Slovene Residential Property Prices Misalignment with Fundamentals

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Abstract

This paper replicates the computation of an aggregate indicator for Slovene house prices, using a multiple indicator approach developed for the Austrian house price data by Schneider (2013). The aim of the aggregate misalignment indicator is therefore to recognize the under- and over-valuation of house prices in Slovenia. The key findings are that during the 2004-2008 economic boom period the aggregate misalignment indicator clearly shows the significant over-valuation of Slovene house prices, while during the financial crisis there was an abrupt correction in house prices. With real house prices still declining despite recent economic recovery there is currently an under-valuation of house prices present, from the end of 2013 onwards.

JEL Classification Numbers: C43, C55, E31

Keywords: multiple indicator, house prices, under- and over-valuation

*The views presented herein are those of the authors and do not necessarily represent the official views of Banka Slovenije.

1 Introduction

The dynamics and development of house prices are treated as very important. The dynamics of housing wealth can have a significant effect on aggregate consumption and can consequently determine the business cycle of a particular economy. In the boom periods it can act as a financial accelerator and can cause more severe and prolonged crises after the burst. In addition to the consumption effect, the housing wealth can also influence the credit worthiness of firms and households and can also jeopardize the balance sheets of banks.

The housing wealth is most intuitively reflected in property prices, which are in theory commonly considered thorough various types of discount models. Accordingly, the price evaluating housing asset would thus resemble the net present value of the future rental income, discounted by a risk-free interest rate. The property prices are therefore determined by future expectations, which can be affected by the current and expected future state of the economy. Sufficient housing demand (driven by favourable interest rates, loan availability, household income, unemployment rate, and others) on one side and housing supply (resembled in construction material prices, labour costs, building permits, and others) on the other, may considerably affect the property prices, which in turn affects the activity in construction sector and hence the overall economy. The aim of this paper is to combine various demand and supply factors into one indicator, indicating an alignment of property prices with the current and expected future state of the economy.

Using a multiple indicator method (explained in the following chapters) we try to assess an aggregate misalignment indicator based on 7 subindicators in order to identify the under- and/or over-valuation of the house prices in Slovenia. These 7 subindicators cover different house market areas. Three of them are reflecting the household perspective in the housing market, three of them are reflecting the investors' perspective, while the last one covers the banking system perspective. Compared to the actual market house prices, our composite indicator can be interpreted as a house price indicator resembling economic fundamentals. The main findings of the paper are that in the 2004-2008 economic heating-up period the aggregate misalignment indicator suggests a significant over-valuation of Slovene house prices, while with the start and during the economic and financial crisis period the Slovene house prices abruptly decreased. In the 2011-2013 period the aggregate misalignment indicator shows that the house prices were more or less aligned with the fundamentals. However, due to economic recovery in Slovenia starting with the end of 2013 and an ongoing fall in house prices, the aggregate misalignment indicator suggests that the house prices are currently under-valued.

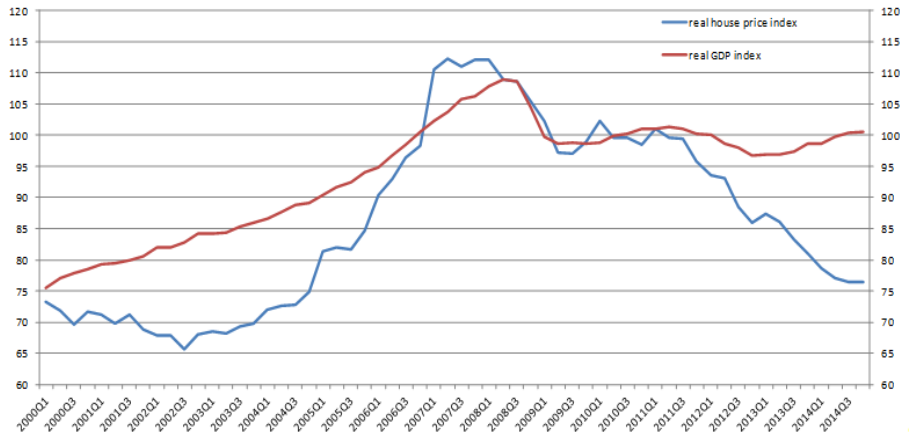
2 The motivation and a short literature preview

The last financial crisis had shown that large swings in real estate prices became a relevant issue from the economic policy perspective. These swings may cause financial and other macroeconomic instabilities. When house prices rise, they can act as a financial accelerator in the build-up process of the imbalances in the economy and can later cause more severe and prolonged crises after the burst. The decrease in house prices is reflected in the form of financial losses of credit institutions and investors holding real estate as an investment as well as collateral and can have unwanted negative wealth effects for households. Due to the negative equity effect and the consequent deleveraging process (Eggertsson and Krugman, 2012), this usually leads to a sharp drop in aggregate demand and could later on lead into a deflationary spiral.

