



Fundamentals and rational bubbles in the Korean housing market: A modified present-value approach[☆]



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ABSTRACT

This paper employs the present-value approach to examine the dynamics of the Korean housing market. To capture the large swing in the price-rent ratio accompanied by intermittent ups and downs, we incorporate a periodically collapsing bubble in an otherwise standard present value model. We then decompose the movements in the actual price-rent ratio into those explained by the expectations of housing market fundamentals (i.e., the rent growth, risk-free interest rate, and excess returns from housing investment) and the bubble. The bubble part set aside, most of the variations in the price-rent ratio are explained by the expected risk premium of housing investment, whereas the expected real interest rate and rent growth account for relatively small fractions of the variations. It is also found that the bubble has continuously accumulated since the early 2000s, reaching as high as 51% of the house price around the end of 2014. Finally, the recent increases in house price over 2007–2014 are likely to have been driven by self-fulfilling expectations typical of a bubble.

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1. Introduction

Over the previous decades, many industrialized countries experienced rampant movements in residential property prices, and Korea is not an exception. Since the mid-80s, there have been three major episodes of housing market boom in Korea. Spanning 1988:Q1–1991:Q3, the first boom marked the annual average of the real house price as high as 14.2%. This bullish run was then followed by a decade-long bear market which lasted until the economy weathered out the impact of the Asian currency crisis. As the economy bounced back from the crisis, the second boom came along. Over 2001:Q4–2004:Q2, the real house price increased by 12.3% per annum and recovered most of the losses since the previous peak. The most recent boom prevailed during 2006:Q4–2007:Q4, registering a 7.6% increase in the real house price per annum. Since then, the housing sector has remained more or less stable with mild signs of slowdown in recent years.

This paper is an empirical examination of the Korean housing market, with the ultimate objective of identifying its main sources of variations. More specifically, we ask the following questions: first, are the movements in housing price mostly responses to changes in market

fundamentals or reflecting a speculative bubble? Second, what is the driver of housing prices among its fundamental determinants? Given the importance of housing sector in the Korean economy,¹ the recent signs of stagnation in the Korean economy overall and housing market warrant a renewed interest in the perennial questions above.

Addressing the questions requires us to take a stance on how housing prices are related to their determinants. Our analytical framework is the present-value model of asset pricing, the choice of which is made on account of unique characteristics of the Korean housing market to be detailed later. The present-value model ties an asset's worth to the expected value of the future payoff stream accruing to the asset. This type of model has been widely used in the literature on finance (e.g., Campbell and Shiller (1988a, 1988b); Campbell (1991); Cochrane (1992), and Campbell and Ammer (1993)) and exchange rate (e.g., Engel and West (2005) and Wu (1995)). There is also a large body of present-value literature on housing market studies. In a study of house prices in the San Francisco area, Meese and Wallace (1994) derive a present-value relation among house price, rents, and the costs of capital for home owners (relative to renters), and find appreciable upward deviations of the house prices from what is predicted by the relation. In more recent studies, Case and Shiller (2003) and Gallin (2008) also find that the US house prices in their sample periods

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¹ For example, the market value of housing stock relative to annual GDP as of 2013 is 2.2 for Korea, much higher than 1.3 for the US and 1.8 for Japan.

are significantly above what could be justified by the present-value model. In a study similar to ours, [Campbell et al. \(2009\)](#) decompose the US house price movements into the contributions of the expected rent growth, risk-free rates of return, and housing risk premium, confirming a dominant role for the risk premium. Using a version of present-value relation explicitly derived from a dynamic equilibrium model, [Ayuso and Restoy \(2006\)](#) find evidence of overvaluation in the house prices of the US, the UK, and Spain.

To the extent that rent payments constitute the intrinsic cash flow to the owners of the property, the housing market version of the present value model predicts that house prices and rents will tend to move in tandem.² The actual movements of the Korean housing market are, however, quite different from this prediction. [Fig. 1](#) plots the real house price, rents, and price-rent ratio series between 1987:Q1 and 2014:Q3. The plot of real house in panel (a) demonstrates the aforementioned three bullish phases marked by shades.³ In the earlier part of the sample period, real rents in panel (b) tended to move together with real house price, yielding a stable price-rent ratio.⁴ Since the end of the crisis, however, real rents has steadily decreased by 2.5% per annum with its own troughs and peaks around the decreasing trend. As a result, the price-rent ratio in panel (c) exhibits occurrences of boom-bust around the large swing in the ratio itself, which is in contrast to the prediction of the present-value model.

Taking a stable price-rent relation as reflecting the ‘fundamental’ forces in the housing market, one can address the long swing in the ratio by appending the present value model with additional components for explosive ‘bubbles’ or nonstationary ‘residuals’, as in [Wu \(1995\)](#) or [Kishor and Morley \(2015\)](#), respectively. We also note, however, that the intermittent buildup and collapse of the price-rent ratio cannot be adequately explained by linear relations between house price and its drivers including bubbles. To account for the features of the Korean housing market in [Fig. 1](#), therefore, we follow [Balke and Wohar \(2009\)](#) and augment the standard present-value model with a special class of bubbles, i.e., those which periodically gestate, bust, and then reappear. Once the present-value model thus modified is estimated, the movements in the price-rent ratio are decomposed into what is attributable to the housing market fundamentals and the bubble, so that we can address the main questions posited above. To the best of our knowledge, no previous studies have examined the possibility of periodically collapsing bubble in the Korean housing market.

