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Agglomeration Effects in Initial Public Offerings

Shahram Amini
University of Denver, Daniels College of Business
shahram.amini@du.edu

Andrew MacKinlay
Louisiana State University, Ourso College of Business
acmackin@lsu.edu

Johan Sulaeman
National University of Singapore, NUS Business School
sulaeman@nus.edu.sg (corresponding author)

Chishen Wei
Hong Kong Polytechnic University, Faculty of Business
chishen.wei@polyu.edu.hk

Abstract

We show that the decision to go public is influenced by spatial variation in the supply of equity financing. We measure the amount of capital of equity investors in each U.S. region and document that the incidence of initial public offerings (IPOs) by intangible-intensive resident firms increases significantly when regional equity capital is abundant. Using a novel empirical strategy and hand-collected data on out-of-state pension flows, we confirm that our findings are not due to underlying regional factors.

I. Introduction

The initial public offering (IPO) is arguably the most significant financing event the firm has undertaken to date. In recent years, companies have delayed going public, in part because they can obtain capital from private sources. The growth of late-stage private capital and index investing raises critical questions about the role of public equity capital. If firms can obtain capital from private sources, then fewer firms will go public. In this article, we examine these issues through the lens of agglomeration effects, which refer to the location-based

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complementarity between the financial sector and the real sector, facilitated by access to capital. Our evidence indicates that IPO activity is determined in part by the supply of *regional* public equity capital.

Agglomeration effects between financiers and firms are known to affect local business formation, innovation, and economic growth. Studies show that credit access via local banks influences entrepreneurial activities, and local venture capital (VC) increases founding rates of local startups.[1] Young firms often require close relationships with banks and VCs, but for more established public firms, agglomeration effects have received less attention, perhaps because the U.S. equity market is generally viewed to be unsegmented, as there are no legal barriers for public capital to move across states and localities.

Spatial proximity, however, can still play a prominent role because financiers who are colocated with firms in the same region have better access to firm-specific information. For example, financiers can obtain information through serendipitous sources such as informal conversations with employees, customers, suppliers, and competitors (Subrahmanyam and Titman (1999)) as well as from information exchange within the resident investment community. These financiers are better situated to assess and certify the quality of nearby companies where firm-specific information plays a crucial role, such as those that pursue intangible-intensive business strategies. As intangible assets have grown as a fraction of total assets in the last several decades (Falato, Kadyrzhanova, Sim, and Steri (2022), Crouzet and Eberly (2023), and Li (2025)), it has become increasingly important to understand the role of regional capital. Intangible-intensive firms may face challenges in securing financing due to the nature of their business, making it difficult for outside investors to understand the business operations and accurately value the firm. Investors located in spatial proximity could learn information about the firm directly or indirectly from insiders or other stakeholders. This mitigates the information asymmetry between outside investors and insiders, and reduces the external financing wedge for intangible-intensive businesses. We hypothesize that information immobility related to spatial proximity (Van Nieuwerburgh and Veldkamp (2009)) creates regional variation in the cost of equity capital for intangible-intensive private firms considering whether to go public.

Our empirical strategy exploits geographic heterogeneity in the supply of regional capital. We construct a proximity-based measure, which we call regional equity capital (REC), to capture the supply of capital in public equity markets that can evaluate and finance intangible-intensive firms that are colocated in the same region. As most IPOs are conducted through the book-building process, it is natural to focus on institutional investors because they are the main participants and are informed.[2] REC is defined as the total market value of nonlocal equity holdings managed by institutional investors located in each state, based on 13F regulatory filing data. We deliberately exclude the stock holdings of firms headquartered in the same state to negate the possibility that localized shocks affect the value of

[1]See, for example, Jayaratne and Strahan (1996), Guiso, Sapienza, and Zingales (2004), Bertrand, Schoar, and Thesmar (2007), Becker (2007), Kerr and Nanda (2009), and Cornaggia, Mao, Tian, and Wolfe (2013) for banks and Stuart and Sorenson (2003) and Chen and Ewens (2025) for venture capital.

[2]See, for example, Hanley and Wilhelm (1995), Aggarwal, Prabhala, and Puri (2002), Field and Lowry (2009), and Chiang, Qian, and Sherman (2010).

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institutional investors' portfolio holdings in local stocks. We also omit the holdings of BlackRock, Vanguard, and State Street to remove the influence of passive index capital. By design, REC is an ex ante measure of the local supply of informed capital that can participate in IPOs and potentially reduce information frictions for nearby firms.

To accommodate our geographic setting, we developed a new method to estimate IPO activity. We utilize a count-based Poisson model with fixed effects to estimate the propensity of firms to go public, where the dependent variable is the annual count of IPOs at the state level.[3] For each state, we create two time series of count data: intangible-intensive IPOs and nonintangible-intensive IPOs. To identify intangible-intensive firms, we use a high-tech classification used by practitioners, which is available through the LSEG SDC New Issues database. We verify that the empirical results are similar using other measures of intangible intensiveness, such as a low ratio of tangible assets and negative income at the time of the IPO (Ritter and Welch (2002)). Our results are also similar using the IPO firm's age, which can proxy for financial constraints (Hadlock and Pierce (2010)). Finally, we control for the supply of private firms within each state using the U.S. Census Bureau's Business Dynamics Statistics (BDS) data.

A key consideration is that IPO activity tends to cluster in certain states (e.g., California, New York, and Massachusetts) due to inherent cross-sectional differences driven in part by regional attributes such as climate, transportation networks, and economic opportunities. These regional attributes, in turn, might attract certain types of companies and employees. Political policies or uncertainty could also create this assortative matching (Çolak, Durnev, and Qian (2017)). To identify our economic mechanism of how REC influences IPO decisions, we focus on the time-series variation within each region. In particular, we include state fixed effects to absorb regional differences across states in our initial analysis. A major advantage of our econometric approach is the use of two time series for each state. Hence, we can go a step further and use state-by-year fixed effects to absorb the variation in macroeconomic and political conditions at the state level across time. With state-by-year fixed effects absorbing the influence of localized time-varying shocks, this stringent specification provides an estimate of the differential effects of REC on intangible-intensive versus nonintangible-intensive IPOs within each state and year.

Using a sample of U.S. IPOs over the period 1982–2021, our baseline analysis shows that an increase in REC spurs more intangible-intensive resident firms to go public. A 10% increase in REC is associated with 2.4% more intangible-intensive IPOs. This equates to approximately 2.5 more intangible-intensive IPOs nationwide each year, an economically meaningful impact given that the average state hosts only about two such IPOs annually. In relative terms, a 10% increase in REC leads to 3.9% more intangible-intensive IPOs compared to nonintangible-intensive IPOs. We continue to find similar effects when using state-by-year fixed effects.

[3]See Ellison and Swanson (2016) and Parsons, Sulaeman, and Titman (2018) who use Poisson models to estimate the propensity to perform well in education and commit misconduct, respectively. Cohn, Liu, and Wardlaw (2022) show that the Poisson model produces consistent and reasonably efficient estimates under general conditions.

Overall, the baseline results indicate that the regional supply of equity capital creates windows of opportunity for intangible-intensive resident firms to go public.

Our empirical framework is flexible and allows for the incorporation of additional financiers such as venture capitalists. We include venture capitalists because they help guide the IPO process of intangible-intensive companies (Megginson and Weiss (1991), Lerner (1994), and Chemmanur, Krishnan, and Nandy (2011)), and going public provides these financiers with an important exit opportunity. Therefore, an abundance of venture capitalists in a region may increase the IPO activity of resident firms because these firms are better prepared to go public. But VCl could also reduce the urgency to go public by directly providing more capital to private firms (Ewens and Farre-Mensa (2020)). To evaluate these mechanisms, we augment our specifications with a *regional venture capital* (RVC) measure that aggregates the assets under management of venture capitalists in each state. We find that the exit mechanism dominates the funding mechanism, as the presence of venture capitalists spurs resident intangible-intensive firms to go public. Moreover, the effect of RVC on IPO activity is distinct from that of REC. Our inferences regarding REC are also robust when we re-estimate our tests after excluding VC-backed firms, which also precludes any pre-IPO firms with institutional investments. Hence, our findings are not due to investors affecting private firms' IPO decisions through the direct ownership channel.[4]

To address time-series variation in regional conditions that may affect IPO decisions, all regression specifications include state-level GDP and personal income from the Internal Revenue Service (IRS) to control for wealth effects. We also control for the supply of local deposits because it can affect local economic outcomes (Becker (2007), Butler and Cornaggia (2011)). We further interact these regional control variables with the measures of intangible intensiveness to capture possible differential effects on intangible-intensive versus nonintangible-intensive IPOs. Our results are also robust to excluding the major technology hub states of California, Massachusetts, and New York. One important caveat is that we cannot observe the limited set of potential investors who attend each IPO roadshow (Sherman and Titman (2002), Sherman (2005)). We verify that our inferences are similar after restricting our REC measure to assets managed by institutions that have recently invested in a new IPO.

As the empirical patterns are robust to the inclusion of state-by-year fixed effects, static geographic attributes, or generalized local shocks are not driving our results. The remaining challenge in establishing causality is to rule out a particular type of shock that simultaneously increases regional intangible-intensive IPO activity versus nonintangible-intensive IPOs and the level of REC. For example, if a positive local shock increases household wealth, households may prefer to invest these funds with nearby institutional investors specializing in intangible-intensive companies. The resulting increase in REC can still influence IPOs through our proposed agglomeration mechanism, but the effect is entangled with underlying changes in local economic conditions.

[4]See, for example, Kwon, Lowry, and Qian (2020), Chernenko, Lerner, and Zeng (2021), and Huang, Mao, Wang, and Zhou (2021).

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To sharpen our estimates, we exploit the variation in REC stemming from reallocations of investment funds by three major state public pension systems (i.e., California Public Employees' Retirement System, Florida State Retirement System, and South Carolina Retirement System). Using hand-collected data, we first measure the time-series variation in the relative size of REC when these pension systems reallocate some of their investments to active out-of-state domestic equity fund managers.[5] Our assumption is that pension systems do not allocate equity capital to a particular manager based on the specific economic conditions of the state where that manager happens to reside. As pension flows are uninformed and not correlated with future return performance (Goyal and Wahal (2008)), it is unlikely that these allocations can anticipate future regional economic growth and subsequent local IPO activity. We verify that pension fund reallocations are indeed not correlated with changes in state-level GDP. As these shocks are generated by out-of-state pension systems, they allow us to net out the role of underlying regional factors and local capital growth from the causal effect of changes in REC on IPO activity. We find that flows from out-of-state pension systems predict more intangible-intensive IPOs in each state relative to nonintangible-intensive IPOs.

We conduct a final set of tests to supplement our analysis and address other interpretations of our findings. First, we examine an alternative option for private firms to raise capital or exit, namely, merging with or getting acquired by another firm. For intangible-intensive private firms, we find that REC increases the incidence of going public relative to being acquired, but overall, accounting for exit through acquisition does not affect the main IPO results. Second, our inferences are robust to accounting for regional retail equity capital. Third, we also find evidence that agglomeration effects are weaker for issuers whose business operations are geographically diversified and not concentrated in their headquarters state. Fourth, we confirm that our main findings are similar when using metropolitan statistical areas (MSAs) instead of state boundaries to define a region.