Ex ante detecting price misalignments has always been difficult. From this perspective the policy makers' task is to identify the drivers of price misalignments and apply necessary steps to curb these misalignments. The identification of the main drivers of the residential property price dynamics and consequently the ability of a precise signalling of the future residential property prices could therefore represent a corner stone in preventing house price bubbles and the negative effects of their burst on a particular economy. Even more, a reliable early warning signal could enable a timely response of the economic policy by forming and implementing appropriate (micro- and macroprudential) tools, which could in turn (at least) limit the future house price bubbles and strengthen the resilience of the financial sector.

Focusing the analysis to the case of Slovenia, in Figure 1, there is a visible distinction of the development of the house price bubble in the Slovene housing market till 2008. With the start of the global financial crisis the real house prices significantly decreased. Comparing the real house prices with the real GDP growth, one can clearly suspect there was an over-valuation of the house prices in the 2004-2008 economic pre-crisis boom period in Slovenia. While the real GDP growth slowly picked up in 2010 and in 2014, the real house prices continue to fall till this day following an abrupt correction in 2008 and 2009 and a relative stable period in 2010 and 2011. However, the chart-based inference of solely observing house price movements alone does not off us any concluding suggestion about the presence of house bubble just yet.

Figure 1: Real house price dynamics and the real GDP growth in Slovenia (Average 2010 = 100)



Source: Statistical Office of the Republic of Slovenia (SORS).
*Note: In order to compare the real GDP dynamics the nominal house prices are presented in real terms and are deflated by the HICP inflation.

Despite the difficulties of a housing bubble identification[1], the key question how to identify the under- and/or over-valuation of the house prices remains. Most of the present-value method literature focuses on calculating the fundamental house prices on the basis of economic fundamentals and then compares them with actual market house prices. If the actual market house prices exceed the fundamental house prices, then the housing market is over-valued, and *vice versa*. In order to calculate the fundamental house prices, researchers use several methodologies. For example, by net present value methodology the fundamental house prices are calculated on the basis of discounting future rent returns and then comparing them to market house prices. Similarly to the net present value method, the user cost methodology uses a comparison between the ongoing housing expenditures[2] of home-ownership and market rent returns. Both methods are usually used by financial and investment professionals when valuing their portfolio.

However, most of the academic literature focuses on the econometric-based methodologies. Dreger and Kholodilin (2011) for instance constructed an early warning system based on three alternative approaches (signalling approach, logit and probit models) in order to signal the possible over-valuation in the housing market. Quantile regression (McMillen, 2008; Zietz, Zietz and Sir-

[1]Himmelberg, Mayer and Sinai (2005) argue that the house price dynamics are a local phenomenon and that strong conclusions based on typical economic and housing variables are not reliable and could be misleading.

[2]Which usually include the opportunity costs of the capital deployed, property taxes, maintenance costs, appreciation/depreciation of the residence, a risk premium, etc.

mans, 2008; Gerdesmeier, Lenarčič and Roffia, 2012) is another method based on fundamentals used to detect the boom and busts of the house prices. In short, the quantile regression measures the effect of the predictor variables on a specified quantile of the response variable, based on the modelling relationship between a set of predictor variables and the response variable. Markov-switch models (Schaller and van Noorden, 2002) try to capture the regime-switching characteristics in market revenues by separating the price dynamics onto fads or bubbles. Panel regressions (Kajuth, Knetsch and Pinkwart, 2013) and various types of autoregression models, such as the VECM[3] models (Gattini and Hiebert, 2010; Chen, Gan, Hu and Cohen, 2012) and more complex dynamic macroeconomic models (for example: Darracq Paries and Notarpietro, 2008; Iacoviello and Neri, 2010) were used as well; however the latter methods are more suitable for forecasting purposes.

