Internet Appendix for

Initial Public Offerings and the Local Economy: Evidence of Crowding Out

Internet Appendix A: Data Descriptions

Variable Name	Variable Definition (source in parentheses)
Independent Variables	
IPO and Market Characteristics	
IPO Completion	Indicator variable equal to one if an issuer that files for an IPO ultimately completes the IPO, and zero if an issuer that files for an IPO ultimately withdraws the IPO (SDC).
IPO Sector	The two-digit NAICS sector of the IPO filing firm, as disclosed in SDC. We group two-digit sectors 31, 32, and 33 together, in addition to grouping 44 with 45, and 48 with 49.
IPO Size	The amount of proceeds filed for in the original IPO filing of a prospective IPO issuer, inflation adjusted to 2011 dollars (SDC).
Ln(Number of IPOs)	The natural log of one plus the number of IPOs filed in that county and year.
Ln(Number of Lead Managers)	The natural log of one plus the number of unique underwriters serving in the role of Lead Manager, as of the initial IPO filing (SDC).
Post-Filing 2-month Market Returns	Cumulative daily CRSP value-weighted market index return over the forty trading days beginning the day of an IPO filing (SDC).
Private Equity	Indicator variable equal to one if the IPO firm received pre-IPO private equity or venture capital funding, computed by combining SDC's private equity indicator with a search of all firms receiving private equity and venture capital funding in Thomson One's Venture Xpert database between the years 1975 and 2010.
Relatively Large IPO	IPOs with above-median real filing proceeds scaled by lagged total real county earnings (from the BEA) in the headquarter county, conditional on real filing proceeds being above the full sample median.
Underwriter Reputation	Modified Carter-Manaster rankings of the top lead manager of the IPO, as computed in Ritter and Loughran (2004), with updated rankings made available on Jay Ritter's webpage (https://site.warrington.ufl.edu/ritter/ipo-data/).
County Characteristics	
Establishment Growth	One year growth rate in the number of establishments in the county of an IPO, measured as of March 12 of the pre-filing year to March 12 of the filing year. The data is available beginning in 1978 from Business Dynamic Statistics (BDS). Number of establishments is based on the same basic source data as the Census Bureau's County Business Patterns, which derives from the Business Register, and accounts for all single and multi-establishment companies. More information can be found in the Business Dynamic Statistics Technical Documentation: https://www.census.gov/programs-surveys/bds/documentation.html.
Employee Growth	One year growth rate in the number of full-time and part-time jobs in the county of an IPO, covering wage and salary jobs and self-employment, from the pre-filing year to the filing year. Counts are reported as annual averages of monthly estimates (BEA). More information can be found in the BEA's regional account methodology: https://www.bea.gov/sites/default/files/methodologies/lapi2016.pdf.
Population Growth	One year growth rate in the Census Bureau's annual population estimates in the county of an IPO filing, from the pre-filing year to the filing year (BEA).

Unemployment Growth	One year growth rate in the unemployment rate in the county of an IPO filing, from the pre-filing year to the filing year. Unemployment rate is computed as the number of unemployed over the sum of the number of employed and unemployed in a county month, produced by the Local Area Unemployment Statistics (LAUS) program managed by the Bureau of Labor Statistics (BLS) of the US Department of Labor beginning in the year 1990 (BLS). More information can be found at website of the BLS: https://www.bls.gov/lau/.
Income Growth	One year growth rate from the pre-filing year to the filing-year in a county's per capita personal income, defined as the personal income of the residents in the county of an IPO filing, divided by the resident population of that county (BEA). Personal income is defined as income received by, or on behalf of, all persons resident in a county from all sources, calculated as the sum of wages and salaries, supplements to wages and salaries, proprietors' income, rental income, personal dividend income, personal interest income, and personal current transfer receipts, less contributions for government social insurance plus an adjustment for place-of-residence.
Lagged Total County Real Earnings	Total earnings in the headquarter county of the IPO filing firm by place of work as of two years prior to the IPO filing year. Total earnings includes the sum of wages and salary disbursements, supplements to wages and salaries, and proprietors' income for all employees working in that county,

