Angels, Entrepreneurship, and Employment Dynamics: Evidence from Investor Accreditation Rules

Laura Lindsey*
W. P. Carey School of Business
Arizona State University

Luke C.D. Stein†
Babson College

March 2025

Abstract

This paper examines the effects of a shock to angel finance on entrepreneurial activity. Using U.S. Census data, we estimate the state-level fraction of households that lost accreditation status from Dodd–Frank's elimination of housing wealth in determining accreditation. A larger reduction in the pool of potential investors reduces angel investment, firm entry, and employment at small entrants. Employment increases at small and young incumbents, suggesting competitive effects. Though we document partial substitution, angel finance appears to complement other capital sources in the entrepreneurial ecosystem. Our paper offers insight on the impact of angel finance and where it matters most.

We are grateful for comments from Tania Babina, Allen Berger, Stefano Bonini, Michael Ewens, April Franco, Jessica Jeffers, Shane Johnson, Ramana Nanda, Paige Oiumet, Berk Sensoy, Xinxin Wang, Toni Whited (the editor), Ting Xu, two anonymous referees, and participants in the 2017 Southern California Private Equity, 2017 SIT Emerging Trends in Entrepreneurial Finance, 2017 SITE Labor & Finance, 2017 European Finance Association, 2018 UNC Kenan Institute Frontiers of Entrepreneurship, 2018 Financial Intermediation Research Society, 2018 Texas A&M Young Scholars Finance Consortium, 2018 University of Kentucky, 2018 SFS Cavalcade, 2018 Chicago Fed/Notre Dame Labor Market Dynamism, 2019 Midwest Finance Association, 2019 SEC Financial Market Regulation Conferences, and presentations at Johns Hopkins University and Cambridge University. We thank Andra Ghent for extensive advice and Hong Zhao for valuable research assistance.

*Department of Finance, P.O. Box 873906, Tempe AZ 85287; laura.lindsey@asu.edu.

†Finance Division, Babson College, 231 Forest Street, Babson Park MA 02457; lcdstein@babson.edu.

1 Introduction

Access to capital has long been recognized as crucial to the entrepreneurial process of creative destruction (Schumpeter, 1911, 1942). While financial intermediaries such as banks and venture capital firms play an important role, much of the capital supplied to new firms takes place through the informal channel of direct investment from individuals, often referred to as "angel finance." Puri and Zarutskie (2012), for example, estimate that fewer than 0.2% of new companies raise venture capital, and bank lending often requires collateral or personal credit that is infeasible for many types of businesses or entrepreneurs. Estimates of the angel capital market's size are comparable in magnitude to that of the venture capital industry in the U.S. and many other countries (Fenn, Liang, and Prowse, 1997; OECD, 2011; Karlsen, Kisseleva, Mjøs, and Robinson, 2024). Yet, largely due to data limitations, very little empirical evidence exists on angel investing or its economic impact.

In the U.S., many angel transactions require no disclosure, and where disclosure requirements *do* exist, enforcement is lax and compliance levels are low (Hanley and Yu, 2023). Of transactions reported to the SEC claiming exemption from securities registration under Regulation D, 99% of investment takes place through Rule 506, which allows a company to issue securities to an unlimited number of accredited investors (meaning investors who meet minimum wealth or income thresholds) and a limited number of other purchasers (Bauguess, Gullapalli, and Ivanov, 2018).[1]

In this paper, we exploit a rule change in 2010 that differentially reduced the pool of

[1]Shane (2009) argues that while not all funds deployed in the angel market come from investors meeting accreditation standards, accreditation likely gives investors access to better investment opportunities. Entrepreneurs may prefer Rule 506 (and accredited investors) for a number of reasons, including lower disclosure requirements, automatic compliance with state securities laws, and the option to raise additional funds up to a pre-determined limit. Notably, failure to notify the SEC has not been deemed to eliminate the ability to claim safe-harbor under the rule.

accredited investors across geographies in order to assess the importance of business angels for the entrepreneurial sector. We show that the availability of accredited investor capital affects venture-adjacent angel activity and bears a causal relation to firm entry that is driven by smaller firms. Our estimates suggest the policy shock reduced the number of newly entering firms by roughly 2% in the average state. We also provide evidence on how employment at existing firms is affected by the decline in business entry associated with the rule change, demonstrating the economic importance of angels beyond the companies they directly fund. Further, effects on entry are driven by states where alternative capital sources are more prevalent, suggesting other sources of capital are geographic complements to angel finance in the entrepreneurial ecosystem.

Our measure of differential treatment derives from the public-use Survey of Income and Program Participation (SIPP), with geographic information available at the state level. A special wave of the survey conducted around the time of the rule change contains detailed information on households' net worth and income.[2] From these data, we calculate the fraction of the sampled accredited investor population that lost accreditation status when the value of equity in a primary residence could no longer be used to meet the net-worth standard for accreditation as a result of the passage of The Dodd–Frank Wall Street Reform and Consumer Protection Act (Dodd–Frank).

Using a continuous-treatment difference-in-differences framework, we examine the impact of this shock to angel finance, controlling for state fixed effects and measures of local economic conditions that vary over time. We first demonstrate that the change in accredited investor requirements indeed affected the use of angel capital by start-up firms. Using data from Pitchbook, we show that both the number of angel-backed companies and the amount of

[2]We are unaware of any alternative representative source that contains the micro data necessary to assess investor accreditation at a finer geographic level.

angel capital deployed in early stage financings declined disproportionately in states where a higher fraction of previously accredited investors were affected by the change.

We then consider the effect of angel capital availability on overall business entry using Business Dynamics Statistics (BDS) data. We find a negative and statistically significant reduction in new business formation of about 2% on average. This provides further evidence that the net-worth threshold for investor accreditation binds, and also demonstrates that even relatively small angels play a vital role in the entrepreneurial sector of the economy. To our knowledge, this result provides the first empirical evidence on the effects of angel investment for business entry in the U.S. economy.

The entrepreneurial sector has been shown to have a disproportionate effect on the economy, with most new job creation stemming from young firms (Haltiwanger, Jarmin, and Miranda, 2013; Decker, Haltiwanger, Jarmin, and Miranda, 2014). With fewer new businesses resulting from reduced funding from smaller investors, we expect a reduction in total employment at smaller entrants. Incumbent firms may benefit from reduced competition in the labor or product markets, and funding sources complementary to angel finance could redeploy capital to existing firms. Indeed, we find that employment falls more for firms with 10 or fewer employees by the end of their entering year in states that lost a greater percentage of accredited investors, though we find no effects on aggregate employment levels for entrants or incumbents. For incumbent firms, we identify larger increases in employment at smaller and younger incumbents from both increased new job creation and decreased job destruction. These results indicate that a reduction in capital availability resulting from stricter accreditation standards alters the observed distribution of employment across firms.

In order to better understand what types of firms rely on informal financing networks, we turn to industry-level Quarterly Workforce Indicators (QWI) data. We posit that small

angels may have a larger impact in industries where entry is easier, and partition our sample accordingly. We find larger declines in new-firm employment in industries for which venture capital is more available, employment concentration is lower, and capital requirements are more modest. These results are consistent with angels being most important in competitive industries with lower costs of entry and return characteristics better able to attract external finance.

Finally, we investigate how angel investment interacts with other forms of finance in the entrepreneurial ecosystem. We examine how the reduction in new businesses after the angel shock varies with the prevalence of other sources of capital, segmenting states at median levels of venture capital investment, house-price appreciation, small business bank lending availability, and the use of non-accredited investors (e.g., friends and family) at the time of the shock. Effects on the extent of firm entry are driven by areas with *more* alternative funding, further underscoring that other capital sources imperfectly substitute for angel finance and suggesting that angels play a complementary role in the overall ecosystem.

When we examine the intensive margin of fundraising from non-accredited investors (conditional on new firm formation and on filing a Form D), we document partial substitutability: firms became more reliant on non-accredited investors after Dodd–Frank tightened accreditation standards. Under general solicitation rules, these investors are required to have a pre-existing relationship with the firm, either through previous investment or as friends and family. Here again, the result is driven by states where non-accredited investors were already a prevalent source of capital before the shock.

Our investigation sheds light on the impact of informal capital networks. We show that the investor accreditation net-worth threshold binds, constraining angel investment. We also demonstrate the economic importance of informal capital networks in providing finance

for new business formation. In addition, we offer evidence that the marginal investor has impact beyond the firms that they fund: we observe measurable effects on employment at incumbents consistent with competitive effects from forgone entrants.

Understanding the impact of these rule changes is particularly important given the policy directive of Dodd–Frank that the Securities and Exchange Commission (SEC) review accredited investor requirements every four years. The SEC continues "to monitor the size of the accredited investor pool, the characteristics of individual accredited investors who participate in the private markets, and the appropriateness of the income and net worth thresholds" (Securities and Exchange Commission, 2023). Our results obtain based on what might be considered minor changes affecting primarily smaller participants. Notably, it is not the aggregate amount of capital removed from the market that is important for our study, but instead the number of individuals providing capital to businesses that lack alternative sources of start-up funding. Survey data from 2017 indicate that the interquartile range of investment amounts among angels who remain accredited under the new rules is $15,000 to $37,500 (Huang et al., 2017).

While numerous studies examine the impact of organized venture capital on the firms they finance and their role in the economy, prior work on the causes and consequences of angel finance is scarce.[3] Notable exceptions include Kerr, Lerner, and Schoar (2011) and Lerner, Schoar, Sokolinski, and Wilson (2018), who examine the impact of angel funding on firm outcomes using data from angel groups, and Denes, Howell, Mezzanotti, Wang, and Xu (2023), who study the efficacy of state tax credits in promoting angel finance. Bernstein, Korteweg, and Laws (2017) investigate which factors are important in attracting early stage funding

[3]See for example Hellmann and Puri (2000, 2002); Mollica and Zingales (2007); Sørensen (2007); Bottazzi, Da Rin, and Hellmann (2008); Lindsey (2008); Samila and Sorenson (2010); Puri and Zarutskie (2012); Bernstein, Giroud, and Townsend (2015); Gonzalez-Uribe (2020). An extensive review of the venture capital literature is available in Da Rin, Hellmann, and Puri (2012).

with an experiment conducted on an angel investment platform. Additional treatments study the interaction of angel finance and formal VC (Hellmann and Thiele, 2008; Goldfarb, Hoberg, Kirsch, and Triantis, 2013; Hellmann, Schure, and Vo, 2021; Chemmanur and Chen, 2014). Finally, contemporaneous work studies the incidence of the Dodd–Frank rule change on angel-related Form D filings using a proxy for the city-level average home value to net worth ratio (Xu, 2023). However, Hanley and Yu (2023) document that many firms fail to file Form Ds, and these firms are non-randomly selected. Our work contributes to the scant knowledge about financial angels, providing a first causal glimpse into their effect on entrepreneurial activity and employment at the macro level.

Our work also relates to studies addressing alternative forms of finance for new firms. Prior literature suggests that banks are an imperfect substitute for venture or angel capital, particularly at the early stages (Ueda, 2004; Hellmann, Lindsey, and Puri, 2008).[4] Corporations also participate in new firm finance, but typically invest in companies that complement the core businesses (Hellmann, 2002; Gompers and Lerner, 2000; Ma, 2020). Additional papers have explored the role and success of government programs (Lerner, 1999; Brander, Du, and Hellmann, 2014) and newer market participants such as accelerators (Cohen, Fehder, Hochberg, and Murray, 2019). We show that angel finance plays a unique role and offer new evidence on its areas of impact.

We also contribute to a large literature that has sought to understand the role of financial constraints on entry, employment, and productivity. Local capital availability has been linked to the birth of new firms and the growth of economies more generally.[5] In particular, both theoretical and empirical work emphasize the role of personal wealth in the pursuit

[4]Note that evidence highlighting the role of debt in early-stage finance is not necessarily indicative of business lending from banks; for example, Robb and Robinson (2014) categorize personal debt as outside debt in their study of new firms' capital structures.

[5]See Kerr and Nanda (2011) for a review.

of entrepreneurship (Evans and Jovanovic, 1989; Hurst and Lusardi, 2004), and access to collateral in the form of housing wealth has also been shown to be a binding constraint on entry and growth (Adelino, Schoar, and Severino, 2015; Schmalz, Sraer, and Thesmar, 2017). Several studies in this literature focus on bank lending, relying on changes in the structure of the banking industry to isolate causal effects.[6] Additional work focuses on the role of bank finance, directly or indirectly, through recent financial or other crises (e.g., Goetz and Gozzi, 2010; Greenstone, Mas, and Nguyen, 2020; Cortés, 2014; Chodorow-Reich, 2014; Chen and Ewens, Forthcoming). Our work is similar in spirit in that we utilize a shock to the pool of potential capital suppliers to measure differential effects across geographies and provide estimates for a new constraint on the supply of capital in the aftermath of the financial crisis.

Though we document adverse effects of tightened investor accreditation requirements on entry and job creation at entrants, our study does not attempt to assess any offsetting benefits that may have motivated the rule change or could influence SEC recommendations going forward. While the accreditation rules were originally rooted in investor *protection*, much of the recent debate focuses on expanding investors' *access* to private securities issued by high-growth firms.[7] Our work shows that capital formation for entrepreneurial ventures should be a first-order consideration, especially since it appears that other sources of funding are poor substitutes for informal angels.

[6]See, for example, Black and Strahan (2002), Kerr and Nanda (2009), Kerr and Nanda (2010) , and Krishnan, Nandy, and Puri (2015).

[7]See, for example, Michaels, Dave, "SEC Chairman Wants to Let More Main Street Investors In on Private Deals," Wall Street Journal, 30 October 2018; or the public comments of SEC commissioner Luis Aguilar on 17 December 2014 (available at https://www.sec.gov/news/statement/spch121714laa.html).

