Cash to Spend: IPO Wealth and House Prices*

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Abstract

In this study, we empirically demonstrate the positive impact of initial public offerings (IPOs) on local house prices in California from 1993 to 2017. Using the spatial difference-in-differences approach, we test whether hedonic price indexes increase after IPO events more for the areas around IPO firms' headquarters. We use the IPO events of public filing, issuing, and lockup expiration to distinguish changes in shareholders' expected wealth, assessed wealth, and immediately available wealth, respectively. On filing and issuing dates, house prices increase more for markets that are closer to the headquarters of IPO firms. On lockup dates, house price changes are positively associated with listing-to-lockup returns. This result suggests that original shareholders change their housing demand when their wealth changes. We also use the San Francisco Bay as a natural barrier to commuting. Relative to the East Bay, house prices in San Francisco exhibit sustained increases in response to IPO filings and more temporary increases in response to the issuing and lockup expiration dates.

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1 Introduction

An initial public offering (IPO) rewards a new firm's founders, angel investors, venture capitalists, and employees who have stock options (henceforth "original shareholders") (Mantecon and Poon, 2009). For example, PrivCo reports that Twitter's IPO created 1,600 millionaires.[1] The changes in wealth and liquidity experienced by shareholders around an IPO can lead to corresponding changes in their consumption, although few studies estimate this effect. In particular, demand may increase significantly for housing and durable goods (Chah et al., 1995).

In California, where startup companies cluster (Figure 1), the correlation between the number of IPOs and house price appreciation seems positive (Figure 2). Although this positive correlation is sometimes interpreted as a causal effect of the wealth created by startup companies, causality is not immediately apparent.[2] Furthermore, anticipated changes in wealth should be internalized in shareholders' consumption and tenure choices well before an IPO (Friedman, 1957). Thus, for an IPO to affect housing demand, the wealth changes must be unexpected or there must be obstacles to consumption smoothing, such as financial constraints (e.g., Tobin, 1972; Mariger, 1987; Zeldes, 1989). An additional concern is that IPOs cause house prices to appreciate; increases in the cost of living and business may be a negative side-effect of economic agglomeration (e.g., Butler et al., 2019; Cornaggia et al., 2020).[3]

In this study, we ask two questions. First, do IPOs influence local housing markets? The

[1] PrivCo does market research on private firms and reported on Twitter's IPO (`http://www.privco.com/the-twitter-mafia-and-yesterdays-big-irs-payday`).

[2] New York Times, February 20, 2017, "With Snap's I.P.O., Los Angeles Prepares to Embrace New Tech Millionaires" (`https://www.nytimes.com/2017/02/20/technology/snap-ipo-los-angeles-real-estate.html`); Zillow Blog, June 7, 2012, "Millionaire's Row: How Did Facebook's IPO Affect Silicon Valley Real Estate?" (`https://www.zillow.com/blog/millionaires-row-how-did-facebooks-ipo-affect-silicon-valley-real-estate-86027/`).

[3] See also San Francisco Business Times, August 16, 2017, "Why 83 Percent of Bay Area Renters Say They Plan to Leave" (`https://www.bizjournals.com/sanfrancisco/news/2017/08/16/why-83-percent-of-bay-area-renters-say-they-plan.html`); The Economist, August 30, 2018, "Why Startups Are Leaving Silicon Valley" (`https://www.economist.com/leaders/2018/08/30/why-startups-are-leaving-silicon-valley`).

positive correlation between IPOs and house prices may be a coincidence. It may also be generated by confounding factors, such as a change in the demand for amenities and housing supply constraints. We attempt to isolate the causal effect of IPOs on house prices in two ways. First, we adopt a spatial difference-in-differences approach and compare the effect of IPOs on housing markets that are close to the headquarters of IPO firms and those that are farther away. Second, we use the San Francisco Bay as a natural geographic barrier and compare price changes around IPO events between two areas across the bay, namely San Francisco and Alameda County. We then ask when and how IPOs affect house prices. Most IPOs consist of three sequential events: IPO filing, share issuing, and the expiration of a lockup period. These events provide a unique setting for decomposing a shock to shareholder wealth into (1) an update of the expected future wealth at the time of an IPO filing, (2) an update of the assessed wealth at issuance as the stock is priced mark-to-market, and (3) an update when the liquidity or financial constraint is relaxed at the lockup expiration event. Due to 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 (e.g., Artle and Varaiya, 1978; Schwab, 1982; Slemrod, 1982; Henderson and Ioannides, 1983; Brueckner, 1986; Vigdor, 2006; Halket and Vasudev, 2014).

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

We exploit the housing preferences of the original shareholders to reside closer to rather than farther away from the firms' headquarters to minimize commuting times. Anecdotal

evidence suggests that managers and employees of technology firms tend to prefer living near rather than far from their companies.[4] Of course, some shareholders may prefer residential areas that are distant from their companies. As the data do not identify whether home buyers are original shareholders, we are unable to pinpoint the specific areas to which managers and workers move. In this case, testing for an IPO treatment effect when the impact is not localized biases against finding a significant result in the spatial difference-in-differences analysis. At the same time, our estimate includes both the direct and indirect effects of IPOs on housing markets near headquarters. For example, there may be speculating buyers who hope to sell houses in the future at higher prices. However, short-term speculators' demand is ultimately driven by fundamental demand.

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

The three types of IPO events are well defined, with exact dates. When management decides to take a firm public, it files Form S-1 with the US Securities and Exchange Commission (SEC) that publicizes its intention of pursuing an IPO.[5] Subsequently, the firm issues a combination of primary and secondary shares on a public exchange and its market value is revealed. Many IPOs have a lockup period, during which restricted shares cannot be sold. The lockup period acts as a signal of the firm's quality to remedy information asymmetries and price supports by restricting the supply of shares (Brav and Gompers, 2003; Brau et al.,

[4]For example, Business Insider, May 5, 2011, "Zuckerberg Buys a $7 Million Home Near Facebook's New Campus" (`https://www.businessinsider.com/zuckerberg-buys-a-7-million-home-near-facebooks-new-campus-2011-5`); Marcotte Properties, November 21, 2017, "Where Do Silicon Valley's Tech Workers Really Live?" (`https://www.marcotteproperties.com/silicon-valleys-workers-live/`).

[5]Under the Securities Act of 1933, Form S-1 registers the securities being offered in an IPO. Emerging growth companies may be able to file registration materials confidentially based on the Jumpstart Our Business Startups (JOBS) Act enacted on April 5, 2012.

2005; Arthurs et al., 2009; Chen et al., 2012).

We find IPOs to have statistically significant effects of varying magnitudes on local house prices by event type, firm proximity, length of period used to measure effects, and firm and IPO characteristics. The spatial effect of California's IPOs is characterized by consistently larger magnitudes of house price changes in proximity to the IPO that monotonically decreases over space. 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 0.864% more than house prices 20 to 25 miles away in response to a firm's filing an intent to conduct an IPO. The effect is also large for IPO issuing events. In response to a firm's issuing shares in an IPO, house prices increase by 0.668% more within 5 miles of a firm's headquarters than 20 to 25 miles away. The lockup expiration date does not appear to have an effect in this baseline analysis. The evidence suggests that the treatment effect of the lockup expiration date is a function of IPO performance. Segmenting IPOs on the listing-to-lockup returns provides evidence of a positive relationship between the treatment around lockup events and returns.

These results suggest that original shareholders change their housing demand when their wealth changes but not when liquidity constraint is relaxed. As original shareholders cannot cash out their wealth at the time of share issuance or IPO filing, our results indicate that they can finance their home purchases based on their illiquid wealth. Given the large housing brokerage fees, it is unlikely that arbitrageurs (flippers) with enough liquidity buy houses to make short-term profits. Banks in California may not be very restrictive in originating mortgages to entrepreneurs and workers at startup firms because they have experience with this type of consumer.

Continuing our analysis of the spatial effects of IPOs on house prices, we split the sample along potentially relevant firm and IPO features. We examine size by total assets, firm age, and measures of IPO performance, including underpricing, and the return on listing-to-lockup expiration. Lockup expiration has a larger effect on house prices for firms with large

returns than those with small returns. This result is consistent with the hypothesis that the effect of IPOs on house prices operates through wealth creation and not through liquidity relaxation.

In our second analysis, we use the San Francisco Bay as a natural barrier to commuting to estimate a difference-in-differences-like regression. In this regression, the San Francisco housing market serves as the treated group and the housing markets of the 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 significant effects of the issue and lockup expiration dates of 2.62% and 3.33%, respectively. However, the lockup expiration effect is only significant at the 10% level. At 180 days, these effects are no longer significant, indicating that the added price appreciation in San Francisco relative to the East Bay reverses in the longer term. However, at the 180-day window, we observe a large and significant effect of the filing date of 2.37%. These results are consistent with those of the spatial difference-in-differences approach that we use in the estimation for the entire Bay Area.

The identifying assumption in our San Francisco difference-in-differences regression is parallel price trends. Without an IPO for a firm headquartered in San Francisco, the 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, issuing, and lockup expiration dates forward or backward by a fixed number of days. Consistent with our parallel trends assumption, we do not see significant effects on house prices for these placebo dates.

In summary, the evidence supports the *expected wealth hypothesis*, in which the original shareholders without liquidity constraints change their demand for housing consumption at the IPO filing event. The evidence also supports the *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 the *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 house prices.

Through this study, we make two contributions to the literature. First, we are the first to identify the causal effect of IPOs on local house prices and conduct one of the few studies concerning the effect on consumption (Butler et al., 2019, study credit-card spending.). We demonstrate that IPOs partially contribute to the positive correlation between IPOs and house price appreciation. On average, we find a 0.8% effect of a filing event and a 0.7% effect of a share issuing event (i.e., a 1.5% increase in local house prices around IPO firms' headquarters for each IPO). This study is also related to the literature showing the significant impact of financial wealth on consumption (e.g., Artle and Varaiya, 1978; Poterba, 2000; E. et al., 2005). However, the effect of an IPO is more complicated. As a result of IPO underpricing and post-IPO under-performance, IPOs do not necessarily increase wealth. IPO wealth is more clearly associated with a change in liquidity.

Thus, our second contribution is our separate analysis of the impact of wealth and liquidity constraints on housing demand using different IPO events. Studies offer models of dynamic decisions on consumption and home purchases under borrowing constraints (Schwab, 1982; Slemrod, 1982; Henderson and Ioannides, 1983; Brueckner, 1986). Mortgage qualification requirements, such as down payments, are empirically critical to home purchase decisions (Zorn, 1989; Duca and Rosenthal, 1994; Engelhardt, 1996). In particular, binding down payment restrictions may primarily affect prices rather than homeownership rates and make house prices more volatile (Stein, 1995; Vigdor, 2006). 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 functions well at least for high-wealth individuals in California, allowing them to smooth consumption.

The remainder of this paper is structured as follows. Section 2 describes the institutional background and sets up the hypotheses. Section 3 discusses the data, including the summary

statistics, and methods. Section 4 presents the main results. Section 5 decomposes the treatment at the property transaction level by market segment and composition. Finally, Section 6 concludes the paper.

2 Institutional Background and Hypothesis Development

In this section, we propose that IPOs affect local house prices through the following mechanism. First, an increase in the market value of a startup firm represents a wealth shock to its original shareholders. This wealth shock then translates into an increase in demand for housing close to the firm's headquarters, as employee shareholders prefer to live close to where they work. To the extent that local housing markets are not perfectly elastic, the demand shock leads to an increase in prices. Finally, the IPO process presents multiple opportunities for the uncertainty surrounding the magnitude of wealth created by a startup for its insiders to be resolved and for the availability of that wealth to be spent on housing. Thus, the null hypothesis is that IPOs do not affect property values.

H_0**:** *(Null Hypothesis)* No property value changes occur in association with IPO events.

The first measurable date associated with a firm's IPO is the date at which it declares its intent to go public. The firm signals that its IPO is imminent, reducing uncertainty about the exit timing and strategy of original shareholders. As reduced uncertainty surrounding IPO timing implies a shorter expected time before receiving the IPO payoff, filing increases the discounted present value of the IPO payoff. Using the date of Form S-1 submission as the IPO filing event, we define the expected wealth hypothesis as a change in the demand for housing from this updated expectation.

H_1**:** *(Expected Wealth Hypothesis)* Local property values change after Form S-1 submission.

A change in expectation increases the demand for housing if financial constraints are not binding. In this case, original shareholders can adjust their consumption of housing services even if wealth cannot be immediately liquidated. This hypothesis is essentially a version of the classic permanent income hypothesis (Friedman, 1957).

The second important date in the progression of an IPO is when firms issue equity shares and list them on an exchange. On the listing date, uncertainty surrounding the odds of a successful IPO and the firm's market value is removed. Numerous studies find evidence of IPO underpricing (i.e., when the offered share price is substantially lower than the subsequent market prices) (e.g., Logue, 1973; Certo et al., 2001; Loughran and Ritter, 2002; Dolvin and Jordan, 2008). Thus, the wealth realized in the stock market leads to a change in housing demand if financial constraints are not binding. Under the *listing hypothesis*, changes in property values around the IPO event are due to unexpected changes in the wealth for unconstrained original shareholders, again a version of the permanent income hypothesis. Although changing house prices may be caused by a change in the compensation structure for original shareholders, their wages are unlikely to change around the IPO event.

H_2**:** *(Wealth Hypothesis)* Local property values change after a firm's shares are listed on a public exchange.

At an IPO event, even if original shareholders' wealth constraints are relaxed, they may not change their housing demand if they are still financially constrained. A lockup restriction may leave original shareholders financially constrained because they are unable to liquidate their equity position in the firm until the lockup period expires. During this period, which is usually 180 days, original shareholders are restricted from selling and cashing out their shares. Some IPOs do not have a lockup period, but they are exceptional. The lockup period helps original shareholders signal a firm's quality to investors, align incentives, and protect underwriters.

Some firms offer original shareholders' existing secondary shares to the public in addition to new primary shares. A secondary share offering allows original shareholders to liquidate

their pre-IPO shares regardless of the lockup restriction. Chua and Nasser (2016) finds that original shareholders are motivated to offer secondary shares by liquidity needs. For example, smaller cash-pay is associated with larger secondary offerings. However, investors perceive secondary shares negatively (e.g., Aggarwal et al., 2002). Thus, few firms offer them; when they do, it is only to a fraction of original shareholders (Field and Hanka, 2001).

Third, the lockup expiration event occurs when the trading restriction expires for original shareholders.[6] Lockup expiration enables restricted shareholders to liquidate their shares. Under the liquidity hypothesis, the demand for owner-occupied housing changes following lockup expiration because original shareholders are no longer financially constrained.

H_3**:** *(Liquidity Hypothesis)* Local property values change after the expiration of the lockup period.

One concern is that the lockup event has a confounding factor. For example, Field and Hanka (2001) find an abnormal -1.5% 3-day return around lockup expiration events. However, this confounder only biases against the liquidity hypothesis.