Dependent Variables

County Characteristics

Annualized 5-year Establishment Growth	Five year percentage change (converted to an annual geometric average) in the number of establishments in the county of an IPO over the five years following the IPO filing, beginning as of March 12 of the IPO filing year (BDS).
Annualized 5-year Employment Growth	Five year percentage change (converted to an annual geometric average) in the number of total waged, salaried, and proprietorship employment in the county of an IPO filing over the five years following the IPO filing, beginning in the IPO filing year. Each annual reported employment count is an average of monthly estimates (BEA).
Annualized 5-year Population Growth	Five year percentage change (converted to an annual geometric average) in annual population estimates for the county of an IPO filing over the five years following the IPO filing, beginning in the IPO filing year (BEA).
Annualized 5-year Unemployment Growth	Five year percentage change (converted to an annual geometric average) in the unemployment rate for the county of an IPO filing over the five years following the IPO filing, beginning in the filing year of the IPO.
Annualized 5-year Real Income Growth	Five year percentage change (converted to an annual geometric average) in per capita real personal income in the county of an IPO over the five years following the IPO filing, where per capita income is defined as the personal income of the residents in the county of an IPO filing (in 2011 dollars), divided by the resident population of that county (BEA).

Internet Appendix B: Additional Results

In this appendix, we present additional results, including a variety of tests examining the plausibility of our identifying assumptions (in addition to those presented in the paper).

In Figure B1, we present the distribution of time from filing date to IPO completion (or withdrawal) for the full sample of IPOs. Very few IPOs are completed within one month of filing, but around 40% of IPOs are completed within 2 months and over 70% of IPOs are completed within 3 months of filing. This motivates our decision to use two months of market returns as an instrument for the IPO filing decision. Longer windows are unlikely to be a valid instrument, since these windows will incorporate returns after most IPO completion decisions have been made.

In Figure B2, we plot the industrial distribution for six most-common 2-digit NAICS sectors for our full sample of IPO-filings. There is significant overlap in industrial focus between our sample of completed and withdrawn IPO filings. Manufacturing and Technology (NAICS 51 and 54) are the two most common industrial focuses for completed and withdrawn IPO filings, comprising over 60% of filings for each group.

In Table B1, we estimate the OLS version of our main 2SLS analysis presented in Table 3 in the paper. Given that our primary endogeneity concern is that firms might choose to go public precisely because they expect good future local economic conditions, we expect OLS estimates to be biased upward. The results in Table B1 are consistent with this prediction. While our estimated establishment growth effect when using 2SLS is negative and significant, our estimated establishment growth effect is near zero and insignificant when using OLS.

Our main placebo tests in the paper focus on county establishment growth. In Figure B3, we repeat our placebo analysis using employment growth as the dependent variable. We continue to find that two-month post-filing market returns negatively predict local economic growth, but market returns in the 15 months before and after do not predict any changes in local economic growth. This casts further doubt on the possibility that market returns are directly correlated with economic growth in counties with IPO filings.

In Figure B4, we repeat the clustering subsample exercise from Figure 8 in the main paper, but replacing establishment growth with employment growth. We reach a similar conclusion: as we tighten the restrictions on the number of IPOs per county year, the estimated effect of IPOs on the local economy becomes, if anything, more negative. This suggests that the clustering of IPOs by time and geography is unlikely to drive the effects that we estimate.

In Table B2, we re-estimate our main 2SLS specification for several alternative subsamples and show that our results are robust to each of these alternative subsamples. In Panel A, we find that the negative effect of IPO completion on establishment and employment growth persists when we include the IPO bubble period. In Panel B, we show that the effects are robust to removing all IPO filings for firms headquartered in California. In Panel C, we show that the results are similar after excluding the years 2000, 2002, and 2008, which are the years in our sample with the lowest average market returns during the book building period following the IPO filing. In Panel D, we show that the main results are qualitatively similar if we use sector by year fixed effects. This stringent fixed effects setting alleviates concerns that macroeconomic trends confound our results.

Figure B1: Time spent during the book-building period for completed and withdrawn deals

This figure plots the mean number of calendar days between the official IPO filing date and the date of either completion (dark bars) or withdrawal (light bars) of the IPO deal. The sample includes all deals in the regression sample with filing years between 1988 and March 2011; nearly all deals that are filed and withdrawn in 1986 and 1987 have misreported withdrawn dates in SDC.