2 Empirical approach

Our analysis relies on a difference-in-differences approach to isolate causal effects of angel finance on entrepreneurial activity. The refinement to the investor accreditation definition in Dodd–Frank had little to do with any prior activity in the entrepreneurial sector, and venture capital firms remained exempt from registration under the Act. A key assumption is that angel finance is sufficiently local such that state-level shocks to capital availability impact investment within the state; available data on angel investing indicate that it is, indeed, a local activity, with the majority of investments occurring within 50 miles of the angel investor (Shane, 2009). We also expect effects to begin shortly after the policy change if significant angel investment occurs at or shortly after firm formation. Sohl (2011, 2014) document that as much as 70% of angel group investment is in seed and early stage deals, and the majority of firms in our Pitchbook sample that receive their first investment from an angel do so in the same or subsequent calendar year as founding. In this section, we provide background on the rules that govern accredited investors and describe the construction of our treatment measure.

2.1 Regulatory background

Angel finance usually involves the issuance of private (unregistered) securities. Until recently, the issuance of private securities was governed largely by rules set forth in the Securities Act of 1933 and modifications made in the 1980s under Regulation D.[8] Transactions commonly take place under various provisions of Regulation D, which set limits on the amount of capital that can be raised, require various disclosures to investors, and limit the

[8]These regulations apply to all securities, including debt, though borrowing from an institution such as a bank is not considered a securities issuance.

number of shareholders in certain circumstances. Under Rule 506, disclosure of extensive financial information is not required nor is the capital amount limited as long as investors are "accredited," a designation meant to proxy for financial sophistication sufficient to evaluate securities not covered by the Securities Act (or, alternatively, identify investors who are sufficiently wealthy so as not to require protection).[9]

To be accredited, investors needed to meet minimum wealth or income thresholds. Regulation D defined accredited investor status for an individual as having income in excess of $200,000 in the most recent two years (with an expectation of continued income at the same level in the current year), or a net worth over $1 million. In 1988, the income requirement was refined to include a $300,000 joint-income test with one's spouse (Regulation D Adopting Release).[10] Other than the Dodd–Frank-induced change we study, there were no changes regarding eligibility for investment in private offerings during our sample period.[11]

In the wake of the financial crisis, Section 413(a) of Dodd–Frank required that the value of a person's primary residence be excluded from the calculation of net worth used to determine investor accreditation status. The change to the net worth requirement was effective immediately upon passage when signed into law on July 21, 2010. SEC rules were later updated to reflect that positive home equity should not be included in the calculation,

[9]Rule 504 under Regulation D, which allowed companies to raise amounts up to $1 million in a 12-month period, effectively required either that investors have a prior relationship with the company, the offering be registered at the state level, or investors meet accreditation thresholds. Rule 505 allowed for amounts up to $5 million in a 12-month period from an unlimited number of accredited investors and up to 35 (affiliated) non-accredited investors. Importantly, Rules 504 and 505 did not preempt regulation at the state level as does Rule 506. See also Ewens and Farre-Mensa (2020).

[10]Other thresholds apply to entities that are not natural persons such as business trusts or retirement accounts, and banks and investment companies are governed under separate rules.

[11]The Jumpstart Our Business Startups (JOBS) Act was signed in 2012, but its expansion of participation in private offerings by non-accredited investors did not take effect until after our sample period. Rules for the expansion of Regulation A were finalized in April 2015, and crowdfunding provisions were not effective until 2016. General solicitation, which allowed advertising to accredited investors, became effective in the last six months of our annual sample (after the SEC rule-making process in September of 2013).

and imposed restrictions on the use of cash-out mortgage refinances to meet the threshold.

From the 2010 Survey of Consumer Finances (SCF), we can estimate the number of households that lost accredited investor status. Applying a $200,000 income threshold if the household responder is unmarried and a $300,000 threshold if married, we find that 3.6% of households qualify under the income test. For assets, 9.8% of households have a net worth of $1 million or more including the home equity of the primary residence, dropping to 7.5% with the value of the residence excluded. With the income *or* asset distinction, 10.4% of households qualify as accredited investors prior to the Dodd–Frank change, and 8.4% after, a reduction of almost 20%.[12] Comparison of these figures from the SCF to the SIPP is discussed in Section 2.2.

Of course, only a subset of investors who meet the accreditation standards likely engage in angel activity, and it is likely that a larger proportion of angel capital comes from those households that remain accredited under Dodd–Frank's stricter standard. Nevertheless, a 20% change in the number of households that can provide private capital as accredited investors under Regulation D is sizable, and the treated (i.e., marginal) angel investors may not only have been important for entrepreneurship overall, but may have been particularly likely to fund businesses unable to raise funds from alternative sources. For the percentage reductions in the number of accredited investors and angel investors to be similar across treated and untreated groups requires only that participation rates between the treated group and remaining accredited investors not be very different. If none of the treated households participated in angel finance, we would expect to find null results.

Although we cannot directly investigate participation by individuals in the U.S., several

[12]The SCF also asks whether respondents' prior-year income is "unusually high." Excluding positive responders from the income qualification, about 10% of households qualify before Dodd–Frank, and approximately 8% after. All percentages are calculated using SCF sampling weights.

papers consider related questions in other countries. Bach, Baghai, Strömberg, and Warg (2022) find that in Sweden, informal investors who make only a single investment collectively fund more firms and provide more capital than do business angels who make multiple investments, and Karlsen, Kisseleva, Mjøs, and Robinson (2024) find that only 12% of Norwegian angels invest in more than one portfolio firm. Swedish single-investment angels have median wealth of approximately $500K (3.1M SEK) the year before they make their investment, and 38% fall outside the top wealth decile.[13] This suggests that informal investment by moderately wealthy individuals can indeed be an important source of entrepreneurial capital.

While we do not know which specific households near the treatment threshold would have made angel investments, we can investigate the demographics of treated households. The mean age of the SCF responder in a treated household is 63, with an interquartile range of 54 to 71.[14] Over 72% are college graduates, with an additional 15% reporting some college. Approximately 61% of treated households report "Excellent" financial literacy and about 94% place themselves in either the "Excellent" or "Good" categories. These figures compare to 67% and 96% for those households that remain accredited after Dodd–Frank. Perhaps surprisingly, wealth and income standards may be a reasonable proxy for investor sophistication, and the treated population appears to be from the lower end of the distribution among this relatively sophisticated group.

Table 1 Panel (a) reports mean and median values of income, net worth, and home

[13]Bach, Baghai, Strömberg, and Warg (2022) identify approximately 12% as many multiple-investment angels as single-investment "informal investors." Among multiple-investment angels, median wealth is approximately $1.4M (9.7M SEK) before their first investment, with 14% outside the top wealth decile.

[14]Huang et al., (2017) report that 75% of surveyed angel investors are older than 50 years and 44% are older than 60. In the Bach, Baghai, Strömberg, and Warg (2022) sample, multiple-investment angels are on average 56 years old at first investment (median 56, 28% above age 65) and single-investment "informal investors" average 55 years old (median 55, 23% above age 65). It is intuitive that the treated individuals in the SCF may be slightly older than the average active angel since many working professionals would remain accredited under the income threshold.

values for treated, accredited untreated, and never-accredited investors. For the treated group, average income is $119K and net worth excluding home equity is over $750K. Notably, home equity and home values are not too different between treated and untreated accredited households, with gaps smaller than 25%. The mean (median) home value is $748K ($550K) for households that remain accredited, and $601K ($500K) for those potentially affected by the Dodd–Frank rule change. Home equity figures are even more similar: mean (median) home equity is $530K ($380K) for households that remain accredited, and $476K ($377K) for treated households. (We cannot reject the equality of average home equity between accredited untreated and treated households at the 10% level; for every other pairwise mean comparison across columns of the table, we can reject equality at the 1% level.)

In Figure 1, we consider the probability that a household is treated across several characteristics related to the accreditation criteria. Consistent with the summary statistics in Table 1, treatment likelihood varies considerably with non-housing wealth (i.e., net worth excluding equity in the primary residence), as shown in Panel (a). Households with non-housing wealth just below the $1M accreditation threshold are extremely likely to be treated (e.g., 77% of households with $900K–1M non-housing wealth), while those further below the threshold are much less likely to be treated. In Panels B through D, we maintain the same vertical scale to illustrate that income, home equity, and home value are relatively uninformative in determining treatment, with no group across any of these variables having a treatment likelihood above 14%. Thus, the determination of treatment relates largely to wealth outside of one's residence. Further, this dependence is non-monotonic around the $1M threshold, making it less likely that treatment is correlated with unobservable factors that could drive our results.[15]

[15]Treatment likelihood varies with household income (although it remains low at all levels) only near the accreditation thresholds. Home equity and home value also appear uninformative for values between $300K

2.2 Measuring treatment

While the Survey of Consumer Finances has rich microdata on the determinants of investor accreditation status, it includes only limited information about respondent geography. Since our empirical strategy relies on geographic variation in the intensity of the Dodd–Frank-induced accreditation standards, we obtain information from the Survey of Income and Program Participation (SIPP). In particular, Wave 10 of the 2008 SIPP panel—conducted between September and December, 2011—included a special topical module with detailed questions about family income, assets, and liabilities that we can use to assess accreditation status. We are unaware of alternative data sources with microdata allowing us to determine geographic variation in accreditation under the pre- and Post-Dodd–Frank rules.

The SIPP is a household-level longitudinal survey covering 79,321 individuals in 34,216 families; our assessment of accreditation status is, therefore, at the family level. It should be noted that the SIPP is several times larger than the SCF, and, therefore, surveys a greater number of potentially accredited and treated households than the SCF, despite its role in assessing program participation. The key variables we rely on are monthly earnings (*tpearn_waveavg*), home value (*tpropval*), amount owed on home mortgages (*thhmortg*), and net worth (*thhtnw*). Top-coding of variables means we can observe only an imperfect measure of accreditation and treatment status.

Accreditation under the *income* standard requires annual income of at least $200,000, or $300,000 if married. Income in the SIPP is reported at the individual level, with top-coding at $12,500 (equivalent to $150,000 per year). For each family, we consider the "reference

and $1M. Interestingly, households with homes worth more than $1M appear very unlikely to be treated, presumably because they have sufficient levels of income or non-housing wealth. These observations and the non-monotonic dependence suggest that analyses of accredited investor rule changes that do not rely on individual non-housing wealth data (as in Xu, 2023) could be problematic.

person" and spouse (if any): if neither has top-coded income we say the family *does not* meet the income standard (97.6% of families); if one is top-coded; it *may* meet the income standard (2.3%); if both are top-coded, it *does* meet the income standard (0.1%).

Accreditation under the *asset* standard requires net worth of at least $1 million. After Dodd–Frank, home equity was no longer included in this calculation. Net worth is reported in the SIPP at the family level, calculated from a number of separately top-coded asset and liability amounts including home value (top-coded at $750,000) and home mortgage debt (top-coded at $420,000). For each family we consider the reported net worth, a calculated net worth excluding home equity, and which variables are top-coded, dividing families into four types based on accreditation under the old (pre-Dodd–Frank) asset standard and new asset standard: Families which

1. *Do not* meet the old standard and *do not* meet the new standard (95.4% of families): Less than $1 million in net worth and a non-top-coded home value.

2. *May* meet the old standard and *may* meet the new standard (0.9%): Less than $1 million in net worth and a top-coded home value; or greater than $1 million in net worth, less than $1 million in net worth excluding home equity, and a top-coded mortgage debt.

3. *Do* meet the old standard and *do not* meet the new standard (1.6%): Greater than $1 million in net worth, less than $1 million in net worth excluding home equity, and a non-top-coded mortgage debt.

4. *Do* meet the old standard and *do* meet the new standard (2.1%): Greater than $1 million in net worth excluding home equity.

Combining the income standard with the old asset standard, we find that as many as 6.1% of families in the SIPP may have been accredited investors before the Dodd–Frank

modification. Potentially treated households—an upper bound on those who were actually treated—are those who do not necessarily meet the income standard, but may have met the old but not the new asset standard (i.e., categories 2 and 3, above). Such families represent 2.4% of all families in the SIPP, similar in magnitude to (weighted) estimates from the SCF. We calculate the fraction of potentially pre-Dodd–Frank-accredited investors who may have lost their accreditation at the state level. This measure is available for all states (and the District of Columbia), except that it is undefined for West Virginia, where the SIPP sample included no potentially accredited investors. Variation in this state-level measure of treatment intensity (Frac), which represents the key source of cross-sectional variation in our analysis, is mapped in Figure 2.

Given that the SIPP's design goals include assessment of Americans' participation in income transfer programs, it oversamples lower-income households; we do not rely directly on the *level* of treatment, however, only on cross-state variation. In addition, the Census suggests some caution about using the SIPP to generate state-level estimates.[16] Because Frac is measured more precisely in larger states, all reported regressions are weighted by the estimated number of potentially accredited households under the prior accreditation standard in the SIPP. (When we weight by state population or employment, results are similar.) To the degree that our state-level treatment measure is noisy, we would expect our analysis to be biased towards a null result.

Panel (b) of Table 1 compares the fraction of households meeting relevant accreditation and treatment criteria in the SIPP and SCF samples. Estimates of households qualifying as accredited by income are similar between the two data sources. While the percentage

[16]Per the Census's SIPP Users' Guide, "2004 and 2008 SIPP Panels can be used to produce state estimates. The survey was designed to produce reliable low-income estimates for the 33 largest states." Therefore, states with larger samples in the supplemental survey are more likely to be representative.

of households treated are also quite similar, the proportion that remain accredited is lower in the SIPP, as one would expect given the differential sampling of the wealthiest households. In particular, 7.5% of SCF households are untreated because they have over $1M in non-housing wealth, compared to 2.1% in the SIPP. Inversely, 90.2% of SCF households are untreated because they have less than $1M in net worth even including home equity, compared to 95.4% in the SIPP. The different overall treatment intensity calculated in the two samples is principally due to these approximately 5 percentage point differences affecting the denominators.

Further, the measure of treatment is not based on changes in household incomes or balance sheets over the sample period, but rather uses the single September–December, 2011 snapshot to assess which households would have qualified as accredited investors under the old and new standards. Our measure of treatment bears little correlation to economic characteristics that might relate to business entry and employment. In Figure 3, we show scatter plots of the estimated state-level fraction treated with each of population, per-capita income, venture capital investment, and house-price appreciation measures for 2010. The highest correlation is with venture capital investment (0.26).

