

## Box 5

### GAUGING RISKS TO EURO AREA HOUSE PRICES ON THE BASIS OF A DYNAMIC DIVIDEND-DISCOUNT MODEL

When housing is viewed as an asset, understanding the evolution of house prices is not unlike understanding the development of financial assets, in that changes in their valuation derives from news on fundamental determinants, or dividends, and expected returns. One methodology that is based on this notion and widely applied in understanding movements in financial asset prices (such as equities or bonds) is the dynamic dividend-discount model pioneered by Campbell and Shiller.<sup>1</sup> In its basic form, this model equates the excess return of a given asset over an alternative riskless asset to the discounted flow of dividends it provides along with changes in expected returns.

While housing can be characterised as both an asset and a consumption good, house prices would be expected from both perspectives to exhibit a long-run relationship with the analogous concept, in the above model, of dividends in the form of a rental yield. From the perspective of housing as an asset, house prices embed information about dividends in the form of the flow of future housing services (which can be proxied by the rental yield), in addition to expected returns. From the perspective of housing as a consumption good, house prices should co-move with rents in the long run, given the substitutability – on aggregate, in the absence of frictions or borrowing constraints – between renting and owning a house.

While such a long-run relationship may be expected, house prices in the euro area – similar to those in other developed economies – have exhibited considerably stronger growth than witnessed in housing rents over the last decade (see Chart A where an equal growth rate of the two series is captured by the 45 degree line). The implied deterioration of the ratio of the observed

<sup>1</sup> See, J. Campbell and R. Shiller, “The dividend-price ratio and expectations of future dividends and discount factors”, *Review of Financial Studies*, 1988, and J. Campbell and R. Shiller, “Stock prices, earnings and expected dividends”, *Journal of Finance*, 1988.

house price to contemporaneous observed rent has been the subject of numerous studies. This literature, however, has tended to examine the relationship between house prices and rents in a static variant of the dividend-discount model, whereby expected returns are assumed to be constant across time. In the dynamic variant of the dividend-discount model, an alternative interpretation is that changes in expected returns on housing as an asset class, as well as rental yields, could have exerted influence on the evolution of euro area house prices.

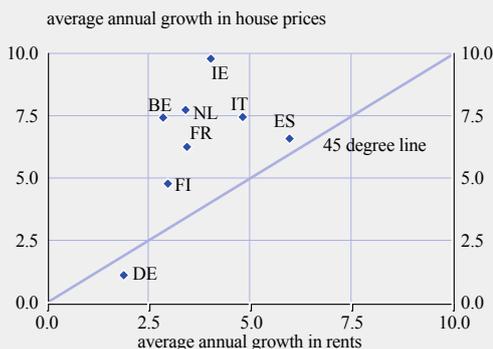
This box uses a dynamic dividend-discount model to decompose euro area house price developments into cash-flow fundamentals – in the form of rents – and expected returns.<sup>2</sup> A vector autoregressive (VAR) model is run,

closely following the methodology used to analyse US equity prices,<sup>3</sup> for a panel of eight euro area countries (Belgium, Germany, Ireland, Spain, France, Italy, the Netherlands and Finland) using quarterly data over the period from 1985 to 2007. In this framework, real returns on housing (defined as real house price inflation less the real “risk-free” return on a long-term government bond) are related to dividends from home ownership in the form of the rental yield (proxied by observed housing rents), with controls for other important determinants of house prices, such as real long-term interest rates and real disposable income per capita.

A variance decomposition of changes in excess returns on housing, based on the above-mentioned methodology and data, is contained in Table A. The methodology relates returns on housing in excess of the risk-free rate of return to two factors: a systematic news component (consisting of shocks to expected cash flows in the form of rents) and an idiosyncratic news component (consisting of shocks to expected return news). The results indicate that housing returns are driven mainly by news on country rents, though with an important but less sizeable influence of market-wide (or expected-return) variations for house prices. Specifically the cash-flow news variance of 0.466 is significantly larger than that of news on expected returns of 0.120. A negative and sizeable correlation between the two independent news series suggests that house prices overreact to each type of independent news.

**Chart A House prices and rents in selected euro area countries**

(average percentage changes over 1985-2007)



Sources: National data and ECB calculations.  
Note: Rents reflect the HICP component of rent extended back using national data.

**Table A Variance decomposition of unexpected excess return to housing**

(percentage points)

	Variance	Jackknife standard error
Expected return news	0.120	(0.008)
Cash-flow news	0.466	(0.028)
– Correlation between expected return and cash-flow news	-0.296	(0.025)
– Ratio of expected return news variance to total unexpected-return variance	0.136	(0.149)
– Ratio of cash-flow news variance to total unexpected-return variance	0.529	(0.527)

Sources: National data and ECB calculations.  
Note: Return decomposition results from a four variable panel VAR, including real house prices, rents, the real interest rate and real per capita disposable income.

2 The analysis is based on P. Hiebert and M. Sydow, “What drives returns to euro area housing? Evidence from a dynamic dividend-discount model”, *ECB Working Paper*, forthcoming.

3 See, T. Vuolteenaho, “What drives firm-level stock returns”, *Journal of Finance*, 2002.

In the context of historically higher volatility in house prices, as compared with that of rents, stable low-frequency variation in expected returns could therefore have contributed to large and persistent swings in house prices.

The above observations give rise to two issues related to financial stability. First, while the bulk of the variability of house price movements in the panel of countries analysed can be attributed to movements in the rental yields, market-wide movements in expected returns still exert some influence on euro area house prices. In this way, a generalised deterioration in expected returns on housing investments may permeate the housing markets of all euro area countries, irrespective of the evolution of fundamentals. Second, the results suggest that house prices overreact to news, thereby presenting risks of house price developments overshooting, in particular with respect to deterioration in fundamentals. While the ongoing slowdown in the annual growth rate of euro area residential property prices has remained gradual to date, such a characterisation could well apply to house price dynamics in some regions at the present juncture.

There are several caveats to the analysis, notably the role of country heterogeneity, the possibility that non-market forces influence the flexibility of house prices and rents, and their implied substitutability, along with the possibility of changing institutional factors, structural economic change and statistical issues that could imply some change in historical or equilibrium relationships. Nevertheless, the results can be considered to contain an illustrative assessment of the relationship between changing euro area house prices and changing fundamentals in a dynamic framework when allowing for changes in expected returns.