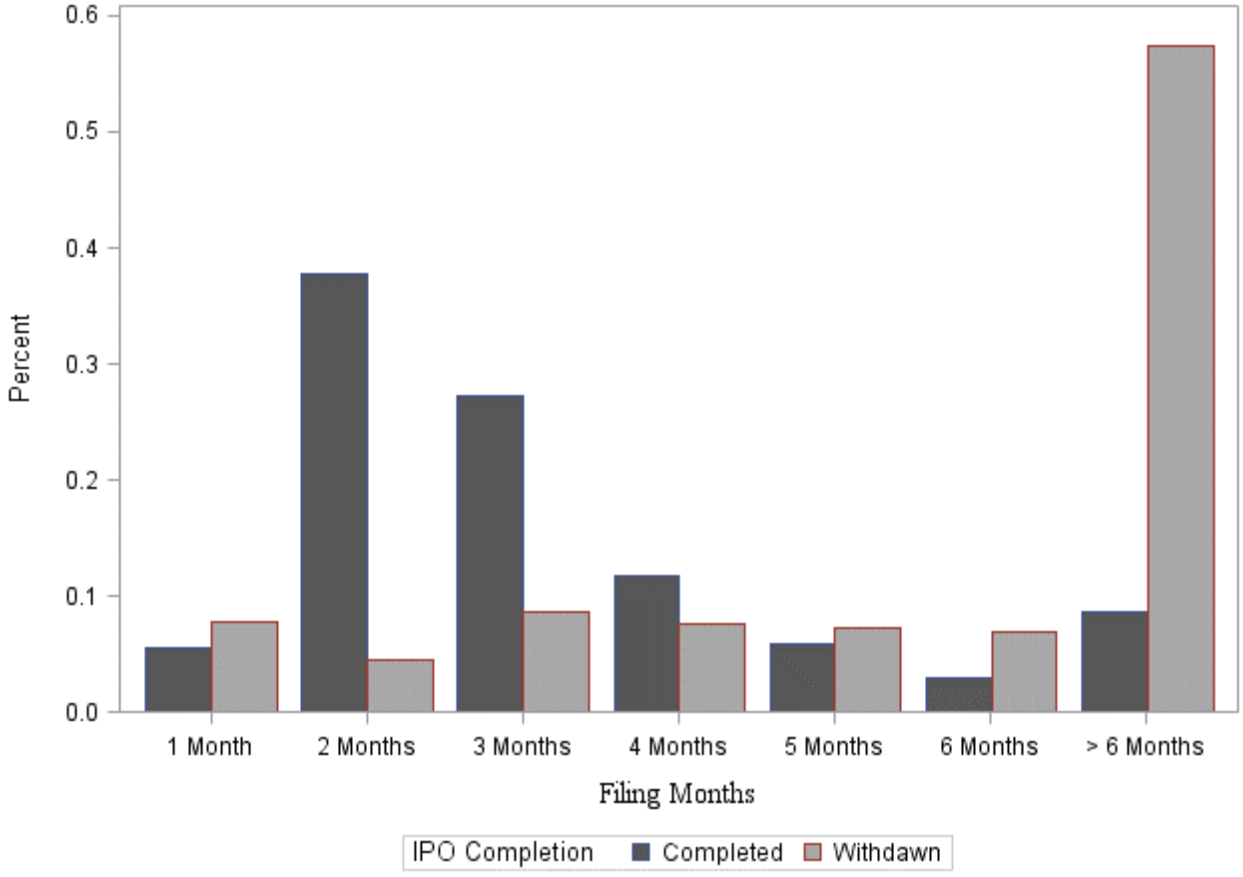

Figure B2: Sector breakdown of completed and withdrawn IPOs

This figure plots the frequency distribution of the top five sectors to which our sample of completed and withdrawn IPO filing firms belongs (Mining is the fifth most populated sector for withdrawn filings, and Healthcare is the fifth most populated sector for completed filings). Withdrawn filings are displayed in the light-gray bars in each sector group, and completed filings are displayed in the dark-gray bars. Our sample of IPO filings spans the period 1986 to March 2011, and excludes blank check offerings, closed-funds, trusts, SPERs, firms in the finance industry, and filings with unreported filing proceeds or headquarters locations.