Next, we consider whether agglomeration effects are persistent or limited to the IPO period. We find that local institutional ownership is greater in high REC areas for at least 5 years post-IPO. This result suggests that agglomeration effects are persistent, perhaps due to the continued information advantages enabled by spatial proximity. We also examine whether intangible-intensive firms that go public in higher REC areas have higher valuations relative to their book values. Our evidence suggests that intangible-intensive firms that IPO in areas with higher REC are valued more than other IPO firms.

An alternative behavioral interpretation of the relation between REC and IPO activity is that high investor sentiment (Baker and Wurgler (2000)) drives the results. Investors may become over-enthusiastic in regions with good economic fundamentals, which in turn attracts resident firms to raise capital through an IPO. If sentiment or other nonfundamental elements drive our findings, we expect to observe stock price underperformance post-IPO. The 6- and 12-month buy-and-hold abnormal returns (BHARs) of intangible-intensive IPOs in higher REC areas are not different from those returns of similar IPOs in lower REC areas (Loughran

[5]We use these particular pension systems because they provide information on the specific external equity managers employed and how much they are allocated.

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and Ritter (1995)), consistent with the view that investor sentiment is not behind our findings.

Our study contributes to the literature on the decision to go public.[6] IPO activity varies with market conditions (Busaba, Benveniste, and Guo (2001), Benveniste, Ljungqvist, Wilhelm, and Yu (2003), Yung, Çolak, and Wang (2008), and Bernstein (2015)) such as high valuations (Lerner (1994), Loughran and Ritter (1995), and Pagano, Panetta, and Zingales (1998)), investor sentiment (Baker and Wurgler (2000), Alti (2006)), and stock market development (Subrahmanyam and Titman (1999), Doidge et al. (2013)). We find that the IPO decision relates to institutional investors and location-based factors (Çolak et al. (2017)).[7] A related study is Chemmanur, Huang, Xie, and Zhu (2022), which examines the geographic dispersion of IPO participants but focuses on IPO pricing. Using a new method to model IPO activity, we show that spatial proximity to capital significantly affects the decision to go public.

Our results also contribute to growing evidence that even in public markets, location-based factors affect financing outcomes. Although local credit access and VC capacity are known to impact the financing of entrepreneurial activities, evidence in public markets is limited.[8] An exception is Kim, Wang, and Wang (2022), who examine firms that are already publicly listed and the effect of local equity capital on their ongoing marginal financing policies. In contrast, we examine the foundational decision to become a public company, which is a transformative "go/no-go" decision that changes the firm's organizational structure (Rajan (2012), Bias, Lochner, Obernberger, and Sevilir (2026)), business strategy, and future trajectory (Bernstein (2022)). Stated differently, the relevant counterfactual for our firms is not simply altering their financing mix; rather, it is getting acquired or remaining private and relying on a different set of financing channels (e.g., VC, bank loans, private equity). Moreover, we focus on intangible-intensive private firms, for which local investors' capacity to conduct deep due diligence is a pivotal factor in the IPO process. In contrast, a public firm has a trading history, a record of public disclosures (e.g., 10-Ks, 10-Qs), and typically research coverage from sell-side analysts, thereby providing investors with substantial public information to draw upon. Finally, our evidence suggests that colocation between institutions and issuers confers sticky advantages. Bookbuilding is an extensive, in-person marketing process intended to enhance IPO pricing by improving the availability of information about the issuer to attending investors. However, our findings suggest that the bookbuilding process cannot easily replicate the information advantages and relationships that local institutions acquire during a firm's early stages of growth.[9]

[6]See for example Ritter and Welch (2002), Lowry (2003), Doidge, Karolyi, and Stulz (2013), Gao, Ritter, and Zhu (2013), Dambra, Field, and Gustafson (2015), Doidge, Karolyi, and Stulz (2017), and Chemmanur, He, Ren, and Shu (2026).

[7]Our findings indirectly relate to evidence that IPOs affect the regional business environment and stock market participation (Butler, Fauver, and Spyridopoulos (2019), Jiang, Lowry, and Qian (2024), and Cornaggia, Gustafson, Kotter, and Pisciotta (2024)).

[8]For evidence on banks, see Jayaratne and Strahan (1996), Guiso et al. (2004), Bertrand et al. (2007), Becker (2007), Kerr and Nanda (2009), and Cornaggia et al. (2013), and for evidence on venture capital, see Sorenson and Stuart (2001) and Chen and Ewens (2025).

[9]We thank the referee for this insight.

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II. Data Construction

A. IPO Sample

Data on IPO filings conducted in the U.S. markets are from the LSEG SDC New Issues database from 1982 to 2021. We deploy the following data filters that are common in the empirical IPO literature (see Purnanandam and Swaminathan (2004), Liu and Ritter (2011)). We exclude unit offers, closed-end funds, REITs, ADRs, limited partnerships, spin-offs, issues of noncommon shares, IPOs with an offer price less than $5, and IPOs in the financial industry with SIC codes between 6000 and 6999. Additionally, SDC provides corporate address information for each IPO, which we use to identify firm locations. Other IPO characteristics, including VC backing, listing exchange, underwriter market share, negative income status, offer price, and shares outstanding, also come from SDC.

We obtain data on the number of years since the company was founded (IPO age) from Jay Ritter's website.[10] Information on stock prices and returns comes from the CRSP database, and accounting data come from the Compustat database. For the firm's accounting data, we use the nearest quarter reported before its IPO when available.[11] To be included in our sample, we also require nonmissing asset, market-to-book, and asset tangibility data. These filters result in a sample of 7,456 IPO filings. Figure 1 presents the geographic dispersion of these IPOs.

B. Identifying Intangible-Intensive Firms

The main hypothesis of this article is that increased REC will increase the propensity of intangible-intensive firms to go public. We identify a firm as intangible-intensive if it offers technology services according to the SDC. The SDC's classification of offering these services encompasses any of the following categories: biotechnology, communications, computer equipment, electronics, and general technology. In practice, this classification is used at the time of the IPO to categorize banking league tables and identify companies with business models based on providing technological services. This measure is suitable for our purposes for several reasons. First, it identifies firms whose core business relies on intangible assets, which the conventional standard industrial classification system cannot capture. Second, as this measure is based on the firm's business model, it is an ex ante measure of the firm's intangible intensiveness and not specific to the timing of the IPO. Third, it is readily accessible and is not subject to the researcher's judgment.

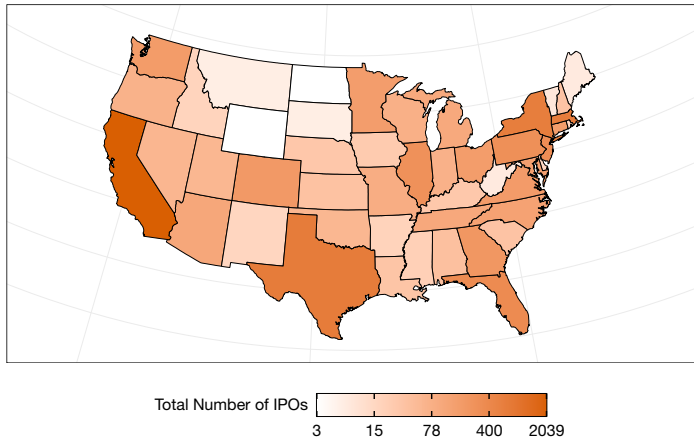
We also adopt several alternative approaches to classify a firm as intangible-intensive. We use an indicator for whether the firm is in the bottom tercile of asset tangibility compared to the sample of all IPO firms. Tangibility is defined as the firm's net property, plant, and equipment (PP&E) divided by book assets. The

[10]The data on the founding date and age of IPO firms are from the Field-Ritter data set of company founding dates and are available at https://site.warrington.ufl.edu/ritter/ipo-data/. These founding dates are first used in Field and Karpoff (2002) and Loughran and Ritter (2004).

[11]We match to pre-IPO accounting data for 91% of IPO observations. We match the remaining IPOs to the closest data post-IPO.

FIGURE 1
Total Number of IPOs by State

Figure 1 shows the total number of IPOs, sorted by the state where the firm is headquartered. The sample period is 1982–2021.



assumption is that firms with low asset tangibility are more likely to be intangible-intensive.

Next, we create an indicator for firms that report negative income at the time of the IPO. This measure captures the notion that intangible-intensive firms are likely to initially lack positive income. The last proxy is an indicator that the firm is less than 5 years old at the time of IPO, which we consider a young firm. Intangible-intensive firms are generally younger because their business operations involve recently developed technologies and cutting-edge processes. Firm age also broadly reflects the financing wedge that may arise due to information asymmetry between insiders and outside investors. Consequently, REC is likely to be important for younger IPOs because proximity will help investors learn directly or indirectly from insiders or other stakeholders.[12]

For each measure of intangible intensiveness, we need a baseline measure of the total number of private firms in the state and year that could potentially go public. We obtain this information from the U.S. Census Bureau's Business Dynamics Statistics (BDS) data.[13] Because we divide the IPO sample into different categories (e.g., intangible-intensive vs. nonintangible-intensive, negative-income vs. nonnegative-income, younger vs. older firms), private firms also must be split into these same groups. We take the following approach to form these groups because most of these characteristics are not observable for private firms.

[12]Although firms in technology services tend to have less tangible assets, negative income, and are younger, the correlations between the measures are not extreme. In our sample, the correlation between the high-tech classification and low tangibility indicators is 0.25, and the correlation between the high-tech classification and negative income indicators is 0.29. The correlation between the high-tech and young firm indicators is 0.10.

[13]The BDS data comes from the same underlying Business Register data as the restricted-use Longitudinal Business Database (LBD) used in Doidge et al. (2017) and Chemmanur et al. (2026).

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For our primary group, intangible intensiveness, we calculate the percentage of IPOs designated as intangible-intensive by SDC within each 2-digit NAICS industry code. We use these percentages to estimate the number of private firms that are intangible-intensive within each 2-digit NAICS industry code in the BDS data. For example, for the Professional, Scientific, and Technical Services industry (NAICS code 54), 72% of IPOs in this group are intangible-intensive. Therefore, we assume that 72% of all private firms in this industry are intangible-intensive. We apply this procedure across all industries for each state and year.[14]

We repeat the same procedure for the low tangibility and negative income classifications. One exception to this approach is our classification of younger versus older private firms. In this case, we have state-level data on private firms by age. We therefore group private firms by age directly rather than imputing their sample from the IPO data. Across all our measures, we restrict the sample to firms 20 years or younger, as the majority of firms that choose to IPO are less than 20 years old. As a robustness exercise, we also use an expanded sample that includes all firms.

C. REC

Apart from identifying intangible intensiveness among IPO firms, our main hypothesis requires a measure of the supply of capital in the public equity market in a region. We quantify local capital by measuring the amount of REC, the capital and resources controlled by institutional investment managers in the firm's state. These investors (e.g., fund managers and broker/dealers) can allocate these funds for investment opportunities such as IPOs. To measure REC, we use equity holdings data from 13F regulatory filings from LSEG (formerly Thomson).[15] At the end of each year, we sum the total dollar amount of reported equity holdings of all institutional investors located in each state.

