

# UCLA ECONOMIC LETTER

## REAL ESTATE AND THE MACROECONOMY



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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 Professor of Finance Barney Hartman-Glaser, with Florida International University Assistant Professor Mark Thibodeau and Pennsylvania State University Associate Professor of Business Jiro Yoshida, examine the relationship between IPO wealth and home prices. The complete report can viewed [here](#).

### The Links Between IPO Wealth and Home Pricing

*By [Barney Hartman-Glaser](#), [Mark Thibodeau](#) and [Jiro Yoshida](#)*

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An initial public offering (IPO) rewards the founders, angel investors, venture capitalists and employees that have stock options. For example, PrivCo reported that Twitter's IPO created 1,600 millionaires. Changes in wealth and liquidity experienced by shareholders around an IPO lead to corresponding changes in their consumption. In particular, demand may increase for housing and services that impacts the local housing market.

*"In response to a firm issuing shares in an IPO, house prices within 5 miles of a firm's headquarters increase by .668% more than house prices 20-25 miles away."*

In California, where start-up companies cluster, a positive correlation is observed between the number of IPOs and house prices. Although this positive correlation is sometimes interpreted as a causal effect of the wealth created by start-up companies, causality is not immediately obvious. Furthermore, anticipated wealth changes should be internalized in the shareholders' consumption and tenure choices well before an IPO. Thus, for an IPO to affect housing demand, the wealth changes must be unexpected or there must be obstacles to consumption smoothing. There is an additional concern that if IPOs are causing house prices to appreciate, increases in the cost of living and business may be a negative side effect on economic agglomeration.

In this study, we ask two questions. First, do IPOs influence local housing markets? The positive correlation between IPOs and house prices can be a coincidence or can be generated by confounding factors such as high amenities and housing supply constraints. We attempt to isolate the causal effect of IPOs on housing prices in two ways. First, we estimate a spatial "difference-in-difference" approach that compares the effect of IPOs on housing markets that are close to the headquarters of IPO firms to those that are farther away. And second, we use the San Francisco Bay as a natural geographic barrier and compare house price changes in San Francisco to those in Alameda around IPO events. We then ask if IPOs influence housing markets and when and how IPOs are internalized into house prices. Most IPOs have three sequential events: IPO filing, share issuing, and the expiration of a "lock-up" period (when inside shareholders are restricted from selling their shares). These sequential stages provide a unique setting for decomposing a shock to shareholder wealth into an update of the expected future wealth at the time of an IPO filing, an update of the assessed wealth at issuance as the stock is priced mark-to-market, and when the liquidity constraint is relaxed at the lockup expiration event. Because of requirements related to mortgage financing (i.e. cash for the down payment), the liquidity constraint is likely to play an important role in housing tenure choice.

We combine data for IPOs and residential property transactions in California from 1993 through 2017. To control for the housing heterogeneity, we construct "hedonic" (explained by the inherent characteristic of the housing product such as number of bedrooms or square footage) constant-quality home price indexes (HPIs) for housing transactions to identify the trend in house prices associated with treatment, which is defined by housing transactions occurring near the IPO firm's headquarters following an IPO event, as well as control groups to capture the general trend in house prices over the time period spanning the IPO events. Using the event-specific HPIs, we analyze the discontinuity in time of each IPO event by looking at the spatial difference in proximity to IPO firms and, also, exploit the natural barrier of San Francisco Bay.

Anecdotal evidence suggests that managers and employees of technology firms do tend to prefer to live near their companies. Of course, some of the original shareholders may prefer other residential areas that are distant from their companies. Because the data does not identify homebuyers as being original shareholders or not, we are unable to pinpoint specific areas where managers and workers moved. Testing for an IPO treatment effect when the impact is not localized, in this case, biases against finding a significant result in the spatial difference-in-differences analysis. Thus, our estimate includes both direct and indirect effects of IPOs on housing markets near headquarters. For example, there might be speculating buyers who hope to sell houses in the future at higher prices.

In our spatial difference-in-difference analysis, we estimate the average change in the HPI before and after IPO events for the area around the IPO-firm's headquarters (the treatment area) by interacting an indicator variable for transactions that occur within a window of an IPO event with indicators for distance to the IPO-firm's headquarters. We use a 180-day window to define pre- and post-event periods and indicators for distance bands in increments of 5 miles to define distance to the IPO-firm's headquarters.