The main findings of the current paper are as follows. First, the bubble set aside, the movements in the price-rent ratio are mainly driven by the expected risk premium for housing investment (or the rate of return in excess of the risk-free rate), and the role of the expected rent growth and real interest rate is of secondary importance. This finding is further supported by the results of the variance decomposition: the variation in the expected excess returns accounts for 66% of that in the fundamental price-rent ratio, whereas the expected rent growth and real interest rate individually explain at most 20% of the variation in the fundamental ratio. Second, there was a continued buildup of bubble since 2001, reaching as high as 51% of the price toward the end of 2014. Finally, the conception and accumulation of bubble until 2007 is likely to be driven by market ‘news’ of low interest rates or easy credits, but the buildup of bubble that is continued after 2007 is deemed mainly due to the self-fulfilling expectations.

² Motivated by this prediction, a large body of existing literature (e.g., [Miked and Zemcik \(2009a, 2009b\)](#), [Clark and Coggin \(2011\)](#), and [Gallin \(2008\)](#)) interpret the lack of cointegration between house price and rents or the nonstationary of their ratio as supporting the presence of bubbles in the housing market.

³ The housing market cycle chronology is determined by authors as follows: a boom starts when real house price first increases by >8% on a year-over-year basis, and ends before a negative rate of increase is observed.

⁴ As will be explained later in [Section 2](#), the real rent series is constructed by authors using market interest rates. The sudden hikes in the real rent series around 1997:Q4–1998:Q2 are outliers due to the historically high interest rates in the wake of the Asian currency crisis.

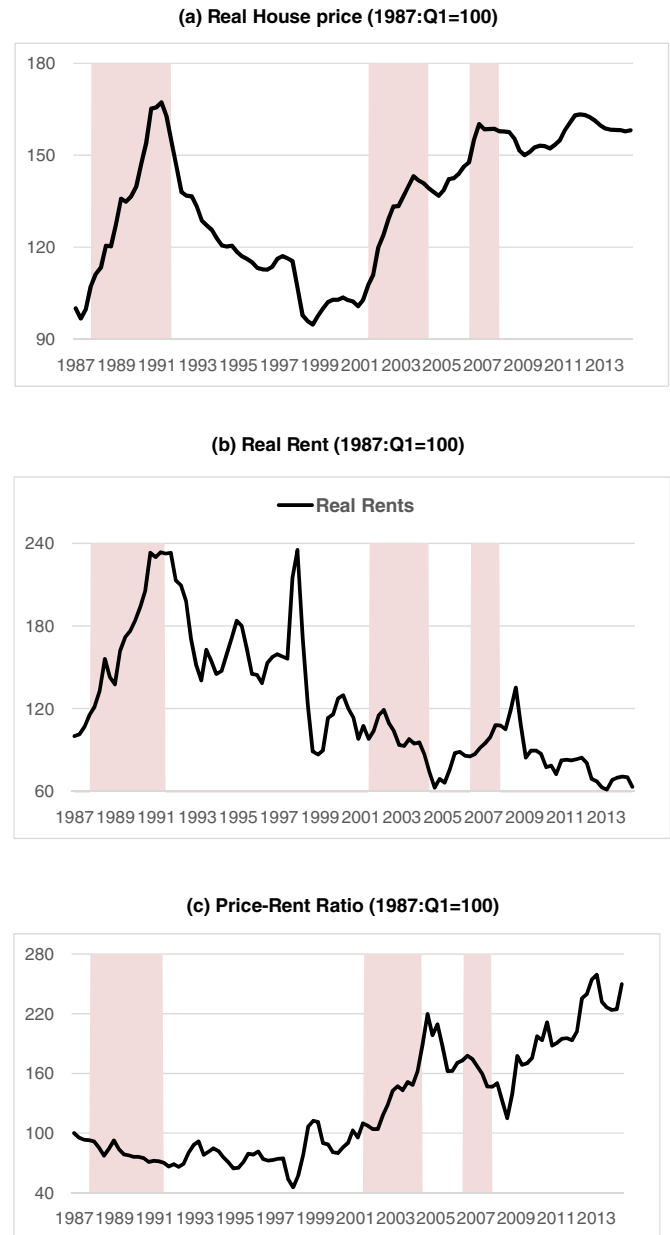


Fig. 1. Housing market trend in Korea (1987:Q1–2014:Q3). Note: Shaded area corresponds to the three episodes of bull market. The nominal indexes of nationwide purchase price and rents for apartments are deflated by CPI less food and energy, and rescaled so that 1987:Q1 = 100.

This paper is organized as follows. [Section 2](#) explains the modified present-value model and the dataset used for estimation. In so doing, we briefly describe a few unique characteristics of the Korean housing market yielding a legitimate body of data for the present-value approach. [Section 3](#) is devoted to comparing the relative importance of the fundamental and bubble components in the price-rent ratio. [Section 4](#) summarizes and concludes the paper.

2. The model and data

2.1. A present-value model with collapsing bubbles

Let $H_{t+1} = (P_{t+1} + R_{t+1})/P_t$ denote the one-period gross real return on housing, where P_{t+1} is the real house price at the end of period t and

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