Calculating REC requires accurate investor location data. For institutional investor locations, we collect all 13F SEC filings in the online Edgar system from 1999 to 2021 and extract investment managers' contact information and business addresses. We begin in 1999 because reporting in the Edgar system is relatively sparse before then. Using these business addresses, we first correct misspellings and errors, and then identify the state where each manager is located. We can identify the managers' location relatively precisely because investors file 13Fs as frequently as each calendar quarter. For manager locations before 1999, we use Nelson's Directory of Investment Managers. By combining these two data sources, we can identify the manager locations of 99% of Thomson 13F equity assets reported during our sample period.

As REC is designed to identify capital that can serve an information discovery role, indexed capital would fall outside of this category. We therefore exclude the Big Three index funds (i.e., BlackRock, Vanguard, and State Street Global Advisors) from our measure of REC.

[14]We use 2-digit NAICS industry codes as this is the most granular level available in the BDS data.

[15]Institutional investment managers that exercise investment discretion over $100 million or more in Section 13(F) securities must file Form 13F.

As a final step, we exclude institutional investor holdings of firms headquartered in the investor's state from REC. This adjustment negates the possibility that a positive local economic shock would induce a positive correlation between local equity capital and local IPOs.[16] Given that the standard Compustat database provides only the most recent headquarters location, we identify accurate historical firm headquarters locations as follows: First, we begin with the corrected locations from Bai, Fairhurst, and Serfling (2020), which are based on historical SEC filings and hand-collected data from the Mergent Manuals (via Moody's Manuals and Dun & Bradstreet's Million Dollar Directory). For firms that are not included in this data, we obtain corporate address information from the point-in-time (PIT) Compustat database.[17] As a robustness test, we use only the PIT Compustat headquarters locations and find nearly identical results.

A central assumption of our hypothesis is that when the marginal investor in an IPO is located in the same region as the firm, they benefit from an informational advantage in evaluating local businesses. We define a region using state boundaries because they are parsimonious and allow for sufficient IPOs in a given year. In Section IV.D, we conduct the analysis using MSAs to define regions. The main inferences remain unchanged.

D. Other Measures of Capital

As an alternative to the REC measure, we use *Ln(REC), External Pensions.* This variable is a subset of REC based on three major U.S. state public pension systems: the California Public Employees' Retirement System (CALPERS), the Florida State Retirement System (FRS), and the South Carolina Retirement System (SCRS). As these systems are funded by a combination of state government and employee contributions, the source of capital is specific to each state. They publicly report their public-equity allocations, including the external managers they employ and the net asset value invested with each. Using data for 1987–2017, we hand-match managers to states and exclude any assets managed within a pension's home state.[18] The measure thus captures capital invested locally but sourced from out of state, which we use in Section III.C to address identification concerns about local economic shocks affecting our results.

We also include a measure of RVC in some of our tests. For this measure, we use the assets under management (AUM) by venture capitalists in a particular state and year to capture local VC activity. From the National Venture Capital Association (NVCA) yearbooks, the data span 1981–2021. We use this measure to confirm that our results with REC are not being driven by correlated activity in the VC sector.

[16]By excluding local holdings and indexed capital, this measure improves on the one introduced in Sulaeman and Wei (2014) to study stock liquidity and adapted in Kim et al. (2022) to examine firm value.

[17]The PIT database is separate from the standard Compustat fundamentals database. According to the data vendor S&P, PIT data captures financial information as it was originally reported, along with any subsequent restatements, preventing the overwriting of original values.

[18]FRS coverage begins in 1987; CALPERS and SCRS coverage begins in 2001. We end the sample in 2017 because CALPERS and SCRS ceased reporting assets under management (AUM) for domestic equity managers, limiting the identification of manager changes. Results are robust to alternative endpoints: 2014 (after CALPERS stops reporting) and 2016 (after SCRS stops reporting).

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E. Additional State-Level Data

Besides the different measures of capital, we include additional state-level economic controls. State-level nominal GDP data come from the Bureau of Economic Analysis (BEA). Bank deposits are from the FDIC's Summary of Deposits (SOD) data.[19] The total amount of individual tax revenue collections reported in each state comes from the IRS.[20]

F. Sample Summary Statistics

Panel A of Table 1 contains the descriptive statistics of the IPO-level sample. Table A.1 in the Supplementary Material lists the variable definitions and data sources. The first part of the table reports the characteristics of the IPOs. The median IPO firm is 8 years old. Using our main measure of intangible-intensive firms ($\mathbb{1}_{(Intangible)}$), 54% of the IPOs are classified as such. On average, 42% of the sample has VC backing before their IPO. We note that while intangible-intensive IPOs often have VC backing, the correlation between the two variables is only 0.45. The percentages of IPOs for the alternative intangible-intensive measures are as follows: low tangibility, negative income, and young firms at 34%, 45%, and 33%, respectively.

In terms of other characteristics of IPOs, 16% are listed on the NYSE or AMEX, and the remaining 84% are listed on NASDAQ, which is similar to the statistics reported in previous studies. The average IPO firm has a post-issue asset market-to-book ratio of 2.4 or an equity market-to-book ratio of 2.77. IPO firms have, on average, a 0.91% BHAR over the subsequent 6 months. The one-year BHAR for IPO firms is −6.4%, which is consistent with prior findings documenting the long-run underperformance of IPOs (Ritter and Welch (2002)).

Panel A of Table 1 also reports the summary statistics for the state-level REC, RVC, and related measures of capital.[21] The average amount of REC is $435.25 billion compared to $18.27 billion for RVC. The table also includes statistics for nominal state-level GDP, bank deposits, and income. For the number of private firms, the average IPO firm comes from a pool of 43.50 thousand firms that are 20 years or younger. Using the expanded sample of firms (regardless of age), the average pool size is 127.59 thousand firms.

In Panel B of Table 1, we separate and compare IPOs using our main measure of intangible-intensive IPOs. We observe that our different proxies for intangible-intensive firms are positively correlated, as these firms are more likely to have negative income and are younger. These firms are more likely to list on NASDAQ and have VC backing. They tend to be smaller, but still generate similar IPO

[19]The deposit data are available from the FDIC from 1987. From 1981 to 1986, we rely on the historical deposit data provided by Christa Bouwman. The link is https://sites.google.com/a/tamu.edu/bouwman/.

[20]Individual income for Washington, DC, and Maryland is not separately reported for the entire sample, so we use the combined reported income for both states. Results are similar if we instead drop Washington, DC, and Maryland from our analysis.

[21]These statistics are summarized at the IPO level. The summary statistics for the sample constructed at the state level are presented in Table 3.

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TABLE 1

Summary Statistics: IPO-Level Sample

Table 1 presents the summary statistics for the sample at the IPO level. The sample consists of the IPO filings conducted in the U.S. markets from 1982 to 2021. Panel A presents the univariate statistics, and Panel B compares the characteristics of intangible-intensive and other IPOs. *REC* variables, *RVC*, *State Deposits*, *State Income*, and *State GDP* are presented in billions. *No. of Firms* is presented in thousands. See Section II and Table A.1 in the Supplementary Material for definitions of these variables. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Univariate Statistics

	Mean	Std. Dev.	25th Pctile	Median	75th Pctile	No. of Obs.
IPO Characteristics						
𝟙(Intangible)	0.54	0.50	0.00	1.00	1.00	7,456
𝟙(Low tangibility)	0.34	0.47	0.00	0.00	1.00	7,456
𝟙(Negative income)	0.45	0.50	0.00	0.00	1.00	7,437
𝟙(Young firm)	0.33	0.47	0.00	0.00	1.00	7,214
IPO age	15.58	20.62	4.00	8.00	17.00	7,214
Assets	287.79	2,118.09	10.63	29.92	101.82	7,456
Tangibility (%)	23.02	21.79	7.10	15.33	32.13	7,456
IPO proceeds	84.07	360.46	12.60	30.00	70.00	7,456
𝟙(NYSE/AMEX)	0.16	0.37	0.00	0.00	0.00	7,456
𝟙(NASDAQ)	0.84	0.37	1.00	1.00	1.00	7,456
𝟙(VC-backed)	0.42	0.49	0.00	0.00	1.00	7,456
Market-to-book (assets)	2.78	3.42	1.28	1.92	2.87	7,456
Market-to-book (equity)	3.29	4.66	1.40	2.13	3.21	7,456
Underwriter market share (%)	5.22	8.31	0.32	1.94	6.28	7,456
6-Month BHAR (%)	0.91	62.43	−33.94	−9.09	20.67	7,293
12-Month BHAR (%)	−6.40	78.62	−55.19	−21.27	21.63	7,293
Local share of institutional ownership (%)	3.68	6.25	0.00	0.71	4.67	6,818
Industry stock returns (%)	24.02	24.51	8.32	21.08	37.27	7,456
State-Level Variables						
REC	435.25	738.97	31.48	134.40	424.21	7,456
REC, external pensions	2.64	3.94	0.44	1.06	2.62	4,164
RVC	18.27	46.72	0.43	2.30	8.88	7,456
State deposits	282.99	341.47	76.29	172.93	372.12	7,456
State GDP	575.52	629.46	159.51	354.23	776.26	7,456
State income	84.89	85.21	27.19	56.85	111.29	7,456
No. of firms	43.50	37.54	13.54	31.95	68.71	7,456
No. of firms (expanded)	127.59	101.14	44.14	99.51	177.44	7,456

Panel B. Comparing IPOs

	Intangible-Intensive IPOs	Other IPOs	
	Mean	Mean	Difference
IPO Characteristics			
𝟙(Low tangibility)	0.45	0.21	0.24***
𝟙(Negative income)	0.58	0.29	0.29***
𝟙(Young firm)	0.37	0.28	0.09***
IPO age	9.98	22.29	−12.31***
Assets	156.55	443.76	−287.21***
Tangibility (%)	16.56	30.70	−14.14***
IPO proceeds	83.79	84.40	−0.61
𝟙(NYSE/AMEX)	0.09	0.24	−0.15***
𝟙(NASDAQ)	0.91	0.76	0.15***
𝟙(VC-backed)	0.63	0.18	0.45***
Market-to-book (assets)	3.43	2.00	1.43***
Market-to-book (equity)	3.97	2.49	1.48***
Underwriter market share (%)	5.94	4.37	1.56***
6-Month BHAR (%)	2.25	−0.70	2.95**
12-Month BHAR (%)	−6.15	−6.69	0.54
Local share of institutional ownership (%)	4.57	2.59	1.97***
Industry stock returns (%)	27.44	19.96	7.47***
State-Level Variables			
REC	583.03	259.63	323.39***
REC, external pensions	3.18	1.69	1.49***
RVC	25.70	9.43	16.27***
State deposits	336.67	219.20	117.48***
State GDP	699.01	428.75	270.26***

(continued on next page)

TABLE 1 (continued)
Summary Statistics: IPO-Level Sample

Panel B. Comparing IPOs (continued)

	Intangible-Intensive IPOs	Other IPOs	
	Mean	Mean	Difference
State income	102.13	64.39	37.74***
No. of firms	33.09	55.87	−22.77***
No. of firms (expanded)	91.48	170.50	−79.02***
No. of obs.	4,049	3,407	

proceeds. Intangible-intensive firms go public more frequently in states with higher REC, RVC, and higher state GDP and income.

