Are Recent Increases of Residential Property Prices in Vienna and Austria Justified by Fundamentals?

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Residential property prices in Vienna have risen sharply since 2005 and to a lesser degree throughout Austria as well. This paper assesses whether the upward movement is justified by fundamental factors or whether it is exaggerated, using a fundamental residential property price indicator for Vienna and Austria to identify deviations between actual and fundamental real estate prices.

The indicator consists of seven subindicators that address a variety of perspectives, including those related to households, investors and systemic factors. For Vienna, the indicator points to an increasing degree of overvaluation in property prices (by 20% in the second quarter of 2013). The primary driver behind this trend, which has recently experienced an especially pronounced surge, is the relative real estate price (compared to rentals, consumer prices and construction costs), which is only weakly mitigated by the increased affordability of home ownership. Of note, the overvaluation evident in the indicator does not suggest that an abrupt price correction will occur in the near future. Rather, such imbalances may subside gradually, as happened in the wake of the price hikes experienced in the early 1990s. For Austria overall, the indicator points to a persistent 6% undervaluation, despite a recent uptick in prices. Diminishing loan growth and declining household indebtedness suggest that a high percentage of equity financing is being used in property investments. At present, therefore, the recent increases of residential property prices in Vienna and Austria do not pose a serious threat to financial stability.

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The strong upward surge in property prices that has been underway in Vienna – and to a lesser extent throughout Austria – since 2005, combined with accelerated hikes during 2012, have stoked fears of an emerging real estate price bubble. Since real estate is indeed the most important component of household wealth, and housing expenditures represent a major part of households' budgets, property prices are not only significant determinants of households' consumption and savings behavior, but also have a major impact on the economic activity of the construction sector. Furthermore, real estate loans play a pivotal role in bank portfolios. Therefore, price bubbles represent a serious threat to the stability of a nation's economy and financial system. However, surging prices alone do not constitute a price bubble. What is much more important is the extent to which price increases are justified by fundamental factors, i.e., all objective supply-side and demand-side elements that affect price formation. These elements include demographics, the general level of prosperity, institutional factors (including taxes, housing construction subsidies, financial sector development, etc.), the availability of land, consumer preferences (higher residential standards), expected income (from rentals), interest rates and various other elements. By contrast, personal expectations of future selling prices are subjective in nature and thus do not constitute fundamental factors. Accordingly, a run-up in housing prices driven by adjustments to changed fundamental conditions cannot be considered a bubble. Instead, a bubble is deemed to exist when prices deviate substantially and for prolonged periods from their estimated fundamental values. When

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analyzing property price trends, therefore, it is essential to determine the justifiable price that is supported by fundamentals.

In this paper, the fundamental residential property price indicator for Vienna and Austria will be used to determine the extent to which residential property prices are fundamentally justified or otherwise deviate from their fundamental values. The article is structured as follows: Section 1 provides an overview of residential property price trends in Austria, followed by a discussion of approaches to estimating fundamental prices in section 2. Section 3 introduces the fundamental residential property price indicator for Vienna and Austria. The implications for financial stability are described in section 4. Section 5 closes with a summary of findings and conclusions from the research.

1 Residential Property Price Trend in Austria

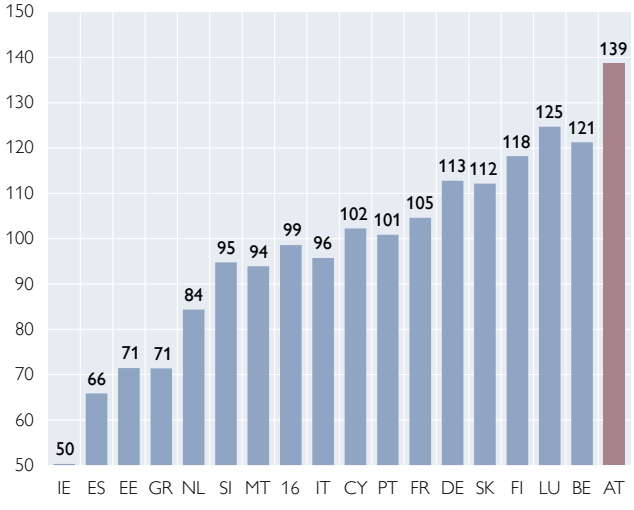
Compared to the rest of the euro area, Austrian residential property prices reflect an atypical trend. While some euro area countries (e.g., Greece, Spain) started to experience a pronounced upswing at the beginning of the 2000s and others (Ireland, Netherlands, Finland) noted the same trend as early as the second half of the 1990s, prices in Austria remained stagnant until 2005, when a marked upward trend emerged. In recent years, in fact, Austria posted the sharpest property price increases in the euro area. From early 2007 to mid-2013, prices rose by 39%, a pattern that differs markedly from the stagnating prices still evident in the rest of the euro area. On average, the situation in euro area countries such as Ireland, Spain, Estonia and Greece is characterized by declining prices following the bursting of their respective economic bubbles. Of those countries that did

Chart 1

International Comparison of Residential Property Prices

Residential Property Prices for Euro Area Countries in Q2 13

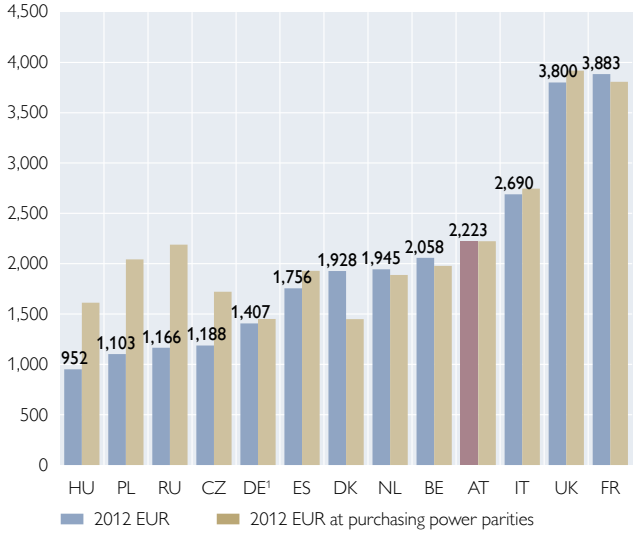
Index (2007Q1=100)



Source: ECB.

Residential Property Prices for Selected EU Countries in 2012

EUR/m²



Source: Deloitte (2013), OECD (PPP).

¹ Bid price.

register an upward movement, none comes even close to matching the pace of price developments seen in Austria.

