

THE IMPLICATION OF  
FINANCIAL CONDITIONS IN  
THE HOUSING MARKET  
A COINTEGRATED ANALYSES

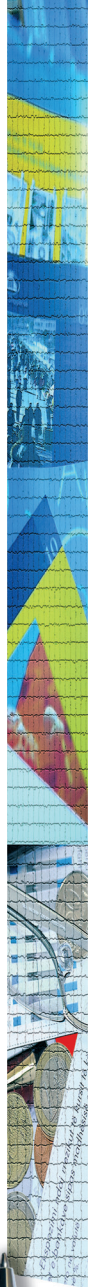
Erjona Suljoti

27 (66) 2017

WORKING PAPER



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## ABSTRACT

The latest financial crisis emphasized the importance of the housing market in the economy. The comprehensive assessment of house price determinants has gained more importance among academic studies. This study aims to assess the role of some financial factors in the performance of house prices for Albania through the VECM cointegration analysis. The empirical findings show that house prices are influenced positively by bank lending, and negatively by the Treasury bills yield, in the long term. The inclusion of the exchange rate in the empirical analysis in determining the house prices is a novelty of this study. The role of the exchange rate appreciation and ER volatility resulted positive and statistically significant. These findings are broadly in line with the empirical literature and complement the existing literature on the determinants of house prices for Albania.

## INTRODUCTION

Buying a house is one of the most complex decisions people make because it combines the necessity for good living conditions with an investment in a long-term asset that is expected to generate benefits in the future. Also, the housing market is affected by multiple interferences of government policies, in terms of both urban management and housing and social policies, which radically affect people's decision to buy a house. Additionally, this market is closely related with the banking sector and its core activity: lending. Through their role as financial intermediaries, banks spread in a spiral pattern the existing problems of the housing market into several sectors of the economy and vice versa, influencing the decision-making of economic agents. Furthermore, house prices play an important role in the macroeconomic policies of central banks, and the debate on whether central banks should be targeting these prices has strongly returned to focus after the recent global crisis of 2007/2008. This crisis, triggered by the housing market and its financing from the banking system, stressed further the importance of the housing market for the entire economy. While widely elaborated, the thorough understanding of this economic phenomena, in a highly dynamic market with extensive influence in the economy, is yet one of the main challenges for researchers and academics. In this context, the comprehensive assessment of the linkages between banks' financing and price dynamics assumes a greater importance.

The Albanian economy has undergone significant changes during the transition from a centrally planned to a market economy. In particular, the construction sector and the housing market have experienced significant changes and have been major contributors to economic growth during this period. Furthermore, after the latest global financial crisis, the housing market and the construction sector have gained more importance for the Albanian economy. In view of these facts, and taking into account the scarce literature of the housing market in Albania, this study aims to explore the role of financial indicators in the developments of house prices in Albania. In this regard, this study explores for the first time the role of the exchange rate and Treasury Bill (TB) yields in the housing market.



Through empirical findings, it also aims to complement the limited existing literature on the determinants of house prices in Albania.

By employing a cointegration model of VECM, this study assesses the long-run relationship between demand determinant factors and house price performance in the case of Albania, based on the same approach as followed by Valverde and Fernandez (2010) and Zhang et al (2012). The main findings of this study confirm the statistical significance of the positive impact of mortgage on house prices, in line with findings by other authors. The 12m treasury bills yield show to be statistically significant and to impact negatively the house prices. Its impact on the house prices is mostly related to the fact that the TB yield represents an alternative investment to the house purchasing and as such has reverse relation to the house prices. Unlike previous studies, this one observes the influence of the exchange rate volatility on the house prices development, taking into account that this is a highly euroised market. Meanwhile, the cost of financing, most typically euro lending interest rate, resulted with the expected sign, but statistically insignificant. In the meantime lek lending interest rate resulted insignificant and with the opposite sign. The very low ratio of mortgage lending in lek to total may imply this result. Besides investigating the long-term relationships, the method used also help to answer the question whether these factors have affected the performance of house prices in the short term.

The paper begins with the literature review and a summary of the international experience on house price determinants from the demand perspective. Then it continues with stylized facts on the housing market in Albania. The third section shows the empirical analysis of house prices and its determinants in the Albanian market. The paper concludes with the main findings and some recommendations for further elaboration in the future.

# 1. LITERATURE REVIEW

## A. DETERMINANTS OF HOUSE PRICES

Housing market and house<sup>1</sup> prices' dynamics have been discussed in depth by the academic literature. Mile (2011) writes that a house is the largest private investment that a person makes in his life. Furthermore, the housing market is considered as a very heterogeneous market, with few transactions and with high cost to obtain information. Also, the specific nature of a real estate product, in a market constrained by a rigid supply and occasional booming periods, creates the premises for the formation of optimistic expectations and decision-making in a state of euphoria (Capozza 2002). All these elements add to the complexity of investing in this market, as well as the importance of housing for households. In addition, housing has a very important impact on the construction sector, which in many countries, especially in developing ones, is the promoter of economic growth and employment (OECD 2011). The interrelation with this sector certainly reinforces the major role of housing in the economy. Given its importance for the economy and people's life, housing is one of those markets wherein the government intervenes extensively, mainly through urban planning or social policies. Consequently, the institutional and legal framework of the country significantly influences the developments in this market and especially the supply for this product. Another equally important channel is the pivotal role of housing in the development and performance of the banking activity (Doling 2013). Given that most of bank loans are granted against collaterals in the form of houses or real estates, the influence of the house price on the lending decision and the banking activity in general, is very essential. Indeed, this role was highlighted by the global financial crisis of 2007/2008, which showed that house prices were an important factor. Especially after the crisis, the debate became even stronger on the role of house prices for central bank's decision-making on macroeconomic policies. The economic debate by many experts<sup>2</sup> focused on whether house prices should be targeted by the central banks' policies. For all the

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<sup>1</sup> In this paper, the house represents all types of real estate units used for residential purposes such as apartments, houses, etc.