Panel A of Table 2 presents the number of intangible-intensive IPOs by Fama–French 49 industry classification. Although they often appear in expected fields (e.g., computer software and hardware, electronic equipment, business services), intangible-intensive IPOs are distributed across numerous other industries. These include pharmaceutical products, medical equipment, communication, health care, and even retail. Indeed, 34 of the nonfinancial industry classifications have at least one intangible-intensive IPO during our sample. Panel B of Table 2 presents the number of intangible-intensive IPOs by state. California, Massachusetts, and New York have the highest number of such IPOs. Nonetheless, we observe broad geographical coverage: except for Hawaii, West Virginia, and Wyoming, all other states in our sample have at least one intangible-intensive IPO.

III. Main Results: REC and the IPO Decision

A. The Frequency of IPOs

To test the main hypothesis that REC affects the propensity of regional firms to go public, we design the following fixed effects Poisson regression:

$$\begin{aligned}(1)\quad \text{No. IPOs}_{ist} = {} & \beta_1 \mathbb{1}(\text{Intangible})_{ist} \times Ln(\text{REC})_{st-1} + \beta_2 \mathbb{1}(\text{Intangible})_{ist} \\ & + \beta_3 Ln(\text{REC})_{st-1} + \beta_4 \text{State Controls}_{st-1} + \beta_5 \mathbb{1}(\text{Intangible})_{ist} \\ & \times \text{State Controls}_{st-1} + \beta_6 Ln(\text{No. of Firms})_{ist} + \delta_s + \gamma_t \varepsilon_{ist}.\end{aligned}$$

For each state (s) and year (t), we have two categories of IPO: intangible-intensive IPOs ($i = 1$) and other IPOs ($i = 0$). The data structure is such that for each state and year, there are two observations: the number of intangible-intensive IPOs and the number of other IPOs. For example, in 2000, Minnesota had five intangible-intensive IPOs and two other IPOs, constituting two distinct observations. The data structure in our sample would be as follows:

State (s)	Year (t)	Intangible-Intensive (i)	# of IPOs	REC (Billions)
Minnesota	2000	1 (Yes)	5	170.4
Minnesota	2000	0 (No)	2	170.4

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TABLE 2

Distribution of Firms with Intangible-Intensive IPOs

Panel A of Table 2 reports statistics on the number of IPOs that are designated as involved in technology services by SDC (our main measure of intangible intensiveness) across the Fama–French 49 Industry Classification. Panel B reports statistics on the number of IPOs that are designated as involved in technology services by SDC across the IPO firm's state.

Panel A. Number of Intangible-Intensive IPOs by Industry

FF 49 Industry	Number of IPOs	FF 49 Industry	Number of IPOs
Computer software	1,162	Construction	4
Pharmaceutical products	655	Defense	4
Business services	529	Agriculture	3
Electronic equipment	482	Fabricated products	3
Medical equipment	315	Rubber and plastic products	2
Computer hardware	238	Utilities	2
Communication	192	Almost nothing	2
Measuring and control equip.	112	Food products	1
Health care	109	Automobiles and trucks	1
Retail	56	Business supplies	1
Wholesale	38	Restaurants, hotels, motels	1
Machinery	34	Candy and soda	0
Electrical equipment	21	Beer and liquor	0
Recreation	17	Tobacco products	0
Chemicals	12	Apparel	0
Entertainment	10	Textiles	0
Personal services	10	Shipbuilding, railroad equip.	0
Printing and publishing	8	Precious metals	0
Steel works etc.	6	Nonmetallic and indust. metal mining	0
Construction materials	5	Coal	0
Aircraft	5	Petroleum and natural gas	0
Transportation	5	Shipping containers	0
Consumer goods	4		

Panel B. Number of Intangible-Intensive IPOs by State

State	Number of IPOs	State	Number of IPOs
California	1,446	Indiana	14
Massachusetts	465	Iowa	13
New York	244	Oklahoma	13
Texas	210	Kansas	11
New Jersey	162	Kentucky	11
Pennsylvania	134	Alabama	9
Florida	122	Nebraska	8
Washington	118	Rhode Island	8
Virginia	107	South Carolina	8
Illinois	104	Delaware	6
Georgia	94	District of Columbia	6
Maryland	92	Idaho	5
Colorado	89	Louisiana	4
Minnesota	78	Maine	4
North Carolina	71	New Mexico	4
Connecticut	69	Arkansas	3
Arizona	43	Mississippi	2
Ohio	41	Montana	2
Michigan	36	South Dakota	2
Oregon	35	Vermont	2
Utah	31	Alaska	1
Missouri	30	North Dakota	1
Tennessee	28	Hawaii	0
Wisconsin	28	West Virginia	0
New Hampshire	20	Wyoming	0
Nevada	15		

The main independent variable of interest is the interaction between the natural logarithm of REC at the state level and the intangible-intensive IPO indicator. Panel A of Table 3 provides the summary statistics for this state-level data structure.[22]

[22]With 50 states and Washington, DC, the maximum possible number of observations is 4,080 ($51 \times 40 \times 2$). We have 3,966 observations due to missing REC data for some states in the early part of the sample.

TABLE 3

Summary Statistics: State-Level Sample

Table 3 presents the summary statistics for the sample at the state level. The sample consists of the IPO filings conducted in the U.S. markets from 1982 to 2021. Panel A provides univariate summary statistics, and Panel B provides the average number of IPOs per state-year for each classification of intangible intensiveness or information asymmetry. *REC* variables, *RVC*, *State Deposits*, *State Income*, and *State GDP* are presented in billions. *No. of Firms* is presented in thousands. See Section II and Table A.1 in the Supplementary Material for definitions of these variables.

	Mean	Std. Dev.	25th Pctile	Median	75th Pctile	No. of Obs.
Panel A. Univariate Statistics						
REC	128.18	378.28	2.66	11.20	86.42	3,966
REC, external pensions	1.34	2.08	0.21	0.60	1.47	828
RVC	3.12	15.13	0.01	0.12	1.02	3,966
State deposits	115.56	187.53	23.44	52.72	125.17	3,966
State GDP	218.82	315.96	50.92	112.97	259.61	3,966
State income	34.11	46.79	6.39	16.86	43.33	3,966
No. of firms	16.89	22.87	4.10	9.23	19.80	3,966
No. of firms (expanded)	50.34	62.75	13.94	28.12	62.28	3,966
Panel B. Average Number of IPOs by Type						
Intangible intensive	2.04		Nonintangible intensive			1.72
Low tangibility	1.27		Nonlow tangibility			2.49
Negative income	1.69		Nonnegative income			2.06
Young firms	1.21		Non-young firms			2.42

The average number of IPOs per state-year for our different measures of intangible intensiveness is presented in Panel B of Table 3.

To estimate a propensity to go public, the model includes a measure for the total number of firms in the state and year to provide a baseline supply of firms. For the number of firms, we include estimates of both the total number of intangible-intensive firms and other firms in a state. Continuing our example for Minnesota in 2000, we estimate an underlying population of 10,353 intangible-intensive firms and 26,241 other firms. The measure we use, *Ln(No. of Firms)*, takes the natural logarithm of the number of firms to reduce the influence of extreme values. See Section II.B for additional details.

We also include state-level deposits as a proxy for local banking capital, as well as state-level GDP and income, to account for other regional economic factors that may influence both REC levels and IPO activity. In some specifications, we interact these economic variables with the intangible-intensive indicator to ensure that the indicator's interaction with REC is not capturing the effect of one of these potentially correlated economic factors.

We include state fixed effects in the specifications. Consequently, identification comes from within-state changes in REC over time rather than from cross-state differences in REC. As certain states have higher levels of REC and IPO activity due to size and economic conditions, this fixed effect separates the effect of REC on the occurrence of IPOs from these factors. We also include year fixed effects to remove macroeconomic shocks (e.g., the dot-com bubble) that alter both REC and the frequency of IPOs. In later specifications, we use state-by-year fixed effects that control for any local economic shock affecting both REC and IPO activity in 1 year. This approach ensures that the effect of REC on intangible-intensive IPOs does not come from some other confounding factors. We cluster our standard errors at the state and year levels.

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TABLE 4

Incidences of IPOs

Table 4 reports Poisson fixed-effects panel regression estimates of the effect of regional equity capital (REC) on the incidence of IPOs in the same region. The dependent variable, *Number of IPOs*, is the number of IPOs by different *Firm Split* variables for each state and year. *Firm Split* is 𝟙*(Intangible)* (columns 1–4), 𝟙*(Low Tangibility)* (column 5), 𝟙*(Negative Income)* (column 6), and 𝟙*(Young Firm)* (column 7). *Ln(REC)* is the log of state-level equity capital. 𝟙*(Intangible)* takes a value of 1 if IPO firms are designated as intangible-intensive. 𝟙*(Low Tangibility)* takes a value of 1 for firms that are in the bottom tercile by net PP&E to assets. 𝟙*(Negative Income)* takes a value of 1 for firms that report negative income at IPO. 𝟙*(Young Firm)* takes a value of 1 for firms that are 5 years or younger at IPO. *Ln(REC)*, *Ln(State Deposits)*, *Ln(State GDP)*, and *Ln(State Income)* are as of the end of the prior year. Standard errors (in parentheses) are clustered by state and year. See Table A.1 in the Supplementary Material for descriptions of the control variables. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Number of IPOs						
	1	2	3	4	5	6	7
𝟙(Intangible) × Ln(REC)		0.291***	0.397***	0.359***			
		(0.073)	(0.089)	(0.074)			
𝟙(Intangible)	2.824***	0.482	0.424	4.536***			
	(1.050)	(0.743)	(0.596)	(1.153)			
𝟙(Low tangibility) × Ln(REC)					0.265***		
					(0.050)		
𝟙(Low tangibility)					0.674		
					(1.429)		
𝟙(Negative income) × Ln(REC)						0.288***	
						(0.083)	
𝟙(Negative income)						4.239**	
						(1.955)	
𝟙(Young firm) × Ln(REC)							0.094*
							(0.053)
𝟙(Young firm)							−0.192*
							(0.113)
Ln(REC)	0.010	−0.101	−0.151**				
	(0.064)	(0.067)	(0.074)				
Ln(State deposits)	−0.010	0.118	0.300*				
	(0.133)	(0.103)	(0.164)				
Firm split × Ln(State deposits)			−0.409	−0.209	−0.030	−0.291	−0.113
			(0.284)	(0.228)	(0.164)	(0.255)	(0.182)
Ln(State GDP)	−0.947	−0.006	−0.298				
	(0.843)	(0.626)	(0.655)				
Firm split × Ln(State GDP)			0.706	0.581	−0.184	0.015	−1.018***
			(0.565)	(0.504)	(0.357)	(0.473)	(0.279)
Ln(State income)	0.066	0.196	0.441				
	(0.566)	(0.474)	(0.507)				
Firm split × Ln(State income)			−0.516	−0.787*	0.295	0.236	0.935***
			(0.396)	(0.418)	(0.322)	(0.489)	(0.268)
Ln(No. of firms)	2.793***	0.941	0.826	4.824***	2.558	6.558***	1.590***
	(0.968)	(0.721)	(0.585)	(1.149)	(1.737)	(2.440)	(0.330)
State fixed effects	Yes	Yes	Yes	No	No	No	No
Year fixed effects	Yes	Yes	Yes	No	No	No	No
State-year fixed effects	No	No	No	Yes	Yes	Yes	Yes
No. of obs.	3,966	3,966	3,966	3,966	3,966	3,966	3,966
Pseudo R^2	0.660	0.677	0.679	0.760	0.778	0.757	0.767