Because international time series data on residential property prices generally consist of indices, information about prices in absolute terms is typically unavailable. According to a comparison of residential property prices for particular European countries published by Deloitte (2013), Austria ranked fourth among a total of 13 EU countries in 2012. Considering country-specific differences in purchasing power, Eastern European countries display significantly higher price levels.

Within Austria, price trends varied widely among regions and segments. In Vienna, for example, the movement of prices over the past two decades stands in stark contrast to the patterns noted in many other major European cities, where prices for the most part posted a steady upward trend, while prices in Vienna had stagnated for more than a decade after having doubled in the run-up to the 1995 World's Fair (which was eventually cancelled). By 2004, in fact, residential property prices in real terms had even dropped by more than 25%. Since then, growth increased steadily at an average annual rate of 7%, while prices surged suddenly to 15.7% in 2012. This pattern persisted during the first half of 2013, albeit at a slower pace.[1]

Box 1

The Housing Situation of Austrian Households

By international comparison, the housing situation of Austrian households reflects a rather low proportion of home ownership. According to the 2012 Austrian microcensus, 56.4% of primary residences were owned by households (or their relatives), 41.2% were rented (40.1% under master lease agreements and 1.0% under sublease agreements) and 2.4% fell into some other legal category. The share of residences rented under master leases shows a significant disparity between rural and urban areas, ranging from 14% in Burgenland to 75% in Vienna (Baumgartner, 2013). EU-wide, Austria ranks next to last in home ownership rates (57.5% in 2011) followed only by Germany (53.4%). Across the EU-27, the average rate of home ownership is 70.7%. The high proportion of rented residential units versus owner-occupied units in Austria is attributable primarily to the dominant role of subsidized low-rent apartments in the general rental market. In 2012, more than half of the residences rented under master leases fell into that market segment. Of those, 19% were municipal apartments, which are units in an apartment complex owned and operated by a municipality in order to provide low-cost public housing, while 41% were categorized as housing association (cooperative) apartments, i.e., units within an apartment complex owned and operated by a cooperative association. Households in Austria primarily purchase homes to live in rather than for investment purposes. Indeed, just 5% of all residential real estate owned by households are used for rental purposes (Albacete and Wagner, 2009). This phenomenon can be explained by the fact that compared to other countries, Austria has a comparatively high degree of tenant protection, while the tax incentives that favor home ownership are limited. Combined, this makes home ownership for rental purposes rather unattractive.

[1] *The residential property price indices used for this paper were commissioned from the Vienna University of Technology (TU Wien) by the OeNB. Hedonic regression models were used to estimate quality-adjusted property prices for detached single-family homes and old and new, condominiums for Vienna and the rest of Austria using the offer and transaction prices published on the online real estate portal Austria Immobilienbörse (AiB). Price indices for building plots and rentals (houses, apartments, offices and total rent) were also developed.*

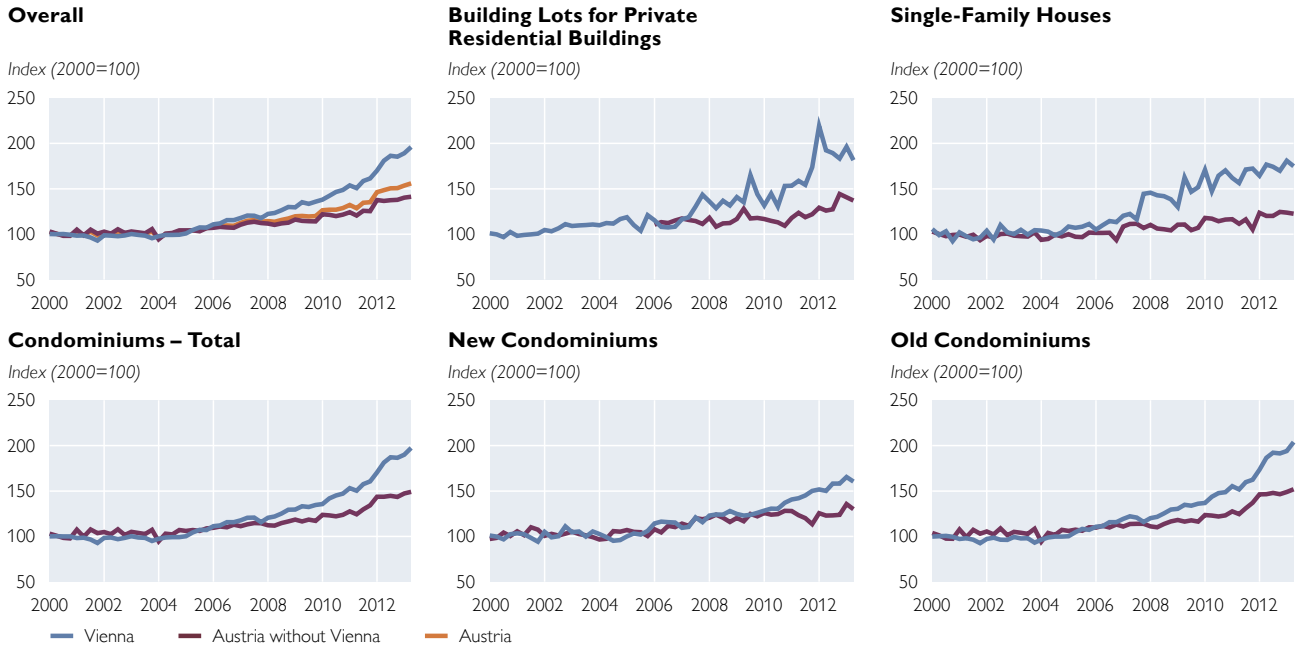
An analysis of cumulative price increases from 2000 to mid-2013 indicates that the sharpest jumps involved old condominiums (owner-occupied apartments) (+104%), a category that represents Vienna's largest property market segment. That upward trend is noticeably less steep among new condominiums (+60%), building lots for homes (+82%) and single-family houses (+75%). Rental prices, by contrast, posted only a modest rise (+29%) during the same period. In the Austrian provinces (excluding Vienna), the price trend was also far less precipitous. While prices in Vienna surged by 96% during the 2000 to mid-2013 period, those in the rest of Austria experienced only a 41% gain (chart 2 and table A-1). Assessed by market segment, the situation throughout the Austrian provinces is similar to the trend observed for Vienna: the sharpest price gains are associated with old condominiums while those for new condominiums and single-family houses were significantly slower.