3 Methodology and Data

Using a hedonic approach to modeling house prices, we test for an association between IPOs and local house price changes. The hedonic price method assumes that property value is the sum of the implicit prices of a bundle of attributes in equilibrium (e.g., Rosen, 1974). It is a common method applied in housing-related research.

However, concern about omitted variables arises when prices and implicit attributes are determined in a spatial equilibrium. In our case, the estimate of a treatment effect is biased if the choice of the firm's location correlates with the timing of the IPO, if the timing of the IPO correlates with local housing market cycles, or if they both correlate with an unobserved omitted variable.

[6] When more than one lockup expiration date appears in the SDC IPO data, we consider the first incidence as the lockup expiration date.

Our main concern is that IPO timing and headquarters location are endogenous choice variables. Brau and Fawcett (2006) survey chief financial officers and find that creating shares for acquisitions is the most important motivating factor for going public where the overall stock market and industry performance are the largest determinants of IPO timing. Therefore, IPOs are not timed in coordination with house prices directly, but the determinants of IPO timing may still correlate with an omitted variable that correlates with local property values.

To deal with this problem, we exploit the spatial-temporal variation of IPOs and follow two main approaches. Our first approach is a spatial difference-in-differences approach. Pope and Pope (2015) estimate the impact of Walmart store openings by comparing house price changes around a store opening between the area closer to a Walmart to those in an area slightly farther away. Other studies use similar designs to analyze the impact of sex offenders (Pope, 2008) and the spillover effect associated with foreclosures and forced sales (Schuetz et al., 2008; Lin et al., 2009; Campbell et al., 2011; Gerardi et al., 2015). We construct IPO-specific HPIs that capture house price movements in geographic annuli (i.e., distance bands) surrounding a firm's headquarters at multiple distances. Next, we regress those indexes on an indicator for periods following an IPO event, indicators for distance bands, and interactions between the distance bands and the post indicator.

Our second approach is to exploit the geographic features of the location of many of the IPOs in our sample. We treat the San Francisco Bay as a natural barrier to commuting for workers at IPO firms. The cities in the San Francisco Peninsula in which IPO firms are headquartered are considered "treated cities" and those on the east side of San Francisco are considered "control cities." Using these treatment and control classifications, we estimate a traditional difference-in-differences model for each IPO event.

This difference-in-differences approach requires two assumptions for the results to be interpreted as causal. First, original shareholders are assumed to value proximity to the firm's headquarters, ceteris paribus. This assumption holds as long as they place some cost

on commuting time and distance and commuting time are associated. Second, we attribute changes in house prices levels right before and right after an IPO event to the IPO event itself. Only including transactions that occur around the IPO event date being considered and within 5 miles of the firm's headquarters limits the possibility of confounding events. This approach controls for the trend in house prices and time-invariant omitted variables related to the firm's location.

Furthermore, we consider each IPO as three separate event studies corresponding to the sequential events of a completed IPO. In this way, the IPO events being considered do not occur simultaneously with the decision to go public. Instead, the time between the decision to go public and each IPO event varies by event and across firms. For example, the length of time between filing and issuance depends on the time that managers spend with underwriters gauging investor interest. The time between IPO issuance and lockup expiration is defined by institutional convention, which is independent of any consideration of local house prices, to be 180 days. As a result, it can take years to go from IPO filing to lockup expiration. Given no indication that pursuing an IPO coincides with the local housing cycle over the series of IPO events, separate IPO events are exogenous shocks to the local housing market.

3.1 Data and Summary Statistics

Transaction-Level Data

We use Zillow residential property data for California. These data are the product of merging their transaction and property assessment files (Zillow, 2018). The raw file contains 12.8 million transactions, with 99% falling between 1993 and 2017. First, we clear the observations of missing and unwanted or unreasonable property characteristics (e.g., intra-family transactions). Next, we filter the properties by property type, the number of parcels, and the number of buildings. Furthermore, we restrict the sample to single parcels containing only one building and include the following property types: residential general, single-family or inferred single-family, rural residence, townhouse, row house, planned unit development,

and bungalow. The final sample consists of properties that (1) have at least one full bathroom and at least one bedroom, (2) have a non-negative property age and are less than or equal to 150 years old, (3) have a non-missing sales price greater than or equal to $1,000, (4) have no more than four units, (5) have non-missing latitude and longitude, (6) have non-missing land size strictly greater than 500 square feet, and (7) have a non-missing number of stories less than or equal to three. The final sample has 6.38 million unique property transactions from 1993 to 2017.

IPO Data

From SDC, we obtain 1,987 unique IPOs for California from 1970 to 2017.[7] Firms with inaccurate or imprecise address information for their headquarters are excluded.[8] The final sample includes 725 IPOs from California with IPO events between 1993 and 2017.

We supplement the IPO data from SDC with data from the Center for Research in Security Prices (CRSP) and Ritter.[9] From the CRSP, we obtain the daily open and closing stock prices, returns with and without dividends, the number of shares outstanding, and the volume of shares traded. From Ritter, we obtain firms' founding year and rollup status.[10] Of the 725 unique IPOs, 224 offer secondary shares at the IPO, 447 are backed by venture capital, 71 have their IPO issuance backed by private equity, and 16 are identified as rollup firms.

Summary Statistics

Table 1 summarizes the distribution of transactions and IPOs by year and IPO event. The IPOs appear to come in waves, with most filings at the peak of the dot-com bubble

[7] Figure B of the appendix provides a comprehensive summary of the SDC IPO search criteria.

[8] Excluded IPOs include those with missing address information, when a P.O. box is listed as a firm's address, and when geocoding returns an inaccurate longitude and latitude for the street address. The Google Maps geocoding API is used to determine the longitude and latitude of the firm's listed address.

[9] The Field-Ritter data on IPOs is downloaded (10/21/2017) from `https://site.warrington.ufl.edu/ritter/ipo-data/`.

[10] A rollup firm is one that grows by acquiring other firms.

in 1999 and smaller waves around 2004 and then again around 2014. Therefore, our period of analysis covers multiple cycles and market environments, including the financial crisis period.

Table 2 provides descriptive statistics at the property and firm levels. Panel A summarizes the transacted properties for which the average sales price during this period is $335,145. After adjusting for inflation, the average adjusted sales price during this period is $415,363.[11] In the analyses, the adjusted sales prices are used to generate the results, which are robust to using the raw sales prices. Large standard deviations in the property characteristics are observed, but they are in line with similar studies.

Panel B summarizes the sample of IPOs in which the average target price is $12.99 per share with a maximum price of $97.00 and average PIO proceeds of roughly $131 million. The IPO- and firm-level characteristics demonstrate considerable variation, as exhibited by the large ranges and standard deviations. For example, the average total assets is $224.24 million, with a minimum of $0.10 million and a maximum of $7,190 million for the largest firm by total assets. To further examine the relationship between IPOs and local house prices, we exploit the variation in firm and IPO characteristics in robustness tests. We focus on the variation in firm age, total assets, offer type, offer price, IPO proceeds, IPO underpricing, and the firm's stock performance post-IPO.

Panels C and D provide additional summary information on IPO performance. The average return at 1 year from the IPO is 25.47%, with a minimum of -227.78% and a maximum of 740.83%. Here, the firm's return is the percentage change from the offer price to the closing price on the date considered (i.e., 1 year following IPO) and the displayed average return is the simple average across the firms. To quantify the IPO-associated risk, we calculate the relative volatility for each firm's stock post-IPO as the standard deviation of daily closing prices divided by the average of closing prices for the period.

[11]Sales prices are adjusted by finding the May 2017 dollar equivalent according to the monthly Consumer Price Index (CPI) for All Urban Consumers: All Items from `https://fred.stlouisfed.org/series/CPIAUCSL` (downloaded 7/19/2017).

Event-Level Statistics

Table 3 shows the mean differences in the adjusted sales prices of transactions in the pre- or post-period by event type and across distances of 1, 5, and 10 miles from the IPO firm's headquarters. Specifically, transactions are identified as occurring in a pre- or post-event window if they are within a specified radius of a firm's headquarters (1, 5, or 10 miles) and the sales date for the property is within 90 days of that firm's IPO event. For example, for Facebook's IPO, we define a 5-mile radius from Facebook's headquarters and identify property transactions occurring within the 90 days before and after its filing event (Figure 3). We repeat this procedure for each IPO firm (e.g., Figures 4 and 5). It is possible for a transaction to be included in the pre-period for one IPO and in the post- or treatment period for another. In this table, we only include observations that are in one pre-period or one post-period window by event type for a clean interpretation of treatment. For example, a transaction that appears in the pre-lockup expiration period for XYZ and the post-lockup expiration period for another IPO is excluded from this table summary of the lockup event. Instead, the main results are based on HPIs that are generated at the firm event-level, where overlapping observations are not excluded.

Table 3 shows that the post-filing prices are consistently higher than the corresponding pre-filing prices, with a roughly 3.7% increase in the unconditional mean at 1 mile that decreases to 2.8% and 1.3% at 5 miles and 10 miles, respectively. The lockup expiration event shows a consistent negative price change in local house prices across the distances with the largest decrease, or -6.5% at 1 mile around the firm. The change around the issue date varies from being negative at 1 mile and 10 miles to being positive at 5 miles. The largest magnitude of price change around the issue date is -2.4% within a 1-mile distance boundary from the firm. Additional analysis is necessary to control for differences in the composition of properties transacted and trends in house prices in the pre- versus post-period by IPO event.

3.2 Baseline Hedonic Price Index for California

We construct HPIs around each IPO firm's headquarters for each IPO event that account for aggregate conditions and trends in California's housing market. The estimations of these residual HPIs (RHPIs) proceed as follows. First, we estimate a hedonic HPI using the entire sample of cleaned transactions (6,381,800 from 1993 to 2017) for California. Specifically, we estimate a log-linear specification run at the property level (i) that includes controls for property characteristics (X_i), county-fixed effects (δ_c), year/month-fixed effects (δ_{t_c}) in "calendar" time, and quarterly dummies to separately identify the effect of seasonality (δ_s):

$$ln(P_{icst_c}) \quad = \quad \beta_0 + uX_i + \delta_{ic} + \delta_{it_c} + \delta_{is} + \varepsilon_{icst_c} \tag{1}$$

From the coefficient estimates, the residual or unexplained variation in house prices is expressed as follows:

$$Residual_{icst_c} = ln(P_{icst_c}) - \widehat{ln(P_{icst_c})} \tag{2}$$

With the residuals at the transaction level, the HPIs by firm (f) and IPO event (e) are constructed following the time dummy approach. The transactions included are only those observations identified in the firm's pre- or post-period by IPO event and either within a certain distance band of the headquarters (i.e., within 5 miles or 5 to 10 miles), within the city of San Francisco, or within cities in the East Bay that serve as control cities for San Francisco. Where time (t_c) previously identified calendar months, time (t_{fe}) now represents the "event time" or indicators defined in 10-day intervals from each by firm event date. We estimate the RHPIs to capture the unexplained variation in house prices:

$$Residual_{it_{fe}} = \beta_0 + \sum_{t_{fe}=-s}^{s} \delta_{t_{fe}} T_{it_{fe}} + \varepsilon_{it_{fe}} \quad (3)$$

Here, s is a time window around the event and $T_{it_{fe}}$ represents time dummies for the dates around the event.

In this specification, the coefficient estimates on the time dummies ($\hat{\delta}_{t_{fe}}$) give the variation in house prices, which is unexplained by property characteristics or the general trend in house prices in California. We run the firm by IPO event regressions separately to construct the firm event-level RHPIs ($RHPI_{fedt_{fe}} = 100 \cdot exp(\hat{\delta}_{t_{fe}})$), where d identifies the boundary or geographic proximity constraint imposed on the within (treated) transactions (i.e., 5 miles from headquarters).

However, we estimate the residuals based on certain limiting assumptions, such as holding the trends in housing constant across the entire state of California. Therefore, we construct a comparable per firm per event index or $RHPI^{c}_{fedt_{fe}}$ to control for the local trend. The $RHPI^{c}_{fedt_{fe}}$ is defined in the same event time as that of the treated $RHPI_{fedt_{fe}}$ for the county in which the firm is located but excluding the within or treated transactions.

4 Spatial Effects of IPOs on House Prices

4.1 Main Results

In this section, we describe the spatial effects of the three IPO events on house prices. The first step in this analysis is generating unique RHPIs by distance band (0 to 5 miles, 5 to 10 miles, and up to 45 to 50 miles from the firm) for each firm-IPO event. As a result, each firm-IPO event has 10 distinct RHPIs, with each representing unexplained house price variation for the mutually exclusive regions. The omitted or base period is the earliest 10-day bucket. We then include an observation of each RHPI for a ±180-day window around each

firm-IPO event.

Next, we estimate a regression model that provides estimates of average level changes in the RHPIs during the post-period compared to the pre-period by distance band. Specifically, the constant term and the main effect of the post-period are omitted. We include the main effects of each distance region, the interaction of the distance and post-period indicator, and firm-fixed effects, thereby controlling for variation by region, time, and firm characteristics.

$$RHPI_{fetd} = \sum_{d_{fe}=1}^{10} \left[\delta_{d_{fe}} DistanceBand_{d_{fe}} + \beta_{d_{fe}} (Post_{fe} \cdot DistanceBand_{d_{fe}})\right] + \eta_f + \varepsilon_{fetd} \tag{4}$$

This analysis is similar to the spatial difference-in-differences design of Pope and Pope (2015). The variable $DistanceBand_{d_{fe}}$ corresponds to indicators specific to a firm event and a distance from headquarters in the set $0-5, 5-10, ..., 45-50$ miles.

The coefficient estimates for the interaction terms identify the relative RHPI level change from the pre-period to the post-period by distance band. The standard errors, which are clustered by year and the zip code of a firm's headquarters, for the coefficient estimates of the interaction terms, then represent the likelihood that the treatment effect differs from the distance band price levels captured by the main effects.

Figure 6 illustrates the coefficients and standard errors from estimating the regression in Equation 4. Panel A of Figure 6 displays the estimates for the filing date event. The figures show a significant decrease in the effect of the IPO filing date as the distance from IPO firms' headquarters increases. The coefficient $\beta_{1_{fe}}$ on the closest distance band (i.e., 0 to 5 miles) is 2.722%, with a standard error of 0.428. The coefficient $\beta_{5_{fe}}$ on 20 to 25 miles is 1.556%, with a standard error of 0.221. Although less pronounced, similar patterns are present in Panels B and C of Figure 6, which display the effects of the listing date and lockup expiration date, respectively. Panel B shows that $\beta_{1_{fe}}$ is 2.507%, with a standard

error of 0.334, and that $\beta_{5_{fe}}$ is 1.681%, with a standard of 0.209. This again indicates that the listing date has a positive effect that decays with distance. In Panel C, the confidence intervals of the coefficient estimates for the 0- to 5-mile band through roughly the 20- to 25-mile band are close enough that we fail to reject the null hypothesis that they are not significantly different. However, in all three plots, a large difference between the effects of house prices close to the firm and at the extreme distance of 45 to 50 miles is apparent. The spatial effect of the filing date on house prices is clear. The listing date has a weaker effect, and the lockup data has little to no effect. These results support the expected wealth hypothesis and, to some degree, the wealth hypothesis, but they do not support the liquidity hypothesis.