<sup>2</sup> This topic is discussed in depth by Taylor (2007), De Nicolo et al., (2010) etc.

above reasons, many studies have focused over the last decades on exploring the determinants of house price dynamics.

Existing literature<sup>3</sup> suggests that house price dynamics are closely linked to the performance of macroeconomic variables, housing market conditions and housing financing characteristics. These studies have evaluated the key factors affecting the demand/supply for housing and, consequently, house prices. They estimate that, on the demand side, the house price dynamics in the long run are primarily determined by: increase of the households' disposable income; gradual demographic shift; features of the tax system in the economy; bank loans; and average level of interest rates. On the supply side, the house price dynamics in the long run are primarily determined by: availability and cost of land; construction costs; investment in improving the quality of existing housing stock and building permits.

One of the demand determinants, which is given special attention in literature, is the impact of loans, especially mortgage loans, on the price of housing. Mortgage loans affect house prices through the so-called "financial accelerator mechanism". According to Bernanke et al (2000), the "financial accelerator mechanism" consists in the mechanism of interaction between credit granted by banks and house prices. In response to increasing housing demand, the prices will rise. Also, the value of the collateral pledged for loans will rise, releasing additional potential for mortgage borrowing, thus fueling credit demand and accelerating the process. High housing prices would trigger the creation of the "wealth" effect, according to which property owners feel richer and will therefore spend more. Meanwhile, some individuals would prefer to use the added value of their collaterals to further increase the demand for consumer loans. This behavior would create room for obtaining a new loan, which can be used to further boost consumption<sup>4</sup>. Growth of consumption and aggregate demand will boost the economic activity. Therefore, it would be associated not only with increasing inflationary pressures

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<sup>3</sup> Cappozza D., P.H. Hendershott, C.Mack, Mayear (2002), Shiller (2005, 2006), Annett (2005), Fitzpatrick and Macquinn (2007), Glaeser, Gyourko and Saks (2005), Wheaton and Nechayev (2007), Valverde and Fernandez (2010) etc.

<sup>4</sup> In literature, this is defined as "wealth withdrawal".

on the economy, but also with the expectations for higher return on assets, which would eventually lead to a further increase in house prices, conditional on a rigid housing supply in the short term. Boom periods in lending and house prices would terminate if an external factors<sup>5</sup> reversed the influence of these two factors to each other. Economic activity in general would shrink by the same way and instruments that were set in motion during the period of economic boom and, as a consequence, the disinflationary pressures would increase. Annett (2005) argues that the true cost of a period of rapid growth in house prices, is not the inflationary pressure that it causes, but the fact that the burst of the house prices "bubble" shall significantly slow the economic activity and induce deflationary pressures in the economy. The burst of the house prices "bubble", often accompanied by financial instability and bottlenecks in lending and conditioned by the impairment of collaterals, becomes very costly in terms of slackening the economic activity in a country. Many of these mechanisms were confirmed by the developments in the most recent financial crisis (during 2007/2008), in both advanced and developing economies.

Many observers<sup>6</sup> of the recent financial crisis have proposed that easy access to credit and reduced lending interest rates were the central factors fueling the boom in house prices as well as the subsequent reversal in house price growth when credit dried up. Proponents on the other side of the debate argue that cheap credit alone cannot explain the house price boom and bust and that other forces are likely to have been at play (Glaeser et al (2010), Greenspan (2010)). However, it has already been proven in the academic literature that despite the specific characteristics of the housing market and the cyclicity of economies, mortgage loan and its interest rates are among the factors determining house price developments.

The exchange rate is another widely addressed macroeconomic factor that affects house price developments. It takes an important

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<sup>5</sup> E.g. the shock on confidence in the banking system, a tightening monetary policy, etc.

<sup>6</sup> Favilukis, Ludvigson and Van Nieuwerburgh (2010); Hubbard and Mayer (2008), Khandani et al (2009), Mayer (2011).

role especially against the backdrop of global liberalization and, of profit-seeking foreign investors, who are in search for opportunities to invest in developing countries real estate market. The exchange rate plays a special role for highly euroised economies, where house purchasing transactions are widely made in a foreign currency. Zhang Hua, Zhao (2012), in their paper on the fundamental determinants of house prices in China, estimate that an important monetary factor affecting developments in house prices is the real exchange rate. They find a positive correlation between house prices and the appreciation of the real exchange rate.

## B. EMPIRICAL FINDING AND COUNTRY EXPERIENCE

Kasparova and White (2001) and Tsatsaronis and Zhu (2004) thoroughly analyzed the housing market reaction to changes of the variables determining demand and supply such as disposable income, current housing situation, inflation, interest rates and bank loans. They also emphasized that national discrepancies in the mortgage markets have an important role, too. When analyzing the house price dynamics in European countries and in 17 countries from around the world, they discovered that house prices are more sensitive to short-term (policy) rates in countries where floating rate mortgages are more widely used.

Hilbers et al (2008) through their comparative empirical analysis for euro area countries show that the characteristics and dynamics of house prices vary significantly across countries. They found a statistically significant correlation between high growth rates of the loan portfolio and house prices. Whilst the low and stable inflation is present in all the countries, in many of them are extremely different dynamics in the housing market are observed. This shows that the transmission mechanism between house prices and economic activity as well as between the monetary policy and house prices is very complicated. Annett (2005) argues precisely the fact that the impact of rapid credit growth and house prices varies significantly depending on the countries' specific institutional characteristics.

