

An Assessment of Current House Price Developments in Germany¹

Florian Kajuth²

Thomas A. Knetsch²

Nicolas Pinkwart²

Deutsche Bundesbank

1 Introduction

House prices in Germany did not experience a noticeable boom before the economic and financial crisis nor did they fall dramatically in the wake of it. Rather, with the onset of the recovery in 2010 residential property prices started to increase. According to available house price indicators (chart 1) urban agglomerations in Germany saw rather strong price increases over recent years, while the whole country average indicates relatively moderate house price rises. Against this background it is of interest to investigate whether the recent house price increases are signals of an incipient overheating of the German housing market, in particular in large urban areas.

Standard valuation measures based on aggregate time series, such as real house prices, the price-rent ratio or the price-income ratio, usually take the long-run mean as a reference value. Due to extended cycles on housing markets empirical averages are relatively sensitive to the length of the sample. The longest house price series for Germany goes back to 1975. It covers apartments in the largest cities in Western Germany and can neither be taken as representative for Germany as a whole, nor for other market segments. A broader measure is available from 1991 and refers to single-family houses and apartments in 125 German cities.³ The relatively short samples limit the reliability of the time-series mean as a reference value. In particu-

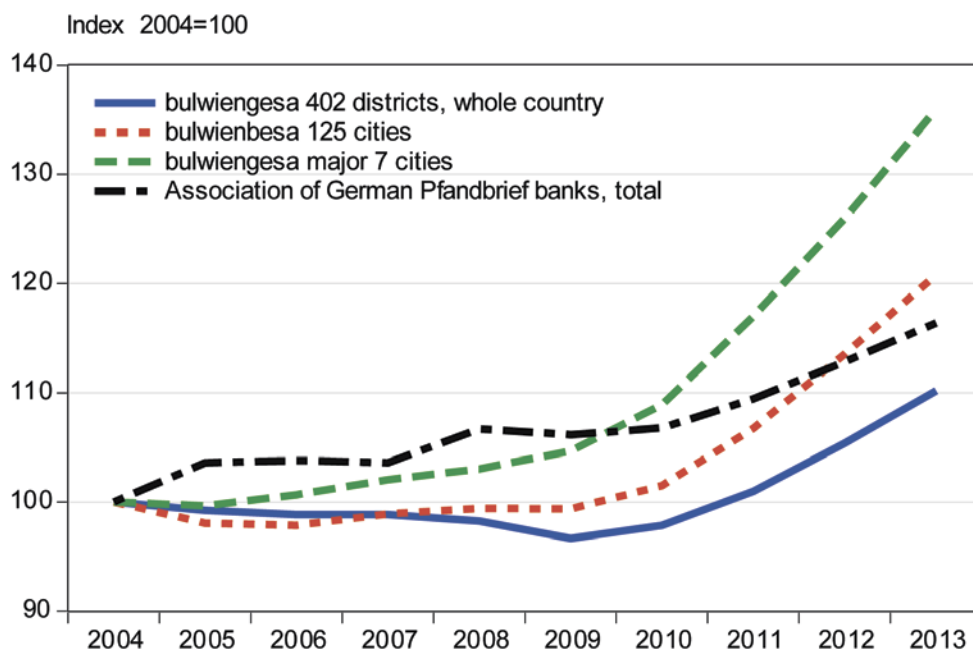
¹ Based on an updated and revised version of Kajuth, Knetsch and Pinkwart (2013). The views expressed represent the authors' personal opinions and not necessarily those of the Deutsche Bundesbank or its staff.

² Economics Department, Macroeconomic Analysis and Projections Division.

³ Data representative for the whole of Germany is available only from 2004. In the sample period before 1991, only large cities in Western Germany are covered.

lar, the protracted period of decline of real residential property prices since the mid-1990s casts doubt on the view that house prices only recently completed a full cycle since the beginning of the 1990s.⁴

Chart 1: Nominal House Price Indicators for Germany



Source: Bundesbank calculations based on data provided by bulwiengesa; Association of German Pfandbrief Banks.

As an alternative to pure time-series approaches we draw on the information from a panel dataset with a high degree of cross-sectional variation, which helps to overcome some limitations of time series data, to estimate an equilibrium house price equation.

