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Understanding the cross-section of the U.S. housing bubble: The roles of lending, transaction costs, and rent growth☆

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ABSTRACT

This paper establishes baseline valuations for housing assets using rent cash flows in 22 regions of the U.S. in a Lucas (1978) framework. The model matches the unconditional averages of the price–rent ratios from 1978 to 2012 quite well; however, the model valuations after 2002 are well below the market price–rent ratios. We explore three mechanisms to understand these housing overvaluations in the post-2002 period relative to the consumption-based model: (1) using cross-sectional subprime consumer and commercial lending characteristics; (2) transaction costs; and (3) turning off the pro-cyclicality of the rent growth in the data. We find that all three factors explain some fraction of the bubble in valuations, but none alone is enough to understand the full extent of post-2002 valuations.

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1. Introduction

Many authors note that U.S. housing prices have risen extraordinarily quickly starting as early as the first few years of the new millennium and peaked just prior to the 2007–2008 financial crisis. Despite recent theoretical and empirical studies trying to explain house prices during this period, understanding the housing bubble remains a challenge for financial economists.[3]

In this paper, we take on the challenge by considering a consumption-CAPM (CCAPM), similar to Mehra and Prescott (1985) and Lucas (1978), and use this method to establish baseline valuations for housing prices. In the baseline valuation model, we abstract from the aspects of the housing asset that bring utility to the economic agent, such as the school district, crime rates, or the general upkeep of the neighborhood. Instead, we treat housing as an asset that entitles the owner to a series of future rent cash flows. In fact, most probably, a significant degree of the non-pecuniary benefits of living in a certain neighborhood are likely already in the rent data to a significant degree, so in some sense, rents are a good proxy for the unobservable monetary value of living in a particular dwelling.

Using Epstein–Zin–Weil utility to price rent cash flows (Epstein and Zin, 1989; Weil, 1990), we calibrate cash flows to rent

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[3] Coleman et al. (2008), and Glaeser et al. (2010), and Duca et al. (2010) explore whether expansionary monetary policy early in the decade and the resulting sustained period of low mortgage interest rates fuel the demand for housing, driving up prices. Mian and Sufi (2008) investigate whether the growth in subprime lending, occurring partly in response to affordable-housing goals, was the problem, amplifying the effect of low interest rates on demand. Hung and Tu (2006) question whether high loan-to-value ratios, along with irresponsibly lax mortgage underwriting, were the sources of price escalation.

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income for housing units in several geographical regions in the United States, and evaluate the regional rent cash flows using the consumption-based pricing kernel in the same way researchers typically value a stock portfolio through its dividends.

We find that theoretical valuations are too low relative to the observed housing prices a few years into the new millennium. This is evident from the disconnect between observed prices and valuations justified by the present discounted value of rents. We interpret the difference between observed prices and consumption-CAPM valuations as excess prices, and try to explain the cross-section of excess prices across several U.S. geographical areas.

To understand the gap between theoretical and observed housing prices, we use three methods. First, we start with subprime consumer mortgage lending and lending to construction businesses. Using data from the Federal Reserve Bank of New York on subprime loans to consumers, we run cross-sectional regressions of the regional empirical–theoretical housing price differential on various subprime activity measures for twenty-two U.S. regions. We find that a higher fraction of subprime loans relative to the total number of mortgages outstanding, as well as the presence of FICO scores higher than 660, are associated with a significantly larger gap between empirical and theoretical price–rent ratios. In fact, more than three-quarters of the cross-sectional variation in the nonfundamental portion of empirical prices can be explained by the cross-sectional variation in high-FICO loans within the universe of subprime loans. Consistent with Mian and Sufi (2008), among others, these findings provide compelling evidence that subprime lending activity plays a significant role in the recent housing bubble.

To provide a more complete picture of the role of lending in the excess valuation of housing, we then supplement our consumer-lending data with information on lending to construction firms. We collect this information from DealScan. We find that higher lending costs to construction firms are associated with larger overpricing. In fact, close to a third of the cross-sectional variation in excess prices can be explained by the borrowing costs that local construction firms face.

