VGTU LEIDYKLA TECHNIKA

ANALYSIS OF THE HOUSING MARKET IN LITHUANIA

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ABSTRACT. Cointegration and Granger causality tests were used for the statistical analyses of the housing market in Lithuania. The relationship between the cost of housing and affordability on the one hand, and interest rates, GDP and average incomes on the other was not proven to exist using the given statistical methods. The period of increase in the cost of housing in Lithuania over the last five years is exceptional and difficult to explain using fundamental economic factors and their fluctuation trends alone. The cost of housing has made a clear departure from the economic (business) cycle; the economy has grown, however at a much slower rate than rising costs in the housing market. The reasons for this situation are record lows in interest rates, good conditions to gain financing, the liberalisation of financial markets, speculative attitudes in expectation of the introduction of the Euro, and a divide between the supply and demand of housing that is available. It should be noted that the evaluation of the influence of these factors on fluctuations in costs in the housing market is more hypothetical in nature.

KEYWORDS: Housing market; General factors influencing housing costs; Statistical methods

1. INTRODUCTION

Many authors have performed analyses of the cost of housing and affordability to clarify their causality and cointegration with various economical factors (see e.g. Coulson and Kim, 2000; Gallin, 2006; Kapopoulosa and Siokis, 2005; Sanders, 2005; Mayer, 1981; Benito, 2006; Richardson and Thalheimer, 1982; Nazem and Guy, 1982; Linneman, 1980; Brown et al., 1997; Pain and Westaway, 1997; Kenny, 1999; Ambrasas and Stankevičius, 2007; Belinskaja and Rutkauskas, 2007; Case and Shiller, 1990; Liu et al., 2002; Chiang et al., 2005; Keskin, 2008; Kryvobokov and Wilhelmsson, 2007; Luo et al., 2007).

As example, some research in affordable housing markets, demand and supply of housing and used statistical techniques are shortly presented.

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International mortgage markets can play an important role in stimulating affordable housing markets and improving housing quality in many countries. Unfortunately, international mortgage markets are often less developed than in the United States. This lack of development often translates into lower homeownership rates or lower housing quality. The problems faced in international mortgage markets include but are not limited to (1) legal systems that delay foreclosure proceedings, (2) incomplete or weak financial institutions, (3) high inflation, and (4) cultural barriers to mortgage market development and homeownership (Sanders, 2005).

Housing policy-makers show increased interest in encouraging rehabilitation of the existing housing stock. But little is known about what factors influence the decision to invest, particularly in rental housing, making policy design difficult. Mayer (1981) presents an empirical analysis of individual landlords' housing rehabilitation decisions in one housing market. The analysis tests hypotheses about the impacts of detailed neighborhood, structure, and site characteristics on each owner's investment activity.

Benito (2006) considers empirical implications of the down-payment constraint for the UK housing market. It shows that, at the aggregate-level, models of the housing market with this constraint are consistent with a number of stylized facts. Benito (2006) then exploits variation across local housing markets and considers how leverage affects the response of house price inflation to shocks. The evidence, based on data for 147 district-level housing markets for the period 1993–2002, suggests that a large incidence of households with high leverage (loan-to-value ratios) raises the sensitivity of house prices to a shock.

Previous studies of UK house prices, developed from the demand and supply of housing or from the asset market approach have been poor in terms of robustness and ex-post forecasting ability. The UK housing market has suffered a number of structural changes, particularly since the early 1980s with substantial house price increases, financial market deregulation and the removal of mortgage market constraints through competition. Consequently, models which assume that the underlying data-generating process is stable and apply constant parameter techniques tend to suffer in terms of parameter instability (Brown et al., 1997). Brown et al. (1997) use the Time Varying Coefficient (TVC) methodology where the underlying data-generating process in the UK housing market is treated as unstable.

Pain and Westaway (1997) develop a new approach to the modelling of house prices in the UK, with housing demand being conditioned directly on consumers' expenditure rather than the determinants of expenditure. Conditioning on consumption ensures that the permanent income measure used in determining the level of consumption is consistently reflected in housing demand.

