

APPENDIX 2. ESTIMATING THE EQUILIBRIUM LEVEL FOR PRICES OF ESTONIAN REAL ESTATE

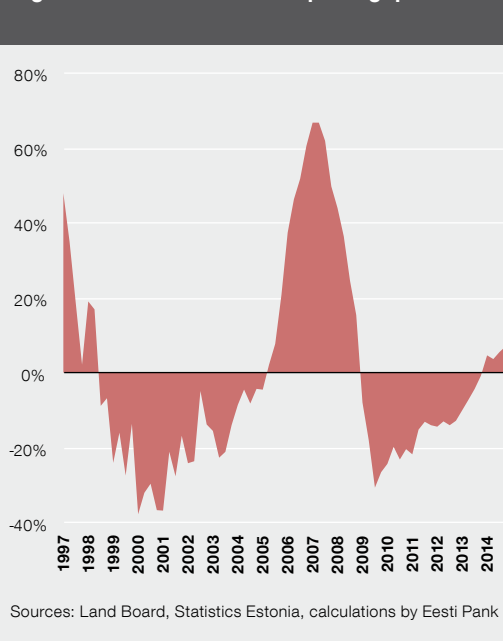
Rises in real estate prices should generally be in line with the long-term trends in the key economic indicators. Movements in real estate prices may depart from their equilibrium level for various reasons however, and this can lead to the risk of a bubble inflating. As the real estate and credit markets are closely linked, overvaluation of real estate could cause risks to build up in the financial system. This makes it important from the point of view of risks to financial stability to estimate the equilibrium level of real estate prices and how different it is to actual prices.

Assessing the real estate price gap

The deviations in real estate prices from their equilibrium value can be calculated in various ways. This analysis uses the method proposed by Harding and Pagan³⁴, which has been developed further by many other researchers³⁵ and by central banks. This approach divides the time-series of real estate prices into their trend and cyclical components³⁶ to calculate the real estate price gap. This gap is found as a ratio of actual real estate prices to their long-term average trend values.

The real estate market in Estonia has seen both overheating and a subsequent sharp fall in prices. Until 2005 real estate prices³⁷ were mainly below their long-term average level (see Figure A2.1), then in the next four years they rose to as much as 65% above that average. This

Figure A2.1. Relative house price gap



34 Harding, D., Pagan, A. (2002). Dissecting the Cycle: a Methodological Investigation. *Journal of Monetary Economics*, 49, 365–381.

35 For example Jaeger, A., Schuknecht, L. (2007). Boom-Bust Phases in Asset Prices and Fiscal Policy Behaviour. *Emerging Markets Finance and Trade*, 43 (6).

36 The decomposition of the time-series uses a one-sided Hodrick–Prescott filter with the smoothing parameter lambda set at 100,000.

37 To obtain a longer time-series for this analysis, real estate prices are composed from two indicators. Data from the third quarter of 2003 onwards are taken from the database of transactions of the Land Board and expressed as the average square metre price for transactions with apartments in Tallinn. As similar data are not available for before that date, data from Statistics Estonia are used. These extend back to 1997 and satisfactorily represent the average selling price for a square metre of residential space in Tallinn. As the difference between these indicators is very small for the time period covered, the composed time series can be considered reliable.

may have been caused by the transfer of the banks to foreign ownership, a favourable global liquidity climate, and inflows of capital related to accession to the European Union³⁸.

Prices fell during the financial crisis, but the negative peak of the gap at around -30% was smaller than the positive peak reached when the economy was growing fast. Prices have again been above their long-term average since the second half of 2013, but the size and duration of the gap do not yet indicate significant imbalance in the real estate market. Over or undervaluation of real estate prices can be identified by examination of other economic indicators as well.

It is hard to pin down the long-term trends of Estonian real estate prices and other indicators because the time series are generally relatively short and contain periods with different structures. This makes it difficult to find the equilibrium level for real estate prices using the standard model-based methods.

Estimating the balance in the real estate market from the price-to-rent ratio

Another way, and one of the most commonly used, of estimating the fundamental value of real estate and its possible over or undervaluation is the price-to-rent ratio. This compares the income from owning and from renting property. In a balanced market, the income from renting real estate should be the same as the current value of future income from owning that real estate³⁹. In this case economic agents should have equal preference for renting or buying property, and the ratio of real estate prices and rents should be close to one. If it is more than one, then potential purchasers would benefit more by renting, which should put downwards pressure on real estate prices. If the price-to-rent ratio remains above its average level for a long-time, it could indicate that real estate is overvalued and there is a risk of a bubble, because purchase prices are probably remaining higher than rent prices because of unrealistic expectations for continued price growth⁴⁰.