With reference to various institutional characteristics, Annett (2005) also investigates subgroups among euro area countries with common characteristics. Thus, in the countries in such subgroups, the role of lending in the volatility of house prices was proved to be statistically significant. Test results showed that the impact of loans in the house price volatility is statistically significant also for the short-medium term in countries with floating interest rates of mortgage loans, with mortgage loans' securitization, and those that allow equity withdrawal. Meanwhile the interest rates remain a statistically significant factor in each subgroup, regardless of the criteria used. Similarly to Tsatsaronis and Zhu (2004), Annett (2005) found that the more aggressive is the lending policy, the stronger the relationship between lending and house prices volatility. Also, in countries where floating mortgage rates are more widely used, their effect on the house prices is larger. The variation in the extent of interrelation between lending and house prices may be partly linked with the difference in the financial liberalization between countries and especially with the process of integration - catching up process.

Hildebrandt et al (2012) show that housing markets in Central, Eastern and South Eastern Europe (CESEE)<sup>7</sup> countries have undergone significant transformations, since the 1990s. The transition from a centrally-planned totalitarian regime to a market-based economy was followed by land privatization. This process faced numerous problems both in the registration of properties and in the documentation of ownership. Hildebrandt et al (2012) argue that the CESEE housing markets suffer from lack of transparency and standardization. Thus, the processes required for the purchase or sale of property vary across countries, and asset turnover rates are low in CESEE, creating difficulties for analyzing price dynamics in these countries. Data on housing refer mainly to the situation in the capital cities, and sources of information are transaction prices, tax declarations, private real estate agencies, or prices from properties advertised in newspapers. With their specific characteristics, the housing markets in CESEE present difficulties in collecting comparable data on prices (Hildebrandt et al, 2012).

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<sup>7</sup> Including former communist countries: Poland, Czech Republic, Hungary, Estonia, Lithuania, Latvia, Serbia, Croatia, Rumania, Bulgaria, FYROM and Albania.

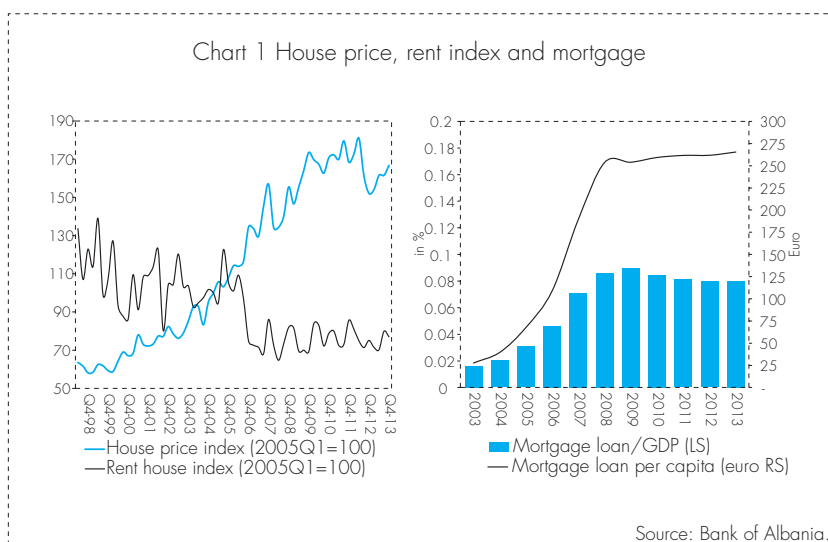
Egert and Mihaljek (2007) are among the few authors who have empirically analyzed the determinants of house prices in CESEE countries. They found that the rapid increase in house prices in these countries is positively affected by robust economic growth, increase in real wages combined with high demand for houses and accompanied by ample financing with loans from the banking system. Demographic factors, such as the high number of births in the late 1970, have also increased the demand for housing in some countries. In addition, house price developments are closely linked with the privatization of residential buildings and the relatively high rental prices, due to underdeveloped rental markets. Another factor, specific to this group of countries, is the underestimated initial level of house prices, which from the empirical analysis resulted statistically significant and has influenced price dynamics during the integration and convergence of these economies. Egert and Mihaljek (2007) estimate also that the demand for apartments by nonresidents or capital inflows from abroad in the form of FDIs have influenced the developments in the housing market in the CESEE countries.

## 2. HOUSING MARKET IN ALBANIA

### A. STYLIZED FACTS

The Albanian economy, similarly to other countries of the CESEE region, has undergone significant changes during the transition from a centrally-planned to a market-based economy. In particular, the housing market has been highly dynamic. In the absence of house price data, at national level, our study is based in Tirana house price index. Data show that house prices have grown significantly in the period 2000-2007, when house prices rose by an average of 15% per year. Meanwhile, developments during the period 2008-2013 show that the real estate market has reached a bottleneck, with prices fluctuating and shrinking occasionally, since 2009.

The first factors that have triggered the increase in the demand for new construction, beginning in the early 1990s, have been the lack of sufficient housing space and the poor quality of existing housing; shifting of individuals behavior towards living in smaller families; as well as the alteration of the demographic map driven by economic and social factors (UNECE 2000). Along to these factors an important factor supporting housing demand and the prices rising until early 2008, has been the increase in disposable income<sup>8</sup>. After that, along with the deceleration of income, there is a reluctance of households towards both house purchasing and mortgage loans. In addition to this factor, the general uncertainty for future income, including increased unemployment and overall uncertainty about the labor market, was reflected in a contraction of households' demand for housing (Unicredit 2011).



During the transition period, an important source of demand for new houses originated from emigrants, which has been growing

<sup>8</sup> In absence of data published by INSTAT, the series of Gross Domestic Product has been used as the best proxy to disposable income.



until the end of 2007<sup>9</sup>. Meanwhile, since the onset of the crisis, the demand from emigrants has declined, reflecting deteriorating conditions in labor markets abroad. The decline in house purchasing transactions has confirmed the overall sluggish demand and especially the lack of demand from this group.