Kenny (1999) uses cointegration analysis in order to separately identify both the demand and supply sides of the Irish housing market. The analysis suggests that in the long-run the demand side of the market can be modelled using a stable relationship between house prices, the housing stock, income and mortgage interest rates. To model the supply side of the market, the empirical section of the paper tests the data for the existence of a stable ratio of house prices to construction costs (including land costs) which is consistent with 'normal profits' in the house building sector. Impulse response functions are employed in order to shed light on the issue of short-term dynamics about the identified cointegrating relationships. Interestingly, the dynamics implied by the VECM specification suggest significant constraints on the supply side of the market and the potential for house prices to overshoot their long-run equilibrium level following a sudden increase in housing demand.

Richardson and Thalheimer (1982) employ four different statistical techniques (geographic, AID, cluster and discriminant analysis) to define homogeneous groupings of houses within an urban area. The major conclusions of the study are that there are no discernible differences among the four methods and that predictions made ignoring the grouping information are as accurate as those obtained by grouping.

Nazem and Guy (1982) performed an empirical study of the housing market using the statistical method of Markov Process. The first phase of the study is devoted to measuring the filtering process in a selected neighborhood by estimating probabilities of transition from one income group to another, over the period 1949–1969 using four-year intervals. The estimated transition probabilities are then used to forecast occupancy structure for different periods and the suitability of applying the Markov Process for long term policy analysis in housing is examined. The final phase of the study includes an examination of steady state occupancy structure by various income categories of household.

An attempt is made to develop a systematic statistical methodology for the analysis of the urban housing market. The standard estimation procedures used for fitting hedonic price functions for the urban housing market are reviewed, and several potentially serious sources of bias are noted. An alternative estimator which capitalizes property values into flows and also searches for the appropriate functional form which avoids these biases is developed (Linneman, 1980).

Our choice was quarterly data from the 1998: IV – 2004: III period:

1) average cost of 1 m^2 of a given residence and affordability equal to the ratio of the averages of the cost and monthy income,
2) GDP, average monthly income and average annual interest rates on housing loans in litas.

The analysis starts with short explanation of real estate prices in Lithuania and its neighbouring countries. It is followed by a description of the factors potentially influencing real estate prices and the cointegration and Granger causality analysis. Lastly is a presentation of the conclusions reached.

2. DEVELOPMENT OF THE HOUSING MARKET

The development of the real estate market in Lithuania can be characterised by several stages. The *first* (1992-2002) was related to a more active commercial real estate market. In this decade, the real estate market was more oriented towards the construction of shopping centres, offices and multi-functional buildings, with less attention given to the residential property market. This was due to more profitable and more easily predictable conditions in commercial real estate, a significant shortage in contemporary business facilities and the changed attitudes of businesses towards customer service, work and business environment conditions. The *second* stage (2002-2005) was characterised by a growth in demand in residential real estate. Real estate market and bank analysts frequently identify this as the period when the real estate market 'overheated' – the observed rise in costs was too rapid and often unjustifiable. Over three consecutive years real estate costs rose by 30–50% – a jump which was the result of both objective macroeconomic factors (improved conditions for housing loans, growth in wages, the rate of economic growth, etc.) and subjective speculative factors. By the *third* stage (the second half of 2005 – early 2006), the housing market had reached its summit. This stage is related to the influence of the much-awaited Euro, the appreciation of construction work and work force shortages, the emigration of Lithuanian citizens and the investment of money earnt abroad back into Lithuania, a decrease in available land, etc. In 2005 the growth of the

real estate market in Lithuania had reached a record high. Average increases in the costs of apartments in the country's larger cities had grown 50%, and as high as 120% in certain segments in one year. The *fourth* stage (marked by the dashed expectations concerning the introduction of the Euro) was seen as a period of stabilisation in the real estate market (Galinienė, 2005; Galinienė et al., 2006; Belinskaja and Rutkauskas, 2007).

3. HOW DO WE FARE AND HOW DO WE APPEAR IN AN EU CONTEXT?

In the last decade the cost of housing has grown not only in Lithuania, but in many countries in the world, and at rates and for periods that have gone against many analysts' predictions. According to data from Lithuanian bank analysts, costs in the Eurozone have grown more than 30%, with increases of 50% noticed in the USA, and 115% in Great Britain. In more recent years similar real estate cost growth trends have been observed in the new EU member states as well. In 2005 they grew by 55% in Latvia, 40% in Lithuania, 28% in Estonia, 22% in Denmark, 18% in Spain, 17% in France, 14% in the UK, and so on Titarenko and Titova (2006).