To verify the statistical significance of the effects apparent in Figure 6, we estimate a difference-in-differences version of the regression in Equation (4):

$$RHPI_{fetd} = \alpha + Post_{fe} + DistanceBand_{1_{fe}} + Post_{fe} * DistanceBand_{1_{fe}} + \eta_f + \varepsilon_{fetd} \quad (5)$$

The treated group $DistanceBand_{1_{fe}}$ consists of the RHPI estimated on transactions within 5 miles of headquarters and the control group consists of the RHPI estimated on transactions in the 20- to 25-mile distance band around headquarters. Table 4 reports the results of this regression for three time windows. Panels A and B report the results for 30- and 90-day estimation windows, respectively. Only the issue date appears to have a significant effect on house prices within the 90-day window. Furthermore, the effect is only marginally significant. Panel C shows the results for a 180-day estimation window, which correspond to the effects we document in Figure 6. We see a 0.864 greater percentage point increase in the appreciation of house prices around the filing date for transactions within 5 miles of headquarters than for transactions 20 to 25 miles away from headquarters. Similarly, the same comparison around the issue dates shows a 0.668 greater percentage point increase.

We find no significant effect on the lockup expiration date during the 180-day event window.

The following sections exploit the variation in firm-IPO characteristics to expand on the main results shown in Figure 6.

4.2 Variation by Firm Characteristics

In terms of firm characteristics, firm age is a likely proxy for growth and time at the headquarters and total assets is a proxy for firm size.[12] For example, growth firms can be cash-constrained and thus rely more heavily on stock options to compensate original shareholders. As firm-level characteristics may not be linearly related to the treatment effect, we sort the firms into buckets by quartiles on the variable of interest and estimate the base model (4) for the top and bottom quartiles.

In Figure 7, we repeat the analysis shown in Figure 6 separately for the top and bottom quartiles of the firms by firm age at the filing date. Interestingly, we find no substantial difference in the spatial effect of IPOs on house prices for old and young firms around the lockup event. Looking at the filing and listing events, the youngest quartile of firms tend to have higher coefficient estimates for the interaction between the post-period indicator and the geographic band. Furthermore, the treatment effect associated with the youngest quartile of firms appears to decay more slowly over space, with the largest differences in pre-post house prices observed between the youngest and oldest firms in the bands from 25 to 40 miles away from firm headquarters.

We repeat the analysis for the top and bottom quartiles of the firms by total assets. Figure 8 shows the results. The firms are sorted into quartiles by their total assets, with their total assets measured just before going public. However, we find no substantial differences in the spatial effect of IPOs on house prices by total assets.

[12]Of the 725 IPOs in the sample, 115 are missing firm age and 126 firms are missing total assets. These missing values are excluded from the respective analyses.

4.3 Returns by IPO Performance

We measure post-IPO performance by a firm's stock return and assume a direct relationship between the magnitude of returns and the wealth shock experienced by the original shareholders. To test whether the treatment effect is sensitive to firms' IPO performance, we estimate the following model specification incorporating event-specific returns.

In Figure 9, we repeat the analysis shown in Figure 6 separately for the firms with large (small) first-trading-day returns (i.e., underpricing). The firms with larger first-day returns exhibit a greater effect on house prices at the listing date. We also find evidence that larger effects at the filing event are predictive and positively associated with underpricing at issuance.

To test whether the effect of lockup expiration is sensitive to the amount of wealth accumulated by shareholders from the IPO, we sort the firms according to their listing-to-lockup return. In Figure 10, we repeat the analysis shown in Figure 6 separately for the firms with large (small) listing-to-lockup expiration returns. These are ex-post returns that are realized after the filing and listing events.[13]

The difference in the impact of the lockup expiration date on house prices is substantial once we condition on returns. When a firm has a large listing-to-lockup return, the lockup expiration date has a large effect on house prices. This effect is consistent with the expected wealth hypothesis. When shares appreciate more, the lockup expiration date represents a larger liquidity shock for those households.

5 Effects of IPOs on San Francisco House Prices

In this section, we use the San Francisco Bay as a natural geographic barrier that provides an added cost of commuting from the East Bay to the headquarters of IPO firms located in the city of San Francisco. The added cost of commuting implies that housing markets in

[13]In Figure 6, the listing-to-lockup returns are adjusted for the S&P 500 return over the same periods to remove the market trend. The figures without this adjustment are not materially different.

the East Bay are less likely to be affected by IPOs in San Francisco than housing markets in the city of San Francisco are. Thus, we compare house price changes in San Francisco with those in the East Bay around IPO events.

To identify the house price changes following IPO events, we implement a difference-in-differences approach, which is appropriate as long as the East Bay is a good control for the trend in house prices. Our difference-in-differences procedure consists of three steps. First, we exploit the population of California transactions to control for trends and seasonality in house prices.[14] Second, we generate per firm per event HPIs separately for the city of San Francisco (treatment area) and cities in the East Bay (control area).[15] Lastly, we obtain the average treatment effect of IPO events on the treated group from the difference-in-differences coefficient estimates.

We estimate the difference-in-differences coefficients to identify the conditional average treatment effects of IPO events on the treated group. Each event is run separately using the following model specification:

$$RHPI_{fetd} = \beta_0 + \beta_1 Post_{fe} + \beta_2 Treated_{fe} + \beta_3 (Post_{fe} \cdot Treated_{fe}) + \eta_f + \varepsilon_{fet} \qquad (6)$$

The left-hand variable ($RHPI_{fetd}$) gives the time series of house price levels over the pre-post windows. The dummy variable $Post_{fe}$ identifies the post-period by firm (f) and event (e). Treatment identifies the RHPI series associated with the area of a firm's headquarters. The RHPI complement controls for regional trends in house prices and confounding events. Firm-fixed effects (η_f) control for firm-level variation. Lastly, the reported standard errors are clustered by firm zip code by IPO year.

Table 5 displays the results of estimating the regression in (6) at three time horizons. Panel A shows the results of the regression for a window of 30 days plus or minus the event

[14]The methodology is summarized in Section 3.2.

[15]The East Bay cities in the control group include Alameda, San Leandro, San Lorenzo, Castro Valley, Albany, Berkeley, Emeryville, Kensington, Oakland, and Piedmont.

date. At this horizon, houses prices increase significantly, by approximately 2.6% on the issue date and 3.3% on the lockup expiration date. However, the change on the lockup date is only significant at the 10% level. No effect is observed around the filing date at this time horizon, which is unsurprising given that the filing event is the most difficult of the events for insiders to time. At the 90-day window, the lockup expiration date effect is no longer positive and the issue date effect is smaller in both magnitude and statistical significance. At the 180-day window, both the issue date and the lockup date effects disappear, whereas the filing date has a significant effect of approximately 2.4%.

Taken together, the results in Table 5 indicate a degree of efficiency in San Francisco's housing market consistent with the expected wealth hypothesis. The results of the difference-in-differences regression at the 180-day window imply a persistent effect on the housing market following a firm's announcement of its intent to pursue an IPO. The treatment effects of an IPO's listing and lockup expiration are both more immediate and temporary. As in the case of the California-wide analysis, the results for San Francisco support the expected wealth hypothesis. Although the San Francisco results also show some support for the liquidity hypothesis, the effect is short-lived.

In Tables 6 and 7, we repeat the analysis shown in Table 5 but split the sample by IPO characteristics. Table 6 shows that the issuance date effects presented in Panel A of Table 5 are driven by older and larger firms with more underpriced IPOs. In comparison, the lockup date effects are driven by older firms whose IPOs have greater listing-to-lockup returns. Table 7 shows that the filing date effect evident in Panel C of 5 is driven by older firms with more underpriced IPOs.

We find a disagreement between the San Francisco results (Tables 6 and 7) and the coefficient estimates displayed for California in Figures 7 and 8. The disagreement is the result of a combination of differences in the firm samples (i.e., young firms in San Francisco are fundamentally different from young firms generally) and methodologies.

The coefficient estimates for the variables of interest in the California analysis identify

the level change between pre- and post-period HPIs by distance band (e.g., Equation (4)). Alternatively, the difference-in-differences model specification used to generate the estimates of the average treatment effect on the treated group for San Francisco includes a dedicated control group in Alameda house prices (e.g., Equation 6).

The difference-in-differences approach is an effective method of controlling for the regional trend in house prices. However, the deviation in HPIs between the treated and control groups after IPO events identifies the treatment effect of IPO events if and only if the trends would otherwise be the same except for the presence of IPO events affecting the treated population.

Figures 11 and 12 show the results of the placebo analyses used to test the parallel trend assumption we use in 4. We rerun the regression using falsified event dates ranging from -120 to 120 days at 30-day intervals for each IPO event. Figures 11 and 12 report the coefficient estimates for the interaction term ($Post_{fe} \cdot Treated_{fe}$) from each iteration. For example, in Panel A of Figure 11, at -120 days from the actual filing event, the coefficient estimate identifies the HPI in San Francisco in the post-period based on a 30-day pre- and post-event window compared to the control. For the most part, the falsified events are insignificantly different from 0 across Panels A, B, and C. The actual or realized events where the tests occur at time 0 are positive and statistically significant. In Figure 12, we repeat the exercise but smooth the coefficient estimates for the treatment effect by defining the event windows at 180 days. We fail to reject the assumption of a parallel trend between the house prices in the treatment and control groups.

6 Conclusion

Combining IPO and residential property transaction data for California from 1993 to 2017, we (1) test for an association between IPOs and local house prices; (2) compare and contrast the different IPO events; (3) test for an association between IPOs and changes in the composition of residential properties being transacted by examining property character-

istics and market segments; and (4) test for an association between firm characteristics that includes IPO performance and house prices.

We find evidence consistent with 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 regarding how IPOs affect local property values. The expected wealth hypothesis is supported, suggesting that original shareholders who are not financially constrained respond to changes in their demand for housing consumption from updated expectations around the IPO filing event. The listing hypothesis is also supported, indicating a positive change in property values when IPOs are issued. Finally, the evidence supports the liquidity hypothesis, suggesting a positive change following the expiration of the lockup restriction, which is sensitive to firm characteristics and IPO performance. We conclude that IPOs are associated with price changes in local property markets that are in part due to the presence of credit constraints in housing.

Using the IPO setting as a natural experiment, we highlight credit constraints in mortgage lending that are binding for a segment of original shareholders and pre-IPO shareholders. Our results are preliminary and require verification through further study. However, they do offer insights into the role that entrepreneurs play in the demand and consumption of housing services and how completed IPOs affect local house prices. Furthermore, the sequential events of an IPO provide a natural experimental setting in which to deconstruct the overall effect (i.e., a wealth shock to original shareholders) into changes in expectation, wealth, and liquidity in the presence of mortgage lending constraints.

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Figure 1. California IPOs from 1993 to 2017. Displayed are the headquarter locations of firms that initiated IPOs between 1993 and 2017.

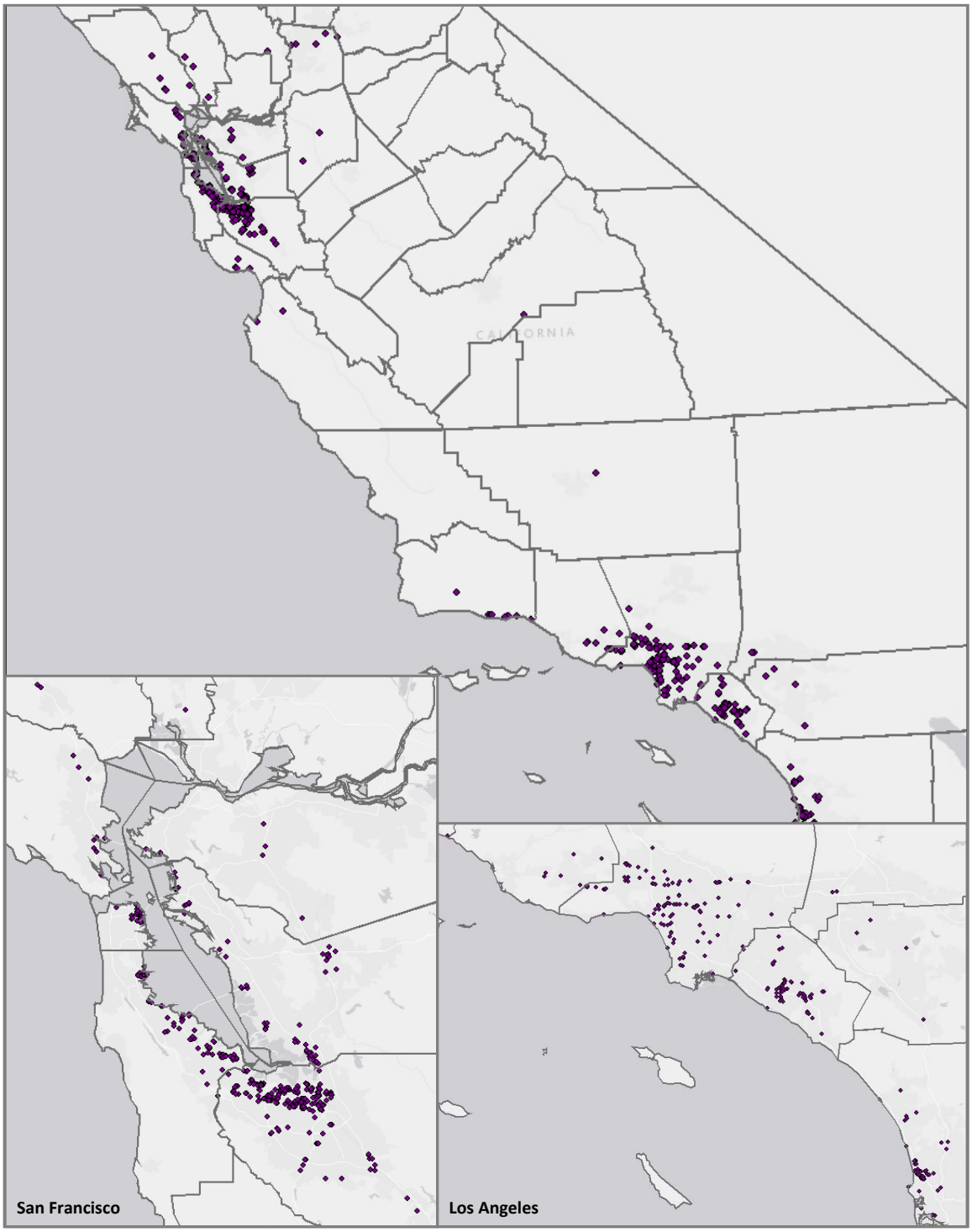


Figure 2. Number of IPOs and California House Prices from 1993 to 2017. This figure compares the number of IPO filings and HPIs for Silicon Valley and the rest of California between 1993 and 2017.