2 Approaches to Estimating Fundamental Prices

Fundamental prices are determined by objective fundamental factors on the supply and demand sides. As the fundamental price of real estate cannot be observed directly, it must be estimated. For that purpose, empirical studies employ a variety of methods. The *present value model* calculates the fundamental price by discounting the total expected future returns (rental income) and comparing them to the property price. The *user cost method* compares the ongoing expenditures of home ownership to market rentals. The factors typically considered include the opportunity costs of the capital deployed, taxes (property tax less any deductible interest payments on loans), maintenance costs, expected appreciation or depreciation and a risk premium. The property

Chart 2

Development of Residential Property Prices in Austria



Source: OeNB; TU Vienna.

Box 2

Definition of a "Real Estate Bubble"

When analyzing sharp spikes in property prices, the assumption may be made that a price bubble is to blame. Most attempts to define the term "bubble," which scientific studies still fall short of explaining, typically focus on one or more of the three perspectives (Rombach, 2011) presented in the following paragraphs.

Chart-Based Perspective

Chart-based perspectives focus exclusively on price movements and do not consider any contributing factors, claiming essentially that sudden spikes in prices suggest a bubble in the making. This approach is problematic, however, especially since sudden pronounced price gains may very well be justified by fundamental factors. Distinguishing between a boom and a bubble – characterized by the latter's inherent tendency to burst – is virtually impossible. Other approaches (e.g., that used by Cecchetti, 2005: "Bubbles – by what I mean booms followed by crashes…") thus incorporate an abrupt correction of the bubble (boom-bust scenario) in the definition. As they only provide ex post evidence, such definitions contribute nothing to the early recognition of price bubbles and also fail to provide an explanation of bubbles' origins.

Fundamental Perspective

According to the fundamental perspective, a price bubble exists when observed market prices deviate from values justified by underlying fundamental factors, which include all of the supply-side and demand-side factors that influence real estate prices, such as demographic factors (population growth and household size), the prevailing level of prosperity, institutional factors (taxes, housing construction subsidies, financial sector development), the availability of land, consumer preferences (higher residential standards), expected income (from rentals), interest rates and various other elements. The empirical literature strives to estimate the fundamentally justified price in order to identify an emerging price bubble.

Behavior-Based Perspective

Behavior-based approaches to explaining real estate bubbles focus on the mood and behavior of the players in the property market. Relevant factors such as speculation, excessively high expectations and irrational exuberance are used to assess the behavior of market buyers. In speculative buying, expected appreciation takes precedence over rental income. Such properties are often purchased as investment properties rather than for use as a domicile by the owner. While investors may already know that the price is too high, they are still looking to sell the property at the right time and for a profit (the "greater fool" theory). Where overblown expectations are involved, investors believe that the previously observed price increase will persist in the future (the "sure thing" mentality), which means that they ignore risks that are hiding in plain sight. A concept related closely to the sure thing mentality is "irrational exuberance," a term coined by Alan Greenspan in 1996, which describes a mood of exaggerated optimism on the asset markets.

In addition to chart-based aspects, the definition offered by Kindleberger (1987) includes elements that incorporate market players' behavior.

"A bubble may be defined loosely as a sharp rise in price of an asset or a range of assets in a continuous process, with the initial rise generating expectations of further rises and attracting new buyers – generally speculators interested in profits from trading rather than in its use or earning capacity. The rise is then followed by a reversal of expectations and a sharp decline in price, often resulting in severe financial crisis – in short, the bubble bursts."

Stiglitz (1990) provided one of the most commonly used definitions for a price bubble, which includes both behavior-based and fundamental aspects. According to Stiglitz, a bubble exists when the level of prices has been bid up by expectations of future increases beyond what is consistent with underlying fundamentals: "The basic intuition is straightforward: if the reason that the price is high today is only because investors believe that the selling price will be high tomorrow – when 'fundamental' factors do not seem to justify such a price – then a bubble exists."

market is considered to be in a state of equilibrium when the ongoing costs of home ownership match rental costs. A specific branch of the literature attempts to identify fundamental prices by using a broad range of *econometric approaches* (Gurkaynak, 2005; Berlemann et al., 2012), which include estimation methods such as modified cointegration tests (Campbell and Shiller, 1987), quantile regressions (Gerdesmeier et al., 2012), Markov switching models (Schaller and van Norden, 2002) and state-space models (Kizys and Pierdzioch, 2009). The Deutsche Bundesbank (2013) estimates fundamental residential property prices for Germany by using panel regression analysis. Structural time series models are another method for estimating fundamental data. Gattini and Hiebert (2010) apply a vector error correction model to estimate fundamental property prices for the euro area, an approach that also facilitates forecasting and the identification of structural shocks.

All of the techniques used to estimate fundamental prices are subject to substantial uncertainty. When a number of different indicators coincidentally signal overvaluation, however, the conclusion is more reliable. The *multiple indicator approach,* which uses a number of indicators to capture both supply-side and demand-side factors, is therefore quite promising, since the individual indicators are weighted and aggregated. In Switzerland, for example, UBS (2012) has been calculating the "UBS Swiss Real Estate Bubble Index" since 2011 in an effort to identify imbalances and risks in the Swiss residential property market. The UBS index consists of six subindicators that track the following ratios: purchase prices to rental prices, house prices to household income, house prices to inflation, mortgage debt to income, construction activity to gross domestic product (GDP) and loan applications for rental properties to total loan applications of UBS retail clients.

3 A Fundamental Residential Property Price Indicator for Vienna and Austria

This section presents a fundamental residential property price indicator for Vienna and Austria calculated on the basis of seven subindicators that address a variety of perspectives. The *household perspective* is based on two indicators that represent different affordability aspects of home ownership. The *investor perspective* comprises two indicators that reflect the profitability of real estate investments. The three indicators that capture the *system perspective* attempt to map interrelationships between the property market, macroeconomics and financial stability.

3.1 Household Perspective

Real Residential Property Prices

Long-term studies using international data have found that real property prices (corrected for consumer price inflation) are stationary in the long run. Here, the length of the observation period is crucial, and in this context, "long term" implies centuries, since there may even be periods of several decades during which real property prices are nonstationary. Therefore, a marked hike in real prices may be an indicator of overheating, while the predictive power for short-term corrections is low. In Vienna, real residential property price levels doubled between 1987 and 1992, and subsequently dropped by one-fourth from 1992 to 2004. Since then, they have gone up by 63% (as at mid-2013). Austria overall experienced a similar

trend until 2004, but since then saw a less pronounced rise in real price levels (+29%).