Lithuania, where a thousand citizens have an average of two new apartments, is still considered to be quite far behind other EU states where the scale of construction is two to three times more rapid. Lithuania's neighbours are also ahead – with an average figure of 2.3 apartments recorded in Estonia, yet we are slightly ahead of Latvia, where this figure is 1.6. Lithuania should approach average EU levels in the next decade, but only if an additional 12,000-15,000 apartments are built every year. Generally speaking, going by the number of apartments (old and new) per thousand citizens, Lithuania is quite far behind both the older EU states and the newer states. Across the whole expanded EU there are an average of 431 apartments per thousand citizens, while this indicator reaches 462 apartments per thousand citizens in the older established EU states. In Lithuania this figure is 375 apartments per thousand citizens – quite far behind Latvia (417) and Estonia (460) (Titarenko and Titova, 2006).

Other Baltic countries are also ahead of Lithuania when considering the average area available per person. Estonians live most spaciously, with 28.2 m^2 per person, while Lithuanians and Latvians live in more cramped conditions, with 23.4 m^2 and 23.9 m^2 per person respectively. According to this indicator Estonia is closest to the EU average of 40 m^2 per person. Danes live most comfortably and most spaciously, with 52 m^2 per person, while people living in Luxembourg, Sweden and the Netherlands are not far behind (CEPI, 2004; CEPI, 2006).

Many of the people living in Lithuania's cities reside in high-rise apartment buildings, while in most EU states priority is given to individual houses which are still a luxury in Lithuania. The absolute majority of Lithuanians live in privately owned property, as opposed to rented (Lithuania is first among EU states in the number of people living in privately owned housing) – 98% in Lithuania, 97% in Romania and Bulgaria, 85% in Estonia, and 83% in Latvia and Spain. Swiss citizens express the lowest rates of ownership, coming in at 43%, with 49% ownership in Sweden and the Czech Republic and 74% in the UK (CEPI, 2004; CEPI, 2006).

4. FACTORS INFLUENCING FLUCTUATION IN THE HOUSING MARKET IN LITHUANIA

Is housing affordable?

In recent years there has been more and more discussion on whether housing really is affordable to people earning an average wage? Affordability indicators are mentioned which allow us to evaluate the state of the real es-

tate market. However, do Lithuania's citizens already earn enough to allow them to buy into newly constructed housing?

Average income amounts show how much people earn, however, in order to find out whether they can afford to buy into housing, the housing affordability index is applied in EU states. It is calculated by finding the ratio between the average cost per m^2 (an average apartment is set at 2 rooms, with a total area of 55 m^2) and the average income in the capital.

Real estate costs are rising at a considerably greater rate that wages in Lithuania: in the summer of 2003 a one room apartment in a residential Vilnius suburb cost approx. 70,000 Lt (1 Euro = 3,45 Lt), while with the addition of a 25 year loan, the resulting monthly bank payments added up to an average of 380 Lt, or 45% of the net income (see Figure 1). In 2005 the cost of an equivalent apartment had already risen to 160,000 Lt, with monthly payments of 850 Lt, or around 80% of the average net income.

In the case of Lithuania, the application of the earlier mentioned indicator is limited by the relatively short history of housing costs. The Lithuanian housing market is not considered to be well-informed – here there is no official housing costs index, like the one that exists in many other countries. This is why it is not surprising that there is such disparity between market players' and even analysts' opinions on the economic reasoning behind housing costs. On the one hand this makes it more difficult to conduct a reliable economic analysis or present recommendations for the formation of economic policy. On the other, this places greater pressures on market players and creates the conditions for the often-mentioned 'price bubble', as there is no reliable data allowing the adoption of economic resolutions.

Statistical analysis of average wages and the cost of 1 m^2

The hypothesis concerning the cointegration of these two attributes cannot be proven:

- For r=0 "Trace" test equal to 9.2512, critical value equal to 15.34;
- For r=1 "Trace" test equal to 2.9682, critical value equal to 3.84.