The consolidation of the banking system and its increased flexibility to finance households and construction companies are additional important factors that have led to increased demand and supply in the housing market. During the period 2002-2007, financing through bank loans constituted an important source of funding for households. High property prices provided their owners with sufficient collateral to obtain new loans and to expand the demand for housing beyond their financial capabilities. After year 2008, the loan growth declined significantly, marking negative value during 2012-2013.

Another component of the demand for housing in Albania is its purchasing for investment purposes. Renting out the houses increases the profitability potential of the investment of savings/assets in housing. The rent represents the expected profit from the capital, and resembles the profit from investments in securities (Stanfield and Jazoj 1995<sup>10</sup>). In this context, the stock and securities markets are alternative markets for the investment of savings and as such their returns' dynamics could affect the demand for housing. In the absence of a stock market, in Albania, the 12 month<sup>11</sup> T-bills represents a typical alternative for the investment of funds. Therefore, the 12-month yield is expected to have an inverse relation with the housing demand and price. Furthermore, the yield of 12-month treasury bills can be seen as a reference rate for the lek lending interest rate, cost of financing a house purchasing and indirectly influencing

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<sup>9</sup> Stepanyan et al 2010 emphasizes that for the former Soviet Union countries remittances represent an importance source of house purchasing financing. Likewise Ibrahimaj and Matarocci (2014) estimated that remittances represent an important source of house financing even for Albania.

<sup>10</sup> In their paper the authors demonstrate that the demand for houses during the pyramid schemes was low in Albania, due to the placement of the saving in the pyramid schemes. After 1997, the demand for housing reemerged and an uptick followed until 2008.

<sup>11</sup> 12 m T-bills occupy the major share of households' financing to the Government therefore they can rightly be considered as very popular securities.

house prices. However, lek lending represents a very small share in the total mortgage portfolio. In this regard the main channel that TB yields influence house prices is through the opportunity cost/ return of investment. Due to the fact that the mortgage portfolio is largely dominated by euro loans, an international market rate- mostly 12m euro Libor- is used as the reference rate. In this regard, euro lending interest rate is considered as cost of mortgage.

Furthermore, another component that has affected the demand and price for houses in Albania is the "expectations channel". Under conditions of rapid rise of prices and expectations for the persistence of this trend, people become euphoric and consider buying a house as a high return investment (Case & Schiller (2003)). This phenomenon is thought to have affected also the performance of housing demand and prices in Albania. The influence may be even higher if we consider the house as an investment alternative for savings. After the 2008 global financial crisis, in Albania, as in many other countries of the region, housing demand contracted, reflecting not only the weak disposable income, but also the households' expectations for a downward correction of house prices (Unicredit 2011).

In Albania, euro mortgage loans represent in average 75% of the mortgage loan portfolio. Based on the literature<sup>12</sup>, the interest rate on euro loans is expected to be a significant factor in the cost associated with obtaining a loan from banks as well as an element that discourages or encourages the decision for house purchasing. Depending on the (in) elasticity and cyclicity of the housing demand, this cost can be fully transferred to the price of the house, or sustained partly by constructors (Maudos et al (2009)). Based on the theory, the relation of housing prices and lending interest rates are expected to be negative in the long term.

The exchange rate is an important factor for the housing market in the Albanian economy. The euro is broadly used in the real estate market. In particular, the euro quotation of housing prices

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<sup>12</sup> Annet (2005), Hilbers et al (2008), Egert and Mihaljek (2007) etc..

is emanated by the constructors<sup>13</sup>. In addition, the choice to use a hard currency is linked to the fact that housing is seen as a long-term investment and saving instrument. As such, to protect it from fluctuations in the value of the local currency, or the possibility of high inflation, economic agents have preferred quotations and transactions in foreign currencies. Studies at the Bank of Albania<sup>14</sup> have shown that Albanian households have inherited the behavior of preserving their wealth in currencies stronger than the local one.

## B. LITERATURE REVIEW ON THE HOUSING MARKET IN ALBANIA

There are very few studies on the real estate market in Albania. The limited extension of economic studies on the housing market in Albania has been influenced by the relatively young housing market and the lack of detailed data on prices and other features. Taking into account the importance of house prices in the economy and the lack of official statistics published by INSTAT, part of the literature on Albania focuses on calculating the house price index. This phenomenon has been studied by Kristo and Bollano (2011) and Kripa et al (2013).

Meanwhile, Bollano and Ziu (2009) investigated the relation between credit and house prices in Albania, and the impact that credit and house prices fluctuations have on the economy. Their empirical analysis suggests that the economic stability has been supportive to credit activity and housing market, while increased lending to the private sector has fueled the prices of housing. These findings were later confirmed by Suljoti and Hashorva (2012), who in their research DOLS, used the co-integrated model and analyzed developments for the period from 1998 to 2011. Empirical results of the study confirmed the positive correlation between house prices and credit, total income and construction costs. Meanwhile, the coefficient of euro lending interest rates, though with the expected sign, resulted statistically insignificant.

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<sup>13</sup> Constructors sell their products in euro in order to be hedged against exchange rate fluctuations. Official data show that majority of raw materials for constructions are imported, thus are paid in euro.

<sup>14</sup> Luci, Muco and Sojli (2006), etc.

The most recent material published on the housing market for Albania is that of Ibrahimaj and Mattaroci (2014), who examine the factors that have affected the performance of the construction sector. The authors analyze the following determining factors: real economy indicators (gross domestic product, remittances, construction permits and construction cost index); monetary indicators (household loans, and interest rate on deposits); and housing market indicators (housing and rental prices). Their empirical analysis through VAR model and “impulse response” shows that the construction output is positively influenced by GDP growth of other non-construction sectors, by household loans, remittances and the ratio of prices to construction costs. Furthermore, part of their findings was the positive correlation of house prices with household loans and remittances, as two of the main sources of financing in the economy.