For an assessment of recent house price developments in Germany, we take as a reference value the fundamental house price, which is determined by fundamental socioeconomic factors and macroeconomic variables at levels free of unsustainable elements. Deviations of actual house prices from their fundamental level thus consist not only of unexplained parts but also of transitory and one-time factors.

⁴ The price-rent and price-income ratios exhibit a similar pattern. For a detailed discussion of the standard measures applied to the evaluation of house prices in Germany, and their limitations, see Deutsche Bundesbank (2013).

2 Empirical Model

2.1 Panel Model Specification

The panel dataset covers house prices (in euro) for existing apartments and existing single-family houses provided by a private property valuation firm, bulwiengesa, in all 402 administrative districts of Germany at annual frequency for the years 2004 to 2013, and for a subset of 93 towns and cities for the years 1996 to 2013. The unique feature of the dataset is that it contains prices in euros, which allows comparing the level of house prices across regions.

The empirical specification of house prices in our paper is derived from a theoretical stock-flow model, which accounts for the interaction of house prices with residential investment and allows for sluggish stock and price adjustments (DiPasquale and Wheaton, 1992; McCarthy and Peach, 2002; Steiner, 2010).

Real house prices per square metre are modelled to depend on the number of housing units per resident, real disposable income per capita, the population aged between 30 and 55 as a ratio of total population, the population density, the unemployment rate (in % of population), the mortgage interest rate and growth expectations of aggregate real GDP per capita.

2.2 Estimation Results

To make use of the cross-section information in a panel model while accounting for potential endogeneity of some regressors we use an instrumental variables estimator based on a random-effects setup, which allows to address the correlation of some of the explanatory variables with the unobserved district-specific effect (Hausman and Taylor, 1981).

Our results, based on separate equations for apartments and single-family houses, show significant effects of the explanatory variables that are in line with economic intuition. For a given level of demand, the house price level is lower in districts with a higher supply of housing in form of the housing stock at the beginning of the period. A higher disposable income per capita, a larger share of middle-aged population, more densely populated areas and more favourable growth expectations put pressure on house prices, while higher mortgage rates are associated with lower house prices. However, the effect of the unemployment rate cannot be determined with sufficient statistical precision in the estimation.

3 Assessing Aggregate House Prices

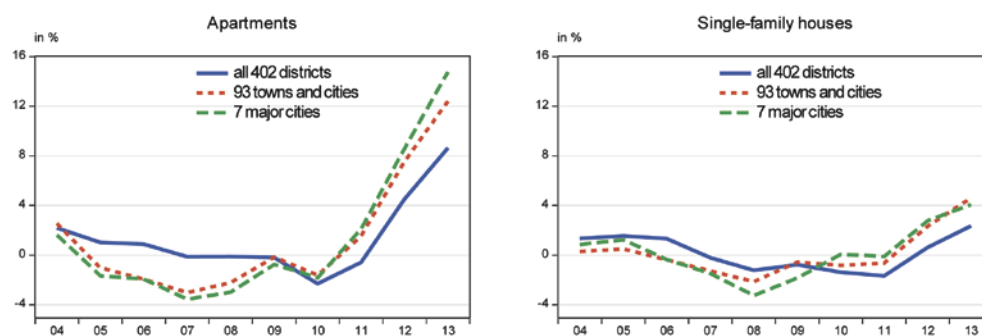
Our approach is designed to assess house prices for the whole country or other sub-aggregates such as urban areas or large cities. This is particularly relevant since house price developments have recently differed substantially across regions.

The panel estimates can be used to assess residential property prices at aggregate levels. Under the condition that the explanatory variables exclusively reflect permanent movements, the fitted values for house prices at district level can be taken as a measure for the fundamental house price at district level.⁵ Assuming that the estimated equation on the district level represents the true underlying relationship with parameters valid for all regional entities, a model for the fundamental prices of houses at different levels of aggregation can be constructed.

In order to gauge the degree of over- or undervaluation in German house prices at different aggregation levels, the deviation of actual house prices from their estimated fundamental price is computed for different regional sub-aggregates using population weights.

Based on the variance of the district-specific estimation errors we can also provide approximate confidence intervals for the estimated aggregate residual, which also allows for spatial correlation among the residuals.

Chart 2: Residential Property Price Misalignments



Source: Authors' calculations.

Note: Deviations of residential property prices in % of estimated fundamental value conditional on an unchanged mortgage rate from 2009 onwards.