Granger causality has not been proven between these attributes:

- Cost of 1 m^2 -> Av. W – p-value is 0.1981;
- Av. W -> Cost of 1 m^2 – p-value is 0.4203.

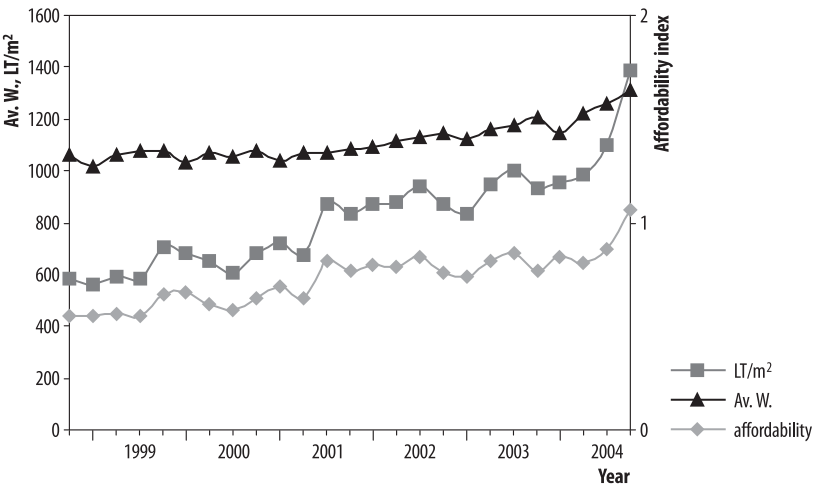

Figure 1. Average wages, average cost per m^2 and housing affordability index in Lithuania, 1998 Q4 – 2004 Q3

5. GROSS DOMESTIC PRODUCT (GDP)

Realistic growth in GDP creates the conditions for growth in the real estate market, which is several times greater than the Eurozone indicator, as does growth in wages (see Figure 2).

Statistical analysis of cost per m^2 and GDP

The hypothesis concerning the cointegration of these attributes cannot be proven:

- For r=0 "Trace" test equal to 12.9026, critical value equal to 15.34;
- For r=1 "Trace" test equal to 0.3775, critical value equal to 3.84.

Granger causality between these attributes cannot be proven:

- Cost of 1 m^2 -> GDP – p-value is 0.4578;
- GDP-> Cost of 1 m^2 – p-value is 0.4851.

Examination of affordability and GDP

The hypothesis concerning the cointegration of these attributes cannot be proven:

- For r=0 "Trace" test equal to 8.8560, critical value equal to 15.34;
- For r=1 "Trace" test equal to 0.0054, critical value equal to 3.84.

Granger causality was found only in the form of GDP dependence on affordability:

- Affordability -> GDP – p-value is 0.0235;
- GDP -> Affordability – p-value is 0.7266.

GDP cointegration or Granger causality between other attributes under examination was not found.

6. LOANS

Compared with the rest of the Eurozone, Lithuania is characterised by particularly low interest rates, attractive loans conditions and the application of various tax exemptions (e.g. income tax exemptions) for those wanting to buy into residential property. The combination of a growth in disposable incomes for Lithuanian citizens and low interest rates have created better opportunities for more people to qualify for a home loan (see Figure 3).

All the same, compared to the EU average, the importance of home loans in Lithuania is still quite low. In other countries in Western Europe about 60-70% of all residential property is acquired by taking out a loan. The extent to which home loans are utilised in the Baltic countries is quite far behind that evident in other EU countries (30 times less than in Sweden, which has a similarly sized population to Lithuania, Latvia and Estonia, 72 times less than in the Netherlands, and as much as 280 times less than in Germany, which has the greatest loans market in Europe).

