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Monthly condensed analyses of crucial real estate and economic issues offered by UCLA Anderson Forecast and UCLA Ziman Center for Real Estate. Here, UCLA Anderson Assistant Professors of Finance Barney Hartman-Glaser and William Mann summarize [their research](#) that correlates income levels with returns on housing investment.

Risky Zip Codes

Returns on Housing Investment Are More Volatile in Lower Income Areas

By Barney Hartman-Glaser and William Mann

Housing is a large component of the wealth portfolio in the United States, both in the aggregate and for the typical household. While a growing literature studies the relationship between risk and return in housing markets, much remains unknown about the cross-sectional determinants of this relationship at a fine geographic level. In this paper ([Collateral Constraints, Wealth Effects, and Volatility: Evidence from Real Estate Markets](#)), we establish that housing is a riskier investment for lower-income households. Our main finding is that lower-income zip codes experience higher housing return volatility without any higher average returns. We argue that the collateral role of housing, as emphasized by prior studies such as Lustig and Van Nieuwerburgh (2005), can explain these patterns in the data.

“Lower-income zip codes experience higher housing return volatility without any higher average returns.”

To frame our findings, we begin with a theory of housing return volatility. The representative household in our model is endowed with a risky income stream and is impatient relative to an exogenous (or external) borrowing rate. It thus borrows up to a limit that we impose via a standard collateral constraint. The price of housing therefore depends both on the future marginal rate of substitution (MRS) between housing and other consumption, and on the future value of the home. The collateral constraint means that the MRS fluctuates with income shocks, which produces volatility in the housing return if housing supply is not perfectly elastic. Moreover, this volatility is greater for lower-income households, for whom the magnitude of income shocks is relatively larger.

A decrease in the debt capacity of the house, via a tightening of the collateral constraint (e.g., a lowering of the maximum loan-to-value or LTV ratio), causes the contemporaneous MRS to become a proportionally-larger component of the present value of the home as compared to its future price, amplifying the endogenous (or internally caused) volatility in housing returns. Housing return volatility is further amplified if households have non-homothetic preferences, i.e., if richer households spend a smaller fraction of their wealth on housing, which causes the MRS to depend on their relative level. Both the LTV constraint and non-homothetic utility have been documented and studied in prior research on housing markets; we show that they combine to amplify endogenous volatility in housing returns.

Our model delivers several novel, testable predictions. Most importantly, higher average household income leads to lower volatility of housing returns in a given market, assuming that income volatility is decreasing in the level of income. The model predicts this to be a smooth and robust relationship across time and space. Further, return volatility is also higher in the presence of tighter collateral constraints. Both predictions reflect the same mechanism: Collateral constraints prevent the market from smoothing-out home prices relative to fluctuations in the household's MRS.

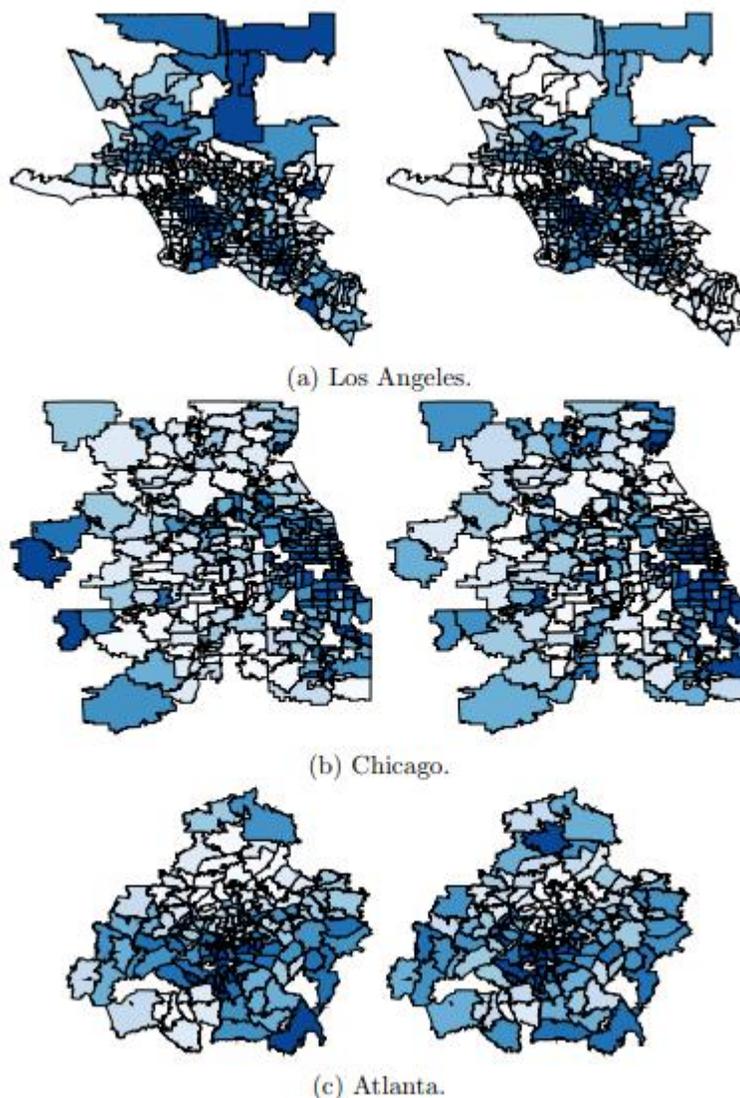
We corroborate our predictions empirically by measuring housing return volatility and income at the zip code level. We demonstrate that low-income zip codes feature consistently higher return volatilities, with no compensating increase in their average return. This finding holds across two data sources (CoreLogic and Zillow), and within each of the largest metropolitan statistical areas (MSAs) in the United States. In our main result, a doubling of annual income is associated with 1.3% less annual volatility in housing returns when measured with CoreLogic, or 2.7% less when measured with Zillow. Importantly, the level of housing returns is not any higher in the low-income, high-volatility zip codes.