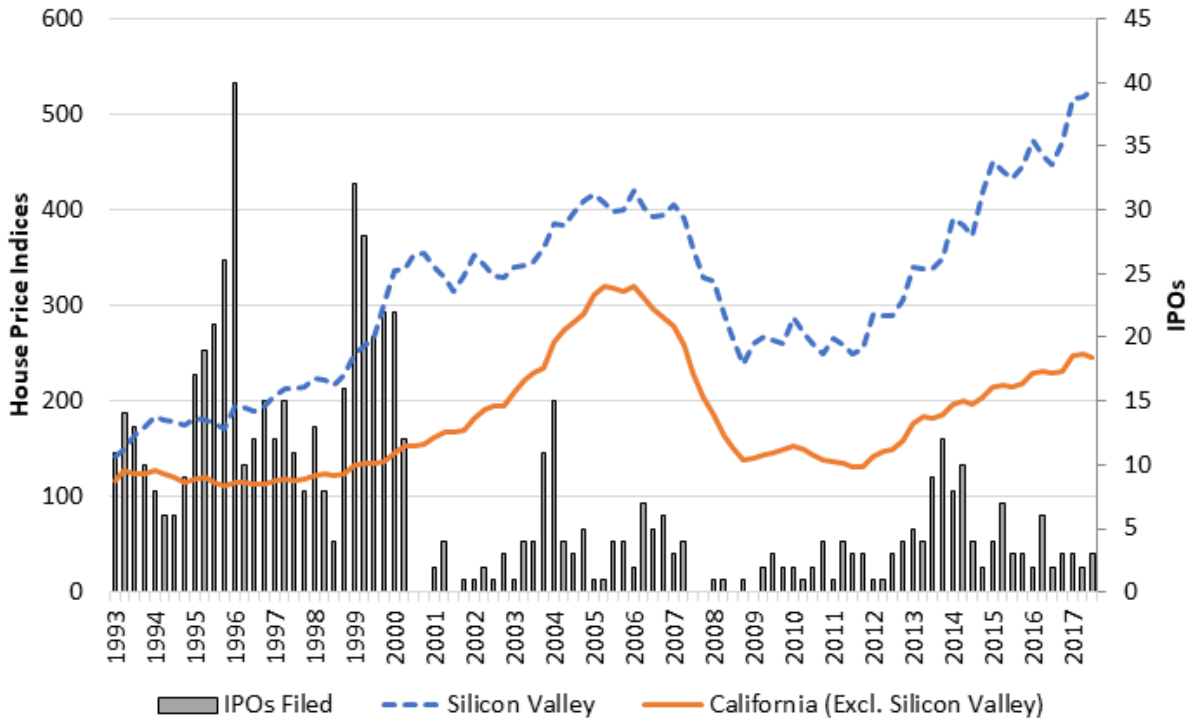


Figure 3. House Transactions within 5 miles of Facebook's Headquarters by IPO Event. This figure shows a 5-mile radius around Facebook's headquarters in Silicon Valley and the locations of house transactions around the filing, issuing, and lockup expiration events. The pre-period includes the 90 days before the event and the event date. The post-period includes the 90 days after the event.

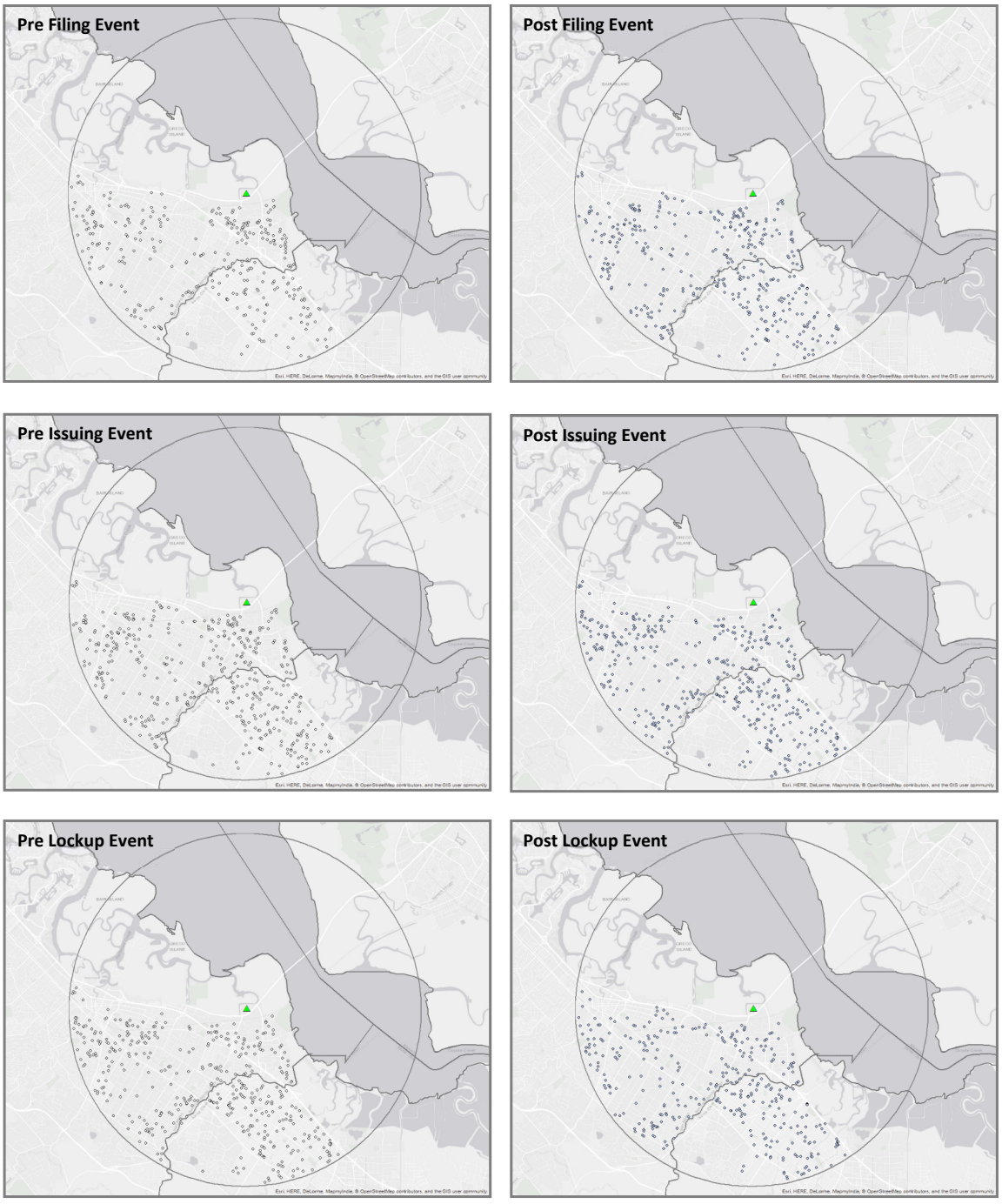


Figure 4. House Transactions within 5 miles of Google's Headquarters by IPO Event. This figure shows a 5-mile radius around Google's headquarters in Silicon Valley and the locations of house transactions around the filing, issuing, and lockup expiration events. The pre-period includes the 90 days before the event and the event date. The post-period includes the 90 days after the event.

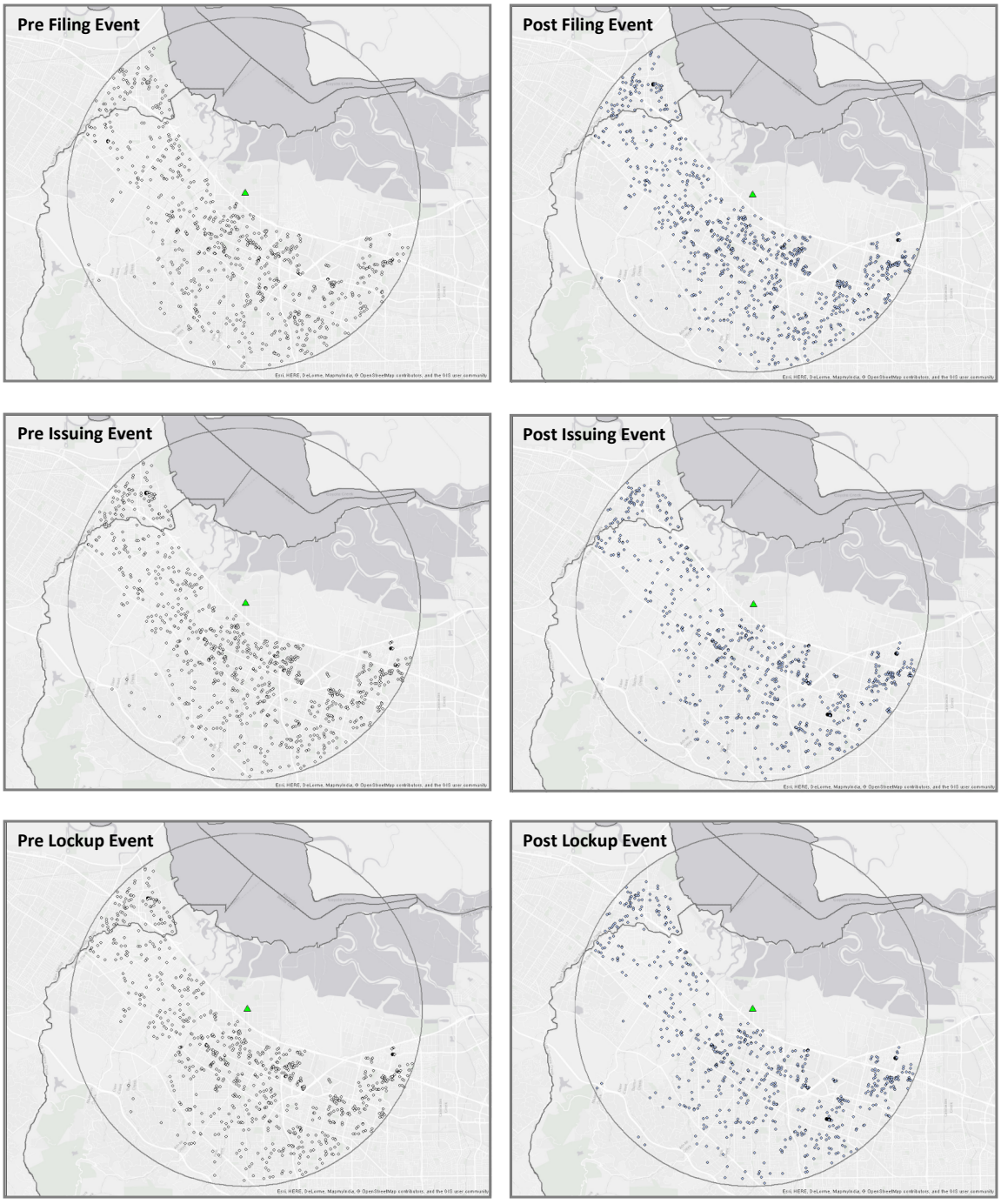
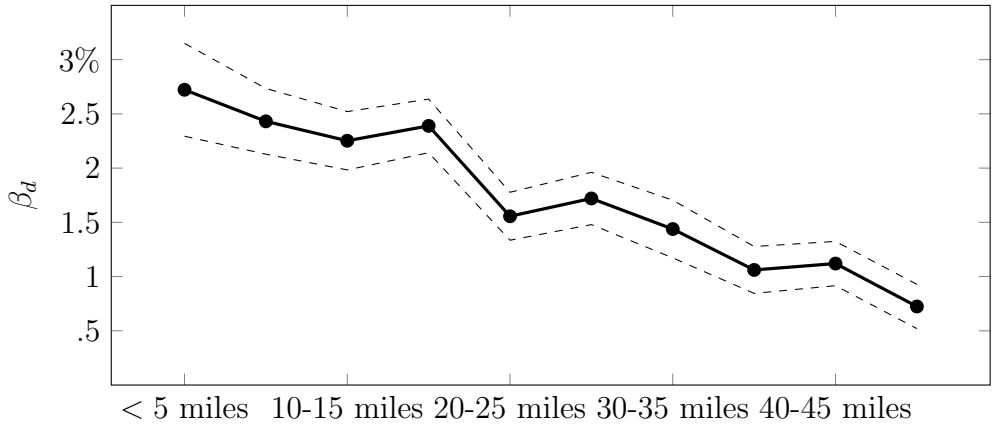


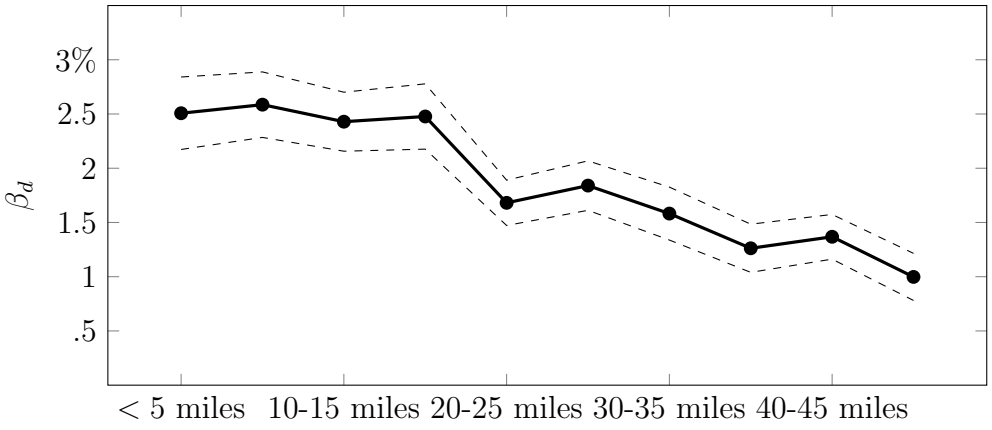
Figure 5. House Transactions within 5 miles of Twitter's Headquarters by IPO Event. This figure shows a 5-mile radius around Twitter's headquarters in Silicon Valley and the locations of house transactions around the filing, issuing, and lockup expiration events. The pre-period includes the 90 days before the event and the event date. The post-period includes the 90 days after the event.

Figure 6. Spatial Effects of IPOs on House Prices. The plots display the regression coefficients obtained from estimating Equation 4 using solid black lines and the standard error bounds using dashed lines.