In order to take into consideration a larger number of relevant economic variables influencing the housing market the multiple indicator methodology was developed (UBS, 2012; Schneider, 2013), which tries to capture the demand-side as well as the supply-side factors. The idea behind the multiple indicator method is to incorporate factors such as the house price-to-CPI ratio, price-to-income ratio, price-to-hypothetical borrowing volume, loan bearing capacity, price-to-construction costs, real housing investments-to-GDP ratio and price-to-rent ratio in order to take into account their characteristics which could in turn affect the housing dynamics and development. In chapter 5 the multiple indicator method is presented in more detail.

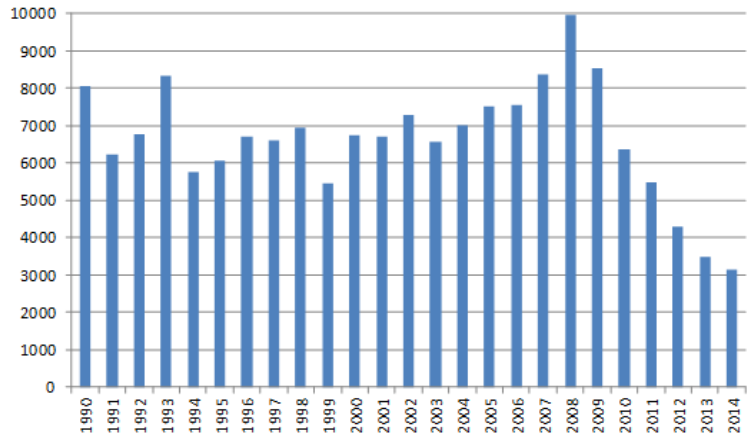
3 An overview of the Slovene housing market

This section offers a descriptive overview of the Slovene housing market in order to assess whether our quantitative method can represent a relevant stance of housing market developments. For the past 20 years Slovene housing market has been characterized by a large home-ownership rates, enabled by Housing Act in the early 90s. With more than 80% ownership share Slovenia is holding second place among euro area countries and in turn exhibiting one of the least developed rental market. Only 12% of Ljubljana's residential units were considered to be of a rental nature in the pre-crisis period. The extremely underdeveloped rental market and ownership structure indicate a critical shortage of supply that has prevailed in Slovene real estate market for most of the period since the independence. In order to tackle the under-supplied market, the government issued the National Housing Programme act in 2000, which in its implementation provisioned to reach 10.000 completions per annum by the year 2009 (see Figure 2 for actual number of completions). The shortage

[3]the Vector Error Correction Model

of supply may perhaps be best resembled in the Ljubljana Municipal Housing Fund data. In 15 years of fund's existence it received more than 15.000 applications for non-profit rentals while only 1912 dwellings were allocated. In that particular example the demand exceeded the number of dwellings by 843% (Sendi, 2010).

Figure 2: Number of completions - new dwellings



Source: Statistical Office of the Republic of Slovenia (SORS).

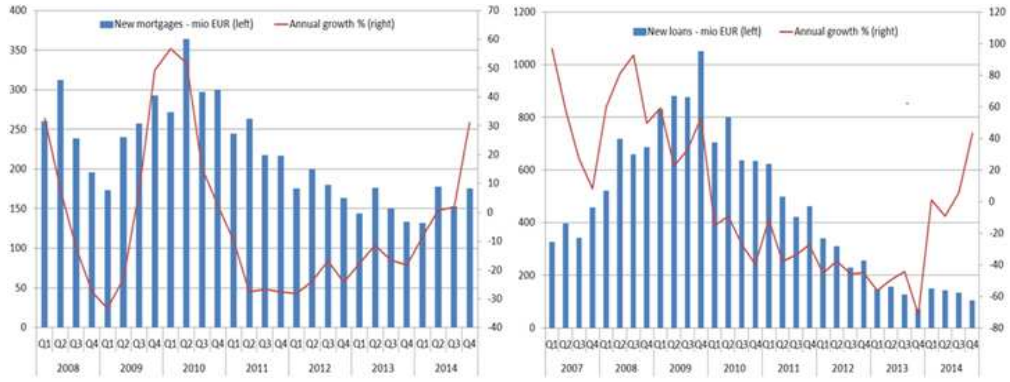
The investments into new dwellings only started to rise more steadily after 2004. In that period Slovene construction sector was abundant with foreign labour force and extremely low construction costs, ranking behind Slovakia, Romania, Poland and Bulgaria. Combination of soaring sales prices and very affordable borrowing conditions enabled developers to generate high profits.