### 3. EMPIRICAL ANALYSIS

#### A. DATA

In the absence of comprehensive data on the housing market in Albania, the analysis is based on the house price index for Tirana<sup>15</sup>. Data included in the empirical analysis are quarterly and cover the period 1998-2013. Data sources are Bank of Albania and INSTAT. More specifically, these data include: the house price index published by the Bank of Albania, total banks’ outstanding mortgage loans published by the Bank of Albania; due to data unavailability the gross domestic product (GDP) published by INSTAT has been considered as a proxy for disposable income; the average annual interest rate of new euro loans published by the Bank of Albania; interest rates on 12m Treasury -bills published by the Bank of Albania; and period average exchange rate EUR/ALL published by the Bank of Albania.

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<sup>15</sup> The official statistics do not provide a house prices index that covers the entire territory of the country. However, Tirana represents a good studying sample, representative of the developments of the housing market in Albania, since it is the city/district with the largest population and economic activity in the country.

Exchange rate volatility has been generated from official statistics of exchange rate and measures the recursive standard deviation for a three-year period, selected to capture a persistent volatility of the exchange rate.

The analysis of the data revealed two moments of structural changes in the behavior of the key variables included in the model. The first point refers to year 2004, when banks began to play an active role in financial intermediation in the economy. For this purpose, a dummy variable was generated (Dumm04). This dummy variable takes a zero value prior to 2004 and 1 afterwards. Another qualitative variable generated is Dumm08, which represents the shock that hit both housing market and bank loans due to global financial crisis. More specifically, this variable is zero until the third quarter of 2008 and 1 afterwards. The existence of these two breaking points was confirmed by statistical tests (Table 2, Annex 1).

The statistical analysis of the series included in the study confirms that these series are integer of the first level (Table 3, Annex 1). As a result, variables that are integer of first order may be included in a VECM cointegrated analysis.

## B. METHODOLOGY

The selected variables for the empirical analysis of the house price determinants from demand perspective in Albania are mortgage loans; disposable income; interest rate on new euro loans; and exchange rate. This approach is similar to that followed by Fitzpatrick and Macquinn (2007) and Valverde and Fernandez (2010), who investigated the house price performance in Ireland and Spain.

Similarly to the work of Valverde and Fernandez (2010), this study uses the econometric co-integrated vector error correction method (VECM). In the first step, the existence of a co-integration relationship was tested through the Johansen test. After confirming the presence of a co-integrating relationship, we continue with

the simultaneous evaluation of a system of equations for each endogenous variable both in long-term and in short-term perspective. The system of equations defines the error correction coefficient, which also represents the speed of reversion to long run equilibrium, in case of deviation.

The Johansen methodology emphasizes that if, between two or more non-stationary variables of the first order, exists at least one vector that is a product of the two series and is a stationary variable, then the variables are cointegrated of the first order. According to Julius (2006), the vector error correction model (VECM) provides a convenient reformulation to estimate several time series variables in levels. Furthermore, Julius (2006) emphasizes another key advantage of using this model. This is encapsulated in the significant reduction of multicollinearity, which is present in time series and summarizes information on the long-term relation between endogenous variables in a matrix form. Moreover, the model evaluates within the same system the short-term relationship between the variables.

A schematic representation of the functional equation of the vector error correction model of the first order is:

$$\Delta X_t = \pi X_{t-1} + \sum_{j=1}^{q-1} \tau_j \Delta X_{t-j} + \delta D_t + \epsilon_t \epsilon_t \sim N_p(0, \Lambda)$$

$$t=1 \dots T$$

where:

$\pi X_{t-1}$  represents the vector of cointegration relation. This vector contains endogenous variables (not stationary) with lag one. More specifically, in this study, this vector includes house price, ratio of mortgage loans to GDP, 12-month Treasury bill (euro loan interest rate) and volatility of EUR/ALL exchange rate.  $\pi$  is a matrix of coefficients of long-term relation. The coefficient of this matrix should be negative and statistically significant. This coefficient indicates the speed of return to equilibrium whenever there are deviations from equilibrium in the short term.

$\Delta X_t$  represents the vector of endogenous variables first differences included in the model. In this study, this vector includes the first difference of the house prices, of the ratio of mortgage loans to GDP, of the 12m T-bill yield (or interest rate of new loans in euros) and volatility of EUR/ALL exchange rate (or the level of exchange rate). The indexes "j" and "q" stands for the number of equations according to each endogenous variable.

$\theta D_t$  represents exogenous variables included in the model. Two dummy variables for the years 2004 and 2008 are included as well as a seasonal dummy for the first quarter.

$\tau_1 \Delta X_{t-1}$  represents endogenous variables in the first difference, with predetermined lag, which serve to identify short-term relationship.  $\tau$  is a matrix of short-term parameters.

$\epsilon_t$  is a vector of random errors which represent the model errors. This vector is expected to have the characteristics of a "white noise" that must be uncorrelated, with a covariance/variance matrix  $\lambda$  - and normal distribution.

The empirical analysis aims to answer the following questions: is there a long-term relationship between the selected factors (credit, income, exchange rate and interest rate) and the house prices; and if so, are the variables' growth rates related also in the short term?

## C. RESULTS

In assessing the above described VECM model, we found that in the long run, house prices have a co-integrating relationship with mortgage loan to GDP ratio, 12m T-bill yield, and exchange rate volatility<sup>16</sup>.