3 Data

There are no comprehensive data sources covering angel investment or angel-backed firms. (For example, OECD (2011) suggests that only 3% of angel investment in the U.S. is "visible.") For our main results, therefore, we rely on data sources that capture the overall entrepreneurial landscape.

The primary data source for our analysis is the U.S. Census. In particular, we use the firm-level Business Dynamics Statistics (BDS) dataset that provides annual information on the

number of businesses and jobs by state, year, (initial) firm size, and firm age. The BDS data forms the core of our state–year and state–year–size samples. We also employ the Census's Quarterly Workforce Indicators (QWI), which incorporates data from the Quarterly Census of Employment and Wages. From the QWI, we obtain quarterly information on employment by state, industry, and firm age, which forms the core of our state–quarter–industry sample.

We supplement these data with annual state- and industry-level information from a variety of sources. From Pitchbook, we obtain state–year aggregates for angel and early-stage venture deals. We collect information by geography on state populations and incomes from the Bureau of Economic Analysis, housing prices from Federal Finance Housing Agency, venture capital investment amounts from SDC's Venture Xpert, and bank branch data from the FDIC's Summary of Deposits. We also construct a state–year sample using Form D filing information. Industry information includes VC investment amounts from SDC's Venture Xpert, startup capital requirements from the public use microdata sample of the 2007 Survey of Business Owners, and concentration from the 2007 Economic Census.

The time period of our study is centered around the modification to the accreditation rules in July 2010. Data from the BDS covers seven years (ending March 12) 2008 to 2014; Pitchbook data is from 2007—2013; Form D data begins in 2009 due to data availability. The state–quarter–industry sample (from the QWI) covers 2007q2 to 2013q1. (We provide a description of the variable definitions that follow in Appendix Table A1.)

3.1 Variable construction: Outcomes

Our primary outcome measure is new firm entry. We identify entrants as the number of firms with an age recorded as zero in the BDS, which indicates the first year a firm reports employment. For use in the regressions, we normalize the number of entrants in each

cell (state×year or state×year×firm size) by the total number of firms in the state at the beginning of the year. We construct the beginning total by subtracting the total number of age-zero firms from and adding the number of firm deaths to the total number of firms.

A necessary condition for the validity of our approach is that the expectation of the error term conditional on the treatment intensity after the policy (After×Frac) is zero. While this assumption cannot formally be tested given the unobservability of the error, we can test for the absence of pre-treatment trends in the outcome variables correlated with treatment intensity. Figure 4a plots average annual firm entry rates within terciles of the state-level treated fraction of accredited investors as a result of Dodd–Frank; pre-treatment trends appear parallel. We also estimate dynamic effects analogous to our main difference-in-difference specifications; the coefficients for one such regression are plotted in Figure 4b, where the annual Frac interaction coefficients are statistically indistinguishable from zero before Dodd–Frank.

We also examine effects on employment at both entrants and incumbents, segmenting firms by size, and further segmenting incumbents by age. For entrants, net job creation (job creation less job destruction) is normalized by the state–year total of the provided Davis–Haltiwanger–Schuh (DHS) denominator, which is the average of total employment in the current year and its lag. We define young incumbents as non-entrants five years old or younger and old incumbents as firms older than 5 years. For each group, we construct a measure of net job creation. For young incumbents, we also examine job creation and job destruction separately. Each of these is normalized by the (cell-level) DHS denominator. Thus, for incumbents, the normalization has the standard interpretation of a percent change in jobs for firms of a particular age and size, adjusted so that transitory shocks are smoothed. Note that for entrants, the average of lagged employment and ending employment would be half of ending employment, and so we choose a normalization that has the interpretation of

the size of the entrepreneurial sector relative to the economy in the state as a whole.

The QWI contains information on employment at the state–quarter–age–industry level; we use the 2-digit NAICS code industry categorization. As before, we analyze entrants, with the caveat that the finest age category available also includes firms that are one year old. Using these data, we define entrant employment by normalizing the ending level of employment by total initial employment in each state–industry–quarter.[17]

We use Pitchbook data to examine changes in the angel financing market for the small subset of transactions that can be observed. Pitchbook is a commercially available database with broad coverage of the U.S. venture capital market. We identify deals where companies raised angel or early-stage finance (including capital from incubators/accelerators and excluding follow-on investments from the same investors). We then calculate for each state–year the proportion of these deals with an angel, which indicates investments made by individuals rather than VC firms. Pitchbook also reports the amount received for a subset of these transactions, and we calculate the state–year proportion of capital raised from angel deals. Given that the totality of the market for angel finance is fundamentally unobservable, this normalization allows us to control for selection into a venture-oriented database, though we also consider non-normalized versions of these variables.

To directly examine fundraising from non-accredited investors, we employ data from Form D filings. While the identity of investors is not disclosed, firms are required to enter the number of non-accredited investors who have already invested, as well as the total number of investors regardless of accreditation status. We calculate the fraction of initial Form Ds that report having raised capital from at least one non-accredited investor at the state–year level. For robustness, we also consider whether a company indicates that it may raise capital from

[17]Note that we cannot study new firm creation with these data since the number of employers is available only at the establishment level.

non-accredited investors via a checkbox.

3.2 Variable construction: Controls

We construct a number of variables to control for state-level economic conditions that may affect new business entry and vary over time. Population growth is thought to be important for economic growth, and recent studies have suggested that regional population declines may be responsible for the secular declines in new business formation over the past several decades (Hathaway and Litan, 2014). Following Adelino, Schoar, and Severino (2015), we include the natural logarithm of population (measured in the middle of the year) as a control.

Given the importance of personal wealth for entry into entrepreneurship, we also control for per-capita income. This measure can also capture differential economic fluctuations through the sample period (Adelino, Ma, and Robinson, 2017). We define income per capita log as the natural log of total personal income for the year divided by the midyear population.

We calculate the percentage change in the seasonally adjusted house price index for each state using index values from the first calendar quarter of the year (to align with the BDS data). Not only might housing price changes also serve as a barometer for economic fluctuations, but several studies have documented the importance of housing wealth and the collateral channel more generally for the growth of small businesses (Adelino, Schoar, and Severino, 2015; Schmalz, Sraer, and Thesmar, 2017).

The availability of more organized startup capital may also affect entrepreneurial activity. We, therefore, construct controls for the amount of venture capital allocated in a state in each calendar year. We sum total venture capital disbursements in the Venture Xpert data for U.S. firms where the round date, the firm's location, and the amount of the round are available, i.e., we exclude stages coded as acquisitions, real estate, and other. For use in the

regressions, we take the natural log of (one plus) the total venture amount, in thousands.

We also construct a number of categorical variables across industries at the 2-digit NAICS level, i.e., sectors. We divide sectors into high or low capital needs based on the amount of startup capital needed as in Adelino, Schoar, and Severino (2015). The source information comes from the public use microdata sample for the 2007 Survey of Business Owners in response to the question about the amount of startup capital needed to start the business. Additionally, we calculate the total amount of VC disbursements by sector (as of 2010). In order to assign company-level disbursements to a sector, we map 4-digit SIC codes to 6-digit NAICS and aggregate up to the 2-digit level. We also divide sectors according to high or low industry concentration based on the employment share of the largest firms in the sector. We define high industry concentration for sectors above the median share from the top 50 companies. Last, in addition to using the log of the total amount of VC in a state–year as a control, we also define states as being high or low venture capital states at the time of treatment. Using 2010 measures, we categorize states as high VC if the VC volume was above the median level, and low VC otherwise. We segment states into high and low house-price appreciation using the same approach.

We also segment states according to the availability of small business lending. Numerous studies have documented the importance of banking industry characteristics for the availability of lending to smaller or more opaque firms (see, for example, Stein, 2002; Cetorelli and Strahan, 2006; Berger and Udell, 1995). We proxy for the availability of small business lending using a measure of the presence of small banks, under the assumption that smaller banks are more likely to lend to small business (Berger, Miller, Peterson, Rajan, and Stein, 2005; Berger, Black, Bouwman, and Dlugosz, 2017). Following the approach in Berger and Bouwman (2009), we use the FDIC's Summary of Deposits data to calculate the fraction of bank branches in

each state that are from banks with less than $1B in total assets.

Finally, we recognize that non-accredited investors can provide informal finance to new businesses under Regulation D in special circumstances such as having a prior connection to the firm or its founders (see, for example, Zaccaria, 2023). As a proxy for geographic variation in the availability or use of friends and family financing, we segment states by the proportion of 2010 Form D filings that include non-accredited investors.

3.3 Summary statistics

Summary statistics for our various samples are reported in Table 2. In Panel (a), we show the mean, standard deviation, median, and interquartile range for variables by state–year. The mean firm entry rate is 7.4%, with an interquartile range of approximately 6.4% to 8.2%. For the average state–year, about 8% of firms in the Pitchbook sample report having received funds from angel investors, with these investors having provided about 2% of capital raised (in deals where capital amounts are reported). From Form D filings, we observe that non-accredited investors participate around 7.4% of the time in the average state–year. Our measure of treatment, Frac, ranges from 26.7% to 47.1%, with a cross-sectional average of 36.6%.[18]

Panel (b) reports statistics for the state–year-size sample. We suppress reporting of the variables that do not change from the state–year level. Here, the entry rate is exactly one-third of the state–year sample, reflecting the division of the sample into three size groupings of 1–4, 5–9, and 10 or more employees. The job creation rate for entrants averages 0.64% for each state, year, and size grouping, or just under 2% in the aggregate. For both young and old incumbent firms, the cross-sectional average of net job creation is negative.

[18]These figures represent raw percentages. The correlation between the Frac measure with and without sampling weights is greater than 97%, and regression coefficients are almost identical across alternative measures.

In Panel (c), we report summary statistics for two additional samples. The average state–quarter–industry has a roughly 4% net job creation rate for entrants in our QWI sample. Last, from disaggregated Form D filings, we observe an average non-accredited participation rate of approximately 5.9%. That this is slightly below the average from Panel (a) indicates that average participation is higher in state–years with fewer Form D filings.

4 Results

In this section, we present results. We start by showing in Section 4.1 that changes in the accredited investor standard following Dodd–Frank affected angel activity in early-stage financings. We then consider firm entry and employment at new and incumbent firms in Section 4.2, and heterogeneous effects across industries in Section 4.3. Finally, we explore the early-stage financing ecosystem, providing evidence on substitutability of other forms of capital on the extensive and intensive margins in Section 4.4.

4.1 Angel activity

In this section, we present evidence of effects from the reduction in the pool of accredited investors on the segment of the angel investment market covered by Pitchbook, which likely tilts towards companies suitable for professional venture capital investment.

Results for continuous-treatment difference in differences estimations for different measures of angel investment activity as the dependent variable are reported in Table 3. The unit of observation is a state–year. The independent variable of interest across specifications is the fraction of accredited investors affected by Dodd–Frank interacted with an indicator variable equal to one for the treatment year 2010 and beyond. Control variables include population, per-capita income, venture capital invested, and the percentage change in house prices, as

well as state and year fixed effects. Standard errors are heteroskedasticity-consistent and clustered at the state level.

In Column 1, the dependent variable is the total number of new angel investments normalized by the number of new angel and early-stage venture investments for the state and year. Because some state–years have very few venture deals and therefore noisy measurement, we require observation of at least 15 deals. The coefficient on the interaction effect (After×Frac) indicates a statistically significant reduction in the number of companies receiving angel finance for states more affected by the change in investor accreditation standards. The coefficient estimate of -0.051 suggests a 23% reduction in companies receiving angel finance at the median level of treatment.[19] This magnitude is similar both to the overall decline in accredited households in the SCF and, as we shall see, our estimated reduction in overall angel-backed business entry.

Column 2 reports the same specification for the proportion of angel capital. Here, we require at least \$15M in total angel and early-stage venture finance in the state year, and add a further restriction that investment amounts must be observed for at least 50% of the investments. Again, the coefficient on the interaction effect (After×Frac) indicates a statistically significant reduction for states more affected by the change in investor accreditation standards. The coefficient estimate of -0.0466 suggests a reduction in the proportion of angel capital also just under two percentage points ($-.0466 \times .366 = -.017$), a larger percentage decline in the total amount of angel capital.

Columns 3 and 4 report alternate, non-normalized dependent variables that allow us to relax the denominator sample restrictions. In column 3, we report a Poisson regression of the count of angel company investments. In column 4, we report OLS estimation using the

[19] .0512*.366 = .0187, or a 1.87 percentage point decline in the proportion, equal to 23% of the mean of the dependent variable (0.08).

natural log of angel capital raised as the dependent variable. In both models, the negative and statistically significant coefficients on After×Frac remains.

These results suggest that changes to the definition of accredited investor from the elimination of housing wealth had an impact on angel financing patterns, even among companies that later become suitable for VC financing or that attract sufficient attention to appear in Pitchbook.

4.2 Business formation and job creation

We now turn to results assessing new business entry and net job creation as functions of the fraction of accredited investors affected by Dodd–Frank after treatment. The indicator for After equals one in BDS years ending March 2011 and beyond. It is once again this variable's interaction with Frac that is the variable of interest. The unit of observation is a state–year or, alternatively, a state–year–firm-employment-size grouping.

4.2.1 Entrants

While we have shown that angel activity is affected by the investor accreditation rule change, it need not follow that business formation would experience a similar decline. For example, Denes, Howell, Mezzanotti, Wang, and Xu (2023) show that while tax credits spur angel activity, the benefits flow largely to existing firms. However, tax policy and investor accreditation policy may affect different investors or investments in different types of firms. Reductions in capital gains taxes tend to reward investment in firms with a larger expected values of gains; i.e., those with a higher probability of survival and suitable for larger investment amounts. Firm formation may therefore be much more sensitive to other policies, such as those that affect marginally accredited angels making arms-length investments. Not all policies affecting the market for informal finance need have the same effects.