The three types of IPO events are well-defined with explicit dates. When management decides to take the firm public, they file Form S-1 with the SEC that publicizes their intention of pursuing an IPO. Subsequently, the firm issues a combination of primary and secondary shares on a public exchange and the firm's market value is revealed. Many IPOs have a lockup period, during which restricted shares cannot be sold. We find the statistically significant effect of IPOs on local house prices with varying sizes by event type, proximity to the firm, and the characteristics of firms and IPOs. The results for Silicon Valley are not significantly different from those for California. Based on the baseline estimation, the effect is largest for filing events: House prices within 5 miles of a firm's headquarters increase by .864% more than house prices 20-25 miles away in response to a firm filing and intent to conduct an

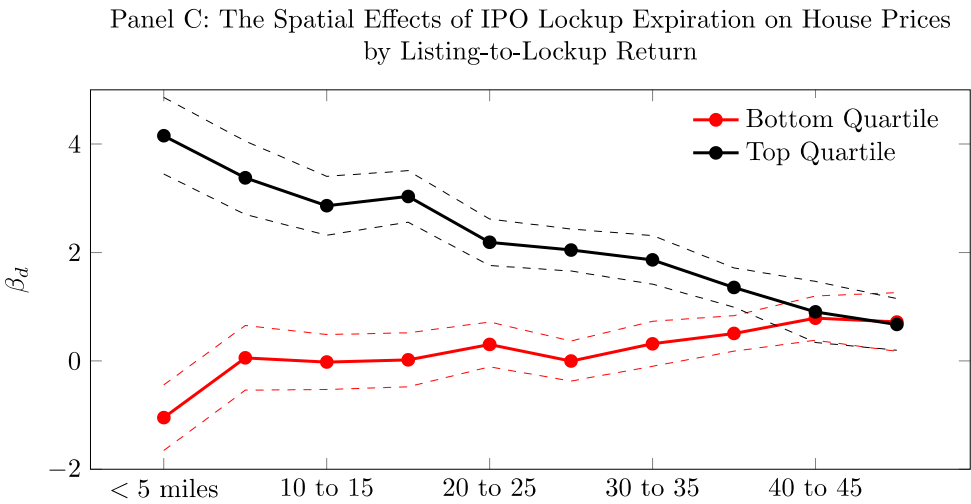
IPO. The effect is also large for IPO issuing events: house prices within 5 miles of a firm’s headquarters increase by .668% more than house prices 20-25 miles way in response to a firm issuing shares in an IPO. There appears to be no effect of the lockup expiration date in this baseline analysis.

These results suggest that original shareholders change their housing demand when their wealth changes but not when liquidity constraint is relaxed. Because the original shareholders cannot cash out their wealth at the time of share issuance or IPO filing, our result suggests that the original shareholders can finance their home purchases based on their illiquid wealth. It is unlikely that arbitrageurs (flippers) with enough liquidity buy houses to make short-term profits because of large housing brokerage fees. Banks in California may not be very restrictive in originating mortgages to entrepreneurs and workers at start-up firms because of their relatively rich experience with this type of consumers. Thus, the result of no-liquidity constraint may not extend to other states. For example, in a related study, Hartman-Glaser et al. use the IPO and housing data for Denver, Colorado, and find a larger treatment effect for the lockup expiration event than for the filing and issuing events. Although this difference between California and Colorado is not conclusive because of differences in data sources and estimation methods, this contrast is very suggestive of the uniqueness of mortgage origination markets in California.

We continue our analysis of the spatial effects of IPO’s on house prices by splitting our sample by relevant features of the firm’s and IPO’s. We see little difference in the effects we describe above when we separately estimate the regression for the largest and smallest firms at IPO or for the oldest and youngest firms at IPO. However, when we split the sample by return from listing-to-lockup expiration, we see an economically large difference between the lockup expiration date effect for firms with a large listing-to-lockup return versus those with a small one. Specifically, the lockup date expiration has a large spatial effect on house prices for firms with a high listing-to-lockup return and no effect for firms with a small one. This result is again consistent with the hypothesis that the effect of IPOs on house prices operates through wealth creation and not through liquidity relaxation.