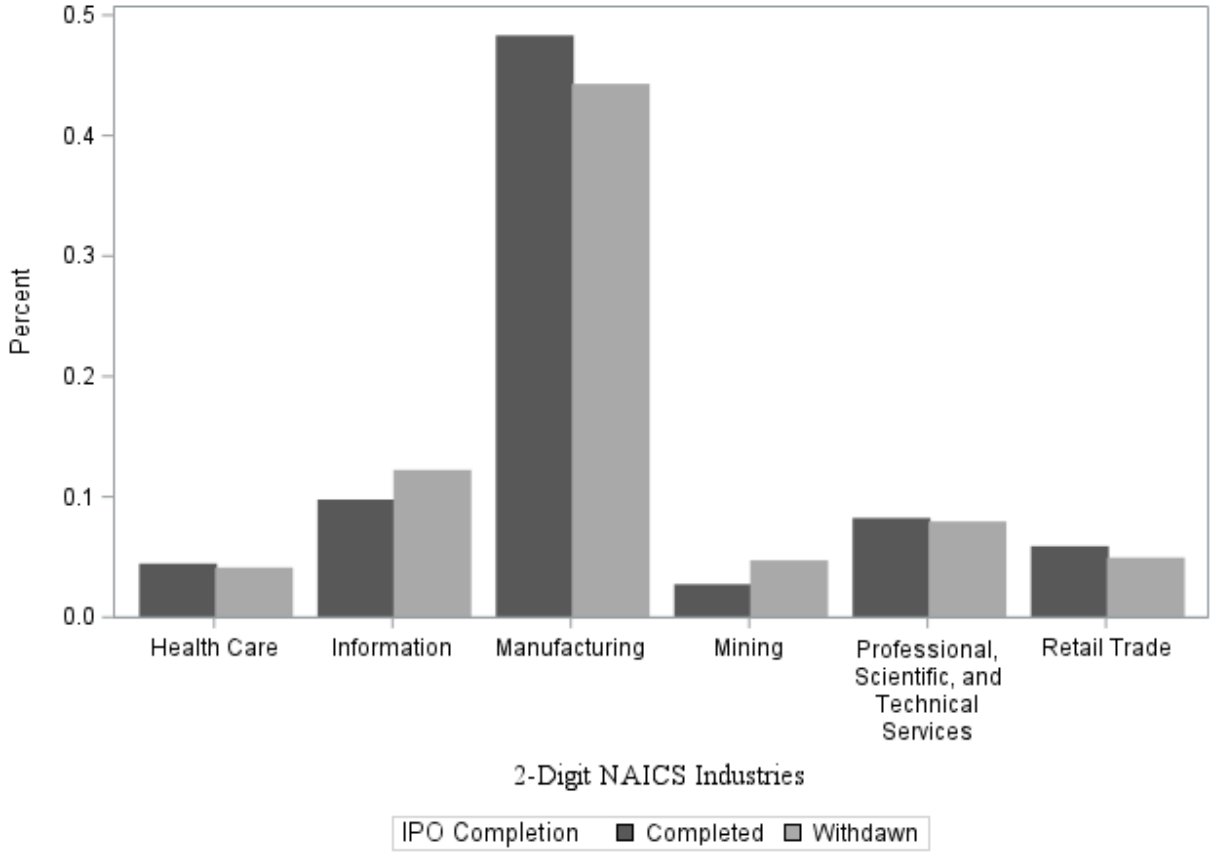

Figure B3: Placebo Robustness Test of Market Returns – Employment Growth

Each panel of this figure plots beta coefficients from fifteen different regressions, with each regression employing a different measure of two-month stock market returns as the primary explanatory variable. The dependent variable is the (annualized) cumulative five-year growth rate of county employees. Each regression regresses five-year economic growth on two-month (CRSP value-weighted) market returns, in addition to the same control variables used in Table 3, but uses a different window of two-month market returns, varying the number of months before or after the IPO filing date that the market return window begins. The start date of the market return window is marked on the x-axis. For example, the point on the figure corresponding to the zero tick on the x-axis represents a regression of five-year county employee growth as a function of two-month market returns beginning at the date of each IPO filing (along with controls and fixed effects), while the point at the +3 tick represents the same regression, but swapping market returns beginning three months *after* each IPO filing for market returns beginning at the filing date. We omit returns in the 6-month window surrounding the filing dates because these returns possibly impact the book-building phase of the IPO, which limits their usefulness as placebo tests. Vertical lines at each point represent 95% confidence intervals for the coefficient on the