Table 4 presents the main results for both business formation and net job creation for entrants of varying sizes.[20] In Column 1, the dependent variable is defined as the number of entering firms normalized by the state total in the prior year. Control variables are again population, per-capita income, venture capital invested, and the percentage change in house prices, as well as state and year fixed effects. Standard errors are heteroskedasticity-consistent and clustered at the state level. In Column 1, the coefficient on the interaction effect (After×Frac) indicates a negative and statistically significant change in the number of new businesses for states more intensively affected by the change in investor accreditation standards. The coefficient estimate of −0.0055 translates to about a 2% reduction in entry at the mean (and median).[21]

The implied magnitude of the causal effect—a roughly 2% reduction in new business entry—is both economically meaningful and plausible. For example, it is in line with estimated magnitudes of the effect of capital availability from the banking literature. Black and Strahan (2002) estimate that new incorporations per capita increased by as much as 3.8% in response to intrastate bank branching deregulation, and by 7.9% following elimination of interstate banking restrictions.[22]

Our estimates also suggest that the overall fraction of angel-backed companies affected is similar to the share of accredited investors that lost accreditation. Survey evidence suggests

[20]We report dynamic estimates in Appendix Tables A3 (state–year sample) and A7 (state–year–size sample). See Appendix Table A4 for control coefficient estimates and specifications with alternate controls, years, states, or weights (and Appendix Tables A8–A9 for the state–year–size sample).

[21]The coefficient estimate of -0.0055 times the mean Frac of 0.366 equals approximately −0.002, or 0.2 percentage points; a 0.2 percentage point decline divided by a 7% to 10% start rate equals 2% to 3%.

[22]To the extent that the effect of bank deregulation was stronger for incorporated firms than for employing firms overall, these effects should be scaled down before comparing their magnitudes with our estimate. For example, if bank deregulation *only* affected incorporation, and if half of new employing firms incorporate, Black and Strahan (2002) suggest a 2–4% increase in new business entry. Corporations account for 66% of employer businesses with fewer than 500 employees (per https://www.sba.gov/sites/default/files/FAQ_Sept_2012.pdf); presumably, the proportion for entrants is lower.

that angels fund over 60,000 businesses annually, with as many as 70% of deals in the seed and early stage (Sohl, 2011, 2014). Given the overall number of new employing businesses, this suggests that at least 10% of employing startups may be angel-backed. A 2% decline divided by the 10% in angel-backed starts implies (under) a 20% reduction in angel-backed entrants as a result of a decline in accredited households of similar magnitude. (The up-to 20% implied reduction in angel-backed entrants is similar to the SCF-implied loss of roughly 20% of accredited angels after Dodd–Frank, or roughly half the 37% loss implied by the SIPP.)

We conduct several further tests designed to assess whether an omitted factor correlated with the measured treatment might be driving our baseline results. When we examine rolling windows varying the timing of the treatment, none of the placebo coefficients (PlaceboAfter ×Frac) are statistically significant, as shown in Appendix Table A5. We further check that our results are not driven by state-level housing market characteristics that are correlated with treatment propensity. We construct placebo treatment measures using data from the 2010 American Community Survey, replacing Frac with the median value of owner-occupied housing or the fraction of such houses with values above $1M, $750K, or $500K. For each of these four price-based placebo treatments, the coefficient on the interaction term with After is statistically insignificant. We also construct placebo treatment measures that replace Frac with changes in each state's house price index (from the Federal Finance Housing Agency) over 2002–07 and 2007–10 to check whether our results could be due to differential run-ups or declines surrounding the financial crisis. These measures also show no relation to firm entry in the post Dodd–Frank period. (Results of these house–price-based placebo tests are reported in Appendix Table A6.)

Given that angel investors are likely to fund smaller firms on average, and this is particularly

true for angels affected by changes to the accreditation rules, we also examine entry and employment changes by firm size. Prior literature seeking to understand the relation between firm size, age, and employment growth in order to inform policy decisions documents that the relation between firm size and growth is driven largely by firm age, emphasizing the role of even small entrants in new job creation (Haltiwanger, Jarmin, and Miranda, 2013). We group firms according to the number of employees at the end of the year in categories of 1 to 4 employees, 5 to 9 employees, and 10 or more employees as the base category. The unit of observation is a state, year, and size grouping. The control variables from Column 1 are augmented with firm-size fixed effects.

Columns 2 and 3 in Table 4 report results for the number of entering firms in each size group for the state and year, again normalized by the state–year total. In Column 2, we report a baseline specification for this new unit of observation without any interactions with firm size. As in Column 1, the coefficient on (After×Frac) is negative and significant, with a value of -0.0018. In Column 3, we add the full set of interactions for firm size with the treatment variable Frac and the time indicator After.[23] The coefficient on (After×Frac) is now insignificant, but the coefficient on the 1 to 4 employee size grouping interacted with (After×Frac) is -0.0048 and significant at 90% confidence. The coefficient for the grouping of 5 to 9 employees interacted with After×Frac is significant at 99% confidence, with an estimated value of -0.0017. These results indicate that the effects are indeed more pronounced at small firms, with a monotonic pattern moving from the smallest category.

Next, we turn to employment. We expect that forgone entry will result in decreased employment at entrants. We report employment effects for entering firms in Columns 4 and

[23]With these data, we could include state-by-year fixed effects to test whether small firms experienced a reduction in entry and employment relative to larger firms controlling for any unobservable factors that vary within the state over time. Because none of our controls vary by firm size, however, the estimated coefficients of interest are identical to those reported (and inference remains qualitatively similar).

5. The dependent variable is net job creation at entrants, normalized by the state–year denominator. We again report a baseline specification with firm-size fixed effects but no interactions with firm size in Column 4. We note that there is no overall effect, meaning that the rate of job creation for entrants does not change when all firm sizes are grouped together. Any jobs created or lost by very small firms, i.e., those we expect to be more reliant on angels, are swamped by a much smaller relative change at larger firms. Column 5 demonstrates the effects across firm sizes as a result of differential treatment. Here, the coefficient on After×Frac is positive and significant, indicating the effect for entrants with over 10 employees. The coefficient for the small firms interacted with After×Frac is negative and statistically significant. The coefficient estimates for both the 1 to 4 grouping and the 5 to 9 grouping are similar in magnitude to one another, and are similar in absolute value (but of opposite sign) to the overall treatment coefficient. These results indicate that smaller firms, i.e., those likely more dependent on angel finance, contributed less job creation when compared to larger entrants.

4.2.2 Incumbents

A decrease in firm entry may have positive repercussions for existing firms, particularly those that would compete with angel-backed entrants in the product, labor, or financing markets. We therefore analyze employment changes at incumbent firms. Adelino, Ma, and Robinson (2017) document that younger firms are better able to take advantage of investment opportunities, so we might expect any such effects to be stronger at younger (or smaller) firms.

We segment previously existing firms into two groups depending on their age to isolate effects on job creation for these groups of firms separately. We define young incumbents being firms ages one to five, and older firms over five years old. In Table 5, we report specifications

for job creation at young and old incumbents. The unit of observation remains a state, year, and firm-size grouping. The normalization for the job creation variables differ from before, however. Each unit of observation is normalized by the denominator for its state, year, and size. The variable of interest is After×Frac or, alternatively, its interaction with firm-size groupings. The regressions have the same time-varying controls as reported in Table 4, and contain state, year, and size grouping fixed effects. Columns 1 and 2 report baseline specifications for net job creation in young and old firms. Consistent with prior literature, we see that younger and smaller firms create more jobs, though there is no statistically significant effect of After×Frac. This makes sense given that we do not necessarily expect angel financed entrants to have a large near-term effect on the economy as a whole.

In Columns 3 and 4, we report estimations for net job creation at young and old incumbents with the full set of interactions for After, Frac, and firm-size grouping. The coefficient on After×Frac remains statistically insignificant, but the interactions with smaller firm sizes are positive and significant in the specification for young incumbents (Column 3). There is no measurable effect for the firm-size interactions for old incumbents (Column 4). These results show that younger, smaller incumbents expand more rapidly in areas disproportionately affected by the decline in angel financing, which affected the rate of entry. In Columns 5 and 6 of Table 5, we see that the effect for young incumbents is driven roughly equally by an increase in job creation and a decrease in job destruction for the smallest firms, and is also driven by both creation and destruction for firms with 5 to 9 employees. While our preferred interpretation is one of decreased competition, insofar as accredited investors may provide capital to firms that are not entrants, the positive effect could be construed as surprising. Importantly, angels were allowed to make follow-on investments in portfolio companies even if an investor lost accreditation status under the new Dodd–Frank rules. Further, firms with

a track record are presumably better able to access alternative financing sources.

4.3 Entrants by industry

Our analysis now turns to the state–quarter–industry sample, built from the Census's Quarterly Workforce Indicators (QWI) data. By considering within-industry effects, this sample allows us to more carefully control for changing differences in industry composition across states, as well as to consider heterogeneous effects across industry groupings. For these regressions, we omit observations for NAICS code 92 (Public Administration) as well as state–industries with fewer than 250 employees.[24] We also require that measures are not "significantly distorted" by the Census in their efforts to preserve confidentiality.

Table 6 presents estimates of the effect of angels' loss of accreditation status on net job creation at entering firms (defined in the QWI as those aged 0–1 years), by industry. The dependent variable is the employment at entering firms in a given state and industry divided by the total number of employees in the state–industry at the beginning of the quarter. In Column 1, we include only the main treatment effect (After×Frac), together with the usual annual state-level controls and fixed effects at the state-, quarter-, and industry-levels. The sign of the coefficient on After×Frac is negative, with a p-value of approximately 11%. Though we cannot segment entrant employment by size as in the BDS data (Table 4), this result suggests that states with a higher treated fraction of angels saw lower employment growth at entering firms after Dodd–Frank when controlling for industry composition.

The following three columns of Table 6 consider heterogeneous effects on employment across industries. First, we categorize industries by the level of venture-capital funding they receive, which may be correlated with return characteristics that make these industries

[24] In addition, our results are robust to excluding the finance and insurance (NAICS code 52) and real estate, rental, and leasing (53) sectors, offering assurance that our results are not driven by Dodd–Frank regulatory changes other than those to investor accreditation rules. (See Appendix Table A10.)

likely to attract external finance. Next, we segment industries by their level of employment concentration as a measure of the degree of competition. We also segment industries by the typical amount of startup capital needed to enter. Thus, each column allows the treatment effect to differ between industries that lie above or below the median of a characteristic plausibly related to the importance of angel-funded entrants. Prior literature emphasizes the role of private benefits for entrepreneurs, such that many business owners may not strive to grow firm employment (Moskowitz and Vissing-Jørgensen, 2002; Hurst and Pugsley, 2011). To the degree that industries where angels are more important demonstrate higher economic dynamism, more pronounced employment effects in these industries would suggest that their loss of entrants was relatively more important.[25]

In each case, the main coefficients of interest are on After×Frac (which shows the treatment effect in industries that lack the characteristic) and Characteristic×After×Frac (which shows the difference in treatment effects between industries with and without the characteristic). Column 2 of Table 6 reports differential effects for industries more or less favored by VC. The coefficient on After×Frac is negative and statistically significant, whereas the coefficient on Low-VC×After×Frac is positive and statistically significant, both at 90% confidence. Thus, we see a reduction in employment growth at entrants for states that lost a larger fraction of accredited investors in industries favored by traditional VC. This result suggests imperfect substitutability between angel and venture capital finance, even in sectors in which it is relatively active.

In Column 3, we examine effects by levels of industry concentration. The coefficient on After×Frac is negative and statistically significant, and the coefficient on Concentrated

[25]Given the small measured base rate on changes in state-level firm entry, we lack statistical power to detect changes in failure rates: differences in survival between forgone entrants and actual entrants would need to be implausibly large to detect an effect.

industry×After×Frac is positive and statistically significant. We thus observe negative effects on entrant employment in less concentrated industries, with no statistical effects for more highly concentrated industries where the threat of entry is presumably less severe.

Column 4 documents differential effects for industries with varying levels of startup capital requirements. The coefficient on After×Frac is negative and statistically significant, whereas the coefficient on High-cap industry×After×Frac is positive, statistically significant at 90% confidence, and approximately equal in absolute value. Thus, the reduction in employment at entrants resulting from the change to accreditation standards is greater for industries with lower startup capital requirements, consistent with angels driving entrant employment growth in such industries. There is no overall effect for industries facing higher capital requirements.These results are consistent with treated angels funding firms with relatively modest capital requirements at the margin, and again provide evidence consistent with forgone entry due to a reduction in capital availability from smaller investors.[26] Overall, these results underscore the particular importance of angel finance in competitive sectors with high growth potential and lower cost of entry, as one might expect.

4.4 Funding ecosystem

Given that we find that tighter investor accreditation standards reduce business formation overall, we have already shown that other forms of finance can substitute for angel finance only partially, if at all. In this section, we explore the extent to which alternate sources of

[26]In Appendix Table A11, we replicate the analysis from Table 6, but consider employment growth at incumbent firms aged 2–5 years rather than at entrants. To the degree that entrants compete with incumbents—particularly young ones—in product, finance, and labor markets, we expect that a reduction in angel finance availability will increase young incumbent employment, especially in industries where angel-funded entrants are likely to be important. While the signs on the coefficient estimates using VC intensity and startup capital requirements are consistent with this hypothesis, none of the coefficients of interest are statistically significant. These results offer little support for the notion that additional financing for young incumbents becomes available, though the QWI data does not allow us to simultaneously segment these data by firm age and size.

capital might moderate the impacts of the policy change by estimating effects segmenting states according to capital availability. We consider both the extent of firm entry as in Section 4.2.1, and also the intensity with which (entering and existing) businesses raise capital from non-accredited investors under Regulation D.

We start by returning to our entry regression in the state–year sample, re-reporting the baseline result from Table 4 in Column 1 of Table 7. This serves as a comparison for the columns that follow, which show estimates from subsamples of states split at median values of alternative forms of finance for new business entry. Median values for the state are calculated in the year prior to treatment. In particular, we consider intermediated venture capital, home equity, small-business lending, and capital from non-accredited investors. Our evidence is consistent with each of these sources of capital serving as geographic complements to accredited angels, with entry effects driven by states where capital is more abundant.