Table 4 presents the results from estimating equation (1). In column 1, we find that higher REC is associated with more IPOs, but the effect is not statistically significant. In column 2, we examine whether the effects differ by the intangible intensiveness of the firm, using our main intangible measure. We find that REC has a positive and statistically significant effect (at the 1% level) on intangible-intensive IPOs, both relative to nonintangible-intensive IPOs (β_1) and in absolute terms ($\beta_1 + \beta_3$). We find similar estimates in column 3, where we interact the intangible

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measure with other state-level economic variables. The effect of REC is economically meaningful. Using column 3, a 10% increase in REC leads to 3.9% more intangible-intensive IPOs relative to nonintangible-intensive IPOs. This increase in REC leads to 2.4% more intangible-intensive IPOs in absolute terms. Given that there are 2.04 intangible-intensive IPOs on average in each state-year (see Table 3) and 51 states, including DC, this equates to 2.5 additional IPOs nationwide each year.[23]

Column 4 repeats the specification from column 3 but introduces state-by-year fixed effects. The relative effect of REC on intangible-intensive IPOs (β_1) remains similar to column 3, confirming that increases in REC spur additional intangible-intensive firms to go public. Unlike earlier specifications, we cannot quantify the effect of REC on intangible-intensive IPOs in absolute terms, but rather its effect only relative to nonintangible-intensive IPOs.[24] For a 10% increase in REC, we document a 3.5% increase in intangible-intensive IPOs relative to nonintangible-intensive IPOs.[25]

Columns 5 through 7 repeat the specification in column 4 but replace $\mathbb{1}$*(Intangible)* with alternative measures of intangible intensiveness. These measures include $\mathbb{1}$*(Low Tangibility)* (column 5), $\mathbb{1}$*(Negative Income)* (column 6), and $\mathbb{1}$*(Young Firm)* (column 7). We interact each of these measures with REC and the other state-level control variables, and recompute the baseline number of firms in each state for each of these measures (see Section II.B). In all 3 columns, we find that the effect of an increase in REC is statistically significant. A 10% increase in REC is associated with 2.5% more low tangibility IPOs (column 5), 2.8% more negative income IPOs (column 6), and 0.9% more young firm IPOs (column 7).[26] For each measure, the calculated change is relative to the other category of IPO firms (e.g., low tangibility relative to nonlow tangibility).

In terms of other control variables, the state deposits variable is generally statistically insignificant (except in column 3). This result suggests that local banking capital does not meaningfully affect incidents of resident-firm IPOs. State-level GDP and income also do not generally predict IPO activity. In contrast, states with more private firms tend to have more IPOs.

To confirm the robustness of our main findings, we perform the following tests. First, we relax the age restriction that private firms must be 20 years or younger for the construction of *Ln(No. of Firms)*. The results are presented in Table A.2 in the Supplementary Material. Second, we use an alternate version of

[23]The calculations are as follows: For the relative increase: $\%\Delta(\text{Intangible-Intensive IPOs}) = e^{(0.397)\times Ln(1.10)} - 1 \approx 3.9\%$. For the absolute increase: $\%\Delta(\text{Intangible-Intensive IPOs}) = e^{(0.397-0.151)\times Ln(1.10)} - 1 \approx 2.4\%$. For the additional number of IPOs: $2.4\% \times (2.04 \text{ average \# IPOs}) \times (51 \text{ states and DC}) \approx 2.5$ IPOs.

[24]This difference is because the state-by-year fixed effects absorb the standalone estimate of REC on the incidence of IPOs. The state-by-year fixed effects also absorb other state-level controls, with the exception of *Ln(No. of Firms)*, which takes different values for intangible-intensive and nonintangible-intensive IPOs within a state.

[25]Calculation: $\%\Delta(\text{Intangible-Intensive IPOs}) = e^{(0.359)\times Ln(1.10)} - 1 \approx 3.5\%$.

[26]The calculations are as follows; For column 5: $\%\Delta(\text{Low-Tangibility IPOs}) = e^{(0.265)\times Ln(1.10)} - 1 \approx 2.5\%$. For column 6: $\%\Delta(\text{Negative-Income IPOs}) = e^{(0.288)\times Ln(1.10)} - 1 \approx 2.8\%$. For column 7: $\%\Delta(\text{Young IPOs}) = e^{(0.094)\times Ln(1.10)} - 1 \approx 0.9\%$.

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REC that is calculated using firm locations from Compustat PIT data instead of data from Bai et al. (2020) (see Table A.3 in the Supplementary Material). Third, we restrict our REC measure to assets managed by institutions that have invested in a new IPO in the last 4 quarters (see Table A.4 in the Supplementary Material). In all cases, the main results are unchanged.

Fourth, in Table A.5 in the Supplementary Material, we repeat our analysis for each of the 4 decades of our sample. The effect of REC on the decision to go public remains statistically significant and economically important in all 4 decades of our sample. Although the estimated magnitudes are largest in the period that includes the 2000 tech bubble, our findings are not solely driven by this event or other specific market episodes. Additionally, Figure A.1 in the Supplementary Material plots the coefficient estimates on REC using 5-year rolling windows and does not show any extreme outlier periods.

In summary, the results support our main hypothesis that REC has a positive and economically meaningful effect on IPO activity for intangible-intensive and informationally opaque firms. This effect is separate from other economic conditions. To the extent that these firms rely on financing from local sources of equity capital, the agglomeration effect captured by REC is a novel and important factor in firms' IPO decisions.

B. The Role of VC

Although VC is a potentially important funding source for intangible-intensive private firms, it is not omnipresent: 37% of the 4,049 intangible-intensive IPOs in our sample lack VC backing. Nevertheless, it remains possible that our measure, REC, is capturing regional differences in VC activity. To address this concern, we conduct additional tests in Table 5, where we explicitly control for the RVC.[27]

Column 1 of Panel A of Table 5 shows the equivalent analysis of column 4 from Table 4 for the subsample with nonmissing RVC data. We observe similar parameter estimates. Column 2 replaces REC with RVC in the interaction term with intangible-intensive firms. Comparing columns 1 and 2, a 10% increase in REC leads to a 3.6% increase in intangible-intensive IPOs relative to other IPOs. A 10% increase in RVC is associated with a 2.7% increase in intangible-intensive IPOs relative to other IPOs.[28] To confirm that REC is not simply a proxy for the presence of VC, column 3 includes both sources of funding. We find that the positive and significant effect of REC on IPO activity is robust to the inclusion of RVC.

As a further test, in column 4, we exclude any IPOs that had VC backing from the analysis. This specification addresses the concern that pre-IPO firms with institutional investments drive the results (Kwon et al. (2020), Chernenko et al. (2021), and Huang et al. (2021)). We continue to find a positive and statistically significant effect of REC on intangible-intensive IPOs, reinforcing the conclusion that the REC effect is not driven by VC availability.

[27]We have fewer observations because venture capital is not reported in all states each year. We obtain similar results if we set those observations to 0.

[28]The calculations are as follows: For column 1: $\%\Delta(\text{Intangible-Intensive IPOs}) = e^{(0.374)\times Ln(1.10)} - 1 \approx 3.6\%$. For column 2: $\%\Delta(\text{Intangible-Intensive IPOs}) = e^{(0.278)\times Ln(1.10)} - 1 \approx 2.7\%$.

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TABLE 5

Incidences of IPOs, Regional Venture Capital

Table 5 reports Poisson fixed-effects panel regression estimates of the effect of regional equity capital (REC) on the incidence of IPOs in the same region. The dependent variable, *Number of IPOs*, is the number of IPOs by the 𝟙*(Intangible)* measure. *Ln(REC)* is the log amount of the state-level equity capital variable. 𝟙*(Intangible)* takes a value of 1 if IPO firms are designated as intangible-intensive. *Ln(RVC)* is the log amount of state-level venture capital. Columns 1–3 in Panel A include all IPOs. Column 4 in Panel A excludes VC-backed IPOs. Panel B excludes IPOs in California, Massachusetts, and New York. *Ln(REC)*, *Ln(RVC)*, *Ln(State Deposits)*, *Ln(State GDP)*, and *Ln(State Income)* are as of the end of the prior year. Standard errors (in parentheses) are clustered by state and year. See Table A.1 in the Supplementary Material for descriptions of the control variables. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. State Venture Capital

	Number of IPOs			
	Including All Firms			Excluding VC-Backed Firms
	1	2	3	4
𝟙(Intangible) × Ln(REC)	0.374***		0.248***	0.219***
	(0.072)		(0.072)	(0.076)
𝟙(Intangible) × Ln(RVC)		0.278***	0.154**	−0.001
		(0.067)	(0.062)	(0.046)
𝟙(Intangible)	4.617***	3.797***	3.931***	4.461***
	(1.149)	(1.124)	(1.139)	(1.368)
𝟙(Intangible) × Ln(State deposits)	−0.209	−0.232	−0.267	0.061
	(0.230)	(0.226)	(0.224)	(0.182)
𝟙(Intangible) × Ln(State GDP)	0.638	0.329	0.599	0.119
	(0.513)	(0.542)	(0.507)	(0.453)
𝟙(Intangible) × Ln(State income)	−0.876**	−0.429	−0.841*	−0.514
	(0.428)	(0.446)	(0.432)	(0.428)
Ln(No. of firms)	4.895***	4.017***	4.176***	4.090***
	(1.152)	(1.125)	(1.127)	(0.999)
State-year fixed effects	Yes	Yes	Yes	Yes
No. of obs.	3,432	3,432	3,432	3,432
Pseudo R^2	0.752	0.752	0.753	0.687

Panel B. Excluding Certain States

	Number of IPOs			
	Excluding CA	Excluding MA	Excluding NY	Excluding CA, MA, NY
	1	2	3	4
𝟙(Intangible) × Ln(REC)	0.306***	0.198**	0.262***	0.227***
	(0.077)	(0.078)	(0.067)	(0.071)
𝟙(Intangible) × Ln(RVC)	0.091	0.123*	0.154**	0.047
	(0.067)	(0.065)	(0.060)	(0.060)
𝟙(Intangible)	2.728**	3.995***	3.020***	1.708
	(1.139)	(1.192)	(1.140)	(1.271)
𝟙(Intangible) × Ln(State deposits)	−0.231	−0.300	−0.124	−0.198
	(0.255)	(0.229)	(0.251)	(0.320)
𝟙(Intangible) × Ln(State GDP)	0.235	0.713	0.252	0.007
	(0.540)	(0.505)	(0.493)	(0.534)
𝟙(Intangible) × Ln(State income)	−0.572	−0.791*	−0.574	−0.148
	(0.446)	(0.435)	(0.377)	(0.422)
Ln(No. of firms)	2.991***	4.265***	3.278***	2.017
	(1.113)	(1.174)	(1.119)	(1.236)
State-year fixed effects	Yes	Yes	Yes	Yes
No. of obs.	3,352	3,352	3,352	3,192
Pseudo R^2	0.661	0.752	0.754	0.625

Separate from REC, the effect of VC is not obvious because regional VC can push IPO activity in opposite directions. More RVC may spur intangible-intensive startups and thus increase IPOs, but it can also help such firms remain private longer, reducing IPOs. The positive RVC coefficient indicates that the former

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channel dominates. One reason may be that RVC does not capture other late-stage funding that keeps firms private (e.g., private equity, endowments, pensions, sovereign wealth funds). In any case, both RVC and REC impact IPO decisions.