variable representing two-month market returns. The sample for each regression is restricted to relatively large IPOs between 1986 and March 2011, where large IPOs are defined as those with above-median real filing proceeds scaled by total real county earnings, conditional on real filing proceeds being above the full sample median.

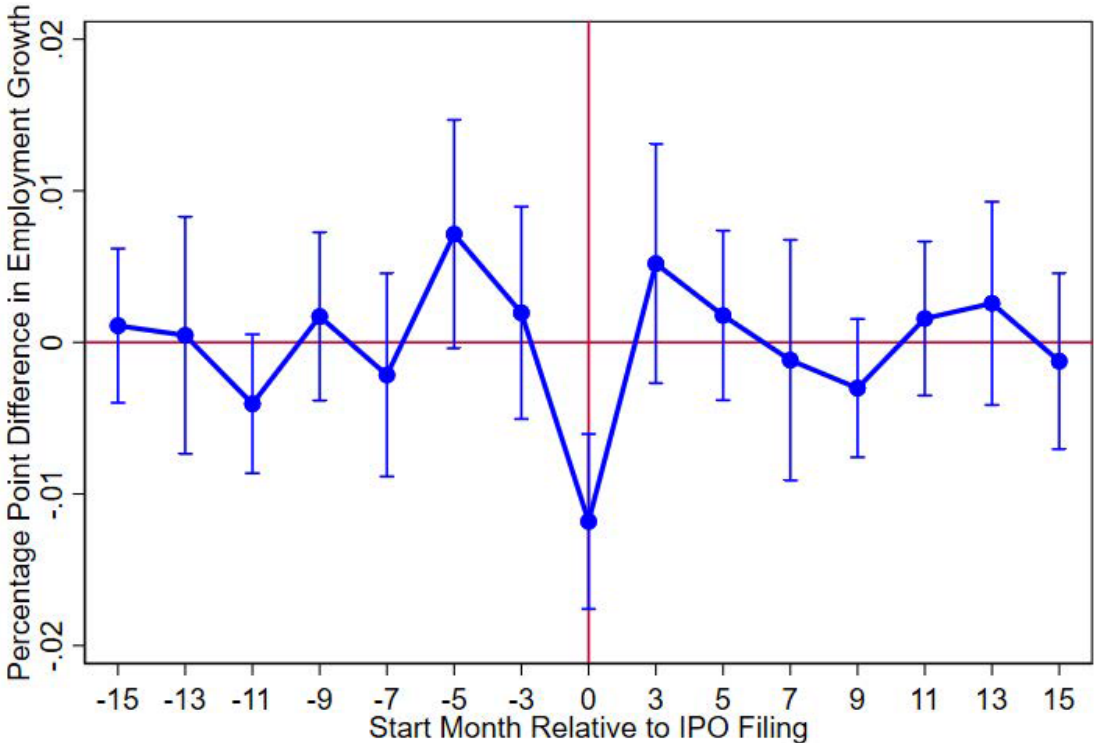

Figure B4: Reduced Clustering Subsamples for Employment Growth

Each panel of this figure plots coefficients from nine different regressions measuring the effect of an IPO on post-IPO five-year local employment growth. Each point on the lines represent a coefficient from our second-stage 2SLS regression on the instrumented IPO completion variable (e.g., Column (5) of Table 3), where each regression is estimated using a different subsample restriction for the maximum number of IPOs filed in the county year (as indicated on the x-axis). The dependent variable measures (annualized) cumulative employment growth from the IPO filing year to fifth post-IPO filing year. The county-level control variables in each regression are the same as in Table 3. Vertical lines at each point represent 90% confidence intervals for the instrumented IPO completion coefficient. The sample for each regression is restricted to relatively large IPOs between 1986 and March 2011, where relatively large IPOs are defined as those with above-median real filing proceeds scaled by total real county earnings, conditional on real filing proceeds being above the full sample median.