Affordability

The level of disposable household income is a key determinant of a household's purchasing power. When it comes to purchases of big-ticket items such as real estate, however, the level of interest rates also plays a crucial role, since it determines the maximum affordable mortgage payment based on a given household income. To account for both income level and interest rates, a "hypothetical borrowing volume" is defined, assuming that a household will have a fixed percentage of its income $(c*Y_t)$ available for mortgage payments. At a given interest rate R_t and a given term (repayment period) T, the maximum borrowing volume is K. R_t is defined as the gross interest rate, which corresponds to 1 plus the mean nominal interest rate on mortgage loans. The repayment period was set at $T=20$ years. Based on these values, the amount of the hypothetical borrowing volume can be calculated according to the following formula:

$$K = \frac{c * Y_t \left[\frac{1 - R_t^{T+1}}{1 - R_t} \right]}{R_t^T} \qquad (1)$$

Affordability is defined as the ratio of hypothetical borrowing volume to property prices. That ratio reflects the affordability of properties more accurately than analyses based on household income alone, such as are often found in empirical studies. The inverted loan-bearing capacity is included in the composite indicator.

In the early 1990s, Germany's post-reunification economic boom prompted the Deutsche Bundesbank to raise interest rates substantially. As a result, interest rates reached record highs in Austria as well. Combined with soaring property prices in Vienna during the early 1990s, affordability dropped to an all-time low. A subsequent reduction in interest rates steadily improved affordability until 2005. Affordability started to decline again when prices were hiked sharply during the past several years. In the rest of Austria, however, affordability remained stable at the 2005 level.

3.2 Investor Perspective

Price-to-Rent Ratio

The price-to-rent ratio constitutes a fundamental parameter in the real estate market and represents the relative cost of home ownership versus renting. 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. The data series used refers only to new rentals of condominiums. It does not cover new rentals of traditional Viennese housing association apartments and municipal or cooperative apartments, nor does it address rental price trends under existing leases. In Vienna, residential property prices rose at a substantially faster pace than average rental rates, leading to an upward trend in Vienna's price-to-rent ratio, while the rest of Austria saw a much less pronounced jump in prices and thus experienced a stagnating trend during the same period.

Residential Property Prices to Construction Costs

Construction costs are an important supply-side cost factor, an element that contributes to explaining the development of residential property prices in the long term. The association between construction costs and property prices

is measured by Tobin's *q*, a company performance indicator calculated by dividing the market value of a company by its replacement cost. If the resulting coefficient is greater than 1, a company's stock is considered overvalued. Applied to properties, the cost factor is calculated as the property price divided by the construction costs. Since property prices and construction costs are available only in index form, the extent of overvaluation or undervaluation cannot be stated with absolute certainty; rather, only the change may be interpreted. An inherent limitation in this concept is that it fails to consider land prices, a decisive factor in urban agglomerations. In Austria, construction costs grow at a higher rate than the harmonized index of consumer prices (HICP). Between 2000 and mid-2013, they went up 45% compared to an HICP increase of only 30%. During the same period, property prices spiked by 96% in Vienna and rose to a somewhat lesser extent (56%) in Austria overall.

3.3 System Perspective

Loan-Bearing Capacity

This indicator measures households' ability to repay home loans by relating the hypothetical borrowing volume to the aggregate amount of home loans actually granted to them by Austrian banks. An increase in this indicator implies that higher income or lower interest rates place households in a better position to meet the repayment obligations for their outstanding loans, thereby reducing banks' exposure to systemic risk. The inverted loan-bearing capacity is included in the composite indicator.

Between 1999 and 2008, this indicator doubled, i.e., the volume of loans granted to households grew twice as much as their loan-servicing capacity,[2] but subsequently dropped sharply after the onset of the economic and financial crisis and the resultant interest rate cuts. New borrowing decreased in proportion to loan-servicing capacity.

Housing Investment-to-GDP Ratio

The ratio of housing investment to GDP, the housing construction rate in short, represents the supply side. A building sector that accounts for a disproportionately high percentage of GDP implies a state of overheating, which can be interpreted as a sign of a housing bubble. Conversely, rising property prices stimulate construction, which should dampen price spikes in the medium term. Nationwide, the housing construction rate peaked out in the mid-1990s and has been declining ever since. In Vienna, that trend is even more pronounced than in the rest of Austria.

Interest Rate Risk

The role interest rates play in the evaluation of bubbles is unclear. Interest rates are a fundamental factor in real estate markets: Low interest rate levels drive improved housing affordability and thus appear to fundamentally justify higher property prices.[3] From the

[2] *The growth in home loans observed since the late 1990s has probably been pushed upward artificially by the strong rise in foreign currency loans during that period. Since foreign currency loans are generally bullet loans, the borrower is responsible only for making the current interest payments, and invests the funds required for the bullet payment in a repayment vehicle. As a result, the outstanding (gross) loan volume (excluding the amount accumulated in the repayment vehicle) remains constant throughout the term of the loan, while normal euro loans are repaid on an ongoing basis and thus reduce the loan volume throughout the entire loan term.*

[3] *According to Hott and Jokipii (2012), house prices in their sample of 14 OECD countries were driven up primarily by interest rates that were persistently too low (relative to their Taylor-implied rates).*

macroeconomic perspective, however, interest rates are an endogenous factor. Central banks set interest rates according to the prevailing macroeconomic environment, a practice that prompts concern about whether current interest rates actually suit the macroeconomic environment. If they are too low, there is an additional risk of a subsequent interest rate rise, which leads to a slump in affordability wherever variable-interest loans (the most common type in Austria) are involved.

The question of whether interest rates are suited to the macroeconomic environment can be answered by using the "Taylor rule," which provides a simple description of a central bank's behavior: The appropriate interest rate depends on the equilibrium real interest rate $\bar{r}_t$, the target inflation rate $\bar{\pi}$, the output gap $\hat{Y}_t$ (percentage deviation of actual output from potential output) and the gap between the actual inflation rate π_t and the target inflation rate (equation (2)).