Panel A: Spatial Effects of IPO Filing Date on House Prices at 180 Days



Panel B: Spatial Effects of IPO Listing Date on House Prices at 180 Days



Panel C: Spatial Effects of IPO Lockup Expiration on House Prices

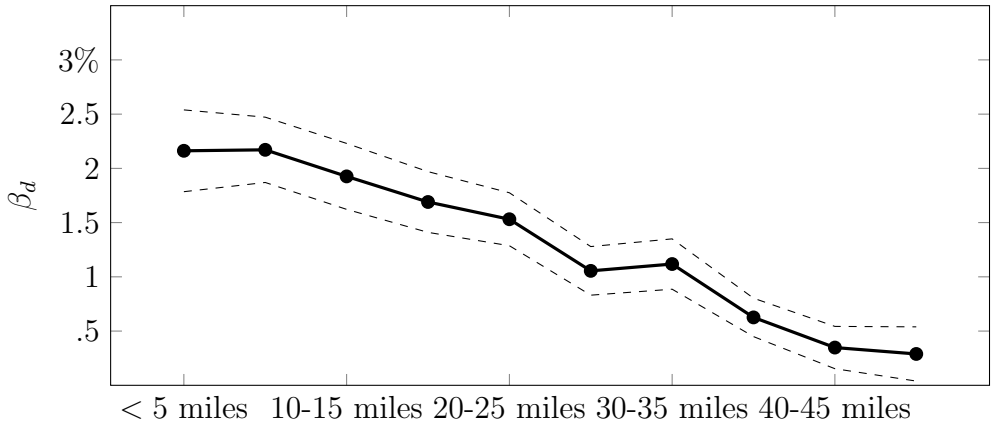
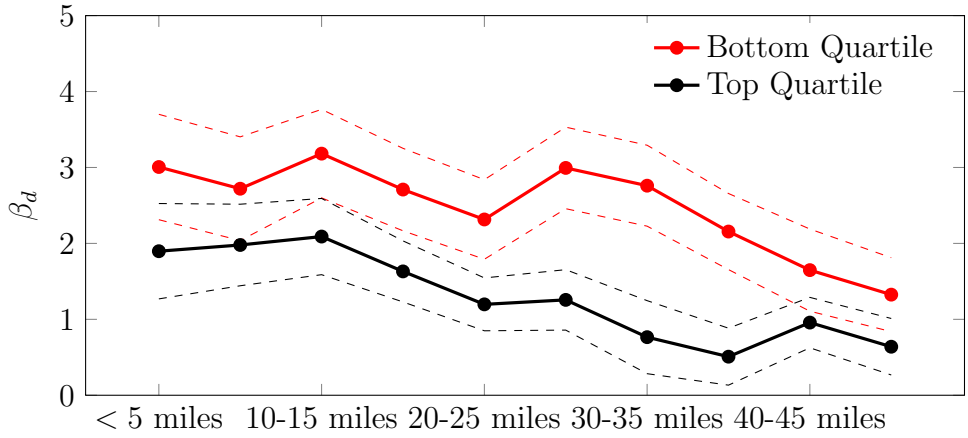
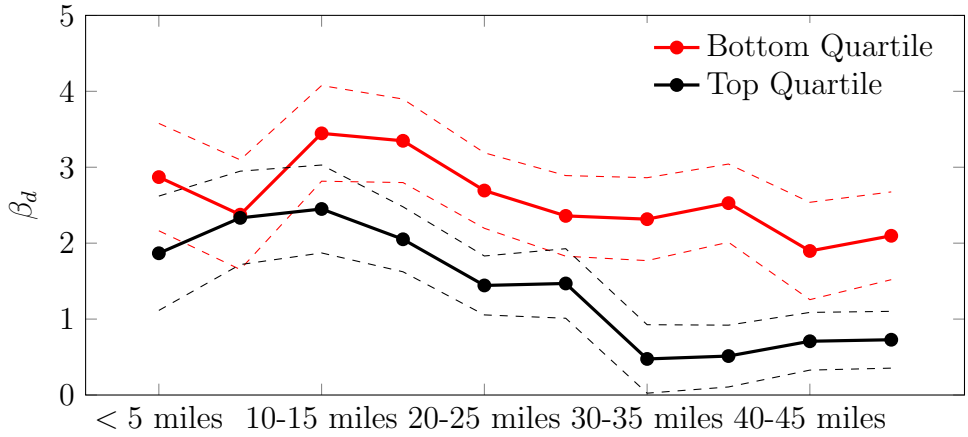


Figure 7. Spatial Effects of IPOs on House Prices by Firm Age. The plots display the regression coefficients obtained from estimating Equation 4 separately for the IPOs. The firm age at filing date is shown in the top (bottom) quartile using solid black (red) lines and the standard error bounds are shown using dashed lines.

Panel A: Spatial Effects of IPO Filing Date on House Prices by Firm Age at Filing



Panel B: Spatial Effects of IPO Listing Date on House Prices by Firm Age at Filing



Panel C: Spatial Effects of IPO Lockup Expiration on House Prices by Firm Age at Filing

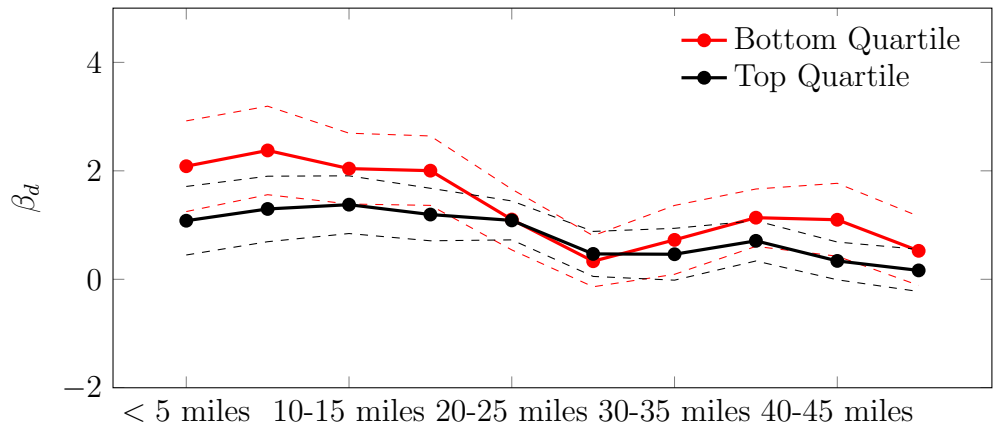
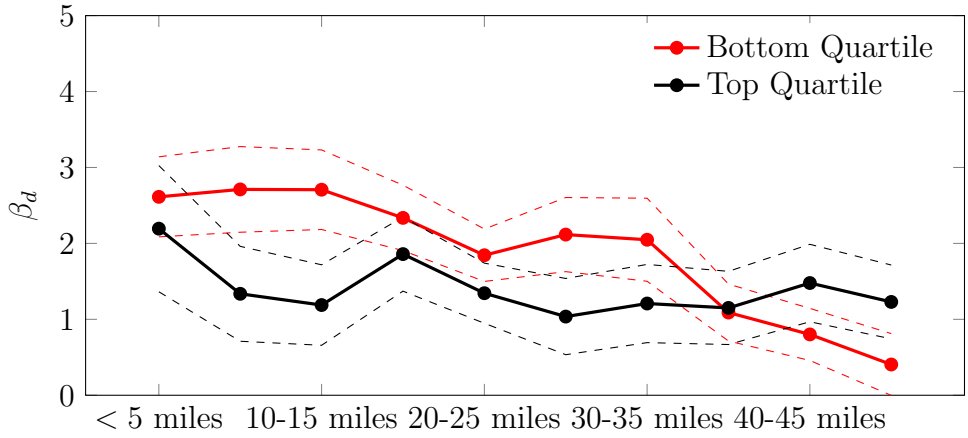
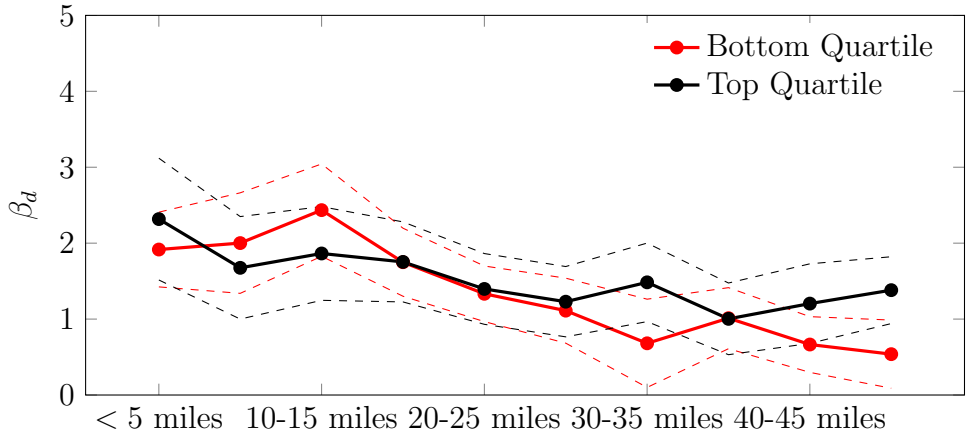


Figure 8. Spatial Effects of IPOs on House Prices by Total Assets. The plots display the regression coefficients obtained from estimating Equation 4 separately for firms. The total assets are shown in the top (bottom) quartile using solid black (red) lines and the standard error bounds are shown using dashed lines.

Panel A: Spatial Effects of IPO Filing Date on House Prices by Total Assets



Panel B: Spatial Effects of IPO Listing Date on House Prices by Total Assets



Panel C: Spatial Effects of IPO Lockup Expiration on House Prices by Total Assets

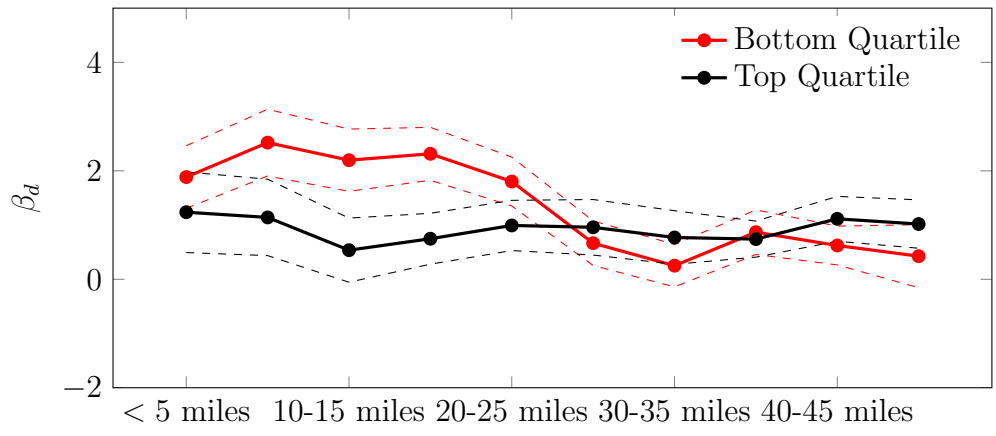
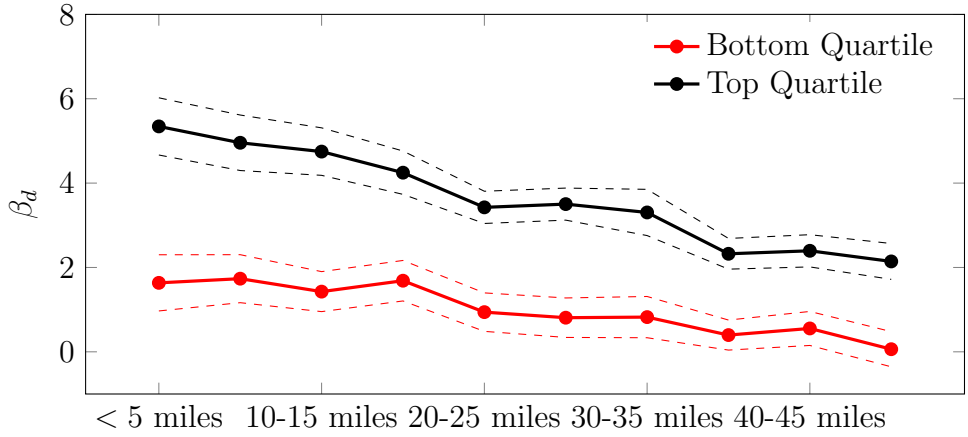
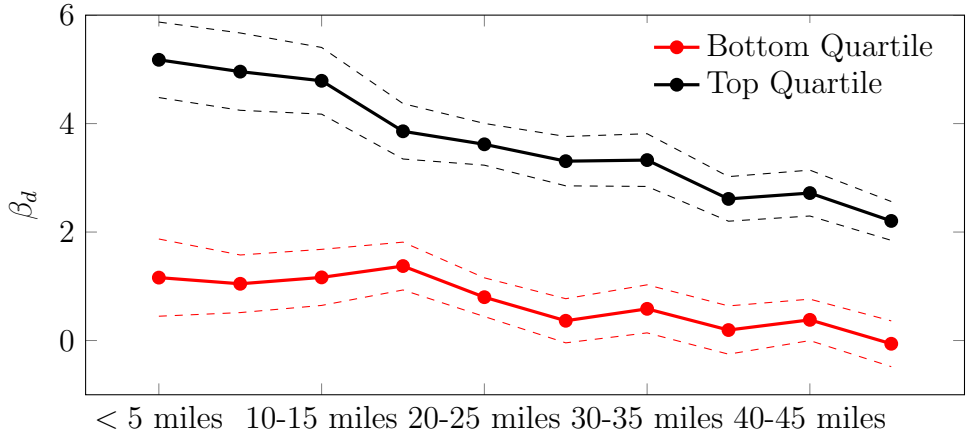


Figure 9. Spatial Effects of IPOs on House Prices by Degree of Underpricing. The plots display the regression coefficients obtained from estimating Equation 4 separately for IPOs. The listing to end of day 1 return is shown in the top (bottom) quartile using solid black (red) lines and the standard error bounds are shown using dashed lines.