But the construction boom had been short lived. With the financial crisis and credit crunch in particular, the pre-crisis profit expectations turned out to be extremely unrealistic. The result of the housing bubble burst can be summarized by a large number of stalled projects, bankruptcy of construction firms and lower employment, especially in the construction sector. Low construction activity from and residential investments consequently decreased the number of completions of new dwellings to the level a decade ago, again emphasizing the shortage of supply of new dwellings reaching historical lows in 2014.

Figure 3 illustrates the demand and supply side aspect from the perspective of credit activity. In the third quarter of 2014, 150 million euros of mortgage loans were issued to households, which is 57% lower compared to the peak value in 2010. The construction sector has been granted 134 million euros of new

loans in 2014Q3[4]. The highest borrowing activity in construction was recorded at the end of 2009, when firms were already facing liquidity and solvency issues and most credits were used to refinance and meet the existing liabilities.

Figure 3: New mortgages (left); New loans - construction (right)

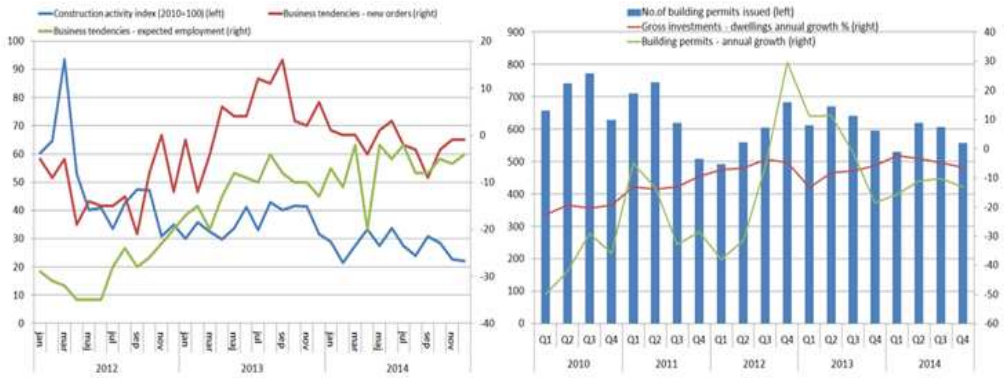


Source: Banka Slovenije.

Dire situation in residential construction activity is visible in the real construction activity index and gross investments into residential buildings. The value of residential activity in Slovenia bottomed at the end of 2014. Namely, in the last quarter of 2014, the construction activity index was on average 75% lower compared to the average of 2010. A slightly more positive sign can be given by observing business tendencies in construction sector, where the difference between positive and negative answers (on expected employment activity and new orders) netted to 0 for the first time in the post-crisis period, albeit due to increased public infrastructure investment. Annual growth of residential building investments and newly issued building permits remains negative (Figure 4).

[4]Mostly due to government procurements.

Figure 4: Residential construction activity index and business tendencies (left); Building permits and gross residential investments (right)



Source: Banka Slovenije.

4 The subindicators

For the purpose of constructing our leading misalignment indicator we consider 7 subindicators representing the fundamentals by which a housing market is directly driven. Our subindicators consists of 3 variables covering households' perspective, 3 variables representing investors' perspective, and one indicator representing the system perspective. The subindicators included in aggregation of misalignment indicator were selected on the basis of the literature reviewed in the Section 2. Table 1 summarizes key housing market fundamentals recognized by the literature reviewed for the purpose of this analysis.

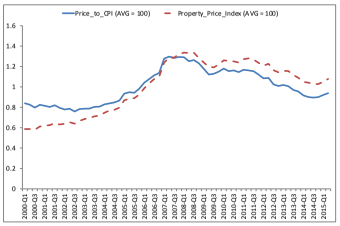
Table 1: The fundamentals comparable and recognized by the literature

	Household perspective				Investor perspective			System perspective		
	Price-to-CPI	Price-to-income	Hypothetical borrowing volume	User costs	Construction costs	Price-to-rent	Housing investments-to-GDP	Loan bearing capacity	Debt-to-income	Interest rate risk
Schneider (2013)	X		X		X	X	X	X		X
UBS (2013)	X	X				X	X		X	
ECB (2013)	X	X				X	X		X	
Gerdesmeier et al (2013)		X		X					X	
Gatini and Hiebert (2010)	X	X								X

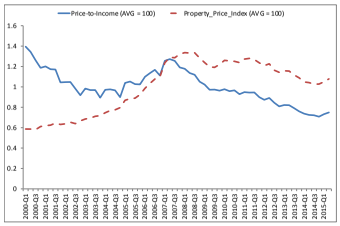
The data limitation of particular indicators limits our indicators selection to the following choice: price-to-CPI ratio, price-to-income ratio, hypothetical borrowing volume, loan bearing capacity, price-to-construction costs ratio, housing investments-to-GDP ratio, and price-to-rent ratio. All indicators include seasonally adjusted categories and spans the period from 2000Q1 to 2015Q2. The dynamics of each sub-indicator is depicted in the Figure 5.