Our second analysis using the San Francisco Bay as a barrier to commuting allows us to estimate a difference-in-difference like regression. In this regression, the San Francisco housing market serves as the treated group while the housing markets of nearby East Bay cities serve as a control group. We estimate this regression using treatment windows at 30, 90, and 180 days. At the 30-day treatment window, we observe a significant effect of the issue and lockup expirations dates of 2.62% and 3.33% respectively, although the Lockup-expiration effect is only significant at the 10% level. At 180 days, these effects are no longer significant, indicated that the added price appreciation in San Francisco relative to the East Bay reverses in the longer run. However, at the 180-day window, we do observe a large and significant effect on the filing date. These results are consistent with the results from spatial difference-in-difference approach that we estimate for the entire Bay Area.

*The below chart splits the effect on house prices by distance to IPO headquarters on the date of lockup expiration by the size of the return on the stock from listing to lockup. If the listing-to-lockup return is positive, there is a large spatial effect on house prices, whereas if there is a small return from listing-to-lockup expiration, there is no effect on house prices. (This could be of interest given the recent crop of IPOs, from example Uber, have low listing-to-lockup expiration returns).*



The identifying, or parallel trends, assumption in our San Francisco difference-in-difference regression is that absent an IPO for a firm headquartered in San Francisco, San Francisco and East Bay housing markets would appreciate at the same rate. We evaluate this assumption by repeating our analysis with “placebo” dates. To generate placebo dates, we shift the actual filing, issue, and lockup-expiration dates forward or backwards a fixed number of days. Consistent without parallel trends assumption, we do not see significant effects on house prices on these placebo dates.

In summary, the evidence supports an *expectations hypothesis*, in which the original shareholders without liquidity constraints change their demand for housing consumption at the IPO filing event. The evidence also supports a *wealth hypothesis*, in which the original shareholders change their housing demand when their book value of wealth is determined in the stock exchange. However, the evidence does not support a *liquidity hypothesis*, in which the original shareholders change their housing demand only when they can monetize their book wealth. In general, IPOs partly explain the appreciation of local housing prices.

This paper contributes to the literature in two ways. First, to our knowledge, this is the first study that identifies a causal effect of IPOs on local house prices. We demonstrate that positive correlations between IPOs and home price appreciation cannot be entirely attributed to the causal effect of IPOs. On average, we find a 1% effect of a filing event and a 0.8% effect of a share issuing event; i.e., a 1.8% increase in local house price around IPO firms’ headquarters for each IPO. Second, different IPO events provide a unique setting for comparing the impact of wealth and liquidity constraints. Our findings indicate that original shareholders in California shift their housing demand when a future wealth increase is anticipated and when a wealth increase is confirmed regardless of whether wealth is immediately available. This result suggests that personal financing function well for high-wealth individuals in California, allowing them to smooth consumption.

## CONCLUSION

We find evidence consistent with there being a positive and significant association between local house price changes and firms going public. The evidence is consistent with the three non-mutually exclusive hypotheses for how IPOs impact local property values. There is support for the expectations hypothesis where original shareholders that are not liquidity constrained respond to changes for their demand for housing consumption from updated expectations around the IPO filing event. Also, for the wealth hypothesis or a positive change in property values when the IPO is issued. Finally, there is evidence supporting the liquidity hypothesis of a positive change following the expiration of the lockup restriction but there is heterogeneity in the treatment effect depending on firm characteristics and the performance of the IPO. We conclude that IPOs are associated with price changes to local property markets that are in part due to the presence of credit constraints in housing.

This study uses the setting of IPOs as a natural experiment to highlight credit constraints in mortgage lending that are binding for a segment of original shareholders and pre-IPO shareholders. This paper informs on the role entrepreneurs play in the demand and consumption of housing services and how completed IPOs impact local house prices. In addition, the sequential events of the IPO provides a natural experiment to deconstruct an overall effect, in this case a wealth shock to original shareholders, into changes in expectation, wealth, and liquidity in the presence of mortgage lending constraints.