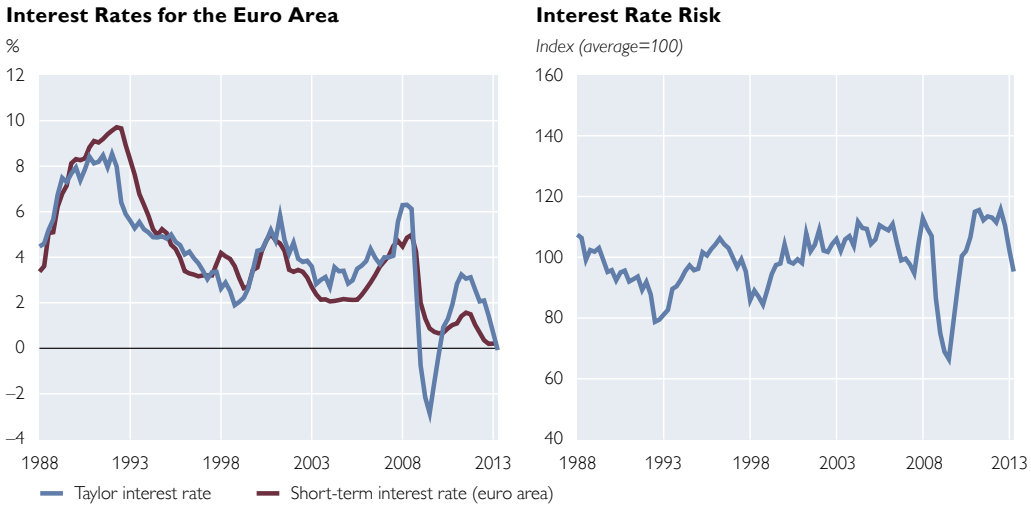
$$R_t^T = \bar{r}_t + \bar{\pi} + \alpha_1 * \hat{Y}_t + \alpha_2 * (\pi_t - \bar{\pi}) \quad (2)$$

The Taylor rule estimation was based on euro area data, with trend growth in the euro area serving as a proxy for the equilibrium real rate.[4] The target inflation rate was set at 1.9%, and the adjustment coefficients selected were 0.5 (α_1) and 1.5 (α_2).

Although short-term interest rates dipped as much as 1.8 percentage points below the levels implied by the Taylor rule in the past three years, that gap closed again in the second quarter of 2013 due to declining inflation and the continued widening of the negative output gap (chart 3, left-hand panel). To ensure comparability with other subindicators, a hypothetical borrowing volume (see above) is calculated at different interest rates (i.e., the three-

Chart 3

Euro Area Interest Rates and Interest Rate Risk

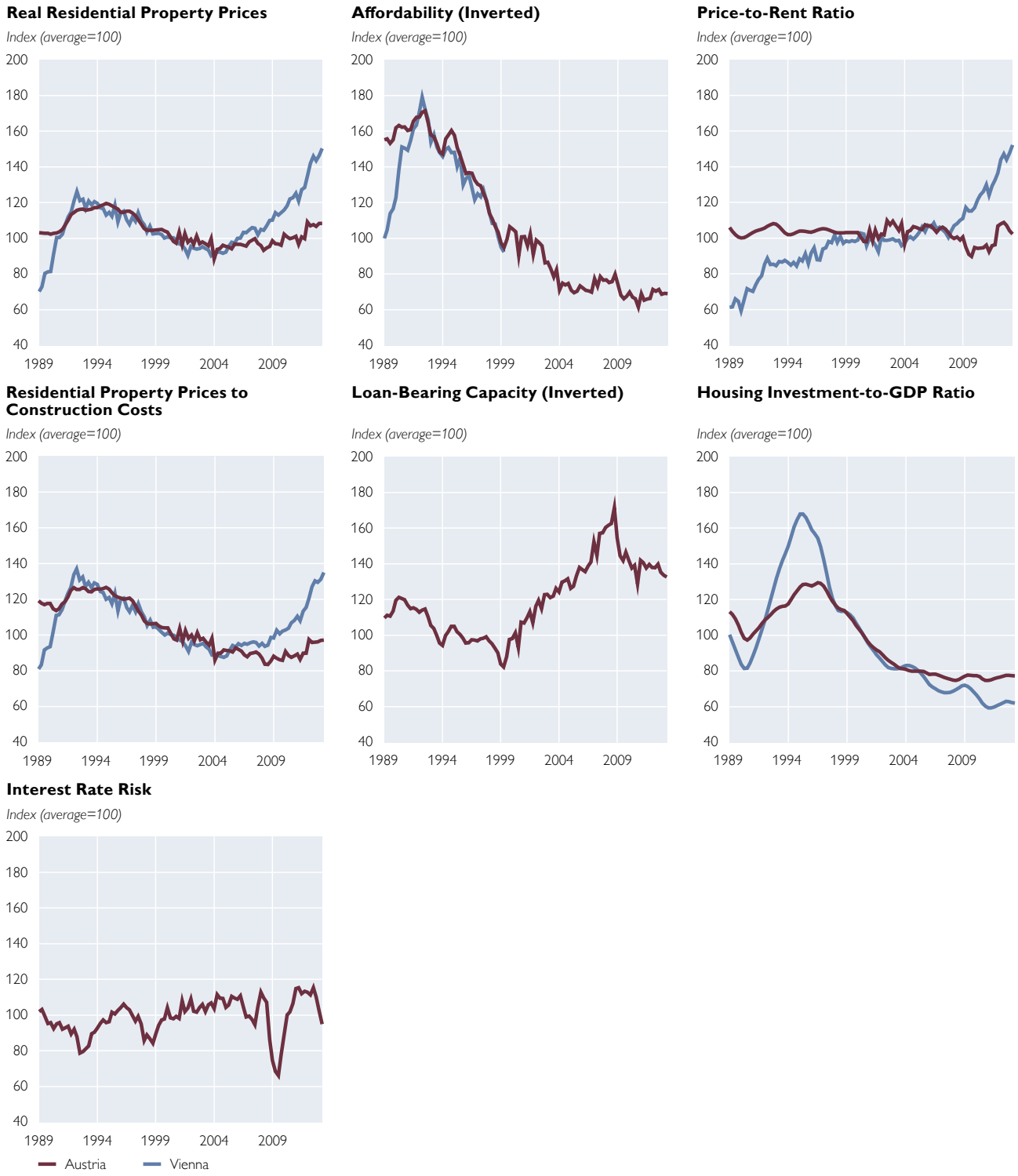


Source: ECB, author's calculations.

[4] *Trend growth was determined using an HP filter. Empirical studies routinely use multivariate Kalman filters and univariate filters to estimate equilibrium real rates (Orphanides and Williams, 2002; Laubach and Williams, 2003; Garnier and Wilhelmsen, 2005).*

Chart 4

Subindikators Comprising the Fundamental Residential Property Price Indicator for Vienna and Austria



Source: Author's calculations.

month interest rate and the Taylor interest rate). The subindicator represents the ratio of the two resulting hypothetical borrowing volumes (chart 3, right-hand panel).