Figure 5: The subindicators

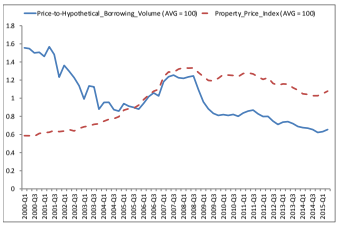
(a) Price-to-CPI



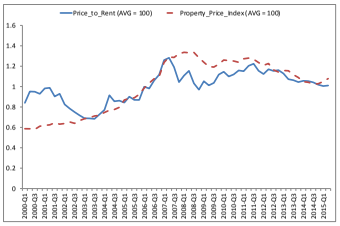
(b) Price-to-income



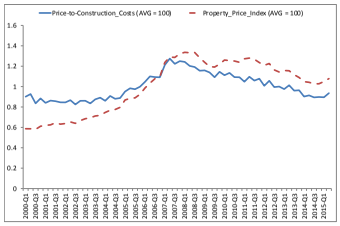
(c) Price-to-hyp. bor. vol.



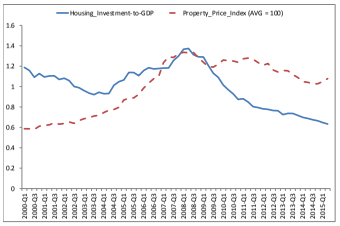
(d) Price-to-rent



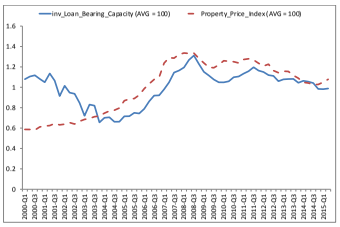
(e) Price-to-construction costs



(f) Housing investments-to-GDP



(g) Loan bearing capacity



Source: own calculations, Banka Slovenije, and Statistical Office of the Republic of Slovenia (SORS).

4.1 Price-to-CPI ratio

Considering the demand side perspective, the real residential property price index probably most clearly summarizes Slovenian housing market developments and Slovenian business cycle in general. In order to ensure sufficiently long time series that encompasses a whole business cycle our property price index addresses only existing flats. In the period between 200 and 2008 real residential property price index increased by more than 60% with prices peaking in the second quarter of 2007. Conversely, in the period from 2007 to 2015 the index dropped by 30%.

We use the official residential property price index produced and published by the Statistical Office of the Republic of Slovenia (SORS). The calculation of

the index follows a hedonic method using log-linear regression function based on transaction prices and set of explanatory variables including floor area of the dwelling and its squared value, age of the dwelling and its squared value, tourist attraction of the municipality area where the property is situated, and the gross domestic product and its squared value corresponding to the statistical region of the transacted property. The real index is obtained by deflating the nominal property price index by the consumer price inflation (2010=100).

4.2 Price-to-income ratio

In order to get a better insight of the households' purchasing power one needs to consider the real residential property prices in relation to real household income. As the measure of affordability of housing ownership we therefore consider the price-to-income ratio. In the build-up to the financial crisis (2004-2007) it can easily be observed that the growth of the residential prices significantly surpassed the household disposable income growth. The detachment of the prices from the household income clearly offers an indication of the evolution of the housing bubble in Slovenia. Namely, at the end of 2013 an individual would have to give up 67 average net salaries in order to acquire $50m^2$ flat, whereas at the peak of the residential price index this number amounted approximately 107 average Slovenian net salaries. The price-to-income ratio therefore relates the average real house price per m^2 to real average Slovenian net salary:

$$\text{Price-to-income ratio} = \frac{\text{Real average house price per } m^2}{\text{Real household disposable income}} \tag{1}$$