It is hard to say how far the ratio should deviate from its equilibrium level, and for how long, for real estate to be considered overvalued. The costs of ownership, such as property taxes, property maintenance expenses and depreciation, and changes in them, should also be considered. This means that other indicators should also be observed alongside the price-to-rent ratio.

38 See also the appendix Factors Affecting Rises in Prices for Estonian Real Estate and the Related Risks to [Financial Stability in Financial Stability Review 1/2014](#)

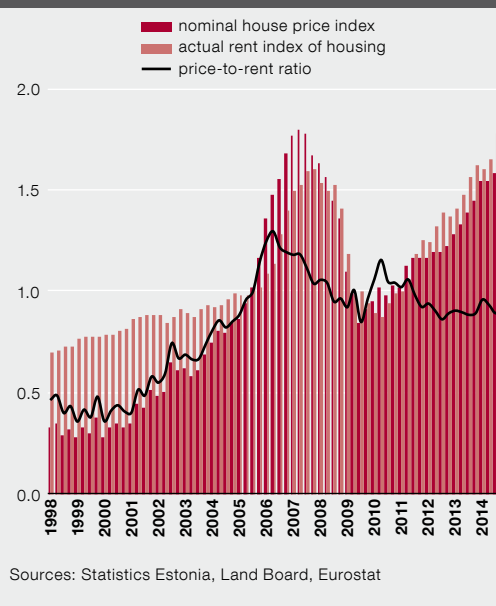
39 Krainer, J., Wei, C. (2004). House Prices and Fundamental Value. FRBSF Economic Letter, 27. Campbell, S.D., Davis, M. A., Gallin, J., Martin, R.F. (2009). What Moves Housing Markets: A Variance Decomposition of the Rent-Price Ratio. *Journal of Urban Economics*, 66.

40 Himmelberg, C., Mayer, C., Sinai, T. (2005). Assessing High House Prices: Bubbles, Fundamentals and Misperceptions. NBER Working Paper, 11643.

If the rises in Estonian real estate prices and rents over the past 15 years are put alongside each other, two distinct periods become apparent from changes in the price-to-rent ratio. The ratio climbed mainly in 2001–2006, but after that its average value barely changed (see Figure A2.2). Part of the rise in the ratio was probably due to the circumstances described above, such as capital inflows, that led to a structural shift.

The real estate price-to-rent ratio can be problematic for Estonia as the property ownership rate is particularly high, standing at 92% in 2012, and the rental market accounts for only a small share of property. This means that statistics on rents are not very reliable and do not necessarily give accurate results. Furthermore, the costs of changing ownership status, from renter to owner or the other way, are relatively high, and so the change is not often made in Estonia. This all means that the balance in the real estate market cannot be estimated from the price-to-rent ratio alone.

Figure A2.2. Price-to-rent ratio (2005=1)



Estimating the balance in the real estate market from the price-to-income ratio

The third method that can be used to estimate the over or undervaluation of property prices is the price-to-income ratio, and changes in it. In contrast to the price-to-rent ratio, the price-to-income ratio compares the cost of buying real estate to average incomes, and the affordability of real estate can be calculated from this. If the ratio rises sharply or remains higher than its long-term average for a long time, it indicates that the accessibility of property has deteriorated, all else being equal, and in most cases that real estate is overvalued. As with the previous indicator the method for finding the price-to-income ratio contains some simplifications. Estimates of the affordability of real estate should also take account of loan servicing costs and changes in lending conditions⁴¹, as real estate is generally bought using largely borrowed funds.

41 Girouard, N., Kennedy, M., Van der Noord, P., Andr , C. (2006). Recent House Price Developments: The Role of Fundamentals. OECD Economics Department Working Papers, 475.

The price-to-income ratio in Estonia was relatively low and not very volatile in 2000–2004 (see Figure A2.3). In the following years rapidly rising prices lifted the price-to-income ratio sharply as well, as wage growth was more modest at the time, and this meant that affordability declined for households. The ratio fell quite a long way during the economic crisis, as real estate prices saw a sharp correction, and in the second half of 2009 the ratio was the same as it had been at the start of the 2000s. Both activity in the real estate market and price growth have recovered since the crisis, and the price-to-income ratio has also risen, but relatively fast wage growth has meant that the affordability of real estate has not deteriorated significantly.

This analysis illustrates that different estimation methods give somewhat different results for the equilibrium level of Estonian real estate prices. The least reliable indicator for Estonia is the price-to-rent ratio, because the rental market is small and the quality of statistics on rents is not high. The price-to-income ratio should be preferred to this, as it gives a better picture of developments in the market, while it is also helpful to observe the real estate price gap calculated from the long-term trend.

Figure A2.3. Price-to-income ratio (2005=1)