We strengthen this conclusion by exploiting time-series variation within zip code: Increases in home values, which represent increases in household wealth, lead to lower housing return volatility. This relationship holds whether we look within state, MSA, or zip code. We also use the time-series dimension of the data to show that the income-volatility correlation is consistently negative throughout the sample period, although stronger in the post-crisis period, which arguably reflects a period of tighter constraints. Furthermore, we show that the results are not driven by correlation between income and liquidity, as turnover rates are roughly the same across bins of income throughout the sample period.

We also corroborate the second prediction of our model, that tighter collateral constraints lead to greater housing return volatility. To proxy for the tightness of collateral constraints, we measure the state-level degree of lender recourse, following the coding of Ghent and Kudlyak (2011). The prior research on lender non-recourse laws emphasizes that they constrain access to credit. In our model, a natural consequence of this effect is higher housing return volatility, and this indeed is what we find. Controlling for the effect of wealth, we find that states allowing a lesser degree of recourse also have greater return volatility, and that this finding is robust to demographic controls.

Aside from its direct effect on the household's portfolio problem, housing return volatility may also matter for the supply of housing. Real-option models of housing construction conclude that production of new homes is less frequent when housing demand is more volatile (e.g. Guthrie, 2010, Oh and Yoon, 2016). Our model induces demand volatility via financial constraints that matter more for low-income households, suggesting that housing supply may be less responsive to demand and price movements in lower-income areas.

To corroborate this prediction, we analyze new permit issuance and the age of the local housing stock using Census data. We show that both the level and growth rate of permit issuance are much more volatile in lower-income areas, while the housing stock is on average older in these areas. These both reflect less-frequent adjustments to the housing stock, which again is a natural implication of the endogenous volatility in demand induced by our model. Our findings provide a novel channel – financial constraints – by which housing supply may be particularly suboptimal in low-income areas, contrasting geographic constraints as studied by Saiz (2010) or inefficient regulation as discussed in Gyourko and Molloy (2014).



Income and housing return volatility for three major metropolitan statistical areas. The three panels on the left show the annualized zip-code level volatility of home price returns from 1998-2015, based on Zillow data. Darker shading corresponds to higher volatility, using eight bins. The three panels on the right show zip-code level 1998 adjusted gross income, again using eight bins, but here darker shading corresponds to lower adjusted gross income.

Our results are consistent with and add to earlier studies of housing return patterns. Ambrose, Buttimer, and Thibodeau (2001) find that the relationship between house price volatility is u-shaped in-house price level for the Dallas metropolitan area. Peng and Thibodeau (2013) uncover the same negative relationship between housing return volatility and geographic income measures for the Denver metropolitan area that we find nationally. Peng

and Thibodeau (2017) find that idiosyncratic house price risk is u-shaped in zip code level income; we study the total volatility rather than the idiosyncratic component of housing returns. Our results also complement those of Eisfeldt and Demers (2015), who present the first comprehensive look at the cross-section of rental housing returns for the entire U.S. Case, Cotter, and Gabriel (2011) find evidence for a single factor model of housing returns.

Our model of the housing market builds on the literature that emphasizes the importance of collateral constraints for asset markets. Kiyotaki and Moore (1997) show how the presence of collateral-constrained agents can amplify fundamental shocks in asset markets. Many studies have demonstrated the importance of this effect in real estate markets. For example, Lamont and Stein (1999) and Almeida, Campello, and Liu (2006) demonstrate that house prices are more sensitive to shocks to economic fundamentals in locations in which households are more highly levered. More recently, Justiniano, Primiceri, and Tambalotti (2015) study a model similar to Kiyotaki and Moore (1997) to show that collateral constraints can quantitatively explain many features of the housing boom and bust of the 2000's. Our model is similar in spirit to Justiniano et al. (2015) but bears closer resemblance to that of Rampini and Viswanathan (2010) and Rampini and Viswanathan (2013).

Another body of evidence shows that credit markets can have an important impact on house prices. Ben-David (2011) shows that financially constrained borrowers inflated house prices to draw larger mortgages. Ortalo-Magne and Rady (2006) highlight how young households' leverage in their first home can have an important effect on house price volatility. Landvoigt, Piazzesi, and Schneider (2015) present an assignment model of the housing market in which households face collateral constraints and find that a key driver of variation of house prices within the San Diego metropolitan area was cheaper credit for poor households. Landvoigt (2017), in a quantitative model of housing markets featuring expectations and credit constraints, shows that an increase in price uncertainty rather than average expectations can explain the rise in household debt during the housing boom of the 2000s. Housing as a source of collateral has also been shown to have important implications for the broader economy. Lustig and Van Nieuwerburgh (2005) show that a decrease in home values leads to a greater market price of risk, as collateral constraints make it harder for households to share risk. Mian and Sufi (2011) provide evidence that increased home equity during the early 2000s allowed for an increase in borrowing and the subsequent default crisis of the late 2000s.

CONCLUSION

Two widely studied features of housing – its collateral value for constrained households, and the non-homotheticity of preferences over it – lead in equilibrium to greater volatility of home price appreciation for low-income households, without any compensating increase in expected return. Our empirical analysis did not focus on any particular time period (such as the housing boom or bust) nor on any particular region. Our results thus capture a fundamental connection between financial constraints and the return patterns of assets with collateral value in the presence of non-homothetic preferences. Because housing is such a large fraction of expenditures for the typical household, this is a quantitatively important pattern to understand for policy issues, such as problems with housing affordability.