4.3 Price-to-hypothetical borrowing volume

Interpreting price-to-income ratio as the measure of housing affordability has one important limitation, that is ignoring the importance of the interest rates in purchasing the high-value assets. Namely, the interest rates crucially determines the portion of the household income that can be dedicated to pay mortgage instalment. In order to account for both, the disposable income and the interest rates, we employ the affordability indicator proposed by Schneider (2013) that relates the housing price to hypothetical volume of the loan that an average household could borrow. To calculate the latter we assume that a household will dedicate a fixed percentage of its income $c * Y$ for mortgage payments for a loan with assumed repayment period of 20 years ($T = 20$):

$$K = \frac{c * Y_t(\frac{1 - R_t^{T+1}}{1 - R_t})}{R_t^T} \tag{2}$$

Where K stands for the hypothetical borrowing volume, R_t is the gross interest rate corresponding to the 1 plus the mean nominal interest rate on mortgage loans, c is a constant, and Y is the average Slovenian net salary in constant prices at time t. To assure the consistency between the sub-indicators and to track the deviation of the house prices from the affordable income and borrowing volume for households, we include the inverted affordability indicator $((K/\text{House prices})^{-1})$ in the calculation of the leading misalignment indicator. In general the affordability indicator offered by Schneider (2013) closely follows the dynamics of the price-to-income ratio with two notable differences. The Schneider's (2013) affordability obviously better captures the high inflation period in the beginning of the sample which coincided with record high interest rates. The second difference that can be observed is the prolonged period of deteriorated affordability of housing purchase coinciding with severe borrowing and financial conditions in the years of 2007 and 2008. In the case of the price-to-income ratio, that ignores the interest rates an therefore financial conditions, this not possible to notice as the affordability deterioration seems to be far less persistent in the period following the peak of the house price index.

4.4 Loan bearing capacity

From the perspective of the banking system and that somewhat relates to the affordability indicators is the loan bearing capacity introduced by Schneider (2013). It relates the households' hypothetical borrowing volume to the actual amount of mortgage loans granted to households by the Slovenian banks. On the onset of the crisis in the second half of 2008 the indicator amounted to only half of the value noted in the year 2004, indicating the built up exposure of banks to a systemic risk and undesirable position of households to meet the repayment obligations of the outstanding loans. The highest amounts of the indicator coincides heavily with the low interest environment and cheap credit activity of Slovenian banks in the years of 2004 and 2005, essentially contributing to the perceived better loan-servicing capacity and built-up of banks' risky assets related to that period. As with the others indicators, to track deviations of from the fundamental housing markets we include the inverted loan bearing capacity indicator in the calculation of the composite misalignment indicator.

4.5 Price-to-construction costs ratio (Tobin's Q)

In order to measure the supply-side activity and its evolution we use a relation between property prices and construction costs containing the construction labour costs as well as construction material costs. The ratio is considered as an important long-term supply-side cost factor. The relation can be interpreted

as a resemblance to Tobin's Q or company's performance, i.e. market value-to-replacement costs ratio. The exceeding critical value of 1 can be interpreted as an over-valuation of a company's stock, in our case an over-valuation of the house prices in relation to construction costs. In the boom period, property prices in Slovenia grew at a much faster pace than construction costs. Consequently, the ratio of the two rose by around 40% in that period, peaking at the value of 1.15 in the second quarter of 2007. During the financial crisis and the housing bubble burst the price-to-construction costs ratio was faced by a significant correction. Currently the ratio is returning to the levels from the pre-boom era.

Tobin's Q is calculated using the following relation:

$$\text{Price-to-construction costs ratio} = \frac{\text{Residential property price index}}{\text{Construction costs index}} \quad (3)$$

4.6 Real housing investments-to-GDP ratio

The real housing investments-to-GDP ratio provides an additional supply-side indicator. It proxies housing dynamics relative to GDP and reflects the infusion of housing capital to support the housing development process. As GDP, real housing investments move pro-cyclically, however are more susceptible to price volatilities and market/sector vulnerabilities in comparison to GDP. Keeping in mind these housing investments characteristics, the real housing investments-to-GDP ratio could indicate boom and bust periods in the housing market. A disproportionate high ratio of housing investments-to-GDP would therefore imply a housing sector overheating, especially during the so-called pre-high-cost boom years (Detken and Smets, 2004). As most sub-indicators housing investment-to-GDP ratio also indicates a housing sector overheating during the boom period, before the burst in 2008. However, in comparison to other sub-indicators the housing investment-to-GDP ratio decreased from its highest 4.6% of GDP to record low 2.5% of GDP, which is significantly lower in the pre-crisis period. These low figures reflect the construction sector breakdown in Slovenia after the burst in the housing market.