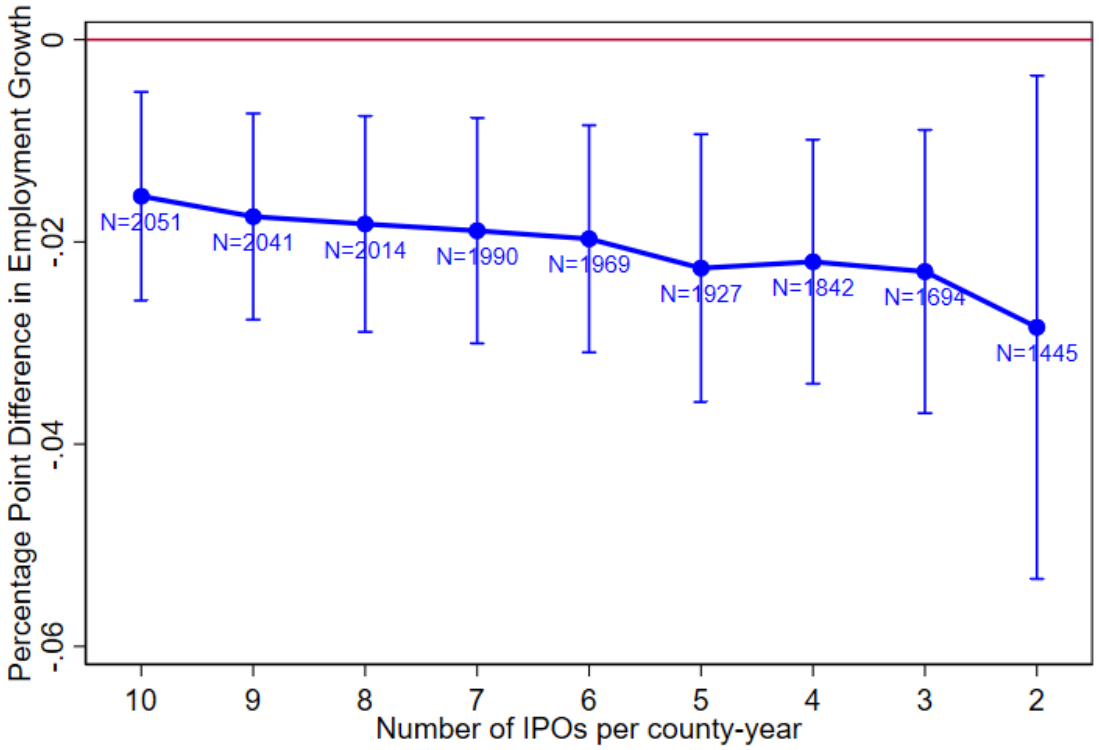

Table B1: OLS Analysis of IPOs and Local Economic Growth

This table reports results from OLS regressions where the primary explanatory variable is an indicator for whether an IPO filing resulted in IPO completion, as opposed to withdrawal. The dependent variable in Columns (1) and (3) is the annual geometric average growth rate in a county's total number of establishments over the five years after an IPO filing. The dependent variable in Columns (2) and (4) matches the dependent variable in Columns (1) and (3) but using the number of employees. We use the full sample of IPOs in Columns (1) and (2) and the subsample of relatively large IPOs – defined as those with above-median real filing proceeds scaled by total real county earnings, conditional on real filing proceeds being above the full sample median – in Columns (3) and (4). The sample period includes IPOs filed between 1986 and March 2011. We winsorize all dependent variables at the extreme 1%. All variables are defined in Appendix A in the paper. Standard errors are clustered at the county and year-quarter levels (with *t*-statistics reported in parentheses). *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Full Sample		Relatively Large IPOs	
	(1)	(2)	(3)	(4)
	Establishments	Employees	Establishments	Employees
Instrumented IPO	0.0002	0.0007*	-0.0003	-0.0000
Completion	(0.99)	(1.77)	(-0.77)	(-0.03)
Controls	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes
Observations	6,293	6,293	2,183	2,183