Before identifying the vector error correction model, we have undertaken the main steps for determining the components of

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<sup>16</sup> Initially we have also estimated the VECM model by using lending interest rate in euro and the level of euro/ lek exchange rate. But the results were either unstable or statistically insignificant.

the model. Firstly we tested for the existence of a co-integrating relationship by employing cointegration tests, Trace and Maximum Eigenvalue, with the variables included in VECM model.

The results of Table 1 confirm the existence of the co-integration vector for the first VECM model.

*Table 1. Co-integration test for unrestricted model (Trace and Maximum Eigenvalue)*

Hypothesized	Trace test				Max-Eigen		
No. of CE(s)	Eigenvalue	Statistic	Critical Value (0.05)	Prob. **	Statistic	Critical Value (0.05)	Prob. **
r=0	0.366399	53.50967	47.85613	0.0134	27.83654	27.58434	0.0464
r≤ 1*	0.257266	25.67134	29.79707	0.1388	18.14245	21.13162	0.1246
r≤ 2	0.111166	7.530683	15.49471	0.5169	7.188525	14.2646	0.4671
r≤ 3	0.005593	0.342158	3.841466	0.5586	0.342158	3.841466	0.5586

Source: Author's calculations.

Table 1 shows that both tests identify one co-integration relation between endogenous selected variables with 99% confidence, for the selected lag of two-quarters. The selected variables are house prices, mortgage to GDP ratio, 12m T-bill and exchange rate volatility.

The selection of lag is determined by lag length criteria tests. The majority of the tests show with 95% probability that the appropriate lag of variables included in equation must be two quarters. The identification of two quarter lags was determined from 4 tests out of 6 in total. The results of these tests do not change with alternative specification of the model.

*Table 2. Lag length criteria tests.*

lag	LogL	LR	FPE	AIC	SC	HQ
0	20.40256	NA	1.01E-05	-0.149239	0.41416	0.070689
1	214.18	335.0051	2.46E-08	-6.175594	-5.048794*	-5.735737
2	239.4814	40.31073*	1.82e-08*	-6.490896*	-4.8007	5.831111**
3	251.8537	18.03407	2.13E-08	-6.367921	-4.11432	-5.488206
4	259.2606	9.79221	3.02E-08	-6.07663	-3.25963	-4.976987

Source: Author's calculations.

Number in bold and with "\*\*" show the selected lag by majority of the tests.



By applying the Granger Causality/Block Exogeneity Wald test, we assessed for the endogeneity of the main variables. Fulfillment of this requirement is a prerequisite for the inclusion of variables in a VECM model. Results of this test indicate that the variables included in the equation to explain the house prices, all together are endogenous. However, the tests do not support the existence of endogeneity for each variable with the dependent variable, house prices, meaning that some weak exogeneity may be present.

*Table 3. Granger Causality / Block Exogeneity Wald test*

Dependent variable (LHPI)	Chi-sq	Prob..
LMCG	12.55809	0.0019
LERSTD	3.159709	0.2060
LBTH	4.074374	0.1304
All	17.34014	0.0081

*Source: Author's calculations.*

*Note: VAR Granger Causality/Block Exogeneity Wald test is based on the hypothesis that the variables are exogenous. This test controls for the Exogeneity by taking separately each of the variables with the dependent one and the overall combinations of these variables in equation. The results of this test shows that the variables included in the model are endogenous with 99% statistical confidence.*

Table 4 presents the results from the estimation of the VECM model with Eviews version 7. The results show that an increase of 1 percentage point in the ratio of mortgage loans to GDP is associated with an increase of housing prices by 0.31 percent in the long run. This relationship is statistically significant albeit the different alternative specification of the endogenous variable. Furthermore, positive relation and statistical significance is also found with exchange rate fluctuation. An increase of one standard deviation of the exchange rate volatility is linked to 0.062 percent growth in house prices in the long run. An appreciation of the exchange rate would make cheaper the service of the loan in euro and consequently seems to increase the demand for mortgages. Meanwhile demand for housing will lead to higher house prices.

Table 4. Empirical finding for long term.

VECM			
Variable	Coefficients	t-value	
Mortgage/ GDP	0.31203	-10.8034	
Exchange rate volatility	0.061955	4.22865	
Treasury bills 12m yield	-0.119554	-4.11569	
C	-5.94028		
ECT	<b>-0.483753</b>	<b>-2.39121</b>	
Adjusted R-squared	0.284687		
S.E. of regression	0.053307		
<b>Residual test</b>	<b>Test value</b>	<b>p-value</b>	
Jaque bera	1.367525	0.505	
LM test	17.86267	0.332	
Hetereskedacity	220.4931	0.296	

Sources: Authors' calculations

Stemming from previous studies, (Egert & Mihaljek (2007)), we analyzed the impact of 12M T-bills (TB) yield on house prices, as an alternative form of investing savings in the economy. The relationship between housing prices and TB yield was in line with the theoretical expectations for an inverse correlation and was statistically significant. Thus an increase in the 12-m TB yield at 1 percentage point is associated with a decline in housing prices by 0.12 percent in the long run. In an alternative model, we include the euro lending interest rate, which represents the typical lending cost. The relationship between house prices and euro interest rate of new loans, resulted with the expected negative sign, but statistically insignificant. This indicates for Albania, we cannot yet find evidence that support the impact of mortgage cost in house prices. One possible explanation for this result is the low elasticity of demand for loans to interest rate (Dushku and Kote 2014). Another factor is the usage of non-price credit standards alongside the interest rate to encourage or discourage credit demand.

The long run vector described in Table 4 shows the long-term adjustment. When house prices are above their equilibrium level, it is estimated that the return to equilibrium will be driven by means of the reduction of mortgage lending, reduction of the exchange rate volatility and the increase of TB yields. The statistically significant

error correction term, with a negative value of 0.48, shows that the speed of houses prices return to equilibrium is about two and a half quarters.