Panel A: Spatial Effects of IPO Filing Date on House Prices by Underpricing



Panel B: Spatial Effects of IPO Listing Date on House Prices by Underpricing



Panel C: Spatial Effects of IPO Lockup Expiration on House Prices by Underpricing

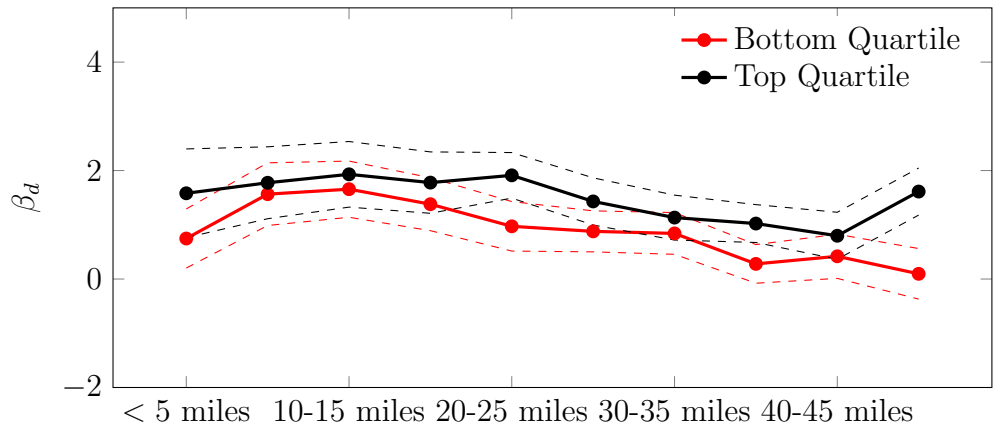
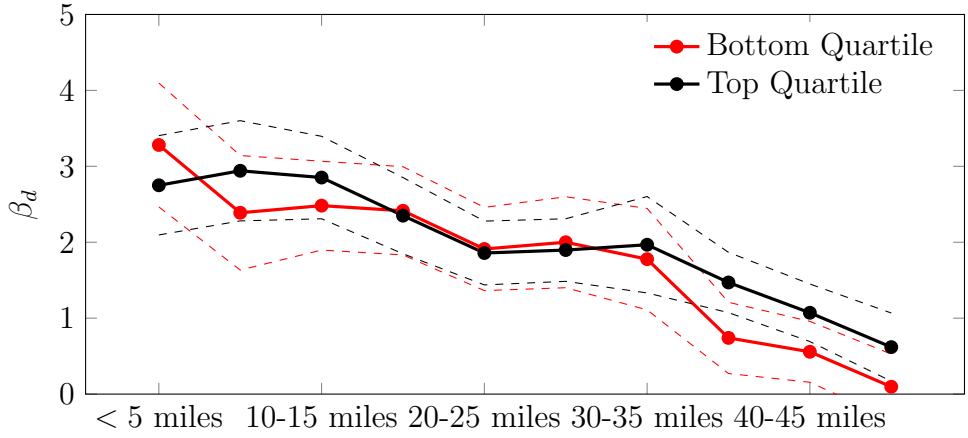
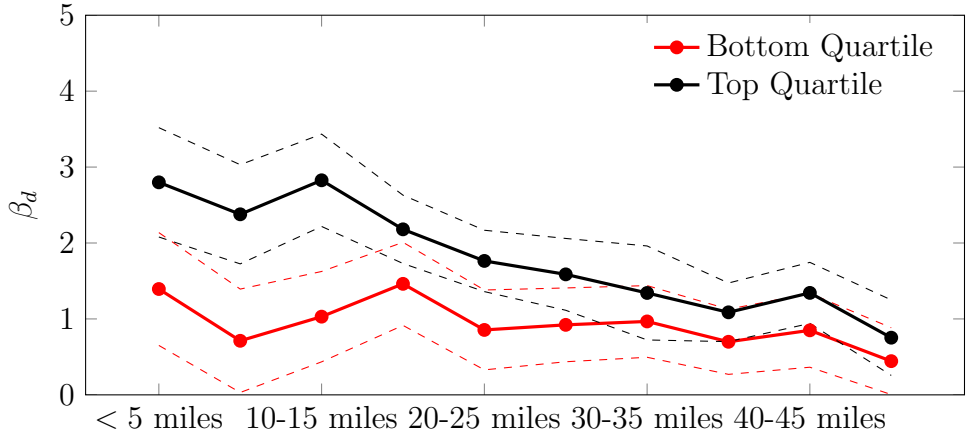


Figure 10. Spatial Effects of IPOs on House Prices by Listing-to-Lockup Return. The plots display the regression coefficients obtained from estimating Equation 4 separately for IPOs. The listing-to-lockup return is shown in the top (bottom) quartile using solid black (red) lines and the standard error bounds are shown using dashed lines. These are ex-post returns that have been adjusted for the S&P 500 return over the same time periods to remove the market trend.

Panel A: Spatial Effects of IPO Filing Date on House Prices
by Listing-to-Lockup Return



Panel B: Spatial Effects of IPO Listing Date on House Prices
by Listing-to-Lockup Return



Panel C: Spatial Effects of IPO Lockup Expiration on House Prices
by Listing-to-Lockup Return

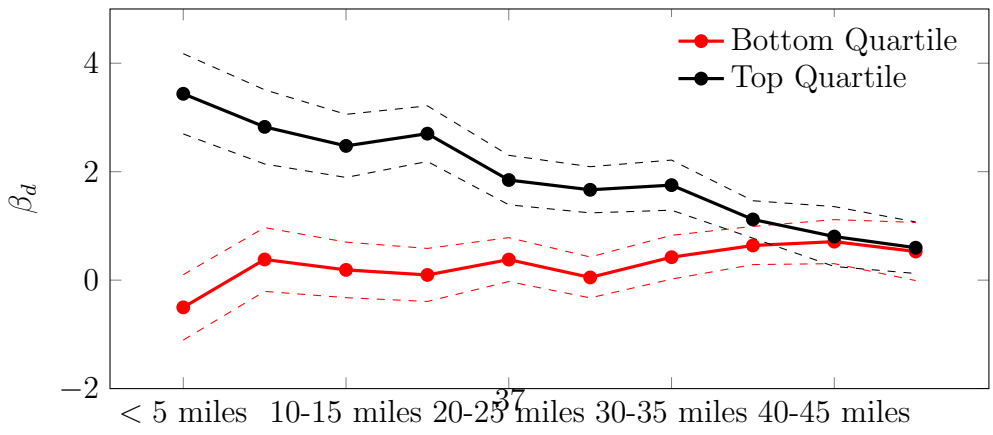


Figure 11. Placebo Date Analysis for San Francisco vs. Alameda County Difference-in-Differences by IPO Event (30-Day Event Window).

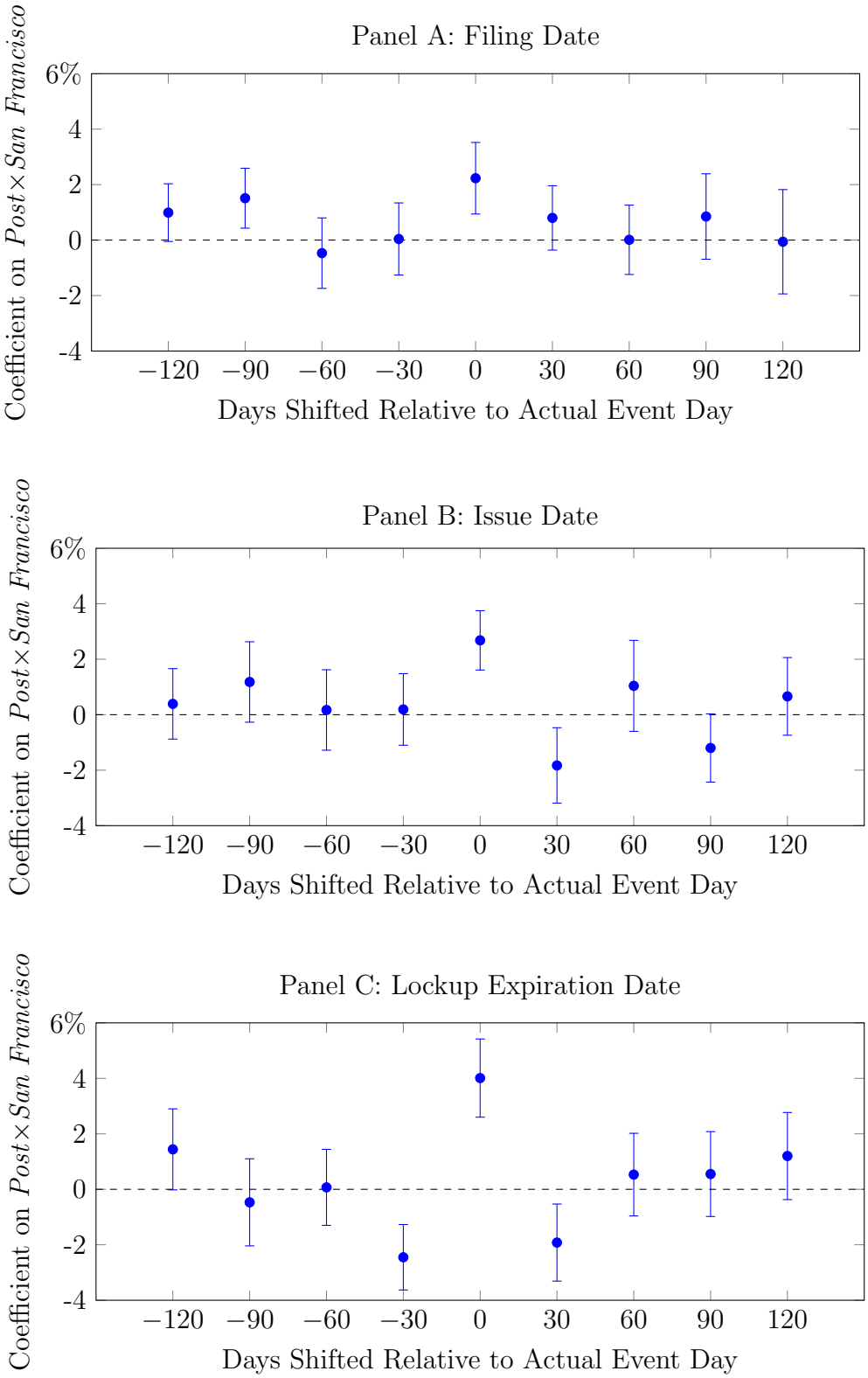


Figure 12. Placebo Date Analysis for San Francisco vs. Alameda County Difference-in-Differences by IPO Event (180-Day Event Window).

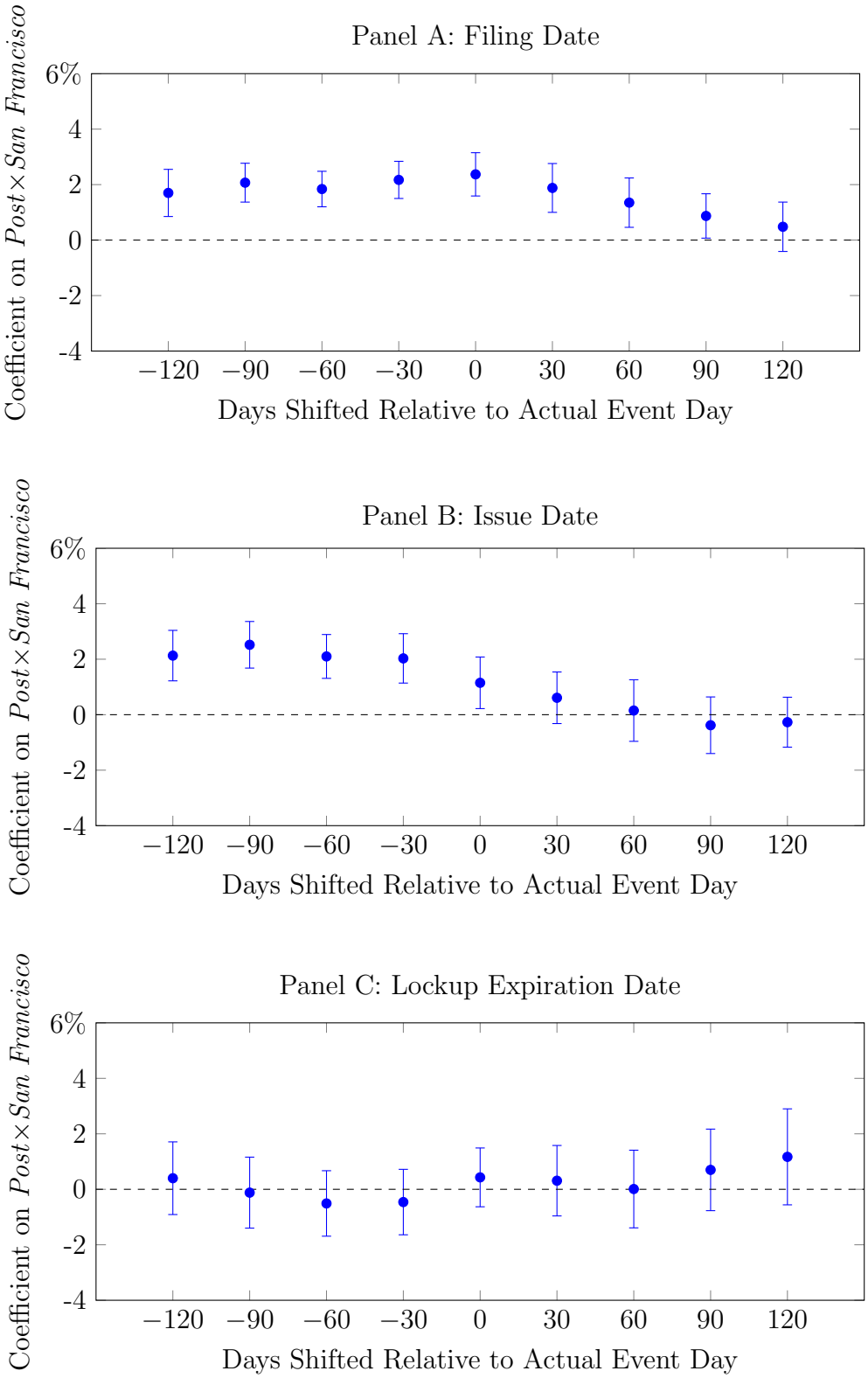


Table 1. Property Transactions and IPO Events by Year. This table shows the counts of California IPO events and property transactions from the cleaned data sample. The firm-level data are from SDC and the property transaction level data are from Zillow ZTRAX.

	Property	California IPO Events		
Year	Transactions	Filing Date	Issue Date	Lockup Date
1993	65,877	50	53	32
1994	200,200	30	32	32
1995	182,591	66	56	34
1996	212,709	88	92	81
1997	240,619	53	49	55
1998	276,327	33	37	37
1999	288,666	96	83	24
2000	283,809	56	71	35
2001	266,668	6	11	23
2002	294,527	5	8	7
2003	318,125	12	6	3
2004	348,088	33	34	22
2005	346,806	11	12	26
2006	258,758	18	14	11
2007	213,637	13	20	19
2008	335,477	2	3	10
2009	328,327	6	4	1
2010	297,348	7	6	6
2011	287,641	12	10	9
2012	268,893	8	13	10
2013	233,346	22	17	13
2014	214,384	34	30	23
2015	231,224	16	19	21
2016	226,731	13	14	12
2017	161,022	11	17	18
Total	6,381,800	701	711	564

Table 2. Descriptive Statistics. This table shows California IPOs and property transactions from the cleaned data sample. (*) are adjusted to current prices using the monthly CPI for All Urban Consumers: All Items (to December 2017 prices). IPO returns (%) are calculated as the percentage change from the IPO offer price to the most recent closing price by the event date being considered. IPO relative volatility is the standard deviation of closing prices divided by the average closing price over the holding period.