For the purpose of constructing the real housing investments-to-GDP indicator we use the following relation:

$$\text{Real housing investments-to-GDP ratio} = \frac{\text{Real housing investments}}{\text{Real GDP}} \quad (4)$$

4.7 Price-to-rent ratio

The price-to-rent ratio compares the costs of owning a property to renting it. The larger the value of the price-to-rent ratio the better it is to buy property in comparison to rent it. In the long term, the ratio should be stationary, since rising relative prices for residential properties make renting a more attractive option, in turn leading to reduced demand for home ownership. However, in the second quarter of 2007 the price-to-rent ratio peaked indicating the most significant overshooting of the real estate prices in comparison to the rental market. At the end of 2013 the indicator decreased to values from the pre-crisis period, reflecting the adjustments of the house prices after the crisis period. Most of the deviations in the price-rent ratio is related to changes in future returns and not to changes in rents (Krainer and Wei, 2004). This is an important perspective since the price-to-rent ratio in Slovenia is returning to its average level in the period between 2000 and 2005, and it will probably continue to do so through downward house price adjustment.

It can be defined as:

$$\text{PE} = \frac{\text{Average price}}{\text{Average rent}} \tag{5}$$

From the burst of the housing bubble in 2008 the price-to-rent ratio decreased significantly, while in the last couple of years the price-to-rent stabilised somewhat, indicating a possible shift in falling house prices.

5 The multiple indicator method on the basis of 7 subindicators

The 7 subindicators enter the aggregate (overall) misalignment indicator as separate time series variables in the form of percentages of deviation from their own historical average. In the calculation process of the overall misalignment indicator the weighting factors have to be determined first. The subindicator weighing follows Schneider's (2013) method and is done by applying a principal component analysis (PCA) with which the cyclical co-movement of the separate subindicators could be stressed.

Each of the 7 subindicators ($x_{i,t}$) can be written down as a linear combination of (uncorrelated/orthogonal) factors:

$$x_{i,t} = \alpha_{i,1}F_{1,t} + \alpha_{i,2}F_{2,t} + ... + \alpha_{i,j}F_{j,t} + \varepsilon_i \tag{6}$$

where $F_{j,t}$ is a principal component factor and $\alpha_{i,j}$ represents the factor loading of variable i on factor j. The first principal component factor has the largest possible variance. Each succeeding component factor has again the highest possible variance conditional on the orthogonal constraint to the preceding component factors.

With the obtained principal component factors the aggregate misalignment indicator can be derived, following the weighted sum of the 7 subindicators:

$$MI_t = \sum_{i}^{I} w_i x_{i,t} \tag{7}$$

where the weights, w_i, are calculated by normalising the sum of pre-weights, v_i, to 1. Pre-weights v_i are calculated by multiplication of the squared factor loading, $\alpha_{i,j}$, of variable i on factor j with the explained fraction of the dataset variance ϕ_j by factor j:

$$v_i = \alpha_{i,j}^2 \phi_j \tag{8}$$

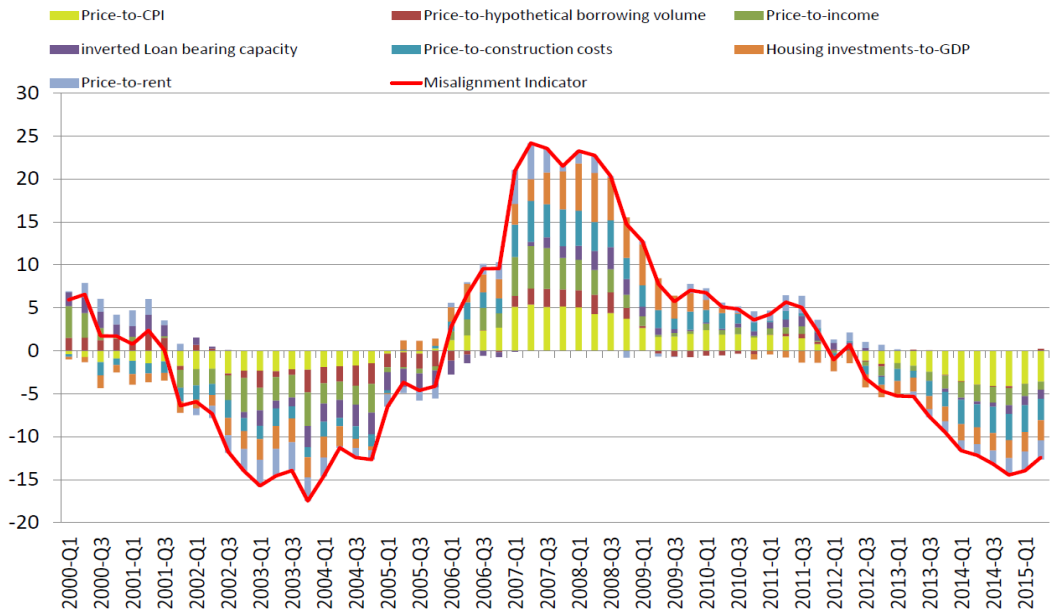
The dataset variance ϕ_j is therefore defined as:

