USC LUSK CENTER FOR REAL ESTATE
Fall 2009

Research BRIEF

Rent-price ratios and the Earnings Yield On Housing

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The dramatic rise and even more dramatic fall in U.S. house prices over the last several years has engendered much research to try to determine whether these events represent a house price "bubble," where prices rose above their fundamental values and then collapsed. A key focus of this research is the behavior of rent-price ratios, which typically combine data on tenant rents and owner-occupied house prices to proxy the earnings yield on owner-occupied housing, much like an earnings-price ratio for a stock. Studies have found little correlation between movements in these ratios and their typical fundamental determinants (e.g., Campbell et al. 2007), leading many experts to conclude that houses were, indeed, overvalued (e.g. Case and Shiller 2004).

This Research Brief reports on a study (Kim 2008) that sheds new light on the determinants and behavior of rent-price ratios. In particular, it explores the calculation of the "rents" of owner-occupied housing—these are called "implicit rents" and must be estimated because, unlike tenant rents, they are not observable. It further establishes a link between implicit rents and the rate of homeownership, which varies over time. Thus, the main argument is that the margin by which observed tenant rents proxy unobserved implicit rents of owner-occupied housing also varies over time. This suggests that using rent-price ratios to proxy the earnings yield on owner-occupied housing can be misleading, as can, therefore, judgments based on these measures.

In this Brief, I first document the inverse correlation between homeownership rates and the rent-price ratio as usually calculated, which I label the "tenant" price ratio. Next I introduce "implicit owner" rent-price ratios and lay out the argument linking homeownership rates with the margin by which tenant rents proxy implicit owner rents. Then I report results relating to the quantitative performance of a model with these features in terms of its prediction of the level of tenant rents and house prices, and I conclude with a discussion of recent house price changes.

Homeownership and rent-price ratios

Despite the elusive dynamics of (tenant) rent-price ratios, their movements are far from random. Figure 1 documents a surprisingly stable positive correlation between the log of the US price-rent ratio (inverse of rent-price) ratio and the household rate of home ownership between 1913-2007. The price-rent ratio is constructed using the historical house price series of Shiller (2006) and the tenant rent index series of the Bureau of Labor Statistics (1913-2007). Household homeownership rates are those reported by the Decennial Census (1910-1960) and Annual Census Survey (1960-2007).

Over this period, the tenant price-rent ratio increased by a factor of 3! The overall increase in this ratio is dominated by two historical episodes: the post-war housing boom of the 1940s, and the recent housing boom of 1995-2007.

The home ownership rate rose from 46.5% in 1910 to a peak of 69.0% in 2004 before falling again in recent years. It is plotted in Figure 1 as the ratio ownership rate/(1- ownership rate). The value of this ratio has increased from 0.87 in 1910 to 2.22 in 2004.

In Kim (2008), I document further evidence of this correlation at the regional level. Specifically, the inverse correlation between the annual difference in tenant rent-price ratios for each region relative to the aggregate US, and the annual difference in the ratio of ownership rate/(1- ownership rate) relative to the aggregate U.S. is remarkably high at 0.73 over the period 1978-2006 for which data is available.

Home ownership and marginal rental efficiency

Under the typical asset pricing equation, the implicit owner rent-price ratio, or the earnings yield on owner-occupied housing, is given by the following:

implicit owner rent /house price=interest rate - expected price growth. (1)

For simplicity, I assume that interest rates are net of depreciation, housing risk premia, and effective tax rates. This means that the implicit rent paid by owner-occupiers is equal to the opportunity cost of homeownership in terms of forgone interest net of expected price appreciation on the value of the home.

The unobserved implicit owner rent is related to the observed tenant rent according to the formula:

implicit owner rent=δ * tenant rent. (2)

The variable δ denotes a margin that converts tenant rent into the implicit rent of owner- occupied housing.

According to the housing literature, a unit of housing delivers a different level of housing services depending on whether it is tenant-occupied or owner-occupied (e.g., Ortalo-Magne and Rady 1999, and Kiyotaki et al. 2006). This means that the "rental efficiency" δ in equation (2) is typically regarded as different from one.

The innovation here is to allow this rental efficiency to vary in the population of the housing stock, and it can be justified in several ways. For instance, rental apartments located downtown may have lower vacancy rates than rental suburban detached homes. Alternatively, problems of moral hazard may imply that physical depreciation occurs at a faster rate in renter-occupied properties than in owner-occupied properties, and this may be more of an issue in suburban detached homes than urban apartment complexes. The option to control the housing environment (decorating, subletting, keeping pets) is typically more restricted in renter-occupied properties, and this may be more relevant in larger rather than smaller properties. The stability of a fixed mortgage payment compared to fluctuating rents may be more valued in housing units with longer expected tenure, such as detached family houses, rather than apartments geared towards singles. Many other sources of variation in rental efficiency are possible.

Insofar as rental efficiency does vary across the housing stock, an immediate implication is that housing units will be rented out in order of the rental efficiency; that is, properties with higher rental efficiency are rented out and the rest are owner-occupied.