Another potential concern is that our results are concentrated in specific states that are hubs of intangible-intensive IPO activity and abundant VC funding. There are high numbers of intangible-intensive IPOs in California, Massachusetts, and New York (Panel B of Table 2). These states also have the most VC funding. Although the use of state fixed effects removes any persistent differences across states in Table 4, and state-by-year fixed effects further remove any local economic shocks that affect both REC and IPO activity, these states could still be the main driver of our results. In Panel B of Table 5, we repeat the analysis of column 3 of Panel A of this table but exclude California, Massachusetts, and New York (columns 1, 2, and 3, respectively). In column 4, we exclude all three states from the sample. REC remains statistically significant across all specifications. The results indicate that the effects of agglomeration captured by REC on the propensity of intangible-intensive firms to go public exist outside of these specific states.

C. Shocks to REC

The results so far are consistent with our hypothesis that the increase in intangible-intensive IPO frequency is driven by the increase in REC. However, it is plausible that changes in REC reflect underlying omitted regional factors that are correlated with IPO activity. To mitigate this concern, all of our previous specifications exclude local equity holdings from the REC measure. Further, these specifications include state-level macroeconomic variables, state fixed effects, and year fixed effects. In certain regressions, we use state-by-year fixed effects to absorb localized shocks that firms in the same state and year might contemporaneously experience. The significant effect of REC on intangible-intensive IPOs persists in all these instances.

Nevertheless, we implement an alternative identification strategy that uses a subset of REC originating from *nonlocal* sources of capital. As this capital comes from outside of the state, it is less likely to be related to underlying *local* economic conditions. This version of REC rules out the possibility that REC is only serving as a proxy for local economic conditions rather than its distinct impact on IPOs.

To do so, we obtain the investment allocations of three major state public pension systems (California Public Employees' Retirement System, Florida State Retirement System, and South Carolina Retirement System). Our key assumption is that out-of-state pension systems do not choose a particular manager based on the specific economic conditions of that manager's state. As pension flows are uninformed and not correlated with future return performance (Goyal and Wahal (2008)), they are unlikely to anticipate future regional economic growth and subsequent IPO activity. In support of this assumption, we verify in Table A.6 in the Supplementary Material that changes in pension fund allocations are not significantly related to past, present, or future GDP growth.

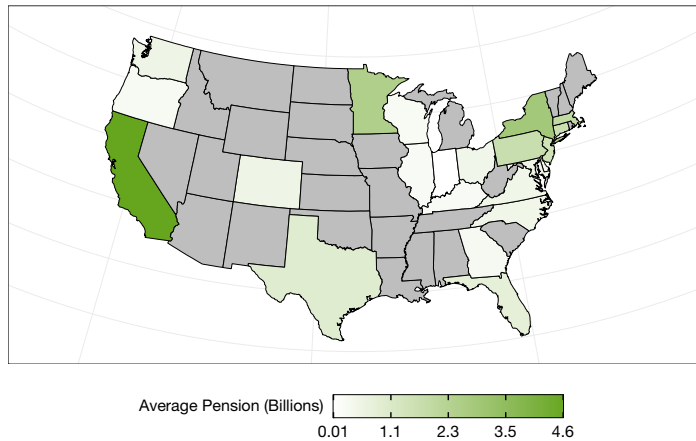
Additionally, these out-of-state allocations serve as a shock to the amount of deployable capital that local managers can invest in IPOs. As there is a significant turnover in these allocations, they are more likely to capture new flows in REC rather than static investment holdings. Indeed, we find that pension funds choose four new managers per year on average and investment allocations persist for about 5 years.

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FIGURE 2

Pension Allocation by State

Figure 2 shows the average allocation of out-of-state pension funds for each state. The sample period for the allocations is 1987–2017. Any in-state funds (California for CALPERS, Florida for FRS, and South Carolina for SCRS) are excluded. States in gray do not receive any pension flows from CALPERS, FRS, or SCRS.



The geographic coverage of this measure of capital is significant, despite stemming from only three pension funds. Presented in Figure 2, these pensions have allocations in 23 different states. Within these states, the amount of out-of-state pension capital is also economically meaningful. In 13 of these states, the pension amounts account for 1%–6% of the state's total REC.

In Table 6, we estimate the same specifications as in Table 4, but use the external pension-based REC measure instead of the original REC measure. Across all these specifications, we find 0.8% to 1.5% more intangible-intensive IPOs relative to nonintangible-intensive IPOs for a 10% increase in pension-based REC.[29] All of these effects are statistically significant. Overall, these findings imply that the REC effect we document is not attributable to omitted local economic factors.

IV. Additional Tests and Alternative Explanations

A. REC and Acquisitions

Our study primarily focuses on the decision to go public, but private firms have other pathways to raise capital or exit, such as selling the business to another firm. We expand our framework to include acquisitions to assess whether REC has a unique role in helping firms go public. As REC does not play a direct role in merger and acquisition (M&A) activity, we should expect REC to have different effects for M&As versus IPOs.

[29]The calculations are as follows; For column 1: $\%\Delta(\text{Intangible-Intensive IPOs}) = e^{(0.152)\times Ln(1.10)} - 1 \approx 1.5\%$. For column 2: $\%\Delta(\text{Intangible-Intensive IPOs}) = e^{(0.143)\times Ln(1.10)} - 1 \approx 1.4\%$. For column 3: $\%\Delta(\text{Intangible-Intensive IPOs}) = e^{(0.081)\times Ln(1.10)} - 1 \approx 0.8\%$.

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TABLE 6

Incidences of IPOs, External Pensions

Table 6 reports Poisson fixed-effects panel regression estimates of the effect of regional equity capital (REC) on the incidence of IPOs in the same region. The dependent variable, *Number of IPOs*, is the number of IPOs by the 𝟙*(Intangible)* measure. *Ln(REC), External Pensions* is the log amount of the state-level equity capital managed for out-of-state pension funds. 𝟙*(Intangible)* takes a value of 1 if the IPO firm is designated as intangible-intensive. *Ln(REC), External Pensions*, *Ln(State Deposits)*, *Ln(State GDP)*, and *Ln(State Income)* are as of the end of the prior year. Standard errors (in parentheses) are clustered by state and year. See Table A.1 in the Supplementary Material for descriptions of the control variables. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Number of IPOs		
	1	2	3
𝟙(Intangible) × Ln(REC), external pensions	0.152***	0.143**	0.081**
	(0.055)	(0.061)	(0.039)
Ln(REC), external pensions	−0.078**	−0.074**	
	(0.033)	(0.037)	
𝟙(Intangible)	4.293***	4.260***	10.458***
	(0.823)	(0.901)	(2.364)
Ln(State deposits)	0.472	0.493	
	(0.382)	(0.454)	
𝟙(Intangible) × Ln(State deposits)		−0.033	0.525
		(0.624)	(0.546)
Ln(State GDP)	−4.625***	−4.331**	
	(1.442)	(1.745)	
𝟙(Intangible) × Ln(State GDP)		−0.427	−0.962
		(1.288)	(1.185)
Ln(State income)	2.275*	1.941	
	(1.217)	(1.691)	
𝟙(Intangible) × Ln(State income)		0.554	0.222
		(1.188)	(1.121)
Ln(No. of firms)	4.270***	4.241***	10.826***
	(0.909)	(0.974)	(2.583)
State fixed effects	Yes	Yes	No
Year fixed effects	Yes	Yes	No
State-year fixed effects	No	No	Yes
No. of obs.	746	746	746
Pseudo R^2	0.697	0.698	0.754

In this expanded framework, we include the number of intangible-intensive or nonintangible-intensive acquisitions at the state-year level. We estimate the following augmented version of equation (1), where observations are indexed by intangible intensiveness (i), acquisition status (a), state (s), and year (t):

$$
\begin{aligned}
(2)\quad \text{No. IPOs or Acquisitions}_{iast} = {} & \beta_1 \mathbb{1}(\text{Intangible})_{ist} \times \ln(\text{REC})_{st-1} \\
& \times \mathbb{1}(\text{Acquisition})_{ast} + \beta_2 \mathbb{1}(\text{Intangible})_{ist} \\
& \times \ln(\text{REC})_{st-1} + \beta_3 \mathbb{1}(\text{Intangible})_{ist} \\
& + \beta_4 \mathbb{1}(\text{Acquisition})_{ast} \times \ln(\text{REC})_{st-1} \\
& + \beta_5 \mathbb{1}(\text{Acquisition})_{ast} + \beta_6 \mathbb{1}(\text{Intangible})_{ist} \\
& \times \mathbb{1}(\text{Acquisition})_{ast} + \beta_7 \ln(\text{REC})_{st-1} \\
& + \beta_8 \text{State Controls}_{st-1} + \beta_9 \mathbb{1}(\text{Intangible})_{ist} \\
& \times \text{State Controls}_{st-1} + \beta_{10} \mathbb{1}(\text{Acquisition})_{ast} \\
& \times \text{State Controls}_{st-1} + \beta_{11} \ln(\text{No. of Firms})_{ist} \\
& + \delta_s + \gamma_t + \varepsilon_{iast}.
\end{aligned}
$$

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For each state and year, there are four observations: the number of intangible-intensive firms that IPO ($\mathbb{1}(\text{Intangible})_{ist} = 1$ and $\mathbb{1}(\text{Acquisition})_{ast} = 0$), the number of intangible-intensive firms that are acquired ($\mathbb{1}(\text{Intangible})_{ist} = 1$ and $\mathbb{1}(\text{Acquisition})_{ast} = 1$), the number of nonintangible-intensive firms that IPO ($\mathbb{1}(\text{Intangible})_{ist} = 0$ and $\mathbb{1}(\text{Acquisition})_{ast} = 0$), and the number of nonintangible-intensive firms that are acquired ($\mathbb{1}(\text{Intangible})_{ist} = 0$ and $\mathbb{1}(\text{Acquisition})_{ast} = 1$). The outcome variable is either the number of IPOs (if $\mathbb{1}(\text{Acquisition})_{ast} = 0$) or the number of acquisitions (if $\mathbb{1}(\text{Acquisition})_{ast} = 1$).

To identify acquisitions at the state level, we obtain M&A data from SDC. Similar to our IPO sample, this data set includes the location of target firms and the technology services variable that we use for our intangible-intensive measure. We restrict the sample to deals involving private target firms acquired by public or private acquirers.[30] On average, there are 15.7 intangible-intensive acquisitions in a given state and year and 40.4 nonintangible-intensive acquisitions.