$$\phi_j = \frac{\sigma_j^2}{\sum_{j=1}^{J} \sigma_j^2} \tag{9}$$

where factor j represents the factor on which a particular variable i has the largest loading, $j = \text{argmax}(\text{abs}(\alpha_{i,j}^2))$.

The obtained aggregate misalignment indicator of housing prices is shown in Figure 6. The misalignment indicator shows a clear over-valuation pattern during the boom cycle, and reaches a 24% over-valuation in its peak at the end of 2007. From the onset of the crisis the real house prices declined significantly (and continue to decline) and with the steady picking-up of the economy in recent quarters, there is an under-valuation present from the 2013 onwards based on historical averages of the 7 subindicators.

Figure 6: Misalignment indicator and the contributions of subindicators



Source: own calculations.

The findings of the dynamics of the under- and over-valuation periods in the housing markets across other European countries are in-line with conclusions made across most of the European countries in other papers (Deutsche Bundesbank, 2013; Schneider, 2013). The misalignment indicator of housing prices for Slovenia suggests that the severity of the housing bubble was closer to the case of countries such as Spain, Ireland, Belgium, United Kingdom and Netherlands (Fradique Lourenço and Rodrigues, 2014; Malzubris, 2008), and was consequently more pronounced in comparison to other core European countries where the identified over-valuations were around 5 to 10% in urban housing markets. Since the housing market is more sensitive to the business cycles and general economic conditions thus potentially amplifying the pro-cyclicality, the understanding of drivers of house prices therefore represents an important tool from the economic policy perspective in order to prevent future misalignments in house prices and to recognize the build-ups of housing bubbles. In this respect further prudential measures and instruments could be developed with the intention of strengthening the resilience of the financial sector against the house-price shocks and bubbles. On the other side policy measures should be taken in the case of under-valuation of house price as well. Having said that, policy makers could stimulate the housing market *via* buying/rental housing schemes (especially for low and moderate-income homeowners and renters), housing tax relief and related schemes, renovation schemes, and simplifying the construction and building permit procedures.

Despite of its good informative nature it has to be noted that the misalignment indicator may lack a robust reliability characteristic. In order to achieve that, a longer and a more stable economic period (10-15 years) would have to be considered. In the case of the Slovene real estate market this is currently impossible due to several reasons. In the 90's the economy of Slovenia was faced with the transition period, which was characterised by a shortage of supply, undeveloped financial and investment markets and therefore an illiquid and undeveloped real estate market. The supply shortage was evident till the 2004 when the "tranquil" period was disrupted by the 2004-2008 boom period characterized by an abundance of credit and soaring construction sector. From the burst in 2008 the real estate market in Slovenia has not yet fully recovered. The construction activity and residential investment are low and the house prices have yet to stabilise. Further more, the methodology of the misalignment indicator construction allows us to consider a larger number of subindicators, however several subindicators had to be left out from the analysis since their time series is too short.

6 Conclusions

By using Schneider's (2013) multiple indicator methodology we try to identify the under- and over-valuation of house prices in Slovenia. The key findings are that during the 2004-2008 economic boom period the aggregate misalignment indicator clearly shows the significant over-valuation of house prices in Slovenia, while during the financial crisis there was an abrupt price correction (following a similar pattern than in most European countries). Due to a steady economic recovery in Slovenia starting at the end of 2013 and an ongoing fall in house prices, the aggregate misalignment indicator suggests that the house prices are currently under-valued, based on the 7 subindicators.

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