Columns 2 and 3 report estimates for states with high and low venture capital investment. For high-VC states, the coefficient estimate is negative and larger in absolute value than in the full sample regression; for low-VC states, the sign on the coefficient is negative, but is not statistically different from zero. The overall effect on entry appears driven by states with above-median levels of venture capital investment since we only estimate a statistically significant effect in that subsample of states (though this estimate is not significantly different from the insignificant effect estimated in low-VC states).[27] This is true for every pair of columns in the table: while statistically-significant effects are confined to the high-alternate-capital states, the differences between states are not themselves significant.

Columns 4 and 5 report subsamples of high and low house-price appreciation states.

[27] When implemented as estimation on the full state–year sample and allowing the After×Frac coefficients to vary between high- and low-VC states using a triple-interaction, we find that these coefficients are not statistically significantly different from each other. This pattern also holds for the other splits across states with high- and low-alternate capital discussed below.

Insofar as home values translate into collateral that enables financing for business entry or expansion, and declining home prices make it harder to borrow against home equity, we again see a negative and significant coefficient for areas with more alternative finance that is (insignificantly) larger in absolute value than for the full sample. There is no measurable effect for areas with lower appreciation.

The segmentation on small business lending availability is similar. In Column 6, in the subsample with above-median small bank concentration, the coefficient estimate is negative and of (insignificantly) larger magnitude than in the full sample, with a statistically insignificant effect for states with presumably lower levels of small business lending availability.

Columns 8 and 9 report estimates segmenting states by usage of non-accredited investors in 504, 505, and 506 Form D filings.[28] Given regulatory rules, this is often regarded as friends and family financing. The coefficient on (After×Frac) in states with more friends and family participation is again negative and significant, with an (insignificantly) larger absolute value than in the baseline specification of Column 1. In low friends and family states, the coefficient is statistically indistinguishable from zero.

Our finding that venture capital is a poor substitute for angel finance is consistent with Hellmann, Schure, and Vo (2021), who finds that angels and venture capitalists do not tend to invest in the same firms. Of course, this does not preclude and can even reinforce geographic complementarity, as the presence of VC may influence the supply of entrepreneurs and angels (Hellmann and Thiele, 2008). Our results suggest that similar mechanisms may apply to other sources of capital, with geographic complementarity driven by cross-sectional variation in the vibrancy of states' funding ecosystems.

[28]In order to capture operating companies, we drop filings also claiming a (3)(c) exemption for investment funds, as well as companies indicating "Pooled Investment Fund" as the industry category. Yimfor (Forthcoming) provides evidence of the geographic representativeness of the Form D sample.

As a final analysis, we consider the use of non-accredited, friends and family finance as an outcome, rather than using it to understand heterogeneous effects on firm entry. We aggregate information from Form D filings to the state–year level. While a company is required to file a Form D within 15 days of fundraising, compliance is imperfect. So that we may reasonably assign filings to the correct year of capital formation, we require that the initial filing date be within 90 days of the first fundraising date, and also omit observations for which fundraising spans the passage of Dodd–Frank on July 21, 2010 (i.e., those that started fundraising before passage, but filed after).[29] Because electronic Form D filings were required beginning in 2009, we have data for two pre-treatment observations for each state (instead of three).

We expect tighter investor accreditation standards to increase the participation of non-accredited investors, both because formerly accredited investors can make follow-on investments, and due to substitution away from arms-length financing when fewer accredited investors are available. Table 8 reports results for continuous-treatment difference-in-differences estimations of the use of non-accredited investors in Form D filings, both overall and segmented across alternate capital sources as in Table 7. The dependent variable is the state–year proportion of (initial) Form D filings that ever have at least one non-accredited investor participating in the capital raise.[30]

Column 1 shows that non-accredited investor participation indeed increased for states that lost disproportionately more accredited investors as a result of the treatment. The coefficient estimate of 0.0796 corresponds to just under a 3 percentage point increase in the proportion of deals with a non-accredited investor for the average treatment intensity, a sizeable increase

[29]Approximately 75% of filings are within 24 days of first fundraising, and approximately 87% are filed within 90 days.

[30]In Table A12 we report robustness to the use of an alternative dependent variable: the state–year proportion of filing groups indicating via a check box that they might seek investment from non-accredited investors. This table also reports results for both outcomes at the deal level, i.e., using one non-aggregated observation for each initial filing date.

relative to the average 7.4% participation rate.

When we split by other alternative forms of finance in Columns 2 through 7, we estimate positive and statistically significant coefficients on (After×Frac) for each subsample. This is consistent with substitution toward non-accredited investors occurring in states with high and low levels of VC, high and low levels of house price appreciation, and high and low share of small banks.[31] These results indicate that partial substitution occurs irrespective of other available forms of capital.

Finally, in Columns 8 and 9, we consider the effect on non-accredited investor participation, segmenting states by its pre-treatment prevalence. Rather than considering substitution towards non-accredited investors as a function of other capital sources' availability (as in the previous columns), we assess here whether there is more substitution towards friends and family where this form of finance was already more popular. Of course, this substitution could reflect either a substitution towards new friends and family, or a substitution towards follow-on investments by formerly accredited investors.

We observe (statistically significant) substitution toward non-accredited investors only in states with an above-median presence of such investors. For geographic areas where friends and family finance was less common, there is no measurable effect. If increased usage of non-accredited investors were driven only by follow-on investments, we would expect to see effects in all states. In contrast—although we cannot reject equality of the effect sizes across the two subsamples—our results' significance only for high-friends-and family states indicates that conditional on entry, the intensity with which firms substitute towards this

[31]It appears that effects may be larger in low-VC and low-house price appreciation states, perhaps because firms substituting away from accredited investors are even more likely to turn to friends and family if other alternative sources of capital are less available. However, as in footnote 27, the effects across each pair of state subsamples are not statistically significantly different from one another when estimated in the full sample using triple interactions.

source of finance *may* depend on the importance of these investors in the local entrepreneurial ecosystem. This suggests that there is at least some substitution towards new friends and family, rather than our results simply reflecting follow-on investment by formerly accredited investors.

Our results in Table 7 Columns 8–9 and Table 8 underscore the important interaction between accredited and non-accredited investors, both as geographic complements and as partial substitutes when accreditation standards are tightened. Zaccaria (2023) offers a cautionary note about friends and family finance, which may make it less likely for a firm to raise subsequent rounds or exit, perhaps due to negative signaling or financing terms. Given our results, this mechanism could create additional negative effects from the accredited investor rule change even for firms that are still able to obtain finance and enter.

More generally, our results provide new evidence on partial substitutability of various capital sources for early-stage finance, and on possible geographic complementarity across these sources in the overall ecosystem. We demonstrate that accredited angel investors fulfill a specialized role, which makes sense given the high degree of uncertainty and asymmetric information involved in new firm finance.

5 Conclusion

In this paper, we provide the first causal empirical estimates of the marginal impact of financial angels in the economy. We demonstrate that a reduction in the pool of potential angels negatively affects angel investment and firm entry. Reduced angel capital availability also reduces employment at smaller entrants.

We find employment increases at small and young incumbents, either as workers are absorbed or as competitive pressures in the product markets are reduced. Coupled with

results by industry-level ease of entry, these effects demonstrate the importance of angels in more competitive and dynamic sectors of the economy, with repercussions beyond the companies that they directly fund.

When considered alongside other financing sources, entry effects are concentrated where capital is more available, suggesting that angels serve as a geographic complement to other forms of early firm finance. The evidence also indicates that investor accreditation rules matter at the margin, as other sources of capital including friends and family do not fully substitute when rules are tightened. Our results underscore the unique role accredited investors play in the entrepreneurial ecosystem.

Our work highlights the importance of policies affecting the informal capital markets and informs assessment of potential future changes. Periodically, policy makers consider additional changes to the accredited investor standards or how tightly they bind. While further proposed wealth or income threshold changes have not been implemented, a 2020 rule change (cf. SEC Release 33-10824) allows Series 7, 65 or 82 license holders to claim accredited investor status, a new approach that attempts to more directly incorporate investor sophistication considerations. The number of license holders who would not otherwise have been accredited is unclear, as is the rate at which they may participate in the angel market. Crowdfunding provisions of the JOBS Act, finalized in 2016 (after our sample period), may also have increased firms' ability to raise funds from investors near the accreditation thresholds.

Other changes remain under consideration, and our study can help inform discussion of potential changes' impacts on the entrepreneurial ecosystem. For example, a recent SEC review discusses the potential use of further proxies for financial sophistication, as well as updating the income or net worth standards through inflation adjustment, regional variation, or exclusion of retirement assets (Securities and Exchange Commission, 2023). These various

proposals involve expanding or contracting the pool of accredited investors, which our study shows would likely significantly impact firm formation. Though our study cannot speak to the costs of individual participation in informal capital markets, it suggests significant effects on business dynamism and—in the context of angels' role in a broader entrepreneurial financial ecosystem—very real benefits to new firms in the aggregate.

References

Adelino, M., S. Ma, and D. T. Robinson, 2017, Firm Age, Investment Opportunities, and Job Creation, *Journal of Finance* 72, 999–1038.

Adelino, M., A. Schoar, and F. Severino, 2015, House Prices, Collateral and Self-Employment, *Journal of Financial Economics* 117, 288–306.

Bach, L., R. P. Baghai, P. Strömberg, and K. Warg, 2022, Who Becomes a Business Angel?, Working Paper.

Bauguess, S., R. Gullapalli, and V. Ivanov, 2018, Capital Raising in the U.S.: An Analysis of the Market for Unregistered Securities Offerings, 2009–2017, SEC Division of Economic and Risk Analysis White Paper.

Berger, A. N., L. Black, C. H. S. Bouwman, and J. Dlugosz, 2017, Bank Loan Supply Responses to Federal Reserve Emergency Liquidity Facilities, *Journal of Fixed Income* 32, 1–15.

Berger, A. N., and C. H. S. Bouwman, 2009, Bank Liquidity Creation, *Review of Financial Studies* 22, 3779–3837.

Berger, A. N., N. H. Miller, M. Peterson, R. G. Rajan, and J. C. Stein, 2005, Does Function Follow Organizational Form? Evidence From the Lending Practices of Large and Small Banks, *Journal of Financial Economics* 76, 237–269.

Berger, A. N., and G. F. Udell, 1995, Relationship Lending and Lines of Credit in Small Firm Finance, *Journal of Business* 68, 351–381.

Bernstein, S., X. Giroud, and R. Townsend, 2015, The Impact of Venture Capital Monitoring: Evidence From a Natural Experiment, *Journal of Finance* 71, 1591–1622.

Bernstein, S., A. Korteweg, and K. Laws, 2017, Attracting Early-Stage Investors: Evidence From a Randomized Field Experiment, *Journal of Finance* 72, 509–538.

Black, S., and P. Strahan, 2002, Entrepreneurship and Bank Credit Availability, *Journal of Finance* 57, 2807–2833.

Bottazzi, L., M. Da Rin, and T. F. Hellmann, 2008, Who Are the Active Investors?: Evidence From Venture Capital, *Journal of Financial Economics* 89, 488–512.

Brander, J. A., Q. Du, and T. F. Hellmann, 2014, The Effects of Government-Sponsored Venture Capital: International Evidence, *Review of Finance* 19, 571–618.

Cetorelli, N., and P. E. Strahan, 2006, Finance as a Barrier to Entry: Bank Competition and Industry Structure in Local U.S. Markets, *Journal of Finance* 61, 437–461.

Chemmanur, T., and Z. Chen, 2014, Venture Capitalists Versus Angels: The Dynamics of Private Firm Financing Contracts, *Review of Corporate Finance Studies* 3, 39–86.

Chen, J., and M. Ewens, Forthcoming, Venture Capital and Startup Agglomeration, *Journal of Finance*.

Chodorow-Reich, G., 2014, The Employment Effects of Credit Market Disruptions: Firm-level Evidence from the 2008–09 Financial Crisis, *Quarterly Journal of Economics* 129, 1–59.

Cohen, S., D. C. Fehder, Y. V. Hochberg, and F. Murray, 2019, The Design of Startup Accelerators, *Research Policy* 48, 1781–1797.

Cortés, K. R., 2014, Rebuilding after Disaster Strikes: How Local Lenders Aid in the Recovery, Working Paper 14-28 Federal Resere Bank of Cleveland.

Da Rin, M., T. F. Hellmann, and M. Puri, 2012, A Survey of Venture Capital Research, In *Handbook of the Economics of Finance*. George Constantinides, Milton Harris, and René Stulz (eds) , vol 2, Amsterdam, North Holland.

Decker, R., J. Haltiwanger, R. S. Jarmin, and J. Miranda, 2014, The Role of Entrepreneurship in US Job Creation and Economic Dynamism, *Journal of Economic Perspectives* 28, 3–24.

Denes, M., S. T. Howell, F. Mezzanotti, X. Wang, and T. Xu, 2023, Investor Tax Credits and Entrepreneurship: Evidence from U.S. States, *The Journal of Finance* 78, 2621–2671.

Evans, D. S., and B. Jovanovic, 1989, An Estimated Model of Entrepreneurial Choice Under Liquidity Constraints, *Journal of Political Economy* 97, 808–827.

Ewens, M., and J. Farre-Mensa, 2020, The Deregulation of the Private Equity Markets and the Decline in IPOs, *The Review of Financial Studies* 33, 5463–5509.

Fenn, G. W., N. Liang, and S. Prowse, 1997, The Private Equity Market: An Overveiw, *Financial Markets, Institutions & Instruments* 6, 1–106.

Goetz, M. R., and J. C. Gozzi, 2010, Liquidity Shocks, Local Banks, and Economic Activity: Evidence From the 2007–2009 Crisis, Working Paper.

Goldfarb, B. D., G. Hoberg, D. Kirsch, and A. J. Triantis, 2013, Are Angels Different? An Analysis of Early Venture Financing, Working Paper 06-072 Robert H. Smith School.