Variables	Mean	S.D.	Minimum	Maximum
Panel A: Property Transaction Level				
Sales Price	335,145	501,165	1,000	400,000,000
Sales Price*	415,363	610,106	1,005	487,142,528
Land (sf)	18,707	741,819	502	433,566,875
Total Rooms	5.06	3.38	0.00	99.00
Bedrooms	3.24	0.87	1.00	20.00
Full Bathrooms	2.00	0.70	1.00	20.00
Half Bathrooms	0.26	0.44	0.00	11.00
Age	29.20	23.53	0.00	150.00
Stories	1.32	0.48	1.00	3.00
Observations	6,381,800			
Panel B: IPO Level				
Firm Age	11.60	16.86	0.00	158.00
Total Assets ($ mil)	224.95	733.18	0.10	7,190.00
IPO Offer Price	12.99	6.94	0.10	97.00
Proceeds Amount ($ mil)	131.11	640.86	0.04	16,006.88
Shares Outstanding After Offer	41,643,796	112,713,832	900,000	2,138,084,992
Secondary Shares of Shares Offered	3,647,752	17,049,468	3,395	241,233,616
Secondary Shares of Shares Offered (%)	9.40	19.45	0.00	100.00
Primary Shares of Shares Offered (%)	90.60	19.45	0.00	100.00
Secondary Shares Flag	224			
No Lockup	152			
Number of IPOs	725			
Panel C: IPO Returns (%) from Offer Price to Close				
Issue Date	35.87	60.96	-23.07	525.00
Lockup Date	28.50	101.26	-260.42	1,140.00
IPO at 1 Year	25.47	112.97	-227.78	740.83
Panel D: IPO Relative Volatility (%) from IPO to Close				
Lockup Date	26.83	24.80	0.71	302.33
IPO at 1 Year	36.64	27.50	5.12	319.13

Table 3. Sales Price by IPO Event. This table shows the mean differences in sales price for property transactions in California in current (December 2017) dollars, which decrease in the pre- or post-IPO event window. The pre- and post-periods include transactions within 90 days of the event date, where day 0 (the event date itself) is included in the pre-period and transactions present in more than one pre-post window per event are excluded.

	Total		Pre-Period		Post-Period		T-Stat.
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Diff.
Panel A: At 1 Mile and 90 Days							
Filing Date	629,279	563,366	617,520	528,570	640,645	594,880	2.71
Issue Date	646,357	740,927	654,034	828,953	638,329	635,938	-1.40
Lockup Date	668,347	912,462	690,948	1,089,577	645,953	693,064	-2.92
Panel B: At 5 Miles and 90 Days							
Filing Date	681,985	807,360	672,437	802,307	691,254	812,131	5.60
Issue Date	694,828	799,696	692,611	824,883	697,135	772,627	1.40
Lockup Date	706,437	814,693	708,142	795,428	704,718	833,664	-1.02
Panel C: At 10 Miles and 90 Days							
Filing Date	631,072	673,299	627,083	612,071	634,981	728,321	3.76
Issue Date	627,098	656,341	629,227	657,589	624,903	655,047	-2.20
Lockup Date	651,237	702,546	653,601	707,191	648,864	697,849	-2.22

Table 4. Pre-Post Spatial Difference-in-Differences Firms. This table shows the coefficient estimates for California IPOs based on IPO by event-level HPIs with two-way clustering of the standard errors by the zip code of a firm's headquarters and the event year. The RHPIs give house price levels for 10-day buckets and are consistent in IPO event time from 30, 90, and 180 days before and to 30, 90, and 180 days after the event. The treated RHPI is estimated using transactions within 5 miles of the IPO firm's headquarters. The control HPI corresponds to transactions at 20 to 25 miles from the headquarters. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

	Filing Date		Issue Date		Lockup Date	
Panel A: At 30 Days						
Post-Event Date	0.495**	(0.221)	0.445**	(0.202)	0.173	(0.219)
0 to 5 Miles	-0.392	(0.388)	0.655*	(0.364)	-0.719*	(0.426)
Post*(0 to 5 Miles)	-0.135	(0.367)	0.592	(0.393)	0.581	(0.429)
Constant	103.100***	(0.219)	96.736***	(0.223)	105.419***	(0.238)
Adjusted R-Squared	0.19		0.20		0.21	
Number of Periods	5,448		5,568		4,308	
Number of IPOs	454		464		359	
Panel B: At 90 Days						
Post-Event Date	0.799***	(0.178)	0.754***	(0.175)	0.643***	(0.192)
0 to 5 Miles	-0.681	(0.495)	-0.820*	(0.475)	0.066	(0.464)
Post*(0 to 5 Miles)	0.146	(0.269)	0.517*	(0.284)	0.379	(0.322)
Constant	90.685***	(0.275)	102.555***	(0.260)	97.066***	(0.240)
Adjusted R-Squared	0.29		0.26		0.27	
Number of Periods	14,652		14,760		11,772	
Number of IPOs	407		410		327	
Panel C: At 180 Days						
Post-Event Date	1.557***	(0.240)	1.453***	(0.241)	1.173***	(0.243)
0 to 5 Miles	0.130	(0.425)	-0.022	(0.509)	-1.209**	(0.473)
Post*(0 to 5 Miles)	0.864***	(0.286)	0.668**	(0.297)	0.188	(0.305)
Constant	96.365***	(0.252)	91.324***	(0.293)	110.800***	(0.280)
Adjusted R-Squared	0.30		0.29		0.27	
Number of Periods	26,568		25,272		22,032	
Number of IPOs	369		351		306	

Table 5. Pre-Post San Francisco Firms. This table shows the coefficient estimates for San Francisco IPOs based on IPO by event-level HPIs with two-way clustering of the standard errors by the zip code of a firm's headquarters and the event year. The RHPIs give house price levels for 10-day buckets and are consistent in IPO event time from 30, 90, and 180 days before and to 30, 90, and 180 days after the event. The treated RHPI is estimated using transactions from the city of San Francisco. The control HPI corresponds to a group of cities in Alameda county: Alameda, San Leandro, San Lorenzo, Castro Valley, Albany, Berkeley, Emeryville, Kensington, Oakland, and Piedmont. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

	Filing Date		Issue Date		Lockup Date	
Panel A: At 30 Days						
Post-Event Date	-0.671	(0.726)	0.956	(0.763)	0.922	(2.193)
Treated	-0.327	(1.371)	1.217	(2.360)	0.160	(1.676)
Post*Treated	1.608	(1.329)	2.627**	(1.044)	3.332*	(1.852)
Constant	85.578***	(0.983)	102.188***	(1.484)	85.921***	(0.910)
Adjusted R-Squared	0.31		0.35		0.19	
Number of Periods	684		696		564	
Number of IPOs	57		58		47	
Panel B: At 90 Days						
Post-Event Date	0.103	(0.829)	1.496*	(0.806)	1.202	(1.033)
Treated	-2.614	(1.721)	-0.835	(1.488)	-4.620	(3.793)
Post*Treated	1.148	(0.954)	1.266*	(0.733)	-0.617	(1.343)
Constant	94.078***	(0.971)	96.669***	(0.941)	90.973***	(1.780)
Adjusted R-Squared	0.28		0.35		0.40	
Number of Periods	2,016		2,016		1,656	
Number of IPOs	56		56		46	
Panel C: At 180 Days						
Post-Event Date	0.681	(0.630)	2.511***	(0.790)	1.865**	(0.824)
Treated	1.721	(1.606)	2.237	(1.866)	-1.217	(1.391)
Post*Treated	2.374***	(0.778)	1.053	(0.901)	-0.838	(1.561)
Constant	91.304***	(0.871)	118.736***	(1.030)	99.678***	(0.839)
Adjusted R-Squared	0.27		0.30		0.38	
Number of Periods	3,960		3,960		3,096	
Number of IPOs	55		55		43	

Table 6. Effects of San Francisco Firms' IPO Dates on House Prices by Split Sample. This table shows the coefficient on Post*Treated in Equation 6 for a treatment window of 30 days for the subsample of IPOs with below-median (right columns) and above-median (right columns) values of Firm Age, Underpricing, Listing-to-Lockup Return, and Assets. The treated RHPI is estimated using transactions from the city of San Francisco. The control HPI corresponds to a group of cities in Alameda county: Alameda, San Leandro, San Lorenzo, Castro Valley, Albany, Berkeley, Emeryville, Kensington, Oakland, and Piedmont. The standard errors are in parentheses. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

	Coefficient on Post*Treated			
Sort Variable	Below Median		Above Median	
Panel A: Filing Date Effect with 30-Day Window				
Firm Age	-15.491	(13.866)	3.633	(2.287)
Underpricing	1.686	(1.586)	0.740	(2.237)
Issue-to-Lockup Return	1.508	(2.317)	1.869	(2.740)
Assets	1.427	(2.447)	-9.329	(10.721)
Panel B: Listing Date Effect with 30-Day Window				
Firm Age	-14.856	(15.809)	3.295**	(1.539)
Underpricing	4.703**	(1.730)	1.081	(0.922)
Issue-to-Lockup Return	4.222**	(1.621)	2.520	(1.627)
Assets	-11.493	(13.149)	3.845**	(1.448)
Panel C: Lockup Expiration Date Effect with 30-Day Window				
Firm Age	-15.118	(13.133)	5.283**	(2.086)
Underpricing	3.108	(2.158)	4.281*	(2.341)
Issue-to-Lockup Return	2.547	(2.322)	4.842**	(2.255)
Assets	0.655	(2.641)	-7.881	(11.153)

Table 7. Effect of San Francisco Firms' IPO Dates on House Prices by Split Sample. This table shows the coefficient on Post*Treated in Equation 6 for a treatment window of 180 days for the subsample of IPOs with below-median (right columns) and above-median (right columns) values of Firm Age, Underpricing, Listing-to-Lockup Return, and Assets. The treated RHPI is estimated using transactions from the city of San Francisco. The control HPI corresponds to a group of cities in Alameda county: Alameda, San Leandro, San Lorenzo, Castro Valley, Albany, Berkeley, Emeryville, Kensington, Oakland, and Piedmont. Standard errors are parenthesis. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

	Coefficient on Post*Treated			
Sort Variable	Below Median		Above Median	
Panel A: Filing Date Effect with 180-Day Window				
Firm Age	-14.036	(14.380)	2.645**	(1.108)
Underpricing	0.677	(1.216)	3.314***	(1.071)
Issue-to-Lockup Return	0.404	(1.252)	3.260**	(1.397)
Assets	1.462	(1.344)	-9.154	(11.401)
Panel B: Listing Date Effect with 180-Day Window				
Firm Age	-20.670	(19.247)	1.285	(1.469)
Underpricing	1.813	(1.429)	0.502	(1.237)
Issue-to-Lockup Return	1.398	(1.644)	0.874	(1.673)
Assets	0.433	(1.318)	-14.104	(14.917)
Panel C: Lockup Expiration Date Effect with 180-Day Window				
Firm Age	-24.906	(17.421)	1.306	(1.219)
Underpricing	-2.203	(2.819)	0.068	(1.367)
Issue-to-Lockup Return	0.977	(1.736)	-3.112	(2.540)
Assets	-2.027	(1.313)	-15.441	(13.962)

Appendix A IPO Events and Sample Period

IPO Date Events

- **IPO filing event**: When a firm submits the appropriate documents required for an IPO. The filing event date is the date that the firm files Form S-1 with the SEC.
- **IPO issuing event**: When a firm's equity is listed on an exchange. This is the date when the firm goes public. Issuing coincides with the firm's submission of its IPO prospectus Form 424 with the SEC.
- **Lockup event**: When restrictions on some shareholders and insiders are lifted, allowing them to sell and liquidate their shares. This usually occurs at 180 days.

Changes in the IPO Landscape Across the Sample Period

The decision to pursue an IPO is taken as exogenous and assumed to be independent of local house price changes. However, regulatory changes over this period that affect IPOs may fundamentally change the composition of the sample of firms that choose to go public. This is a concern if the change in composition correlates with house prices in proximity to the firm's headquarters and cannot be controlled by specifications that include controls to capture variation at the firm level and over time.

Gao et al. (2013) identify a significant decrease in the number of IPOs annually from 2001 to 2013 relative to the period from 1980 to 2000. They attribute this difference to changing market and regulatory conditions that make it more advantageous for small private firms to be acquired than to go public. Iliev (2010) find that the passage of the Sarbanes-Oxley Act in 2002 and the requirements, specifically, Those under Section 404, impose additional compliance costs reducing the value of small firms. In 2012, Congress passed the JOBS Act, intending to increase the frequency of IPOs by lowering the cost of going public. For example, under the JOBS Act, firms considering an IPO can test the waters and communicate with potential investors before submitting the registration Form S-1 publicly. Dambra et al. (2015) find that the changes implemented under the JOBS Act increased IPO activity in the 2 years following its passage. The issue of IPO composition and regulatory changes is compounded by evidence of hot and cold IPO markets going back to Ibbotson and Jaffe (1975) and Ritter (1984).

Appendix B Additional Tables and Figures

Table A1. SDC IPO Search Criteria. The following search criteria yield a population of 8,626 IPOs from SDC, including 1,987 IPOs with headquarters in California.

Request	Operator	Description	Hits
Database	Include	Common Stock Convertible Equity Pipeline and Registrations Equity Private Placements	n\a
Issuer\Borrower Nation (Code)	Include	United States of America	83,432
Listing: Primary Exchange Nation of Issuer's Stock (Code)	Include	United States of America	68,295
SDC Deal Type	Include Include	U.S. Common Stock U.S. Common Stock Withdrawn from Registration	38,246
Issue Type	Include	IPO	14,696
Original IPO Flag (Y/N)	Equals	Yes	14,696
Closed-End Fund/Trust Flag (Y/N)	Equals	No	13,301
Unit Investment Trust Flag (Y/N)	Equals	No	10,967
Blank Check Company (Y/N)	Equals	No	10,233
Foreign Issue Flag (e.g., Yankee) (Y/N)	Equals	No	10,233
Unit Issues: Unit Issue Flag (Y/N)	Equals	No	9,344
REIT Type (Code)	Exclude	Equity Hybrid Mortgage Unknown	9,000
Security Type (Code)	Include	Class A Common Shares Class B Common Shares Series B-1 Common Stock Series 1 Common Stock American Depository Receipts Ordinary Shares Class A Common Shares of Beneficial Interest Class C Common Stock Class D Common Stock Class A Limited Voting Common Stock Special Common Stock Class B Voting Common Stock Class E Common Shares Class C Ordinary Shares Class A Ordinary Shares Class A Voting Common Stock Class B Ordinary Shares Common Stock Equity Shares Class Share	8,739
Standard Common Stock Eligible Flag	Equals	Yes	8,626
favorites		favorites ...	8,626

Table A2. Property Transactions and IPO Events by Year. This table shows the IPO event and property transaction counts from the cleaned data sample for the city of San Francisco. The firm-level data are from SDC and the property transaction level data are from Zillow ZTRAX.

	Property	City of San Francisco IPO Events		
Year	Transactions	Filing Date	Issue Date	Lockup Date
1993	420	5	5	5
1994	1,004	0	0	2
1995	1,583	3	0	0
1996	1,927	3	6	4
1997	2,145	3	2	1
1998	2,201	4	3	1
1999	2,228	10	10	5
2000	1,947	2	4	2
2001	1,597	0	0	1
2002	1,969	0	0	0
2003	2,185	1	0	0
2004	2,457	3	4	2
2005	2,468	1	0	2
2006	2,053	3	3	2
2007	1,982	2	3	4
2008	1,822	0	0	0
2009	1,815	1	1	1
2010	1,844	1	0	0
2011	1,922	3	3	2
2012	2,185	1	2	2
2013	2,038	4	4	3
2014	1,959	6	4	3
2015	1,690	2	3	3
2016	1,443	2	2	2
2017	850	1	2	3
Total	45,734	61	61	50

Table A3. Descriptive Statistics. This table shows IPOs and property transactions from the cleaned data sample for the city of San Francisco. (*) are adjusted to current prices using the monthly CPI for All Urban Consumers: All Items (to December 2017 prices). IPO returns (%) are calculated as the percentage change from the IPO offer price to the most recent closing price by the event date being considered. IPO relative volatility is the standard deviation of closing prices divided by the average closing price over the holding period.