Table 7 shows coefficient estimates from equation (2). Column 1 provides a baseline specification for acquisitions and IPOs, accounting for state economic factors and differences in the underlying populations of intangible-intensive and nonintangible-intensive firms. Column 2 examines the role of REC on these different outcomes. First, we find that REC retains a positive and economically significant effect on intangible-intensive IPOs, consistent with our main finding in Table 4. We also observe a *negative* effect of REC on intangible-intensive acquisitions relative to intangible-intensive IPOs. For intangible-intensive firms, the negative estimate for the triple interaction indicates that REC increases the incidence of going public relative to being acquired. The results are similar using state-year fixed effects in column 3. Overall, even when expanding the set of possible transition paths for private standalone firms, we still find that REC has the greatest impact on intangible-intensive IPOs.

B. Local Retail Equity Capital

Beyond REC, we have examined the effect of VC and, to an extent, bank capital (through state deposits) on the firm's IPO decision. Local retail equity capital could also affect a firm's propensity to go public. As measuring retail capital is difficult, we use the total dividend income reported by individuals in each state as a proxy for this source of funding. We assume that states with higher reported dividend income, after controlling for aggregate personal income, have more retail equity ownership and a greater likelihood of influencing local firms' IPO decisions. These data have been used by Lin (2019) to measure the stock market participation of local residents.

In Table A.7 in the Supplementary Material, we repeat our main specifications from Table 4 with the inclusion of dividend income and its interaction with $\mathbb{1}(Intangible)$. We find that dividend income is positively associated with intangible-intensive IPOs and is statistically significant at the 10% level in one specification. The effect of REC on intangible-intensive IPOs, however, remains

[30]We apply the following filters to the M&A data: i) we drop deals where the transaction is stated in SDC as Buyback, Exchange Offer, Recapitalization, or Acquisition of Partial Interest; ii) we drop deals where the percentage of shares acquired is less that 50%; iii) we keep only deals that are flagged in SDC as "Completed."

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TABLE 7

Incidences of IPOs and Acquisitions

Table 7 reports Poisson fixed-effects panel regression estimates of the effect of regional equity capital (REC) on the incidence of IPOs or acquisitions in the same region. The dependent variable, *Number of IPOs or Acquisitions*, is the number of IPOs or acquisitions for each state and year. *Ln(REC)* is the log amount of the state-level equity capital variable. 𝟙*(Intangible)* takes a value of 1 if the IPO or acquired firm is designated as intangible-intensive. 𝟙*(Acquisition)* takes a value of 1 if the firm is acquired. IPOs for nonintangible-intensive firms are the excluded category. *Ln(REC)*, *Ln(State Deposits)*, *Ln(State GDP)*, and *Ln(State Income)* are as of the end of the prior year. Standard errors (in parentheses) are clustered by state and year. See Table A.1 in the Supplementary Material for descriptions of the control variables. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Number of IPOs or Acquisitions		
	1	2	3
𝟙(Intangible) × Ln(REC)		0.364***	0.344***
		(0.062)	(0.053)
𝟙(Intangible) × Ln(REC) × 𝟙(Acquisition)		−0.097**	−0.099**
		(0.045)	(0.043)
𝟙(Intangible)	1.575*	0.364	3.617***
	(0.896)	(0.409)	(0.765)
𝟙(Acquisition) × Ln(REC)		0.131**	0.134**
		(0.064)	(0.066)
𝟙(Acquisition)	3.157***	2.804***	2.792***
	(0.199)	(0.224)	(0.227)
𝟙(Intangible) × 𝟙(Acquisition)	−1.115***	−1.022***	−1.020***
	(0.140)	(0.135)	(0.128)
Ln(REC)	−0.016	−0.200***	
	(0.025)	(0.067)	
Ln(State deposits)	−0.031	0.025	
	(0.131)	(0.319)	
𝟙(Intangible) × Ln(State deposits)		−0.195	−0.109
		(0.181)	(0.105)
𝟙(Acquisition) × Ln(State deposits)		0.063	0.078
		(0.363)	(0.330)
Ln(State GDP)	−0.540	−1.245**	
	(0.585)	(0.506)	
𝟙(Intangible) × Ln(State GDP)		0.593*	0.433**
		(0.344)	(0.215)
𝟙(Acquisition) × Ln(State GDP)		1.022	1.001
		(0.676)	(0.636)
Ln(State income)	0.210	1.257**	
	(0.249)	(0.500)	
𝟙(Intangible) × Ln(State income)		−0.598**	−0.632***
		(0.270)	(0.201)
𝟙(Acquisition) × Ln(State income)		−0.931*	−0.918*
		(0.490)	(0.484)
Ln(No. of firms)	1.491**	0.704**	3.961***
	(0.747)	(0.328)	(0.715)
State fixed effects	Yes	Yes	No
Year fixed effects	Yes	Yes	No
State-year fixed effects	No	No	Yes
No. of obs.	7,932	7,932	7,932
Pseudo R^2	0.871	0.880	0.895

statistically significant and of the same economic magnitude as our main results, even after controlling for local retail equity capital.

C. Geographic Dispersion of Business Operations

If REC facilitates the IPOs of intangible-intensive firms due to its proximity to the firms' headquarters, we might expect weaker results for firms with more

geographically dispersed operations. To test this implication, we use the approach in García and Norli (2012) and Bernile, Kumar, and Sulaeman (2015) to quantify the geographic diversification of firm operations through their 10-Ks.

Specifically, we denote firms with 5% or less of their 10-K language devoted to their headquarters' state as *Geographically Diversified* based on the sample of operation locations in Bernile et al. (2015). We chose 5% because it separates firms that are the most diversified outside of their headquarters' state. For these firms, the proximity of capital to the headquarters may matter less for going public. Similar to the acquisitions analysis in Section IV.A, we create four state-year level groups, based on whether firms are geographically diversified and whether they are intangible-intensive. Using this data, we estimate a similar specification to equation (2), where observations are indexed by intangible intensiveness, geographic diversification, state, and year. This sample is more limited, covering 2,294 IPOs from 1993 to 2007 (compared to 7,456 IPOs from 1982 to 2021 in our main sample). Nonetheless, we find that the effect of REC on intangible-intensive IPOs is weaker for firms with more geographically diversified economic activity, consistent with spatial proximity being a less important factor in the IPO decisions of these firms. The results are presented in Table A.8 in the Supplementary Material.

D. Alternative Geographic Boundaries

Throughout this article, we use state boundaries to calculate REC, which allows the full set of institutional investors and IPOs to be included in the analysis. As a robustness test, we reconstruct the REC measure and private firm counts at the more granular MSA level. 5,396 of the IPOs occur in these MSAs. Estimating similar specifications at the MSA level to those in Table 4, we continue to find support for our main hypothesis that increased REC increases the propensity of intangible-intensive firms to go public. The results are provided in Table A.9 in the Supplementary Material.

V. IPO and Firm Level Analysis

A. REC and Local Institutional Ownership

Thus far, we document that increases in REC lead to more intangible-intensive IPOs. If these additional IPOs are enabled by the spatial proximity of institutional investors serving an information or certification role, it should be evident in the ownership of these IPO firms.

To test this implication, we construct a new variable, *Local IO*, defined as the percentage of a firm's shares held by institutional investors located in the same state, measured 1 year after the IPO. In contrast to previous tests, we perform this analysis at the firm level rather than the state level. We estimate the following linear regression for IPO firm f in state s and year t:

$$\begin{aligned}(3)\qquad \text{Local IO}_{fst} = {} & \beta_1 \mathbb{1}(\text{Intangible})_{ft} \times Ln(\text{REC})_{st-1} + \beta_2 \mathbb{1}(\text{Intangible})_{ft} \\ & + \beta_3 Ln(\text{REC})_{st-1} + \beta_4 \text{Firm Controls}_{ft} \\ & + \beta_5 \text{Industry Returns}_{ind,t-1} + \delta_s + \gamma_t + \alpha_{ind} + \varepsilon_{fst}.\end{aligned}$$

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TABLE 8

Local Institutional Ownership

Table 8 reports fixed-effects panel regression estimates of the effect of regional equity capital (REC) on institutional ownership in the same region. The dependent variable, *Local Institutional Ownership*, is the percent of equity held by institutions in the same state as the IPO. *Ln(REC)* is the log amount of the state-level equity capital variable. 𝟙*(Intangible)* takes a value of 1 if the IPO firm is designated as intangible-intensive. *Ln(REC)* and *Industry Stock Returns* are as of the end of the prior year. Industry fixed effects use the Fama–French 49 classification. Standard errors (in parentheses) are clustered by state and year. See Table A.1 in the Supplementary Material for descriptions of the control variables. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Local Institutional Ownership (%)			
	1	2	3	4
𝟙(Intangible) × Ln(REC)	0.439***	0.431***	0.209**	0.081*
	(0.119)	(0.112)	(0.078)	(0.043)
𝟙(Intangible)	0.272	−0.239	−0.306	−0.282**
	(0.267)	(0.303)	(0.208)	(0.119)
Ln(REC)	1.017***	1.011***	0.118	
	(0.199)	(0.197)	(0.217)	
𝟙(VC-backed)	1.305***	1.305***	1.186***	1.318***
	(0.261)	(0.257)	(0.291)	(0.302)
𝟙(NYSE/AMEX)	−0.420	−0.339	−0.383	−0.244
	(0.306)	(0.287)	(0.270)	(0.209)
Ln(IPO age)	0.141	0.073	0.056	0.091
	(0.092)	(0.092)	(0.088)	(0.098)
Ln(Assets)	0.258**	0.282**	0.321**	0.383**
	(0.125)	(0.112)	(0.126)	(0.147)
Underwriter market share	0.059***	0.050***	0.048***	0.057***
	(0.015)	(0.014)	(0.013)	(0.017)
Industry stock returns	0.003	−0.003	−0.003	−0.004
	(0.005)	(0.002)	(0.003)	(0.003)
Year fixed effects	Yes	Yes	Yes	No
Industry fixed effects	No	Yes	Yes	Yes
State fixed effects	No	No	Yes	No
State-year fixed effects	No	No	No	Yes
No. of obs.	6,661	6,661	6,661	6,314
Adjusted R^2	0.199	0.204	0.255	0.242

Firm-level controls include indicators for whether the firm's IPO is listed on the NYSE or AMEX, whether it has VC backing, the IPO underwriter's market share, and the firm's age and size at IPO.[31] In addition to year and state fixed effects, we include industry fixed effects (α_{ind}) based on the Fama–French 49 industry classification in some specifications. We also add lagged returns of the firm's specific industry to control for time-varying changes in industry performance.

Table 8 presents the results. In column 1, we find that more REC is associated with higher levels of local ownership for both local nonintangible-intensive and intangible-intensive IPOs. For nonintangible-intensive IPOs, a 10% increase in REC is associated with 10 basis points more local institutional ownership.[32] This change translates to a 2.72% relative increase in local institutional ownership compared to the sample mean of 3.68%. For intangible-intensive IPOs, a 10% increase in REC increases local ownership by 3.80% (relative to the sample mean).[33] The estimates remain similar when including industry fixed effects (column 2). Next, we add state fixed effects (column 3) or state-by-year fixed

[31]We assume the firm's minimum age at IPO to be 1 year.

[32]The calculation is $1.017 \times Ln(1.10) \approx 0.10$.