Within the system equation of the selected VECM, we analyze also the short-term relation between the variables. In the short term, we estimate that housing prices are not determined by the endogenous variables that have been found in the long run. All the coefficients of the endogenous variables resulted statistically insignificant in determining the short-term performance of house prices. This result may be due to housing market friction, which may be related with the long time needed to sell a house and some handicaps of the housing market, such as governmental interference, institutional shortcomings, and flawed enforcement of property rights (World Bank 2012).

*Table 5. Empirical findings for short term.*

	VECM	
	Coefficient	tvalue
$\Delta$ Mortgage/ GDP	-0.108071	-0.834439
$\Delta$ Exchange rate fluctuation (-1)	0.072446	1.508590
$\Delta$ Yield T-bills 12M	0.011484	0.377941
C	0.033057	2.411826
<b>ECT</b>	<b>-0.483753</b>	<b>-2.391207</b>
Dum08	-0.059947	-2.529529
Dum04	0.023180	1.147342
Seas (1)	-0.039314	-2.344644
$\Delta$ LHPI(2)	-0.155682	-0.980472
Adjusted R-squared	0.284687	
S.E. of regression	0.053307	
<b>Residual test</b>	<b>Test value</b>	<b>p-value</b>
Jaque bera	0.4921	0.7818
LM test	0.035	0.953
Hetereskedacity	0.166	0.99

Source: Author's calculations

The behavior of housing prices in the short term is largely determined by error correction term, seasonality of house price series and dummy variables of 2008. This finding confirms the negative role of the crisis in the housing market for the short-term

development. Meanwhile, Dumm04 variable was statistically insignificant, even though with the expected sign. Unexpectedly, the coefficients of lagged house prices variable are statistically insignificant. Even for short-term equations, models residual fulfilled all three features of the stationary series (Annex 1, Table 4).

## D. ROBUSTNESS CHECK

The above-mentioned alternative models represent also a robustness check to the main findings. So the substitution of the 12m T-bills with the euro loans interest rate has resulted with almost the same estimated coefficient of the mortgage to GDP ratio results and statistically significant. Furthermore, other coefficients remain broadly stable. The coefficient before interest rate was negative as expected, but statistically insignificant. Moreover, the replacement of the exchange rate volatility with the series of the euro/lek exchange rate did not change results found for the impact of mortgage to GDP ratio on house prices. Another robustness check is the substitution of the mortgage credit with the total credit and domestic credit as proposed by Gerlach (2005). As shown in Table 6, the results did not bring significant changes to the coefficients and model parameters.

*Table 6. Results of VECM2 model, with an alternative indicator of lending to GDP*

VECM	Coefficients	t-value
Variable		
Total credit/ GDP	0.376554	-7.89492
Exchange rate volatility	0.112122	-4.71552
Treasury bills 12m yield	-0.249081	5.30148
C	-5.94028	
<b>ECT</b>	<b>-0.131823</b>	<b>-1.81391</b>
Adjusted R-squared	0.229468	
S.E. of regression	0.055385	

*Source: Author's calculations*

Another robustness test for the results is done following the approach suggested by Valverde and Fernandez (2010). By taking in consideration different periods within the sample, tests showed that the coefficients before main variables maintain the sign and

remained statistically significant (Table 7). The coefficients' stability makes us more confident about the findings of this research. Also, residual tests of the long-term models show that the series of errors of the two models have the expected characteristics. These series have a normal distribution, and do not suffer from serial correlation and from heteroskedasticity (Annex 2).

*Table 7. Results of VECM model, long term relationship for 2004-2013.*

Long run equation	House prices	T-statistics
Mortgage/ GDP	0.406	-24.59
Exchange rate volatility	0.091	-10.30
Treasury bills 12m yield	-0.264	-8.134
C	-5.56	
ECT	-0.710	-1.896

*Source: Author's calculations*

## 4. CONCLUSIONS AND RECOMMENDATIONS

In recent years, economists around the world have paid special attention to the dynamics of house prices, due to the implications of the housing market in economy. Special consideration is given to the role of house prices in financial stability and macroeconomic policies of central banks. The literature investigates on all these aspects both at a comparative level for groups of countries, and at individual countries level. Irrespective of the chosen approach, academic empirical findings have confirmed the strong correlation between house prices and demand determinants of house prices such as mortgage, disposable income, exchange rate and interest rate. To elaborate this relationship, this paper undertakes a cointegration analysis of house price determinants with the financial factors in Albania. The main hypothesis of this research paper is to assess the influence of demand factors on house price dynamics over the long run, and whether their influence is also confirmed for the short run.

Economic studies on the housing market in Albania and its interrelation with macroeconomic indicators are scarce. The inclusion of the T-bills yield and exchange rate as determinants of house prices distinguishes our analysis from previous studies. Hence, this research paper, along with confirming the main hypotheses that

it raises, aims to provide an added value to the existing literature as well as to help in the practical use of its findings.

Through the application of the cointegrated method VECM for Albania, this study confirms the positive correlation of mortgage loans with house prices in the long run, in accordance with findings in foreign literature. This result highlights the fact that despite the low level of mortgage lending in Albania, its development has a statistically significant effect on the long-term development of house prices. Furthermore, this study confirmed a statistically significant negative relationship between house prices and 12-m T-bills yield, in line with the expectation that the treasury bills market is an alternative for the investment of funds. Meanwhile, the interest rate of new euro loans, as noticed in previous papers regarding Albania, resulted statistically insignificant to house price developments. A novelty of this study is the inclusion of the exchange rate in the empirical analysis of house prices. In a foreign currency-dominated housing market, the role of the exchange rate appreciation and ER volatility resulted positive and statistically significant.

