sisteminiai tyrimai* 3(1): 79–87.
- Razauskas, T. 2009. The cycles of economic development and depression within the different sectors of economy, *Ekonomika ir vadyba : aktualijos ir perspektyvos* 1(14): 224–237.
- Renigier-Biłożor, M.; Wiśniewski, R. 2012. The impact of macroeconomic factors on residential property price indices in Europe, *Folia Oeconomica Stetinensia* 2: 103–125. <http://dx.doi.org/10.2478/v10031-012-0036-3>
- Samuelson, P.; Nordhaus, W. 2010. *Economics*. 19th ed. McGraw-Hill/Irwin. 744 p.
- Scott, K. E. 2010. The financial crisis: causes and lessons, *Journal of Applied Corporate Finance* 22(3): 22–29. <http://dx.doi.org/10.1111/j.1745-6622.2010.00285.x>
- Simanavičienė, Ž.; Keizerienė, E. 2011. Makroekonominių veiksnių įtaka Lietuvos nekilnojamojo turto rinkos krizei, *Ekonomika ir vadyba* 16: 323–329.
- Simanavičienė, Ž.; Keizerienė, E.; Žalgirytė, L. 2012. Lietuvos nekilnojamojo turto rinka : nekilnojamojo turto ir statybos sąnaudų kainų analizė, *Ekonomika ir vadyba* 17(3): 1034–1041.
- Statistikos departamentas* [online], [cited 22 August 2014]. 2014. Lietuvos statistikos departamentas. Available from Internet: <http://www.stat.gov.lt>
- Šliupas, R.; Simanavičienė, Ž. 2010. The effect of real estate speculation on the growth of economics in transition countries, *Ekonomika ir vadyba* 15: 295–301.
- Tyc, W. 2013. The price bubble morphology, *Folia Oeconomica Stetinensia* 1: 76–94. <http://dx.doi.org/10.2478/fofi-2013-0009>
- Urbonas, J. 2011. *Ekonomikos teorijos: praeities ir dabarties tendencijos*. Kaunas: Technologija. 373 p.
- Valkauskas, R. 2012. Fluctuations of Lithuanian economy, *Ekonomika* 91(1): 24–40.
- VĮ Registrų centras* [online], [cited 2014-08-10]. 2013. Available from Internet: <http://www.registrucentras.lt>
- White, L. H. 2009. Federal reserve policy and the housing bubble, *Cato Journal* 29: 115–125.

Lukas KAZLAUSKAS is currently a student at Vilnius University. He has achieved his Bachelors degree at Vilnius Gediminas Technical University. His research interest include econometrics and macroeconomics.

Audrius DZIKEVIČIUS has been an Associate Professor in Vilnius Gediminas Technical University, Department of Financial Engineering since 2007. His research interests include portfolio risk management, forecasting and modeling of financial markets, methods of quantity evaluation of business, and the strategic solutions of corporate financial management.

Šarūnas BRUZGĖ is a lecturer of the Vilnius Gediminas Technical University's Department of Economics and Management of Enterprises since 2008. His research interests include cost-benefit analysis, state regulation of business, economic evaluation using quantitative methods.