Table B2: IPOs and Local Economic Growth, Robust Samples

This table reports results from second-stage 2SLS regressions – identical to those in Table 3 – where the explanatory variable of interest is IPO completion instrumented with the return of the CRSP value-weighted market index during the two-months following an IPO filing, however, in each panel, we augment our main sample in a distinct way. In Panel A, we include IPOs filed during the IPO bubble period (1998-1999); in Panel B, we exclude IPO firms headquartered in California; in Panel C, we exclude years with stock market crashes (2000, 2002, and 2008); and in Panel D, we include year-by-sector fixed effects. The dependent variable in Column (1) is the annual geometric average growth rate in a county's total number of establishments over the five years after an IPO filing; the dependent variable in Column (2) is measured equivalently using the number of employees. All regressions are estimated using the subsample of relatively large IPOs, defined as those with above-median real filing proceeds scaled by total real county earnings, conditional on real filing proceeds being above the full sample median. The sample period is between 1986 and March 2011. We winsorize all dependent variables at the extreme 1%. All variables are defined in Appendix A. Standard errors are clustered at the county and year-quarter levels (with *t*-statistics reported in parentheses). *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Including years 1998-1999

	(1) Establishments	(2) Employees
Instrumented IPO Completion	-0.0080***	-0.0113***
	(-2.76)	(-3.13)
Controls	Yes	Yes
County FE	Yes	Yes
Year FE	Yes	Yes
Sector FE	Yes	Yes
F-statistic	24.27	24.27
Observations	2,619	2,619

Panel B: Excluding California IPOs

	(1) Establishments	(2) Employees
Instrumented IPO Completion	-0.0138***	-0.0200***
	(-2.63)	(-2.72)
Controls	Yes	Yes
County FE	Yes	Yes
Year FE	Yes	Yes
Sector FE	Yes	Yes
F-statistic	11.42	11.42
Observations	1,865	1,865

Panel C: Excluding Years with Stock Market Crashes (2000, 2002, 2008)

	(1)	(2)
	Establishments	Employees
Instrumented IPO Completion	-0.0113**	-0.0173**
	(-2.00)	(-2.46)
Controls	Yes	Yes
County FE	Yes	Yes
Year FE	Yes	Yes
Sector FE	Yes	Yes
F-statistic	12.09	12.09
Observations	1,841	1,841

Panel D: Including Sector-Year Fixed Effects

	(1)	(2)
	Establishments	Employees
Instrumented IPO Completion	-0.0079**	-0.0112**
	(-2.14)	(-2.30)
Controls	Yes	Yes
County FE	Yes	Yes
Sector × Year FE	Yes	Yes
F-statistic	22.67	22.67
Observations	2,069	2,069

Internet Appendix C: Reconciling our Results with Butler et al. (2019)

Butler et al. (2019) match zip code-years that host an IPO to nearby zip code-years that do not host an IPO, but that do host an IPO at some other point in their sample. This creates a set of treatment and control zip codes that are similar on observable dimensions (employment, establishment, etc.). Then authors find that large IPOs increase employment growth in the firms' headquarters zip codes by about 78 basis points per year. Their inclusion of county-year fixed effects makes this effect relative to other zip codes in the same county-year. Thus, this result is difficult to relate to our main county-level analyses, but appears to contradict our zip code-level evidence that IPOs negatively affect employment growth in their headquarters zip code.

In Column (1) of Table C1, we report the main result from their paper for reference. In Column (2), we replicate their result. Although we cannot perfectly recreate their sample, we match their point estimates quite closely. Importantly, the positive effect of IPOs on the local economy is limited to the zip code of the firm's HQ; there are no effects on employment in nearby zip codes. While we do not replicate their establishment results, in their paper Butler et al. (2019) find no effect on establishments in the HQ zip code, but a positive effect on establishment growth in nearby zip codes (even though there is no employment effect in these areas). It is difficult to understand the set of economic spillovers that would justify this set of effects, and the authors do not offer any explanation. This leads us to examine their specification in more depth.