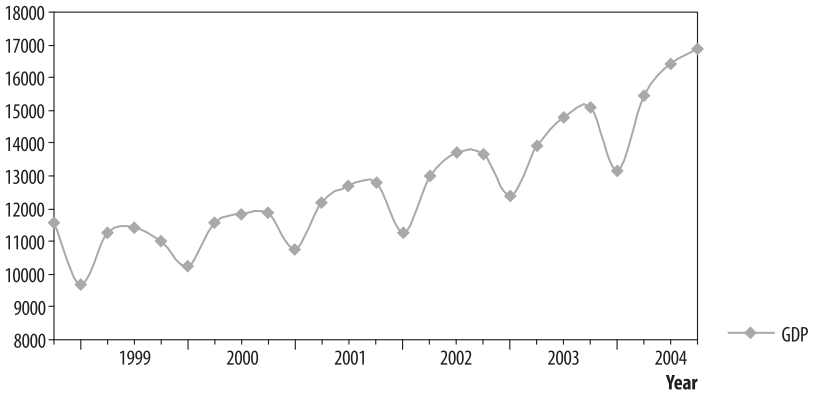

Figure 2. Variation of cost-influenced gross domestic product, 1998 Q4 – 2004 Q3

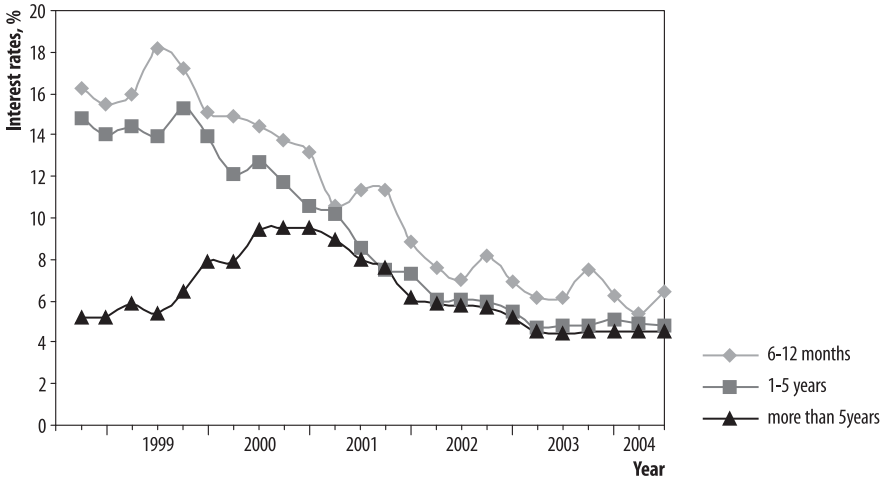

Figure 3. The change of interest rates, 1998 Q4 – 2004 Q3

According to Lithuanian bankers, the loans market will continue to enjoy rapid growth, especially as home loan conditions in Lithuania are among the most favourable in Europe. In a list of 117 countries announced at the World Economic Forum, Lithuania was 5th in terms of loans accessibility. In addition, Lithuanian banks grant loans of for up to 40 years, while other countries set a 25-30 year limit. This means that Lithuanians who are determined to borrow from the banks need to make a smaller initial contribution, while others are granted 100% loans. However, it should not be forgotten that the lowest possible threshold for interest rates has already been reached, and they are now on the rise. The European Central Bank's increased base interest loan rate and talk in the market about Lithuanian banks imposing stricter measures before granting loans may influence changes in housing demand in the future.

Statistical analysis

There is no cointegration between affordability and various interest rates, nor is there any relation to Granger causality.

There is no cointegration nor Granger causality between the average cost of 1 m^2 and various interest rates.

7. THE NATIONAL STOCK EXCHANGE OF LITHUANIA

The level of activity of the National Stock Exchange of Lithuania has not been thoroughly examined as it has a short history, as various funds (superannuation, etc.) are only starting out, and people are new to the world of investment. Perhaps this is a field where economists could give more detailed explanations of this area of finance, if only to distance it from its perceived underhanded nature.

During Soviet rule a popular way for saving money was the so-called 'sock-stuffing' method. Due to the money reforms which took place, placing deposits in Soviet savings banks was not a popular option. These days the former concept of 'sock saving' has been replaced by the only seemingly legitimate successor – investment in real estate markets. This became especially evident after the first major increase in real estate prices. In other words, this change was most clearly illustrated by the privatisation process in Lithuania, when most attention was given to the acquisition of real estate, and not prospective business development.

8. STATISTICAL METHODS

All possible two dimensional error correction models were used to analyse the nonstationarity of the observed time series with Johansen cointegration rank tests. The hypotheses (H0: Rank=r, H1: Rank>r, r=0,1) of cointegrated data were rejected in all the models.