Gompers, P., and J. Lerner, 2000, Can Corporate Venture Capital Succeed? Organizational Structure, Complementaries, and Success, In *Concentrated Ownership*. National Bureau of Economic Research Conference Reports, R. Morck, ed., University of Chicago Press.

Gonzalez-Uribe, J., 2020, Exchanges of Innovation Resources Inside Venture Capital Portfolios, *Journal of Financial Economics* 135, 144–168.

Greenstone, M., A. Mas, and H.-L. Nguyen, 2020, Do Credit Market Shocks Affect the Real Economy? Quasi-experimental Evidence from the Great Recession and "Normal" Economic Times, *American Economic Journal: Economic Policy* 12, 200–225.

Haltiwanger, J., R. S. Jarmin, and J. Miranda, 2013, Who Creates Jobs? Small Versus Large Versus Young, *Review of Economics and Statistics* 95, 347–361.

Hanley, K. W., and Q. Yu, 2023, Strategic Regulatory Non-Disclosure: The Case of the Missing Form D, Working Paper 4363027 SSRN.

Hathaway, I., and R. E. Litan, 2014, What's Driving the Decline in the Firm Formation Rate? A Partial Explanation, Economic Studies at Brookings The Brookings Institution.

Hellmann, T., P. Schure, and D. H. Vo, 2021, Angels and Venture Capitalists: Substitutes or Complements?, *Journal of Financial Economics* 141, 454–478.

Hellmann, T. F., 2002, A Theory of Strategic Venture Investing, *Journal of Financial Economics* 64, 285–314.

Hellmann, T. F., L. A. Lindsey, and M. Puri, 2008, Building Relationships Early: Banks in Venture Capital, *Review of Financial Studies* 21, 513–541.

Hellmann, T. F., and M. Puri, 2000, The Interaction Between Product Market and Financing Strategy: The Role of Venture Capital, *Review of Financial Studies* 13, 959–984.

Hellmann, T. F., and M. Puri, 2002, Venture Capital and the Professionalization of Start-up Firms: Empirical Evidence, *Journal of Finance* 57, 169–197.

Hellmann, T. F., and V. Thiele, 2008, Friends or Foes? The Interrelationship Between Angel and Venture Capital Markets, *Journal of Financial Economics* 115, 639–653.

Huang, L., A. Wu, M. J. Lee, J. Bao, M. Hudson, and E. Bolle, 2017, The American Angel, Whitepaper Angel Capital Association.

Hurst, E., and A. Lusardi, 2004, Liquidity Constraints, Household Wealth, and Entrepreneurship, *Journal of Political Economy* 112, 319–347.

Hurst, E., and B. W. Pugsley, 2011, What Do Small Businesses Do?, *Brookings Papers on Economic Activity* (2).

Karlsen, J., K. Kisseleva, A. Mjøs, and D. T. Robinson, 2024, Are some angels better than others?, Working Paper.

Kerr, W. R., J. Lerner, and A. Schoar, 2011, The Consequences of Entrepreneurial Finance: Evidence from Angel Financings, *Review of Financial Studies* 27, 20–55.

Kerr, W. R., and R. Nanda, 2009, Democratizing Entry: Banking Deregulations, Financing Constraints, and Entrepreneurship, *Journal of Financial Economics* 94, 124–149.

Kerr, W. R., and R. Nanda, 2010, Banking Deregulations, Financing Constraints, and Firm Entry Size, *Journal of the European Economic Association* 8, 582–593.

Kerr, W. R., and R. Nanda, 2011, Financing Constraints and Entrepreneurship, in D. Audretsch, O. Falck, and S. Heblich, eds.: *Handbook on Research on Innovation and Entrepreneurship* (Edward Elgar, Cheltenham).

Krishnan, K., D. K. Nandy, and M. Puri, 2015, Does Financing Spur Small Business Productivity? Evidence from a Natural Experiment, *Review of Financial Studies* 28, 1768–1809.

Lerner, J., 1999, The Government as Venture Capitalist: The Long-Run Effects of the SBIR Program, *Journal of Business* 72, 285–318.

Lerner, J., A. Schoar, S. Sokolinski, and K. Wilson, 2018, The Globalization of Angel Investments: Evidence Across Countries, *Journal of Financial Economics* 127, 1–20.

Lindsey, L. A., 2008, Blurring Firm Boundaries: The Role of Venture Capital in Strategic Alliances, *Journal of Finance* 63, 1137–1168.

Ma, S., 2020, The Life Cycle of Corporate Venture Capital, *Review of Financial Studies* 33, 358–394.

Mollica, M., and L. Zingales, 2007, The Impact of Venture Capital on Innovation and the Creation of New Businesses, Working Paper University of Chicago.

Moskowitz, Tobias, J., and A. Vissing-Jørgensen, 2002, The Returns to Entrepreneurial Investment: A Private Equity Premium Puzzle?, *American Economic Review* 92, 745–778.

OECD, 2011, Financing High-Growth Firms: The Role of Angel Investors, OECD Publishing, http://dx.doi.org/10.1787/9789264118782-en.

Puri, M., and R. Zarutskie, 2012, On the Lifecycle Dynamics of Venture Capital and Nonventure Capital Financed Firms, *Journal of Finance* 67, 2247–2293.

Robb, A. M., and D. T. Robinson, 2014, The Capital Structure Decisions of New Firms, *Review of Financial Studies* 27, 153–179.

Samila, S., and O. Sorenson, 2010, Venture Capital, Entrepreneurship, and Economic Growth, *Review of Economics and Statistics* 93, 338–349.

Schmalz, M. C., D. A. Sraer, and D. Thesmar, 2017, Housing Collateral and Entrepreneurship, *Journal of Finance* 72, 99–132.

Schumpeter, J. A., 1911, *The Theory of Economic Development*. Harvard University Press.

Schumpeter, J. A., 1942, *Socialism, Capitalism and Democracy*. Harper and Brothers.

Securities and Exchange Commission, 2023, Review of the "Accredited Investor" Definition Under the Dodd–Frank Act, https://www.sec.gov/files/review-definition-accredited-investor-2023.pdf.

Shane, S. A., 2009, *Fools Gold? The Truth Behind Angel Investing in America*. Oxford University Press New York.

Sohl, J., 2011, The Angel Investor Market in 2010: A Market on the Rebound, Analysis report Center for Venture Research.

Sohl, J., 2014, The Angel Investor Market in 2013: A Return to Seed Investing, Analysis report Center for Venture Research.

Sørensen, M., 2007, How Smart is Smart Money? An Empirical Two-Sided Matching Model of Venture Capital, *Journal of Finance* 62, 2725–2762.

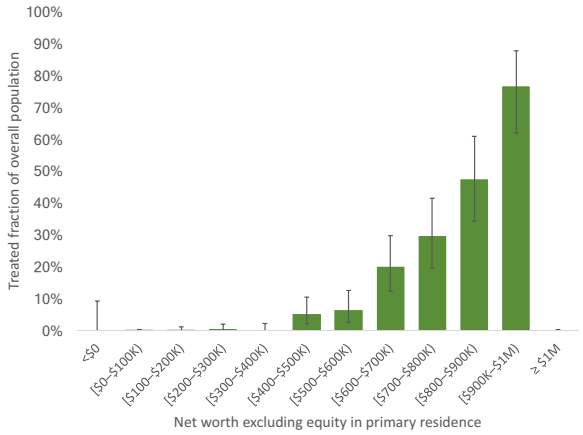
Stein, J. C., 2002, Information Production and Capital Allocation: Decentralized Versus Hierarchical Firms, *Journal of Finance* 57, 1891–1921.

Ueda, M., 2004, Banks Versus Venture Capital: Project Evaluation, Screening, and Expropriation, *Journal of Finance* 59, 601–621.

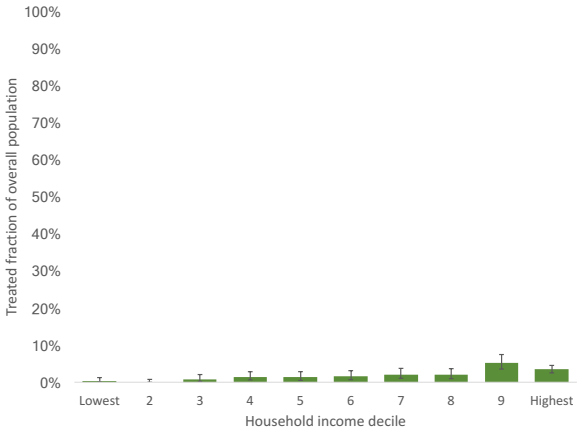
Xu, J., 2023, Is There a Trade-off Between Protecting Investors and Promoting Entrepreneurial Activity? Evidence from Angel Financing, *Journal of Financial and Quantitative Analysis* 58, 3305–3341.

Yimfor, E., Forthcoming, Brokers and Finders in Startup Offerings, *Journal of Financial and Quantitative Analysis*.

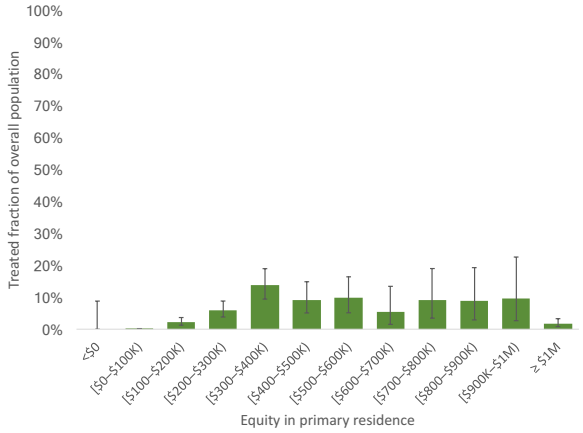
Zaccaria, L., 2023, Are Family and Friends the Wrong Investors? Evidence from U.S. Start-Ups, *Journal of Corporate Finance* 79, 102368.



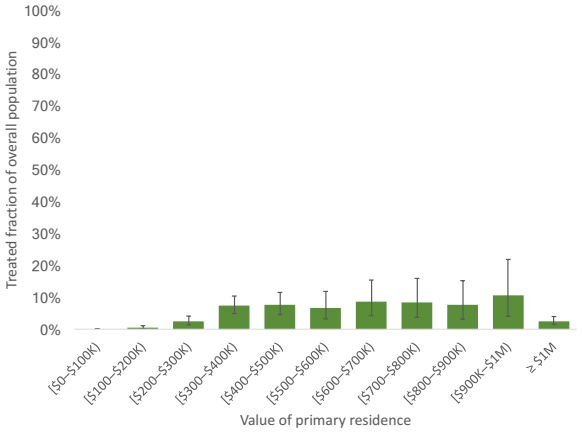
(a) Non-housing wealth



(b) Income



(c) Home equity



(d) Home value

Figure 1. Treated fraction of overall population by household attribute

Each graph plots the estimated fraction of the total population who are treated accredited investors across some household attribute: net worth excluding equity in primary residence, income, equity in primary residence, and value of primary residence. All estimates are calculated using the 2010 Survey of Consumer Finances, and reported with 95% Bernoulli confidence intervals.

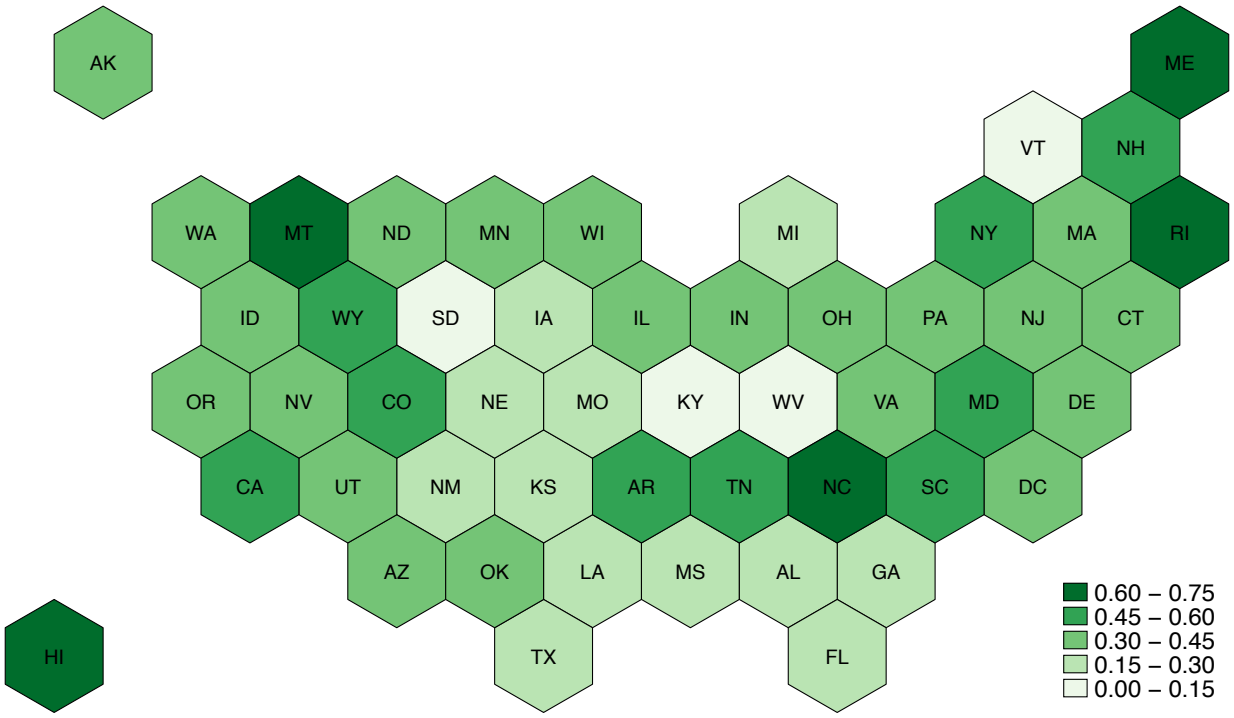
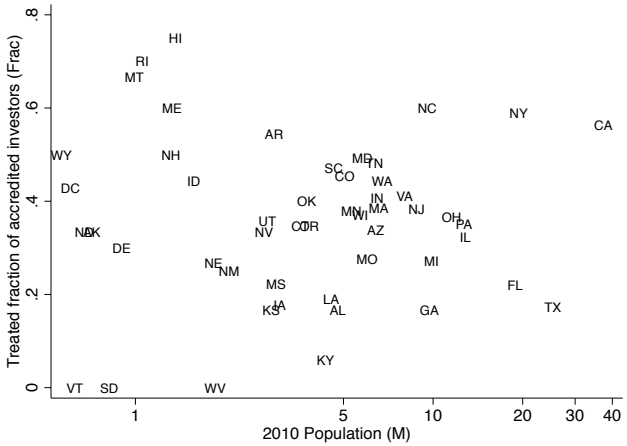
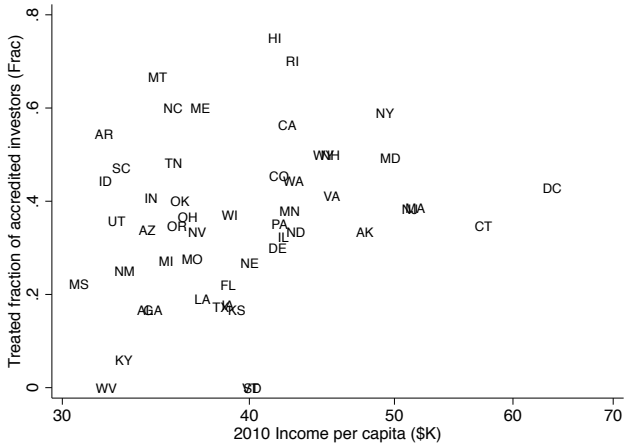