In equilibrium, the relevant rental efficiency δ in equation (2), is given by the marginal rental efficiency (the rental efficiency of the marginal rental property), the identity of which will vary over time depending on the share of the housing stock which is renter occupied. This establishes the argument for how δ can be time varying.

When the rental share of the housing stock is inversely related to the household rate of home ownership, rent-price ratios will be inversely related to household rates of home ownership from equations (1) and (2). Indeed, this implies that despite a stable earnings yield for owner-occupied housing, the observed tenant rent-price ratio can fluctuate over time. This establishes a link between the rate of homeownership and the marginal rental efficiency δ.

Predicted Tenant Rents and House Prices

Having established a qualitative link between changes in homeownership rates and the observed tenant rent-price ratio, I developed a structural economic model to provide a quantitative link between these two variables and I assessed its ability to predicting movements in the level of house prices and the level of tenant rents through simulations.

Figure 2 highlights features of the tenant-rent and house-price level data (in logs), several of which appear odd in the context of the conventional dividend pricing framework. Tenant rent levels have been falling overall during a period when house price levels have risen dramatically. As in the case of rent-price levels, movements in the house price level are dominated by the two historical housing booms, namely, the post-war boom and recent boom. Under a conventional dividend pricing framework where tenant rents proxy implicit owner rents, rents and prices should have moved in the same direction.

Turning to the predicted results of simulations, remarkably, the model is able to generate the decline in rent levels and the increase in house prices accompanying increases in the rate of home ownership rates. The inverse correlation between prices and tenant rents present in the first half of the century and the lack of such a correlation for the second half of the century are also matched by the model.

Figure 1: US ownership rate/(1-ownership rate), 1900-2007, versus US log price-rent ratio, 1913-2007. Household rates of home ownership, Decennial Census (1910-1960) and Annual Census Survey (1960-2007). Rent-price ratio, 1913-2007 from Shiller (2006)

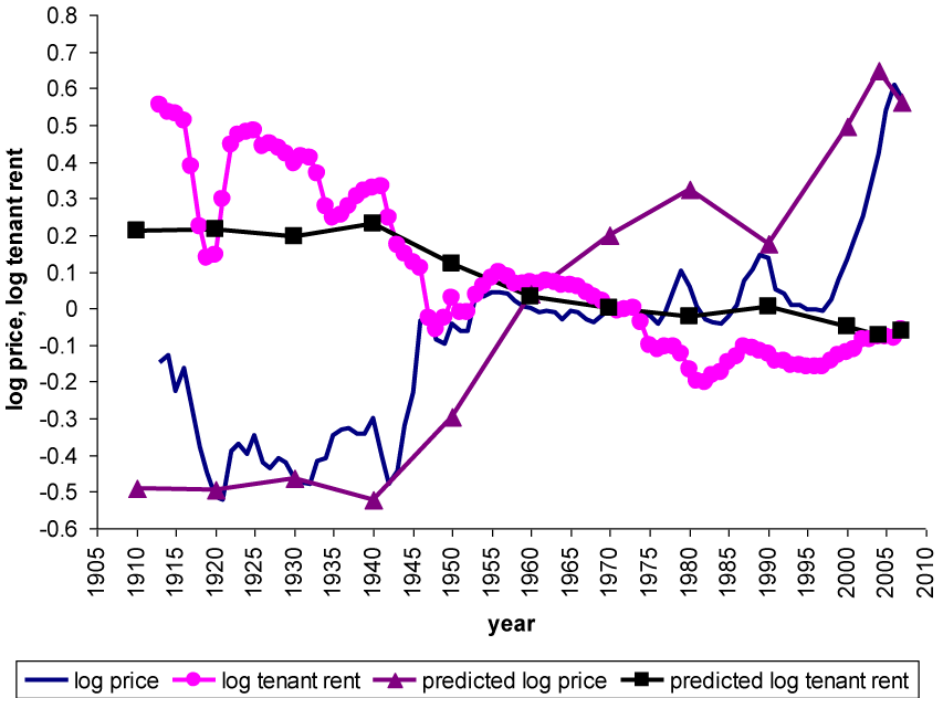

Figure 2: Actual versus predicted log house price and log tenant rent, 1900-2007. Real house price index, 1913-2007 from Shiller (2006), real tenant rent from BLS, 1913-2007. Author's calculations for predicted values, 1900-2007.

Recent House Price Dynamics

This analysis suggests that the source of the recent large decline in tenant rent-house price ratios is the increase in homeownership rates. Careful studies of this increase in homeownership rates have concluded that innovations in the mortgage industry played a large role in the recent housing boom of 1995-2007, just as it did in the housing boom of the 1940s (Chambers, Garriga and Schlagenhauf 2009). Importantly, these innovations are regarded as having been largely driven by factors independent of changes in house prices (the G.I. Bill in the earlier instance and the development of secondary mortgage markets more recently). Consistent with this, conventional wisdom associates the recent housing bust (since 2007) with a reversal of the innovations (and decline in home ownership rates) which had eased access to credit in the housing sector during the boom.

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