Two one dimensional time series are nonstationary, but their linear combination which is stationary does exist. Two such time series are cointegrated.

Time series $\{x_t,\ t = 0,\ 1,\ 2,\ ...\}$ Granger causes time series $\{y_t,\ t = 0,\ 1,\ 2,\ ...\}$ if in the model

$$y_t = \alpha_0 + \sum_{i=1}^{m} \alpha_i y_{t-i} + \sum_{i=1}^{m} \beta_i x_{t-i} \qquad (1)$$

the F-test rejects the hypothesis that all coefficients β's are equal to zero.

Dickey-Fuller tests were performed and find that all one dimensional time series were nonstationary. But the first or the second differences where appropriate already were stationary and Granger causality Wald tests were applied to all these time series. And causality relations were obtained only in one pair of the variables. This analysis was appropriate because of the absence of the cointegration of all two dimensional time series (Engle and Granger, 1987; Brocklebank and Dickey, 2003; Tsay, 2005).

Statistical analysis was performed with SAS 9.1 ETS procedures.

9. CONCLUDING REMARKS BASED ON THE STATISTICAL ANALYSES AND GENERAL CONCLUSIONS

The absence of income and housing cost cointegration has also been presented by other authors (Gallin, 2006). In addition, our negative results on the possible causality of housing costs or affordability and loan interest rates or GDP may indicate a housing costs bubble.

The model for factors influencing housing costs incorporates general factors typical of economies in every country, as well as specific factors, typical of Lithuania, which has its own specific historical background, cultural heritage and mentality. The order of importance of these factors is taken at a more hypothetical value.

General factors: 1) gross domestic product per capita – as GDP grows, theoretically, so does the potential for increase in housing costs, 2) average net monthly income per working person – as this figure grows, theoretically, so does the potential for increase in housing costs; 3) average loan interest rates – as they grow, theoretically, so does the potential for a decrease in housing costs; 4) the divide between supply and demand – as this decreases, theoretically, the potential for a drop in housing costs increases. Specific factors: 1) features of the national Lithuanian character, which is known for having a low risk barrier, limited investment experience (focused mainly on reliable albeit low return investments in real estate), lingering Soviet-era illusionary longing (proven time and again, in the referendum for Lithuania's accession to the EU, and in the comparative EU citizens survey of 2006 evaluating the chosen EU socio-economic course); 2) obvious speculative attitudes in expectation of the introduction of the Euro; 3) a comparatively greater emigration trend, seen more in Lithuania when compared to other post-soviet countries.

Data sources

Average income – Department of Statistics
Loan interest rates – Bank of Lithuania
GDP – Department of Statistics
Average housing costs – State Enterprise Centre of Registers

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SANTRAUKA

NEKILNOJAMOJO TURTO RINKOS LIETUVOJE ANALIZĖ

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Nekilnojamojo turto rinkos Lietuvoje statistinei analizei buvo naudojami kointegravimo ir Grangerio priežastingumo testai. Taikant esamus statistinius metodus nebuvo įrodyta, kad egzistavo ryšys tarp nekilnojamojo turto kainos ir įperkamumo, viena vertus, ir palūkanų normų, BVP bei vidutinių pajamų, kita vertus. Nekilnojamojo turto kainos Lietuvoje didėjimo per pastaruosius penketą metų laikotarpis yra išskirtinis ir sunkiai paaiškinamas remiantis vien pagrindiniais ekonominiais veiksniais ir jų svyravimų tendencijomis. Nekilnojamojo turto kaina aiškiai nukrypo nuo ekonomikos (verslo) ciklo; ekonomika išaugo, tačiau gerokai lėtesniu tempu nei augančios kainos nekilnojamojo turto rinkoje. Šios situacijos priežastys – rekordiškai mažos palūkanų normos, geros sąlygos gauti finansavimą, finansų rinkos liberalizavimas, spekuliaciniai požiūriai tikintis įsivesti eurą ir takoskyra tarp esamo nekilnojamojo turto pasiūlos ir paklausos. Pažymėtina, kad šių veiksnių įtakos kainų svyravimo nekilnojamojo turto rinkoje įvertinimas yra labiau hipotetinis.