We offer two potential explanations for this finding. First, consistent with evidence in Glaeser et al. (2008), higher borrowing costs can reduce the supply elasticity of homes and limit new construction, thus elevating the prices of existing homes. Second, it is possible that the banking sector may have responded rationally to housing price overvaluations and charged higher rates to riskier borrowers. As far as we are aware, this is the first paper that examines the role of lending to construction firms in housing price valuation.

To explain the gap between empirical and theoretical prices, we next turn to a second channel and introduce transaction costs to the Lucas (1978) framework in pricing residential properties. Most certainly, an important feature of residential housing markets is the transaction costs associated with the housing unit (see, for example, Mayer, 2003). This is the case because the presence of transaction costs might significantly affect the pricing implications of the consumption-based pricing model in this paper. For example, transitory high prices may exist because investors cannot sell their houses for prices that cover their transaction costs.

To assess the effect of transaction costs on the gap between empirical and theoretical prices, we follow He and Modest (1995) and use the Euler inequalities that replace the Euler equations of consumption, with calibrated costs ranging from 1.3% to 2% of the purchase price of a house.[4] Using calibrated utility-parameter values from similar no-transaction-cost economies, we find that transaction costs can substantially enlarge the feasible set of equilibrium price–rent ratios to sometimes include the empirical price–rent ratio even during the housing bubble after 2002. Thus, the introduction of transaction costs weakens the implications of the consumption-based model to the extent that the model is unable to rule out the bubble period as a period of excess prices in at least seven U.S. regions, with two additional regions just above the upper bound.

Finally, we turn to a third channel to explain excess price–rent ratios by simplifying the rent growth processes from an economically predictable specification supported by the data to an i.i.d. specification. This simplification raises valuations in the model because, in our empirical analysis, we find that rent growth is pro-cyclical just as the consumption growth used in the pricing kernel. The pro-cyclicality of rent growth is disliked by the agent and results in a lower valuation.[5] We find that while i.i.d. rent growth does narrow the gap between empirical and theoretical prices, the increase in model valuations relative to the predictable case are small and are typically lower than 1%. In short, it is not possible to come close to post-2002 prices by simply turning off the pro-cyclicality of rent growth.

The paper is organized as follows: Section 2 discusses the related literature, motivation, and general framework. Section 3 describes the economy. Section 4 discusses the data. Section 5 presents the calibration of cash flows and the calculation of the empirical statistics of housing prices. Section 6 provides the result of our baseline valuation method. Section 7 describes the three mechanisms to explain the post-2002 valuations. Section 8 concludes.

2. The related literature, motivation, and general framework

To the best of our knowledge, this is the first paper to formally attempt to link a housing price bubble to transaction costs, subprime consumer lending, lending to construction businesses, and the characteristics of rent growth. A number of papers consider macroeconomic explanations rather than lending to explain elevated housing prices (see for example, Case and Shiller, 2003, which links housing prices to personal income, unemployment, and mortgage interest rates). Additionally, Van Nieuwerburgh and Weill (2010) focus on regional labor productivity differences. Favilukis et al. (2009) present an incomplete-markets two-sector equilibrium model of housing and nonhousing production. They show that foreign ownership of U.S. Treasury and domestic debt can explain housing valuations in the United States.

We use a Lucas (1978) complete-markets model and treat the housing unit as an asset. Accordingly, we view rental cash flows as dividends. A number of papers take a portfolio choice perspective and focus on the place of housing investments in the economic lifecycle. Cocco (2005), for example, shows that investment in housing plays a crucial role in explaining the patterns in cross-sectional variation in the composition of wealth and the level of stockholdings observed in portfolio composition data. Housing price risk crowds out stockholdings, and this crowding-out effect is larger for investors with low net worth.[6] Related to this strand of literature

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[4] Yao and Zhang (2005) use larger transaction cost values in their baseline calibration: 3% for buying and 6% for selling. Mayer (2003) investigates the price performance of real estate auctions in selling real estate relative to the more traditional method of negotiated sale. Estimates from auctions in Los Angeles during the boom of the mid-1980s show a discount of 0–9%; similar sales in Dallas during the real estate bust of the late 1980s show discounts in the 9–21% range.

[5] Hansen et al. (2005) and Bansal et al. (2012) emphasize the role of long-run dividend growth predictability in understanding equity valuation.

[6] Other papers consider the effects of risky, illiquid housing on savings and portfolio choices. See for example, Davidoff (2005), Flavin and Yamashita (2002),

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