Chart 4 depicts the subindicators comprising the fundamental residential property price indicator for Vienna and Austria. Because no proxy variables were available for regionalization, the value for Austria was applied to Vienna to facilitate calculation of loan-bearing capacity and interest rate risk.

Box 3

Indicator Construction

Based on the subindicators discussed in the foregoing sections, the fundamental residential property price indicator was calculated separately and in two steps for Vienna and Austria.

Trend adjustment: *The percentage of deviation from a historical average was calculated for each subindicator with mean values adopted for most indicators (real property prices, affordability, property prices versus construction costs, property prices versus rentals, interest rate risk). A linear trend was applied to the housing construction rate since – as with all other components of domestic demand – it shows a downward trend spurred by steadily increasing internationalization. To account for the assumed distortion caused by foreign currency bullet loans, a smooth HP trend (λ=7200) was used for the loan-bearing capacity. Affordability and loan-bearing capacity were inverted to enable comparability with the other subindicators (a positive value indicates overvaluation).*

Aggregation: *The seven subindicators for Vienna and Austria overall were aggregated into the respective overall indicator. The required weighting factors were determined by applying a principal components analysis.[1] Each of the seven subindicators was expressed through a linear combination of factors:*

$$x_{i,t} = a_{i1}F_{1,t} + a_{i2}F_{2,t} + \ldots a_{ij}F_{j,t} + \varepsilon_i,$$

where $F_{j,t}$ represents factor j and $\alpha_{i,j}$ represents the factor loading of variable i on factor j. The number of factors used was selected to permit explanation of the highest possible fraction of variance in the dataset using the smallest possible number of factors. In the case at hand, three factors explain 86% of the dataset variance for Vienna and 90% for Austria. The indicator is determined by calculating a weighted sum of the subindicators

$$I_t = \sum_i^I v_i x_i .$$

The weights for variable v_i were calculated by multiplying the squared factor loading of variables i on factor j

$$v_i = a_{ij}^2 \varphi_j$$

with the explained fraction of dataset variance by factor j

Subindicator Weights

Indicator	Vienna	Austria
Real residential property prices	0.1454	0.1834
Affordability (inverted)	0.1999	0.1051
Price-to-rent ratio	0.1216	0.1616
Residential property prices to building costs	0.2126	0.1935
Loan-bearing capacity (inverted)	0.1762	0.1326
Housing investment-to-GDP ratio	0.0825	0.0991
Interest rate risk	0.0618	0.1246

Source: Author's calculations.

[1] *This approach is used to construct leading indicators (Bierbaumer-Polly, 2010; OECD, 2008) in which the cyclical co-movement is derived from a series of individual indicators.*

$$\left(\varphi_j = \sigma_j^2 / \sum_{j=1}^{J} \sigma_j^2\right),$$

where factor j represents the factor on which variable i has the highest loading

$$\left(j = \arg\max\left(abs(a_{ij}^2)\right)\right).$$

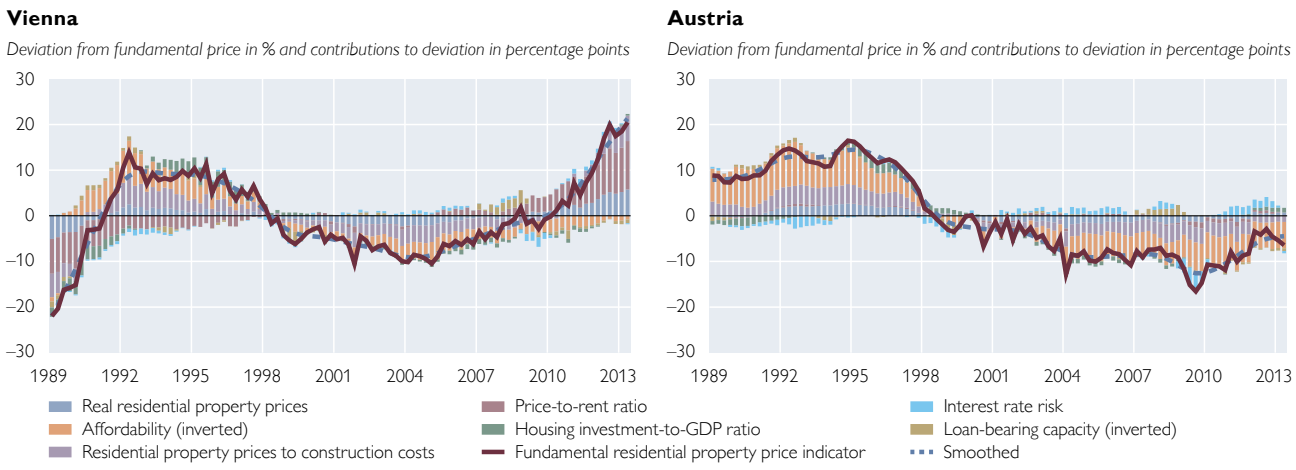
The sum of the weights for all variables was normalized to 1.

Chart 5 shows the fundamental real property price indicator for Vienna and Austria and the contributions made by each of the subindicators. For Vienna, the indicator reflects a pattern of increasing overvaluation, which currently (second quarter of 2013) stands at 20%. That conclusion coincides with recent findings by the Deutsche Bundesbank (2013), which identified overvaluations of 5% to 10% in urban housing markets and up to 20% in attractive major cities. The sharp gains seen recently have been driven primarily by the relative prices of property (in proportion to rentals, HICP and construction costs). Unlike during the phase of soaring prices in the early 1990s, affordability is not contributing to an increase in the indicator. The steady drop in interest rates observed since the early 1990s improved affordability until 2004, before it took another decline in Vienna and subsequently returned to its present historical average. No significant contribution to the overall indicator comes from the loan-bearing capacity, housing construction rate and interest rate risk.

Conditions in *Austria* differ markedly from those in Vienna. Specifically, real property prices fell continuously for more than a decade after peaking in the mid-1990s, and marked spikes were only noted in early 2012. As a result, the fundamental property price

Chart 5

Contribution of the Subindicators to the Fundamental Residential Property Price Indicator for Vienna and Austria



Source: OeNB.

indicator shows a persistent undervaluation (–6% in the second quarter of 2013) despite the recent uptick in prices.