The results suggest that, currently, apartment prices significantly exceed their fundamental levels (chart 2). Their deviation is largest in the group of major cities and smaller for a whole-country average. A similar pattern holds for single-family houses with the size of house price misalignments being generally smaller than for apartments and often not significant. For Germany as a whole, apartment prices show a moderate overvaluation, whereas single-family house prices appear to be approximately in line with the level suggested by the model.

⁵ In particular, this condition is critical for interest rates. See the discussion in section 4.

Available data on residential property prices and their determinants for 93 towns and cities from 1996 to 2013 allows the regression model to fit house prices with a view to a longer term average. This is important as the sample in our baseline model covers the period 2004 to 2013, which excludes the previous period of a protracted decline in real house prices. Results based on the extended estimation sample show house price misalignments at the sample end of a similar degree to those derived using the shorter sample.

The declining GDP growth expectations since the beginning of the last decade play an important role by accounting for some of the downward trend in real house prices. Since around 2006 GDP growth expectations have on average been more or less stable at a relatively low level. These additional results serve as a cross-check against the claim that, during the period 2004 to 2013, the housing market as a whole, was characterised by persistent undervaluation.

4 The Role of Interest Rates

The reference value, against which actual house price developments are compared, is defined as the level of house prices that is supported by economic fundamentals, which are free from unsustainable elements. It is debatable whether the currently unusually low mortgage rates on the German housing market should fully affect the fundamental house price. One could argue that the current low interest rate environment is to a large extent due to factors associated with the management of the financial and sovereign debt crisis. In the assessment of aggregate house prices, the transitory component of the interest rate changes since 2009 is taken as influencing actual but not fundamental house prices. We calculate the hypothetical level of house prices, had interest rates remained at their level from before 2010, on the basis of the estimated house price equation and conditional on the estimated coefficient on interest rates. In particular, we set the interest rate to its value in 2009 for the following years.

The effect of actual interest rates on the deviations of aggregate house prices from their fundamental value can be evaluated. Note that the interest rate effect is identical for all regional sub-aggregates because it is assumed that the mortgage rate does not vary across districts and that its coefficient is the same for all districts.

According to the results, the decline in interest rates since 2010 has stimulated apartment prices by approximately 5% up to 2013 compared to a scenario with unchanged interest rates. Prices of single-family houses are higher by around 0,75%.

The results also imply that the estimated overvaluations of residential property in Germany are partly attributable to the extraordinarily low interest rates. In particular, the overvaluation of apartments by 10% to 20% in urban regions appears to be due to the low level of mortgage rates by approximately 5 percentage points.

5 Conclusion

The main goal of the paper is to examine to what extent the recent price increases on the German housing market are attributable to developments in macroeconomic factors, or whether there is any significant misalignment. Based on a stock-flow model for the housing market we derive an equation for equilibrium house prices, which relates residential property prices to explanatory macroeconomic variables. To estimate the equation we make use of a regional panel dataset comprising price data for single-family houses and apartments in all 402 districts in Germany and district-specific explanatory variables.

District-specific regression residuals are interpreted as deviations of house prices from their fundamental levels. By aggregating the residuals across all districts we conclude that, for Germany as a whole, there are no signs of a significant or sizeable misalignment of single-family house prices. Apartment prices seem to be overvalued significantly at the sample end in 2013 on a whole-country average. In German cities, apartments appear to be markedly overvalued.

Our assessment of residential property prices is subject to an important caveat. Estimates based on a large regional dataset require the assumption that the sample mean of the price observations equals the true unconditional average of house prices. Given the substantive role played by growth expectations without cross-sectional variation, however, the assumption of zero (time-series) residual means cannot be evaluated without further information from outside the chosen framework. However, using an extended sample period for a subset of cities indicates that residential property prices were not sizeably and persistently undervalued before the recent upswing on the German housing market. Rather, the long decline in real residential property prices from the mid-1990s to around 2006 is associated with decline in the long-term growth expectations of real GDP per capita.

Finally, the results are conditional on the role interest rates play in the determination of fundamental house prices. To the extent that the exceptionally low interest rates are out of line with a fundamental equilibrium of the German housing market, they should not affect the fundamental price of residential property. Rather, results based on a scenario analysis show that the increasing misalignments in the recent years are partly due to the decline of interest rates to historically low levels.

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