The research for this paper revealed several issues that hamper housing market developments in Albania. Against a highly informal real estate market, the government approves regularly the list of houses' reference prices by area, thus intervening in the price setting. Also, the housing market continues to suffer from multiple problems regarding law enforcement and property rights in the country, which inhibit the natural development of prices through the interaction of supply and demand in the market. Judicial and institutional shortcomings in addressing problems of ownership and enforcement of land property rights contribute to the distortion of house prices. Moreover, given the current available data, it is evident that a country-level index of house prices needs to be constructed. That would help to expand the analysis on the developments in other districts while maintaining the comparability of the macroeconomic factors under analysis. Another restriction of this research remains the availability of the relatively short-time series. Addressing these issues would help to further improve the empirical analysis of house prices in Albania and use the findings of this paper more practically.

# ANNEX 1

Table 1. Data Statistics

DATA	Label	Sample	Average	Standard deviation	Minimum	Maximum
House price index	HPI	64	117	30	71	164
Mortgage (ml lek)	MC	64	43,733	37,175	4,407	93,862
GDP	GDP	64	860,393	314,271	370,562	1,355,657
Mortgage/ GDP (%)	MCG	64	4.29	3.14	0.87	8.53
Interest rate of euro lending (%)	INTCE	64	5.94	0.97	3.79	8.29
12M TB yield (%)	BTH	64	7.24	4.21	3.01	21.07
Exchange rate euro/ lek	ER	64	134.85	11.63	121.69	171.34
Volatility of exchange rate	ERSTD	64	6.97	5.56	0.93	21.10

Table 2. Structural break test- Chow Breakpoint Test

Variable	F- statistics	Log likelihood ratio	Wald Statistic	Prob. F(3,58)	Prob. Chi-Square(3)	Prob. Chi-Square(3)
2008Q3	124.9034	128.616	374.7103	0.0000	0.0000	0.0000
2004Q1	77.85101	103.3459	233.553	0.0006	0.0003	0.0002

Table 3. Unit root test, (probability for the null hypotheses= non-stationarity)

Variable	Level		First difference	
	ADF (p-value)	PP (p-value)	ADF (p-value)	PP (p-value)
HPI (House price index)	-1.0(0.74)	-0.87 (0.79)	-7.8 (0.00)	-14.36 (0.00)
Mortgage/ GDP	-0.21 (0.99)	-0.93 (0.95)	2.56 (0.01)	-6.67 (0.00)
TCG (Total Credit/ GDP)	-1.4(0.85)	-1.02(0.93)	-1.55(0.11)	-6.82 (0.00)
INTCE (Interest rate of euro lending)	-0.72(0.4)	-0.68(0.42)	-8.1 (0.00)	-8.49 (0.00)
TB (yield TB 12M)	-0.99(0.28)	-1.0(0.28)	-9.16(0.00)	-9.17 (0.00)
ER (exchange rate euro/ lek)	-3.20(0.1)	-2.4(0.38)	-5.2 (0.00)	-6.13 (0.00)
ERSTD (volatility of exchange rate)	-2.71(0.24)	-2.2(0.25)	-3.75(0.03)	-3.75 (0.03)

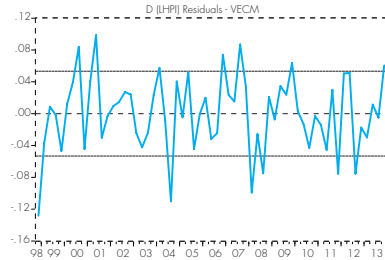
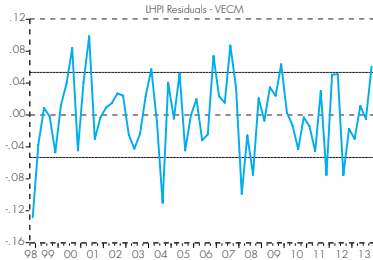
Table 4. Lag exclusion statistic test

Chi-squared test statistics for lag exclusion:  
Numbers in [ ] are p-values

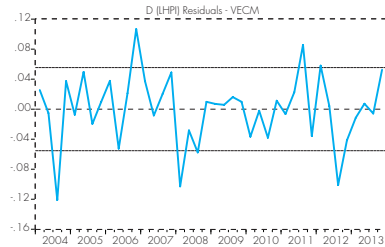
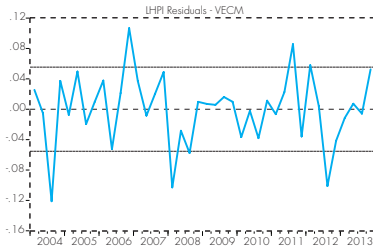
	D(LHPI)	D(LMCG)	D(LBTH)	D(LERSTD)	Joint
Dlag 1	4.729182 [ 0.316230]	2.331096 [ 0.675113]	6.090822 [ 0.192468]	16.89490 [ 0.002026]	28.79142 [ 0.025381]
Dlag 2	12.04625 [ 0.017011]	2.005389 [ 0.734768]	8.583937 [ 0.072383]	2.868587 [ 0.580052]	27.83570 [ 0.033078]
Dlag 3	3.206319 [ 0.523911]	1.973412 [ 0.740649]	1.849317 [ 0.763448]	3.804536 [ 0.433105]	11.77094 [ 0.759591]
Dlag 4	4.694160 [ 0.320142]	0.801407 [ 0.938259]	7.998270 [ 0.091642]	5.345178 [ 0.253677]	20.32216 [ 0.206060]

## ANNEX 2. RESIDUAL GRAPHS FOR VECM

Residual graphs VECM for 1998-2013 sample (Long run- Short run)



Residual graphs VECM for 2004-2013 sample (Long run- Short run)





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