3.4 Interpretation of the Findings

The indicator presented in this paper is intended to provide a broad guide to the extent of overvaluation or undervaluation and the current housing price momentum. The actual numerical results should not be overstated because an indicator of that type is naturally subject to a number of limitations. The fundamentally justified price for a given period is derived by comparing the values of the subindicators for the relevant period with the historic average values posted throughout the observation period. The level of the variables (e.g., international comparison of the property price level) is not factored into the analysis. For some important determinants (e.g., foreign capital inflows), no data are available at all, or the time series are not sufficiently long for a definite conclusion.

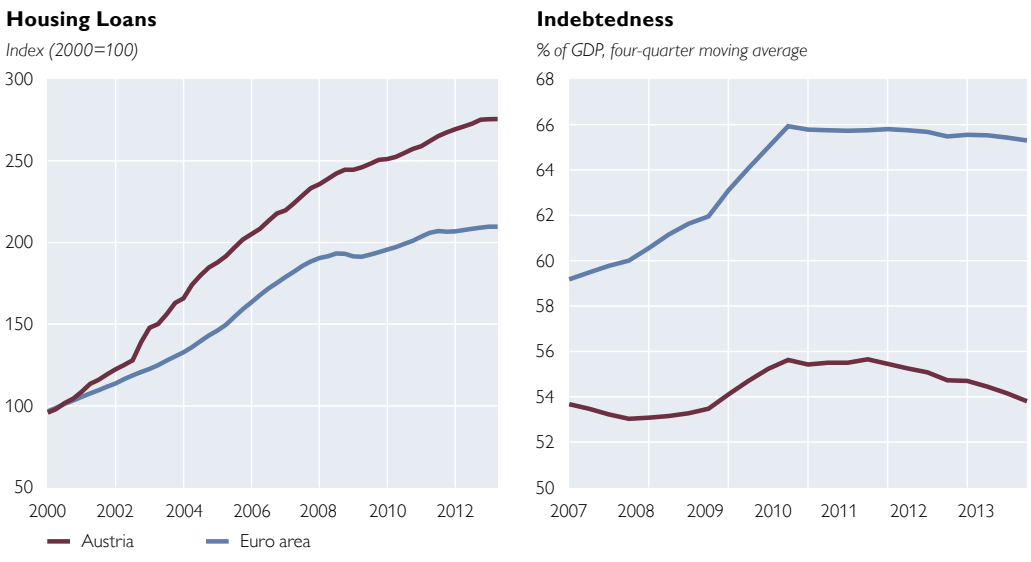
4 Forms of Financing and Implications for Financial Stability

An abrupt decline in property prices poses a threat to financial stability. The degree of danger involved depends largely on the extent of debt financing obtained for real estate purchases. With a 176% increase in the volume of housing loans granted to households since 2000, Austria has clearly outpaced the euro area average of +110%. However, the statistically measured growth in housing loans may be upward biased (see footnote 2). In Austria, household sector indebtedness relative to GDP is not only significantly lower than in the euro area, but also exhibits a downward trend.

Due to the financial and economic crisis, demand for low-risk investment options has increased, which prompted greater capital investments in the property market. In Austria, such investments appear to have concentrated primarily on Vienna. Anecdotal evidence also suggests that a large part of prop-

Chart 6

Housing Finance and Indebtedness of the Household Sector



Source: Eurostat.

erty acquisitions were equity financed. In light of these observations, the danger to financial stability is estimated to be low.

5 Summary and Conclusions

This paper presents a fundamental residential property price indicator for Vienna and Austria, which examines deviations between actual prices and their fundamental values. It is based on seven subindicators that address a variety of perspectives (household perspective, investor perspective, system perspective). Although the indicator suggests an increasing overvaluation for Vienna, that result does not necessarily imply that an abrupt price correction will occur in the near future. Rather, such imbalances may subside gradually, as happened in the wake of the price hikes experienced in the early 1990s. Ultimately, the question of whether a real estate bubble exists in Vienna cannot be answered conclusively. As a whole, Austria still exhibits a tendency toward undervaluation despite the upward trend observed recently in residential property prices.

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Annex 1

Table A1

Residential Property Prices and Rents

	Q2 13	2001	2002	2003	2004	2005	2006	2007
	Index 2000=100	*Change on previous year in %*						
Price indices Vienna University of Technology								
Austria								
Residential property prices	156.0	+0.8	+0.6	+0.3	–1.9	+5.0	+4.1	+4.7
Prices for single-family houses	×	×	×	×	×	×	–2.2	+5.4
Prices for condominiums	×	×	×	×	×	×	×	×
Rents (CPI)	147.8	+2.8	+1.7	+4.4	+3.5	+3.4	+2.3	+2.0
Austria without Vienna								
Residential property prices	141.2	+2.4	+0.2	+0.4	–2.8	+4.5	+2.7	+4.5
Prices for single-family houses	122.6	–2.6	+1.4	+0.1	–2.5	+2.7	+0.5	+10.1
Prices for buildung lots	×	×	×	×	×	×	×	+1.7
Prices for condominiums	149.2	+4.5	–0.3	+0.5	–2.9	+5.3	+3.5	+2.4
Prices for new condominiums	130.1	+6.1	–4.1	+0.2	–0.8	+3.0	+4.1	+7.0
Prices for old condominiums	152.0	+4.3	+0.2	+0.5	–3.2	+5.6	+3.5	+1.7
Rents for single-family houses	99.4	+0.9	–6.6	+3.5	+2.8	–5.4	+6.6	+7.4
Rents for apartmemts	157.7	+9.6	–8.0	+4.4	–0.0	+2.1	+4.1	+3.6
Vienna								
Residential property prices	196.0	–3.4	+1.8	–0.0	+0.5	+6.2	+8.0	+5.1
Prices for single-family houses	174.9	–2.4	+5.0	–0.3	–0.3	+6.7	+1.7	+13.8
Prices for buildung lots	181.5	–0.6	+7.0	+3.3	+2.5	+0.7	–3.2	+15.9
Prices for condominiums	197.5	–3.5	+1.6	+0.0	+0.5	+6.2	+8.5	+4.5
Prices for new condominiums	160.4	–0.4	+4.3	–0.0	–5.4	+4.7	+12.2	–1.1
Prices for old condominiums	203.8	–4.0	+1.1	+0.0	+1.6	+6.4	+7.9	+5.4
Rents	128.7	–0.2	–0.8	+1.2	–0.6	+1.8	+4.9	+8.2
Rents for single-family houses	108.6	+3.5	–1.4	–1.7	+1.0	+2.0	+3.5	+15.7
Rents for condominiums (market)	131.4	–1.6	–0.9	+0.2	–0.3	+2.1	+5.4	+8.0
Rents for condominiums (administered rents)	126.9	–2.2	–0.6	+3.3	–0.4	+0.9	+5.1	+8.3
Rents for offices	120.3	+0.0	+2.0	+1.6	–2.4	–0.6	+0.7	+2.7
Other price indices for Austria								
Residential property prices ECB	156.0	+0.8	+0.6	+0.3	–1.9	+5.0	+4.1	+4.7
Residential property prices Statistics Austria	×	×	×	×	×	×	×	×

Source: OeNB, Vienna University of Technology, Statistics Austria.