We first explore whether sample selection choices can reconcile our two sets of results. Butler et al. use IRS data to control for zip code-level income. This data is not available for three years of their sample (1999, 2000, and 2003); as result, they throw out a subset of IPOs. In Column (3) of Table C1, we add back in these years. Adding in these missing years reduces the magnitude of the positive employment growth in the headquarters zip code. It also leads to a significant negative effect of IPOs on employment growth in zip codes located between 5 and 10 miles from IPO firms' headquarters (and negative point estimates for more nearby zip codes). In unreported results, we find that excluding the income control but maintaining the original sample (i.e., same years as Column (1)) does not change the results. This evidence suggests that it is the additional years of data, not the omission of a relevant control, that drive the differences between Columns (2) and (3).

In Column (4), we re-estimate Butler et al.'s result including the missing years and excluding all other control variables. In a true random experiment, it is not necessary to include control variables to estimate a treatment effect. This should be especially true after the inclusion of county-year fixed effects. The effects of a reasonably exogenous treatment (which Butler et al. (2019) argue they have after matching) should not hinge on the zip code level controls included in their main analysis. Indeed, we find in untabulated results that our main 2SLS results are not sensitive to whether we include controls, which gives us additional confidence in the methods we use.

In contrast to our main results, which depend little on the precise controls selected, the evidence in Butler et al. (2019) fundamentally changes without the inclusion of controls. The positive effect of IPOs on employment growth in the headquarters zip code is no longer significant and there is a negative and significant effect of IPOs on employment in the surrounding zip codes. These negative effects represent large reductions in annual employment growth of between 54 and 65 basis points. Because there are many zip codes included in these mileage bands, the cumulative reduction in job growth represented in the estimates in either Column (3) or (4) would likely easily subsume any positive effect of the IPO in the single headquarters zip code when aggregated across the entire county. Thus, with slight perturbations to the sample and/or control variables, the methods in Butler et al. (2019) deliver results that are consistent with our main finding that large IPOs reduce county-level employment growth.

Table C1: Butler et al. (2019) Replication and Extension

This table shows results from estimates of the effect of an IPO on employment growth in the zip code of the IPO firm's headquarters. These regressions examine the robustness of the results in Butler et al. (2019) to alternative specifications. Column (1) prints the results from Column (2) of Table 5 in Butler et al. (2019). Columns (2), (3), and (4) are our replications of the same estimate under alternative specifications. Column (2) is our attempt at an exact replication. Both Columns (1) and (2) include data from years 1998 to 2015, but exclude IPOs filed in 1999, 2000, and 2003 due to missing IRS data on wage income. Column (3) adds back in these excluded years by omitting the control variable *Ln(Wage Income)*. Column (4) excludes all control variables and includes all data from 1998 to 2015. Standard errors are two-way clustered at zip code and county-year levels (with *t*-statistics reported in parentheses). *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) Butler et al. (2019) Table 5, Colum 2	(2) Replication	(3) All years >=1998	(4) All year >= 1998 Without Controls
Large IPO HQ Zip Code	0.784*	0.773**	0.622**	0.498
	(0.437)	(0.366)	(0.314)	(0.322)
<0-2 Miles from Large IPO HQ	0.598	-0.190	-0.247	-0.562
	(0.701)	(0.580)	(0.457)	(0.454)
2-5 Miles from Large IPO HQ	0.184	-0.151	-0.289	-0.542**
	(0.358)	(0.306)	(0.276)	(0.272)
5-10 Miles from Large IPO HQ	0.279	-0.308	-0.497*	-0.651**
	(0.261)	(0.284)	(0.266)	(0.262)
Number of SEOs	0.130	0.069	0.099*	
	(0.241)	(0.058)	(0.055)	
Ln(Population)	0.053	-0.069	0.091	
	(0.168)	(0.129)	(0.118)	
Ln(Establishments)	-1.171***	-0.723***	-0.843***	
	(0.180)	(0.181)	(0.171)	
Lagged Dependent Variable	-0.918	-1.677	0.250	
	(2.559)	(2.353)	(1.518)	
Ln(Population Density)	-0.061***	-0.041***	-0.055***	
	(0.020)	(0.012)	(0.011)	
Ln(Wage Income)	1.084***	1.079***		
	(0.234)	(0.226)		
County-Year FE	Yes	Yes	Yes	Yes
Adj. R-squared	0.161	0.160	0.164	0.153
Observations	9,284	8,960	12,218	12,218