Variables	Mean	S.D.	Minimum	Maximum
Panel A: Property Transaction Level				
Sales Price	822,989	943,177	1,000	77,500,000
Sales Price*	1,000,991	1,024,306	1,133	78,826,584
Land (sf)	3,072	8,250	558	1,137,903
Total Rooms	6.88	1.98	0.00	23.00
Bedrooms	3.13	1.07	1.00	13.00
Full Bathrooms	2.16	1.00	1.00	15.00
Half Bathrooms	0.00	0.00	0.00	1.00
Age	67.96	25.90	0.00	145.00
Stories	1.45	0.62	1.00	3.00
Observations	45,734			
Panel B: IPO Level				
Firm Age	10.77	18.78	1.00	98.00
Total Assets ($ mil)	341.48	708.69	0.80	3,255.50
IPO Offer Price	14.35	4.68	5.00	26.00
Proceeds Amount ($ mil)	175.44	304.59	5.00	2,093.00
Shares Outstanding After Offer	67,868,192	125,311,320	1,554,637	699,343,360
Secondary Shares of Shares Offered	2,557,155	3,930,436	50,000	14,025,000
Secondary Shares of Shares Offered (%)	9.13	19.30	0.00	100.00
Primary Shares of Shares Offered (%)	90.87	19.30	0.00	100.00
Secondary Shares Flag	22			
No Lockup	13			
Number of IPOs	64			
Panel C: IPO Returns (%) from Offer Price to Close				
Issue Date	43.61	72.59	-23.07	473.53
Lockup Date	63.81	198.35	-86.25	1,140.00
IPO at 1 year	27.19	98.19	-121.74	358.75
Panel D: IPO Relative Volatility (%) from IPO to Close				
Lockup Date	23.26	18.21	4.51	79.71
IPO at 1 year	32.63	25.38	5.86	119.33

Table A4. Matched Pair T-Test of Average Pre-Post Sales Prices by IPO. This table shows the mean differences in the average IPO pre-post sales prices from property transactions in current (December 2017) dollars, which decrease in the pre- or post-IPO event window for the city of San Francisco. The pre- and post-periods include transactions with day 0 in the pre-period.

		Pre-Period		Post-Period		T-Stat.
	Firms	Mean	S.D.	Mean	S.D.	Diff.
Panel A: 30 Days						
Filing Date	60	908,022	373,518	964,287	408,505	1.49
Issue Date	61	988,836	442,612	1,047,460	583,158	1.04
Lockup Date	49	1,009,908	412,386	1,030,053	393,735	1.05
Panel B: 90 Days						
Filing Date	61	898,290	379,826	990,984	366,180	2.77
Issue Date	61	975,701	382,151	1,000,959	353,325	0.89
Lockup Date	50	1,012,888	400,020	1,074,827	409,038	1.67
Panel C: 180 Days						
Filing Date	61	890,185	374,725	982,205	346,171	4.83
Issue Date	61	959,295	372,753	1,004,046	360,774	2.54
Lockup Date	51	1,003,479	389,069	1,058,563	404,496	2.48

Table A5. IPOs Filed by 2000 (Wave 1): Pre-Post Spatial Difference-in-Differences Firms. This table shows the coefficient estimates for California IPOs based on IPO by event-level HPIs with two-way clustering of the standard errors by the zip code of a firm's headquarters and the event year. The RHPIs give house price levels for 10-day buckets and are consistent in IPO event time from 30, 90, and 180 days before and to 30, 90, and 180 days after the event. The treated RHPI is estimated using transactions within 5 miles of the IPO firm's headquarters. The control HPI corresponds to transactions at 20 to 25 miles from the headquarters. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

	Filing Date		Issue Date		Lockup Date	
Panel A: At 30 Days						
Post-Event Date	0.477*	(0.284)	0.533**	(0.259)	0.184	(0.281)
0 to 5 Miles	0.272	(0.486)	0.566	(0.444)	-0.284	(0.535)
Post*(0 to 5 Miles)	-0.016	(0.464)	0.273	(0.488)	0.790	(0.500)
Constant	102.747***	(0.276)	96.816***	(0.278)	105.144***	(0.302)
Adjusted R-Squared	0.20		0.21		0.21	
Number of Periods	3,564		3,708		2,628	
Number of IPOs	297		309		219	
Panel B: At 90 Days						
Post-Event Date	1.376***	(0.230)	1.108***	(0.225)	0.956***	(0.264)
0 to 5 Miles	-0.033	(0.595)	-0.397	(0.575)	-0.001	(0.571)
Post*(0 to 5 Miles)	0.083	(0.335)	0.170	(0.342)	0.534	(0.401)
Constant	90.088***	(0.320)	102.253***	(0.314)	96.904***	(0.294)
Adjusted R-Squared	0.29		0.26		0.29	
Number of Periods	9,252		9,648		7,200	
Number of IPOs	257		268		200	
Panel C: At 180 Days						
Post-Event Date	2.614***	(0.282)	2.339***	(0.294)	1.781***	(0.322)
0 to 5 Miles	0.040	(0.535)	0.437	(0.634)	-1.259**	(0.607)
Post*(0 to 5 Miles)	0.842**	(0.352)	0.381	(0.374)	0.471	(0.412)
Constant	95.887***	(0.319)	90.723***	(0.353)	110.450***	(0.357)
Adjusted R-Squared	0.29		0.31		0.29	
Number of Periods	16,776		16,272		13,248	
Number of IPOs	233		226		184	

Table A6. IPOs Filed from 2001 to 2008 (Wave 2): Pre-Post Spatial Difference-in-Differences Firms. This table shows the coefficient estimates for California IPOs based on IPO by event level HPIs with two-way clustering of the standard errors by the zip code of a firm's headquarters and the event year. The RHPIs give house price levels for 10-day buckets and are consistent in IPO event time from 30, 90, and 180 days before and to 30, 90, and 180 days after the event. The treated RHPI is estimated using transactions within 5 miles of the IPO firm's headquarters. The control HPI corresponds to transactions at 20 to 25 miles from the headquarters. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

	Filing Date		Issue Date		Lockup Date	
Panel A: At 30 Days						
Post-Event Date	0.423	(0.439)	0.103	(0.370)	-0.108	(0.537)
0 to 5 Miles	-0.521	(0.809)	0.694	(0.805)	-2.470***	(0.872)
Post*(0 to 5 Miles)	-1.040	(0.732)	2.153**	(1.026)	-0.342	(1.017)
Constant	97.429***	(0.464)	99.831***	(0.469)	97.696***	(0.534)
Adjusted R-Squared	0.17		0.19		0.20	
Number of Periods	804		816		816	
Number of IPOs	67		68		68	
Panel B: At 90 Days						
Post-Event Date	-0.301	(0.406)	-0.352	(0.290)	-0.207	(0.348)
0 to 5 Miles	0.034	(1.104)	-0.714	(0.912)	1.079	(1.083)
Post*(0 to 5 Miles)	0.437	(0.661)	1.175	(0.785)	-0.410	(0.723)
Constant	104.468***	(0.600)	104.925***	(0.505)	106.641***	(0.559)
Adjusted R-Squared	0.28		0.24		0.24	
Number of Periods	2,412		2,376		2,232	
Number of IPOs	67		66		62	
Panel C: At 180 Days						
Post-Event Date	-0.561	(0.515)	-0.688	(0.498)	-0.363	(0.572)
0 to 5 Miles	-0.161	(0.843)	0.551	(1.092)	-1.912*	(1.119)
Post*(0 to 5 Miles)	0.887	(0.761)	1.310*	(0.707)	-0.315	(0.587)
Constant	99.323***	(0.475)	96.727***	(0.675)	96.529***	(0.677)
Adjusted R-Squared	0.28		0.27		0.27	
Number of Periods	4,752		4,464		4,320	
Number of IPOs	66		62		60	

Table A7. IPOs Filed after 2008 (Wave 3): Pre-Post Spatial Difference-in-Differences Firms. This table shows the coefficient estimates for California IPOs based on IPO by event-level HPIs with two-way clustering of the standard errors by the zip code of a firm's headquarters and the event year. The RHPIs give house price levels for 10-day buckets and are consistent in IPO event time from 30, 90, and 180 days before and to 30, 90, and 180 days after the event. The treated RHPI is estimated using transactions within 5 miles of the IPO firm's headquarters. The control HPI corresponds to transactions at 20 to 25 miles from the headquarters. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

	Filing Date		Issue Date		Lockup Date	
Panel A: At 30 Days						
Post-Event Date	0.610	(0.514)	0.416	(0.491)	0.406	(0.463)
0 to 5 Miles	-2.488***	(0.899)	0.901	(0.977)	-0.389	(1.067)
Post*(0 to 5 Miles)	0.144	(0.894)	0.516	(0.858)	0.815	(1.167)
Constant	103.401***	(0.501)	98.366***	(0.582)	95.780***	(0.518)
Adjusted R-Squared	0.18		0.19		0.18	
Number of Periods	1,080		1,032		864	
Number of IPOs	90		86		72	
Panel B: At 90 Days						
Post-Event Date	-0.098	(0.273)	0.457	(0.394)	0.490	(0.391)
0 to 5 Miles	-3.266***	(1.172)	-2.292*	(1.324)	-0.694	(1.137)
Post*(0 to 5 Miles)	0.103	(0.622)	1.201*	(0.673)	0.652	(0.788)
Constant	100.435***	(0.654)	96.470***	(0.721)	96.241***	(0.600)
Adjusted R-Squared	0.27		0.27		0.24	
Number of Periods	2,988		2,700		2,340	
Number of IPOs	83		75		65	
Panel C: At 180 Days						
Post-Event Date	0.032	(0.342)	0.382	(0.386)	0.852**	(0.393)
0 to 5 Miles	0.704	(1.116)	-2.234*	(1.313)	-0.380	(1.029)
Post*(0 to 5 Miles)	0.915	(0.638)	1.066	(0.687)	-0.165	(0.671)
Constant	97.148***	(0.624)	100.706***	(0.745)	104.095***	(0.564)
Adjusted R-Squared	0.29		0.21		0.21	
Number of Periods	5,040		4,536		4,464	
Number of IPOs	70		63		62	

Table A8. Northern Californian Pre-Post Spatial Difference-in-Differences Firms. This table shows the coefficient estimates for California IPOs based on IPO by event-level HPIs with two-way clustering of the standard errors by the zip code of a firm's headquarters and the event year. The RHPIs give house price levels for 10-day buckets and are consistent in IPO event time from 30, 90, and 180 days before and to 30, 90, and 180 days after the event. The treated RHPI is estimated using transactions within 5 miles of the IPO firm's headquarters. The control HPI corresponds to transactions at 20 to 25 miles from the headquarters. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

	Filing Date		Issue Date		Lockup Date	
Panel A: At 30 Days						
Post-Event Date	0.538**	(0.225)	0.566***	(0.213)	0.228	(0.233)
0 to 5 Miles	-0.606	(0.398)	0.869**	(0.387)	-0.643	(0.457)
Post*(0 to 5 Miles)	-0.082	(0.404)	0.518	(0.429)	0.301	(0.457)
Constant	96.891***	(0.231)	100.273***	(0.238)	98.190***	(0.260)
Adjusted R-Squared	0.20		0.19		0.18	
Number of Periods	4,692		4,776		3,708	
Number of IPOs	391		398		309	
Panel B: At 90 Days						
Post-Event Date	1.076***	(0.189)	0.989***	(0.188)	0.723***	(0.208)
0 to 5 Miles	-0.784	(0.547)	-0.486	(0.494)	0.004	(0.507)
Post*(0 to 5 Miles)	0.125	(0.300)	0.536*	(0.320)	0.261	(0.348)
Constant	104.071***	(0.304)	106.364***	(0.273)	107.104***	(0.265)
Adjusted R-Squared	0.28		0.27		0.27	
Number of Periods	12,744		12,780		10,116	
Number of IPOs	354		355		281	
Panel C: At 180 Days						
Post-Event Date	1.984***	(0.256)	1.822***	(0.264)	1.370***	(0.272)
0 to 5 Miles	0.141	(0.455)	0.075	(0.531)	-0.999*	(0.511)
Post*(0 to 5 Miles)	0.981***	(0.321)	0.685**	(0.335)	0.010	(0.342)
Constant	111.528***	(0.268)	95.063***	(0.309)	106.348***	(0.305)
Adjusted R-Squared	0.31		0.29		0.27	
Number of Periods	22,896		21,744		18,864	
Number of IPOs	318		302		262	

Table A9. Southern Californian Pre-Post Spatial Difference-in-Differences Firms. This table shows the coefficient estimates for California IPOs based on IPO by event-level HPIs with two-way clustering of the standard errors by the zip code of a firm's headquarters and the event year. The RHPIs give house price levels for 10-day buckets and are consistent in IPO event time from 30, 90, and 180 days before and to 30, 90, and 180 days after the event. The treated RHPI is estimated using transactions within 5 miles of the IPO firm's headquarters. The control HPI corresponds to transactions at 20 to 25 miles from the headquarters. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

	Filing Date		Issue Date		Lockup Date	
Panel A: At 30 Days						
Post-Event Date	0.228	(0.767)	-0.279	(0.584)	-0.162	(0.629)
0 to 5 Miles	0.933	(1.299)	-0.638	(1.033)	-1.189	(1.188)
Post*(0 to 5 Miles)	-0.469	(0.861)	1.036	(0.993)	2.312*	(1.197)
Constant	102.654***	(0.660)	97.633***	(0.608)	105.389***	(0.587)
Adjusted R-Squared	0.11		0.24		0.33	
Number of Periods	756		792		600	
Number of IPOs	63		66		50	
Panel B: At 90 Days						
Post-Event Date	-1.046***	(0.378)	-0.765**	(0.367)	0.156	(0.497)
0 to 5 Miles	0.006	(1.054)	-2.978*	(1.504)	0.444	(1.142)
Post*(0 to 5 Miles)	0.286	(0.513)	0.393	(0.479)	1.096	(0.851)
Constant	91.229***	(0.575)	104.425***	(0.746)	96.941***	(0.559)
Adjusted R-Squared	0.34		0.22		0.21	
Number of Periods	1,908		1,980		1,656	
Number of IPOs	53		55		46	
Panel C: At 180 Days						
Post-Event Date	-1.107***	(0.379)	-0.821**	(0.330)	-0.003	(0.437)
0 to 5 Miles	0.065	(1.200)	-0.621	(1.614)	-2.460*	(1.232)
Post*(0 to 5 Miles)	0.129	(0.513)	0.560	(0.533)	1.247**	(0.574)
Constant	97.913***	(0.674)	92.787***	(0.829)	111.749***	(0.670)
Adjusted R-Squared	0.25		0.32		0.30	
Number of Periods	3,672		3,528		3,168	
Number of IPOs	51		49		44	