Tabelle A1 continued

Residential Property Prices and Rents

	2008	2009	2010	2011	2012	Q3 12	Q4 12	Q1 13	Q2 13
	Change on previous year in %								
Price indices Vienna University of Technology									
Austria									
Residential property prices	+1.1	+3.9	+6.2	+4.2	+12.4	+11.9	+11.5	+4.9	+5.0
Prices for single-family houses	–0.7	+0.8	+2.5	+2.7	+4.9	+4.4	+8.0	+4.5	+7.6
Prices for condominiums	+4.3	+2.7	+6.2	+7.9	+9.5	+11.0	+10.7	+9.7	+9.0
Rents (CPI)	+1.3	+4.7	+3.4	+3.3	+4.4	+4.2	+4.1	+4.1	+2.9
Austria without Vienna									
Residential property prices	–0.6	+2.9	+5.5	+2.3	+10.8	+9.3	+9.9	+1.9	+3.4
Prices for single-family houses	–2.7	+1.6	+7.5	–3.4	+8.7	+3.3	+18.3	+0.2	+2.0
Prices for buildung lots	–1.8	+6.5	–5.4	+6.2	+9.3	+7.3	+18.3	+8.9	+8.8
Prices for condominiums	+0.3	+3.4	+4.7	+4.6	+11.6	+11.6	+7.0	+2.5	+3.9
Prices for new condominiums	+3.5	+0.6	+3.8	–3.5	+2.2	+2.5	+9.0	+8.1	+5.8
Prices for old condominiums	–0.2	+3.8	+4.9	+5.9	+12.9	+12.8	+6.8	+1.8	+3.7
Rents for single-family houses	+4.0	–10.1	+0.3	–4.6	–2.5	–5.5	+3.3	+3.2	+6.0
Rents for apartmemts	+5.9	+17.9	+0.8	+1.6	–2.8	–0.8	+7.7	+26.0	+14.2
Vienna									
Residential property prices	+5.3	+6.4	+7.8	+8.5	+15.7	+17.5	+14.9	+11.4	+8.3
Prices for single-family houses	+12.9	+3.9	+10.5	+1.4	+3.5	+1.7	–1.4	+10.1	–1.0
Prices for buildung lots	+4.8	+9.8	–4.3	+14.4	+22.5	+22.7	+5.5	–10.5	–5.7
Prices for condominiums	+4.7	+6.6	+7.6	+9.1	+16.7	+18.8	+16.2	+11.4	+8.9
Prices for new condominiums	+9.3	–0.3	+5.9	+9.8	+7.0	+9.0	+5.3	+9.0	+6.8
Prices for old condominiums	+3.9	+7.7	+7.8	+9.0	+18.2	+20.3	+17.9	+11.8	+9.2
Rents	+1.7	–0.4	+1.1	+2.8	+4.4	+3.1	+5.9	+2.9	+2.5
Rents for single-family houses	+7.5	–2.2	+2.2	–8.1	–4.1	–10.1	–3.7	–10.8	–13.3
Rents for condominiums (market)	+2.6	–0.1	–0.3	+3.7	+6.3	+5.5	+6.8	+2.4	+3.1
Rents for condominiums (administered rents)	+1.6	–0.5	+2.1	+2.2	+3.2	+1.6	+5.3	+3.2	+2.0
Rents for offices	+4.0	–1.8	–5.9	+9.4	+9.6	+3.1	+0.7	–2.8	–0.9
Other price indices for Austria									
Residential property prices ECB	+1.1	+3.9	+6.2	+4.2	+12.4	+11.9	+11.5	+4.9	+5.0
Residential property prices Statistics Austria	x	x	+0.6	–4.7	x	x	x	x	x

Source: OeNB, Vienna University of Technology, Statistics Austria.

Annex 2

Data Sources and Regionalization of Data for Vienna

The most challenging obstacle to constructing the indicator was the lack of available data. Since some of the variables used were not available for the entire period (Q1 1989 to the present), they were extrapolated by means of other time series. It was also necessary to regionalize some of the indicators for Vienna based on various proxy variables. Data that were only available as annual figures (e.g., historical lending series) were interpolated to a quarterly basis using a cubic spline.

Table A2

Data Sources and Proxies Used for Regionalization and Extrapolation of Times Series

Variable	Data source – Austria	Data source – Vienna/proxy for regionalization
Property prices	1989–2000: Austrian Federal Economic Chamber From 2000: Vienna University of Technology	Vienna University of Technology
Rents	1989–2000: Austrian Federal Economic Chamber From 2000: Vienna University of Technology, own aggregation	Vienna University of Technology
Harmonised index of consumer prices	Statistics Austria	–
Construction input prices index	Statistics Austria	–
Disposable income of households	Quarterly National Accounts (WIFO)	1989–1994: Trend-based extrapolation of share 1995–2010 1995–2010: Regional SNA (WIFO) From 2011: Regional employment
Housing investment	Quarterly National Accounts (WIFO)	Building permits
Gross domestic product	Quarterly National Accounts (WIFO)	1989–1994: Trend-based extrapolation of share 1995–2010 1995–2010: Regional SNA (WIFO) From 2011: Regional employment
Home loans	1989–1994: Mortgage and public-sector loans (OeNB) 1995–2002: Loans for home purchase and improvement (OeNB) From 1999: Loans for housing development and improvement (ECB monetary statistics)	–
Home loan interest rates	1988–2002: Return on 10-year Austrian government bonds From 2003: Weighted average of customer interest rates for each range of maturities	–

Variable	Euro Area Data Source
Gross domestic product	Eurostat
Harmonized index of consumer prices	Eurostat
Three-month interest rate	ECB

Source: Author's compilation.