Figure 2. State-level treated fraction of accredited investors

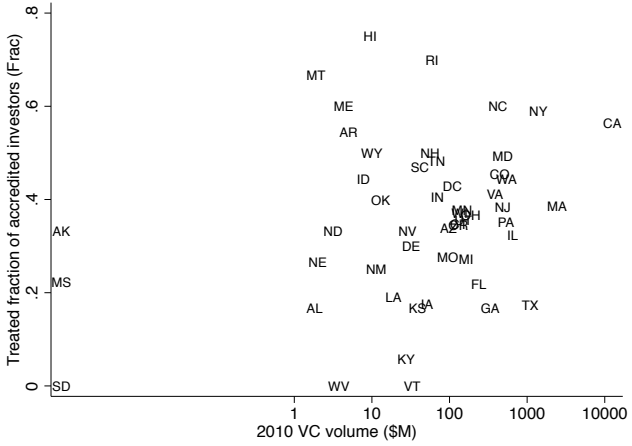
This map shades each state and the District of Columbia according to the treated fraction of accredited investors as a result of Dodd–Frank (Frac). Note that the treatment is undefined for West Virginia. The underlying data is reported in Appendix Table A2.



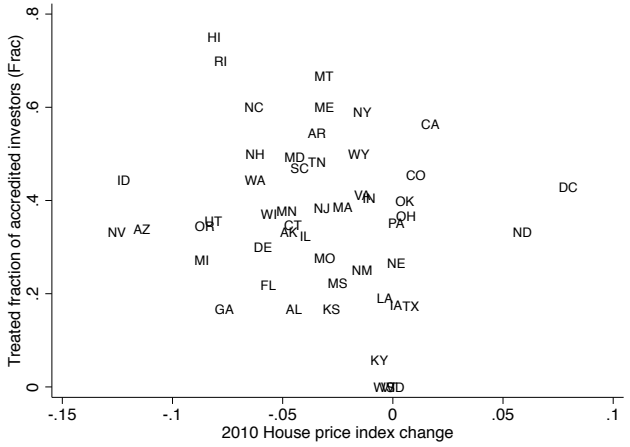
(a) Population



(b) Income per capita



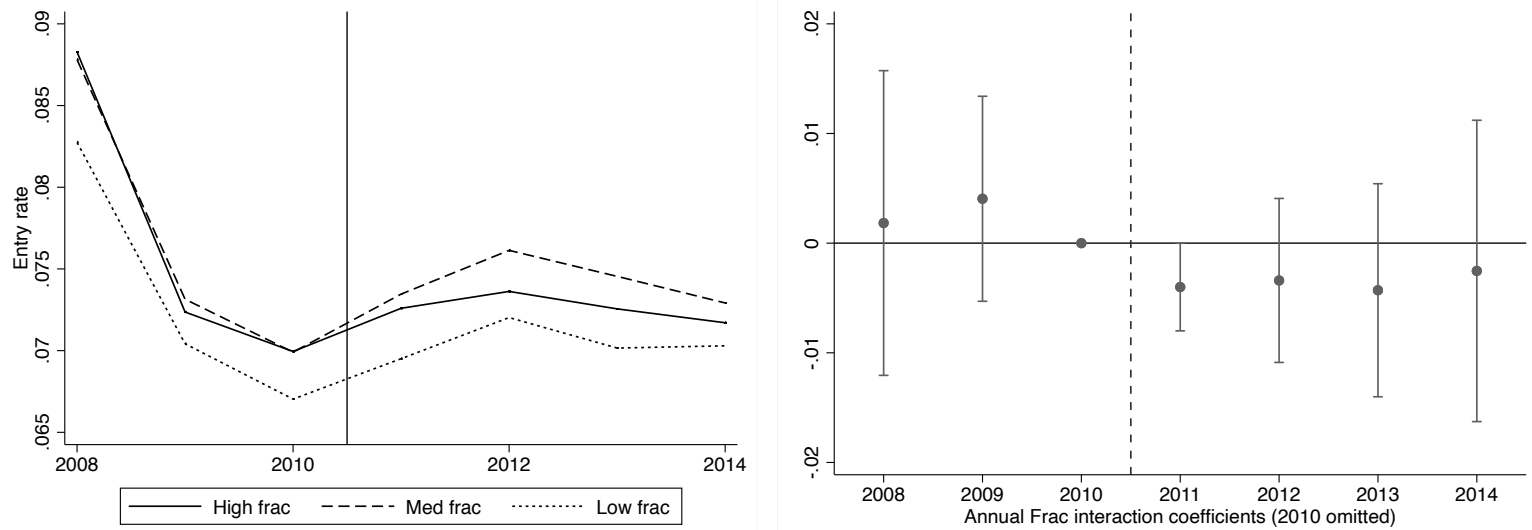
(c) Venture capital



(d) House price index change

Figure 3. Treated fraction of accredited investors and state attributes

Each graph plots the state-level treated fraction of accredited investors against a state attribute: 2010 log population (correlation = 0.01), 2010 log income per capita (0.23), 2010 log venture capital volume (0.26), and the 2010 change in house price index (-0.20). Time-varying analogues of these measures are included as annual state-level controls in our main regressions.



(a) Averages by state-level treatment intensity tercile **(b) Dynamic estimation coefficients**

Figure 4. Firm Entry

Panel (a) plots annual firm entry rates (*entry*, as defined in Table A1) averaged within terciles of the state-level treated fraction of accredited investors (Frac) as a result of Dodd–Frank. Panel (b) plots selected coefficients and 95% confidence intervals from WLS regressions of the firm entry rate, estimated using the state–year sample described in Section 3. The reported coefficients are for year-fixed effects interacted with the state-level treated fraction of accredited investors (Frac), omitting BDS year ending March 2010; regressions also include annual state-level control variables (log population, log income per capita, log venture capital volume, and house price index change), state-fixed effects, and year-fixed effects. Variables are calculated as described in Section 3. The full regression results are reported in Appendix Table A3.

Table 1. Household-level summary statistics by accreditation status

Panel (a) reports mean (and in square brackets, median) attributes for households in the 2010 Survey of Consumer Finances (SCF) by investor accreditation status, as described in Section 2.1. "Not Accredited" households are those not qualified under the pre-Dodd–Frank standard, "Accredited Untreated" households are those qualified both before and after the Dodd–Frank change, and "Treated" households are those qualified prior to the change but unqualified under the stricter, post-Dodd–Frank standard. Panel (b) reports the fraction of the population in the SCF and the SIPP (as described in Section 2.2) who meet various elements of the old and new accreditation standards.

(a) Mean and median household attributes by accreditation status (SCF)

	Not Accredited	Accredited Untreated	Treated
Income ($K)	54	360	119
	[42]	[204]	[111]
Net worth ($K)			
Total	145	4,385	1,234
	[59]	[2,205]	[1,170]
Home equity	59	530	476
	[15]	[380]	[377]
Total excl. home equity	86	3,855	758
	[22]	[1,688]	[801]
Home value ($K)	121	748	601
	[90]	[550]	[500]
Fraction of population (SCF)	89.6%	8.4%	2.0%

(b) Fraction of households meeting accreditation criteria in SCF and SIPP

	SCF	SIPP
Accredited (prior) by treatment status		
Accredited untreated	8.4%	3.7%
Treated	2.0%	2.5%
Net worth thresholds only		
Accredited untreated (≥$1M excl. home equity)	7.5%	2.1%
Potentially treated (≥$1M *only* with home equity)	2.3%	2.5%
Untreated (<$1M incl. home equity)	90.2%	95.4%
Income		
Income >$150K (conditional on >$0)	7.9%	6.8%
Accredited by income	3.6%	2.3%

Table 2. Summary statistics

This table reports distributional summary statistics for our main variables. Panel (a) reports summary statistics for the state–year sample; Panel (b) reports summary statistics for the state–year-size sample; Panel (c) reports summary statistics for the state–quarter–industry (QWI) and Form D deal-level samples. For each variable we report the pooled mean, standard deviation (sd), median (p_{50}), first quartile (p_{25}), third quartile (p_{75}), and number of non-missing observations (Obs).

(a) State–year sample

	mean	sd	p_{50}	p_{25}	p_{75}	Obs
Firm entry rate (%)	7.42	1.36	7.22	6.40	8.19	350
Pitchbook angel-backed						
Companies proportion (%)	8.01	5.17	7.01	4.88	10.71	195
Capital proportion (%)	2.01	3.44	0.84	0.20	2.43	189
Companies	4.81	13.29	1.00	0.00	4.00	350
Capital	3.07	9.46	0.32	0.00	1.79	304
Form D non-accredited investors						
Participation proportion (%)	7.36	6.03	6.14	3.74	9.52	300
Checkbox proportion (%)	14.64	9.12	12.95	8.77	18.66	300
Frac (%)	36.61	16.55	36.19	26.67	47.06	350
Population log	15.13	1.04	15.30	14.27	15.72	350
Income per capita log	10.62	0.16	10.60	10.49	10.71	350
VC log	10.75	3.14	11.23	9.59	12.72	350
House price index change (%)	-0.99	6.18	-1.04	-4.40	2.27	350

(b) State–year–size sample

	mean	sd	p_{50}	p_{25}	p_{75}	Obs
Firm entry rate (%)	2.47	2.26	1.05	0.86	4.68	1,050
Net job creation rate (%)						
Entrants	0.64	0.40	0.46	0.33	0.95	1,050
Younger incumbents	-3.54	7.11	-3.62	-8.20	1.47	1,050
Older incumbents	-1.42	3.65	-0.84	-3.97	1.00	1,050
JC (%): Younger incumbents	20.30	6.56	18.35	15.12	26.72	1,050
JD (%): Younger incumbents	23.84	3.58	23.51	21.52	25.70	1,050

(c) Other samples

	mean	sd	p_{50}	p_{25}	p_{75}	Obs
State–quarter–industry sample (QWI)						
Net job creation rate, Entrants (%)	4.08	2.65	3.51	2.14	5.43	20,869
Form D deal-level sample						
Non-acc. investor participation (%)	5.85					52,903
Non-acc. investor checkbox (%)	11.64					52,903

Table 3. Angel investment

This table reports coefficients, standard errors, and statistical significance from regressions of the proportion of Pitchbook companies reporting having raised angel capital (column 1), the proportion of capital raised by Pitchbook companies reported as coming from angel investors (column 2), the number of Pitchbook companies reporting having raised angel capital (column 3), and the logarithm of the amount of angel capital raised by Pitchbook companies (column 4). All results are from WLS regressions, except column 3, which reports weighted Poisson regression results, estimated using the state–year sample described in Section 3. The key explanatory variable is the state-level treated fraction of accredited investors after Dodd–Frank (After×Frac); regressions also include annual state-level control variables (log population, log income per capita, log venture capital volume, and house price index change), state-fixed effects, and year-fixed effects. Variables are calculated as described in Section 3. The samples are restricted to state–years where Pitchbook reports at least 15 angel or early-stage funded companies (column 1); or at least $15M of funding in such deals, and where the amount of angel capital is available for at least half of the companies reporting having raised angel capital (column 2); or where the amount of angel capital is available for at least half of the companies reporting having raised angel capital (column 4). Standard errors clustered by state are reported in parentheses. Significance levels are indicated by *, **, *** for 10%, 5%, and 1% respectively.

	(1) Companies proportion	(2) Capital proportion	(3) Companies (Poisson)	(4) Capital (log)
After×Frac	-0.0512**	-0.0466*	-0.617*	-1.080**
	(0.0251)	(0.0276)	(0.361)	(0.534)
Population log	0.468*	0.131	3.116	8.960*
	(0.241)	(0.195)	(3.827)	(4.965)
Income per capita log	-0.185	-0.0384	-0.0523	-0.958
	(0.269)	(0.137)	(1.930)	(3.996)
VC log	-0.0205	0.00288	-0.0254	0.0731
	(0.0164)	(0.00752)	(0.105)	(0.0480)
House price index change	-0.0736	-0.00197	-0.942*	0.736
	(0.0663)	(0.0467)	(0.492)	(0.902)
State FE	✓	✓	✓	✓
Annual FE	✓	✓	✓	✓
Observations	195	189	350	304
Adjusted R^2	0.276	0.014		0.860
Mean dependent var.	0.0801	0.0201	4.814	0.684

Table 4. Entry and employment at entrants

This table reports coefficients, standard errors, and statistical significance from WLS regressions of the firm entry rate (column 1), the firm entry rate by firm size (columns 2–3) and entering firms' net job creation rate by firm size (columns 4–5). These models are estimated using the state–year sample (column 1) and state–year–size sample (columns 2–5) described in Section 3. The key explanatory variable is the state-level treated fraction of accredited investors after Dodd–Frank (After×Frac), and (in columns 3 and 5) its interaction with indicators for firm-size categories. Regressions also include annual state-level control variables (log population, log income per capita, log venture capital volume, and house price index change), state-fixed effects, year-fixed effects, and—except in column 1—firm-size indicators (1–4 employees and 5–9 employees; 10+ employees is omitted). Columns 3 and 5 also include interactions of the firm-size indicators with a post-Dodd–Frank indicator and with the state-level treated fraction of accredited investors. Variables are calculated as described in Section 3. Standard errors clustered by state are reported in parentheses. Significance levels are indicated by *, **, *** for 10%, 5%, and 1% respectively.