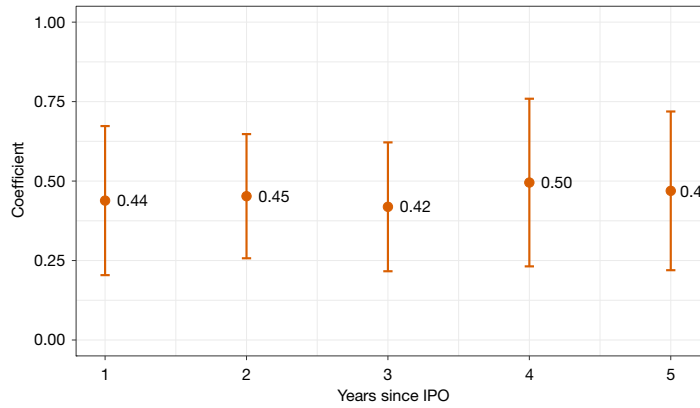
[33]The calculation is $[(1.017 + 0.439) \times Ln(1.10)]/3.68 \approx 3.80\%$.

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FIGURE 3

Effect of REC on Local Institutional Ownership over Time

Figure 3 shows the estimated coefficient for $\mathbb{1}(Intangible) \times Ln(REC)$, measuring the effect of REC on the local institutional ownership for each year in the 5 years following the firm's IPO. The specifications include all other control variables and fixed effects as in column 1 of Table 8. The 95% confidence intervals for each estimate are also provided.



effects (column 4). Although the estimated magnitudes of REC on local ownership of intangible-intensive IPOs are smaller, they remain statistically significant.

Table 8 shows a significantly positive relation between REC and local institutional ownership over a relatively short horizon (1 year). Next, we examine this effect over a longer horizon (up to 5 years). Although local institutional investors are likely to benefit from their information advantage in the short term, it is less clear whether these benefits persist over time. As the firm's operations geographically expand, the firm's public information environment becomes richer, potentially eroding the relative information advantage of local institutions.[34]

For this test, we calculate local institutional ownership for up to 5 years post-IPO. Using the specification from column 1 of Table 8 on this longer-horizon ownership, in Figure 3, we plot the estimated coefficient for $\mathbb{1}(Intangible) \times Ln(REC)$ for each year.[35] The estimated effect of REC on local institutional ownership in intangible-intensive IPOs persists for at least 5 years post-IPO.

Overall, the results suggest that this local advantage is durable. The persistence in local institutional ownership, despite likely geographic expansion, may be attributable to several factors. First, the information advantages gained during initial due diligence could be sticky and result from enduring relationships forged with management. Second, geographic expansion is relatively modest, such that their information advantage persists. Third, corporate headquarters could continue

[34]Using data on business operations across states from Bernile et al. (2015), we find that the average IPO firm expands business operations into new states at a relatively modest rate of approximately 2% per year.

[35]Here, we keep all the independent variables fixed and only move the ownership variable forward in time. The estimates show how the conditions at the time of the IPO predict future local institutional ownership.

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to hold strategic importance, facilitating continued access to serendipitous sources and information sharing for local investors.

B. REC and IPO Valuations of Intangible-Intensive Firms

In this section, we consider the valuation of intangible-intensive IPO firms. We expect these firms that go public due to the availability of REC to have incrementally higher valuations. To test this prediction, we estimate the following linear regression for IPO firm f in state s and year t:

$$\begin{aligned}\text{Valuation}_{fst} = {} & \beta_1 \mathbb{1}(\text{Intangible})_{ft} \times Ln(\text{REC})_{st-1} + \beta_2 \mathbb{1}(\text{Intangible})_{ft} \\ & + \beta_3 Ln(\text{REC})_{st-1} + \beta_4 \text{Firm Controls}_{ft} \\ & + \beta_5 \text{Industry Returns}_{ind,t-1} + \delta_s + \gamma_t + \alpha_{ind} + \varepsilon_{fst}. \end{aligned} \tag{4}$$

To measure valuation, we use two ratios: *Market-to-Book (Assets)* and *Market-to-Book (Equity)*. Firm controls and fixed effects are the same as in the local institutional ownership analysis in Section V.A.

TABLE 9

Valuation

Table 9 reports fixed-effects panel regression estimates of the effect of regional equity capital (REC) on IPO firm valuation in the same region. The dependent variable in columns 1 and 2 is *Market-to-Book (Assets)*, defined as the ratio of the market value of assets (equity value using the IPO price plus the book value of debt) to the book value of assets. The dependent variable in columns 3 and 4 is *Market-to-Book (Equity)*, defined as the ratio of the market value of equity (using the IPO price) to the book value of equity. *Ln(REC)* is the log amount of the state-level equity capital variable. 𝟙*(Intangible)* takes a value of 1 if the IPO firm is designated as intangible-intensive. *Ln(REC)* and *Industry Stock Returns* are as of the end of the prior year. Industry fixed effects use the Fama–French 49 classification. Standard errors (in parentheses) are clustered by state and year. See Table A.1 in the Supplementary Material for descriptions of the control variables. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Market-to-Book (Assets)		Market-to-Book (Equity)	
	1	2	3	4
𝟙(Intangible) × Ln(REC)	0.114***	0.084***	0.127***	0.068*
	(0.036)	(0.029)	(0.036)	(0.037)
𝟙(Intangible)	0.308***	0.349***	0.429***	0.484***
	(0.090)	(0.093)	(0.084)	(0.122)
Ln(REC)	−0.025		−0.021	
	(0.083)		(0.142)	
𝟙(VC-backed)	0.191	0.271*	−0.005	0.098
	(0.148)	(0.147)	(0.154)	(0.168)
𝟙(NYSE/AMEX)	0.200**	0.164	0.295**	0.213
	(0.098)	(0.105)	(0.122)	(0.128)
Ln(IPO age)	−0.244***	−0.229***	−0.263***	−0.248***
	(0.058)	(0.062)	(0.082)	(0.087)
Ln(Assets)	−0.344***	−0.349***	−0.339***	−0.332***
	(0.050)	(0.053)	(0.060)	(0.060)
Underwriter market share	0.049***	0.054***	0.048***	0.054***
	(0.015)	(0.016)	(0.017)	(0.018)
Industry stock returns	0.003	0.003	0.004	0.005
	(0.002)	(0.002)	(0.004)	(0.005)
Year fixed effects	Yes	No	Yes	No
Industry fixed effects	Yes	Yes	Yes	Yes
State fixed effects	Yes	No	Yes	No
State-year fixed effects	No	Yes	No	Yes
No. of obs.	7,214	6,861	7,214	6,861
Adjusted R^2	0.150	0.119	0.094	0.072

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The results are presented in Table 9. Using either valuation measure, we find that intangible-intensive firms that IPO in areas with higher REC are valued more than other IPO firms. The difference in valuation is statistically significant in all specifications. We also observe that the standalone effect of REC on valuation is not statistically different from zero. This nonresult is consistent with the view that the role of REC concentrates in intangible-intensive firms.

C. Investor Optimism and Post-IPO Performance

One alternative explanation for the positive relation between the frequency of intangible-intensive IPOs and REC is elevated investor sentiment. Investors may become overly optimistic about firms in certain regions, and managers may exploit this opportunity to raise capital. To test for investor optimism, in Table 10, we use the BHAR at the 6- and 12-month horizons. If local investment is unrelated to firm fundamentals and driven by investor sentiment, these stocks should eventually underperform. We do not find such evidence. At the 6-month horizon (columns 1–2) or the 12-month horizon (columns 3–4), REC is not negatively associated with

TABLE 10

Post-IPO Performance

Table 10 reports fixed-effects panel regression estimates of the effect of regional equity capital (REC) on post-IPO performance in the same region. The dependent variables, *6-Month BHAR (%)* and *12-Month BHAR (%)*, are buy-and-hold abnormal returns, defined as the difference between the compounded daily returns over 6 and 12 months after the IPO and the similarly compounded CRSP value-weighted market return, respectively. *Ln(REC)* is the log amount of the state-level equity capital variable. *𝟙(Intangible)* takes a value of one if the IPO firm is designated as intangible-intensive. *Ln(REC)* and *Industry Stock Returns* are as of the end of the prior year. Industry fixed effects use the Fama–French 49 classification. Standard errors (in parentheses) are clustered by state and year. See Table A.1 in the Supplementary Material for descriptions of the control variables. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	6-Month BHAR		12-Month BHAR	
	1	2	3	4
𝟙(Intangible) × Ln(REC)	1.589	2.567*	1.221	2.151
	(0.961)	(1.346)	(1.235)	(1.456)
𝟙(Intangible)	−1.597	−0.940	0.777	1.342
	(2.987)	(3.207)	(4.071)	(4.713)
Ln(REC)	−3.026*		0.414	
	(1.665)		(2.192)	
𝟙(VC-backed)	−1.169	−0.922	−0.979	0.975
	(2.388)	(2.447)	(3.419)	(3.596)
𝟙(NYSE/AMEX)	−1.670	−1.283	−1.944	−0.280
	(2.178)	(2.155)	(2.487)	(2.306)
Ln(IPO age)	−0.451	−0.751	1.148	1.204
	(0.947)	(1.149)	(1.213)	(1.395)
Ln(Assets)	1.819***	2.337***	4.288***	4.948***
	(0.477)	(0.468)	(0.684)	(0.711)
Underwriter market share	0.139	0.095	0.247*	0.208
	(0.134)	(0.150)	(0.139)	(0.133)
Industry stock returns	0.076	0.090	−0.022	0.006
	(0.101)	(0.109)	(0.113)	(0.122)
Year fixed effects	Yes	No	Yes	No
Industry fixed effects	Yes	Yes	Yes	Yes
State fixed effects	Yes	No	Yes	No
State-year fixed effects	No	Yes	No	Yes
No. of obs.	7,120	6,770	7,120	6,770
Adjusted R^2	0.054	0.034	0.040	0.021

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BHARs for intangible-intensive firms. Overall, the evidence suggests that more frequent IPOs resulting from higher REC do not lead to systematic overvaluations.

VI. Conclusion

Our study proposes a new and nonmutually exclusive explanation for the decision to go public: the firm's spatial proximity to the supply of equity capital. Our explanation is built on two assumptions. First, spatial proximity reduces the cost of information acquisition for potential investors. Second, the effects are contingent on the supply of capital of these colocated investors. Our empirical tests on a sample of U.S. IPOs over the period 1982–2021 document patterns consistent with the role of spatial proximity to equity capital in the IPO decision. A 10% increase in REC leads to about 2.5 additional intangible-intensive IPOs nationwide each year, an economically meaningful effect, as there are, on average, two intangible-intensive IPOs per state annually. This effect persists even after controlling for the role of VC, regional retail equity capital, or potential acquisition by other firms. Increased REC is also associated with higher initial valuations for intangible-intensive IPOs and higher local institutional ownership. Overall, these empirical patterns indicate that REC affects IPO activity, mostly for resident intangible-intensive firms. Our findings introduce another relevant factor in understanding the IPO decisions of firms in recent decades.

More broadly, our results draw attention to the importance of agglomeration in corporate finance. We find location-based complementarities between suppliers of capital in the financial sector and firms that need funding in the real sector. Although such agglomeration effects are known in local banking and credit markets, it is somewhat surprising to document agglomeration effects on financing in public equity markets. Identifying the operational mechanisms that underlie agglomeration effects on corporate policies is a challenging but exciting direction for future research.

Supplementary Material

To view supplementary material for this article, please visit http://doi.org/10.1017/S0022109025102536.

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