	(1) Entry	(2) Entry	(3) Entry	(4) Net Job Creation	(5) Net Job Creation
After×Frac	-0.00551**	-0.00184**	0.000306	0.000496	0.00173*
	(0.00267)	(0.000836)	(0.000585)	(0.000366)	(0.000967)
1-4		0.0502***	0.0459***	-0.00708***	-0.00893***
		(0.00185)	(0.00603)	(0.000379)	(0.00128)
5-9		0.00110***	-0.000409	-0.00886***	-0.0103***
		(0.000194)	(0.000330)	(0.000410)	(0.00138)
1-4×After			0.00148		0.00167***
			(0.00109)		(0.000304)
5-9×After			0.000867***		0.00158***
			(0.000243)		(0.000341)
1-4×Frac			0.0114		0.00329
			(0.0141)		(0.00296)
5-9×Frac			0.00349***		0.00234
			(0.000985)		(0.00319)
1-4×After×Frac			-0.00476*		-0.00185**
			(0.00264)		(0.000868)
5-9×After×Frac			-0.00167***		-0.00184*
			(0.000543)		(0.000999)
Annual state-level controls	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓
Annual FE	✓	✓	✓	✓	✓
Observations	350	1050	1050	1050	1050
Adjusted R^2	0.963	0.962	0.962	0.930	0.933
Mean dependent var.	0.0742	0.0247	0.0247	0.0064	0.0064
1–4		0.0553	0.0553	0.0047	0.0047
5–9		0.0100	0.0100	0.0031	0.0031
10+		0.0090	0.0090	0.0113	0.0113

Table 5. Employment at incumbents by size

This table reports coefficients, standard errors, and statistical significance from WLS regressions of the rates by firm size of net job creation at young incumbent firms aged 1–5 years (columns 1 and 3), net job creation at older incumbents aged ≥6 years (2 and 4), job creation at young incumbents (5), and job destruction at young incumbents (6). All are estimated using the state–year–size sample described in Section 3. The key explanatory variable is the state-level treated fraction of accredited investors after Dodd–Frank (After×Frac), and (in columns 3–6) its interaction with indicators for firm-size categories. Regressions also include annual state-level control variables (log population, log income per capita, log venture capital volume, and house price index change), state-fixed effects, year-fixed effects, and firm-size indicators (1–4 employees and 5–9 employees; 10+ employees is omitted). Columns 3–6 also include interactions of the firm-size indicators with a post-Dodd–Frank indicator and with the state-level treated fraction of accredited investors. Variables are calculated as described in Section 3. Standard errors clustered by state are reported in parentheses. Significance levels are indicated by *, **, *** for 10%, 5%, and 1% respectively.

	(1) NJC, Young	(2) NJC, Old	(3) NJC, Young	(4) NJC, Old	(5) JC, Young	(6) JD, Young
After×Frac	0.0131	0.00271	-0.0185	-0.00245	0.00435	0.0229
	(0.0148)	(0.0101)	(0.0142)	(0.00598)	(0.00869)	(0.0145)
1-4	0.109***	0.0240***	0.148***	0.0374***	0.154***	0.00636
	(0.00497)	(0.00214)	(0.0150)	(0.00724)	(0.00986)	(0.00916)
5-9	0.0214***	-0.0366***	0.0261***	-0.0365***	0.0347***	0.00862
	(0.00308)	(0.00118)	(0.00945)	(0.00529)	(0.00413)	(0.00767)
1-4×After			-0.0517***	-0.0259***	-0.0283***	0.0235***
			(0.00836)	(0.00755)	(0.00633)	(0.00758)
5-9×After			-0.0189*	-0.00146	-0.00851**	0.0104
			(0.00951)	(0.00588)	(0.00353)	(0.00878)
1-4×Frac			-0.0569	-0.00650	-0.0258	0.0310
			(0.0383)	(0.0175)	(0.0258)	(0.0243)
5-9×Frac			-0.00571	0.00310	0.00389	0.00960
			(0.0220)	(0.0108)	(0.00846)	(0.0181)
1-4×After×Frac			0.0586***	0.0174	0.0293**	-0.0293*
			(0.0182)	(0.0161)	(0.0145)	(0.0164)
5-9×After×Frac			0.0364*	-0.00189	0.0118	-0.0246
			(0.0190)	(0.0123)	(0.00845)	(0.0199)
Annual state-level controls	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Annual FE	✓	✓	✓	✓	✓	✓
Observations	1050	1050	1050	1050	1050	1050
Adjusted R^2	0.876	0.837	0.885	0.852	0.935	0.846
Mean dependent var.	-0.0354	-0.0142	-0.0354	-0.0142	0.203	0.238
1–4	0.0328	0.0156	0.0328	0.0156	0.285	0.252
5–9	-0.0593	-0.0473	-0.0593	-0.0473	0.180	0.240
10+	-0.0797	-0.0111	-0.0797	-0.0111	0.144	0.224

Table 6. Employment at entrants by industry

This table reports coefficients, standard errors, and statistical significance from WLS regressions of the net job creation rate at firms aged 0–1 years by industry, estimated using the state–quarter–industry sample described in Section 3. The key explanatory variable is the state-level treated fraction of accredited investors after Dodd–Frank (After×Frac), and (in columns 2–4) its interactions with indicators for various industry characteristics (less funded by venture capital, highly concentrated, requiring high startup capital). Regressions also include annual state-level control variables (log population, log income per capita, log venture capital volume, and house price index change), state-fixed effects, quarter-fixed effects, and industry-fixed effects. Columns 2–4 also include interactions of indicators for various industry characteristics with a post-Dodd–Frank indicator and with the state-level treated fraction of accredited investors. Variables are calculated as described in Section 3. Standard errors clustered by state are reported in parentheses. Significance levels are indicated by *, **, *** for 10%, 5%, and 1% respectively.

	(1)	(2)	(3)	(4)
After×Frac	-0.00671	-0.0106*	-0.0118**	-0.0116**
	(0.00416)	(0.00549)	(0.00563)	(0.00574)
Low-VC industry×After		-0.00267		
		(0.00197)		
Low-VC industry×Frac		-0.0263*		
		(0.0143)		
Low-VC industry×After×Frac		0.00821*		
		(0.00459)		
Concentrated industry×After			-0.00329*	
			(0.00171)	
Concentrated industry×Frac			-0.00997	
			(0.0144)	
Concentrated industry×After×Frac			0.00726**	
			(0.00325)	
High-cap industry×After				-0.00466*
				(0.00248)
High-cap industry×Frac				-0.0229
				(0.0194)
High-cap industry×After×Frac				0.0110*
				(0.00628)
Annual state-level controls	✓	✓	✓	✓
State FE	✓	✓	✓	✓
Quarterly FE	✓	✓	✓	✓
Industry FE	✓	✓	✓	✓
Observations	20869	20869	15768	20869
Adjusted R^2	0.717	0.721	0.741	0.719
Mean dependent var.	0.0408	0.0408	0.0420	0.0408
p-val: $\beta_{\text{Aft}\times\text{Frac}} + \beta_{\ldots\text{industry}\times\text{Aft}\times\text{Frac}} = 0$		0.522	0.355	0.887

Table 7. Entry by alternate sources of capital

This table reports coefficients, standard errors, and statistical significance from WLS regressions of the firm entry rate, estimated using the state–year sample described in Section 3. The key explanatory variable is the state-level treated fraction of accredited investors after Dodd–Frank (After×Frac); regressions also include annual state-level control variables (log population, log income per capita, log venture capital volume, and house price index change), state-fixed effects, and year-fixed effects. Variables are calculated as described in Section 3. Columns 2–9 are estimated separately on states with above- and below-median 2010 venture capital volume (columns 2–3), 2009–10 change in house prices (4–5), 2010 fraction of branches at banks with less than $1B in assets (6–7), and 2010 fraction of Form D filings reporting having raised from non-accredited investors (8–9). Standard errors clustered by state are reported in parentheses. Significance levels are indicated by *, **, *** for 10%, 5%, and 1% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		VC		ΔHPI		Loan		Non-accredited	
	Overall	High	Low	High	Low	High	Low	High	Low
After×Frac	-0.00551**	-0.00736**	-0.00280	-0.00950*	0.000996	-0.0101**	-0.00448	-0.0117**	-0.00296
	(0.00267)	(0.00328)	(0.00396)	(0.00467)	(0.00466)	(0.00453)	(0.00377)	(0.00516)	(0.00440)
Population log	-0.0604**	-0.0687**	0.00314	-0.0580	-0.110***	-0.0217	-0.0926**	-0.0436	-0.0726*
	(0.0281)	(0.0311)	(0.0540)	(0.0404)	(0.0357)	(0.0335)	(0.0424)	(0.0410)	(0.0410)
Income per capita log	0.0429**	0.0532**	0.0450*	0.0426*	0.000109	0.0238	0.0424	0.00646	0.0625**
	(0.0198)	(0.0257)	(0.0243)	(0.0221)	(0.0343)	(0.0288)	(0.0317)	(0.0158)	(0.0254)
VC log	0.000280	0.0000690	0.000261	0.000518**	0.0000288	0.000317	0.0000867	0.000461**	0.0000763
	(0.000234)	(0.000797)	(0.000189)	(0.000210)	(0.000264)	(0.000238)	(0.000678)	(0.000215)	(0.000312)
House price index change	0.0163***	0.0155***	0.0222***	0.0225***	0.0151**	0.00846	0.0162***	0.00826	0.0162***
	(0.00361)	(0.00422)	(0.00651)	(0.00504)	(0.00591)	(0.0143)	(0.00467)	(0.00776)	(0.00535)
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Annual FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	350	175	175	175	175	175	175	175	175
Adjusted R^2	0.963	0.964	0.934	0.961	0.968	0.937	0.970	0.962	0.965
Mean dependent var.	0.0742	0.0775	0.0710	0.0719	0.0766	0.0711	0.0774	0.0739	0.0746

Table 8. Non-accredited investor participation (overall and by alternate sources of capital)

This table reports coefficients, standard errors, and statistical significance from WLS regressions of the state–year-level proportion of Form D filings reporting having raised from non-accredited investors, estimated using the state–year sample described in Section 3 (excluding 2008, for which Form D data is not generally available). The key explanatory variable is the state-level treated fraction of accredited investors after Dodd–Frank (After×Frac); regressions also include annual state-level control variables (log population, log income per capita, log venture capital volume, and house price index change), state-fixed effects, and year-fixed effects. Variables are calculated as described in Section 3. Columns 2–9 are estimated separately on states with above- and below-median 2010 venture capital volume (columns 2–3), 2009–10 change in house prices (4–5), 2010 fraction of branches at banks with less than $1B in assets (6–7), and 2010 fraction of Form D filings reporting having raised from non-accredited investors (8–9). Standard errors clustered by state are reported in parentheses. Significance levels are indicated by *, **, *** for 10%, 5%, and 1% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		VC		ΔHPI		Loan		Non-accredited	
	Overall	High	Low	High	Low	High	Low	High	Low
After×Frac	0.0796***	0.0641**	0.119***	0.0695*	0.121***	0.0967***	0.0588*	0.0792**	0.0174
	(0.0237)	(0.0249)	(0.0421)	(0.0338)	(0.0402)	(0.0343)	(0.0325)	(0.0363)	(0.0413)
Population log	0.143	0.147	0.337	0.245	-0.0807	0.136	0.326	0.00665	0.252
	(0.183)	(0.237)	(0.582)	(0.325)	(0.307)	(0.173)	(0.317)	(0.168)	(0.276)
Income per capita log	-0.164	-0.0653	-0.282	-0.0938	-0.209	-0.122	-0.0329	0.142	-0.208
	(0.107)	(0.118)	(0.226)	(0.199)	(0.179)	(0.239)	(0.152)	(0.182)	(0.166)
VC log	-0.000672	-0.0100*	0.00194	-0.00117	0.0000877	0.00134	-0.00768	-0.000952	0.0000750
	(0.00230)	(0.00504)	(0.00222)	(0.00388)	(0.00274)	(0.00236)	(0.00538)	(0.00402)	(0.00292)
House price index change	0.0114	0.00349	0.115	0.00896	0.0457	0.320*	-0.0112	0.0947*	0.00355
	(0.0243)	(0.0256)	(0.101)	(0.0299)	(0.0528)	(0.175)	(0.0273)	(0.0541)	(0.0217)
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Annual FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	300	150	150	150	150	150	150	150	150
Adjusted R^2	0.506	0.673	0.266	0.525	0.453	0.444	0.306	0.310	0.332
Mean dependent var.	0.0736	0.0626	0.0847	0.0842	0.0630	0.0873	0.0600	0.0942	0.0531

A Appendix

Table A1.
Variable definitions

This table describes the variables used in our analysis and explains their construction.

Variable	Description	Calculation
Outcome variables: State–year sample and state–year–size sample		
Entry	Firm entry rate	The number of age-zero firms (perhaps of a given size) in a state, divided by the total number of firms in the state at the beginning of the year (calculated as firms minus firm entry plus firm deaths).
Angel company prop.	Angel-backed companies proportion	The number of Pitchbook companies headquartered in a state with deal type coded as angel (excluding follow-on investments from the same set of investors) divided by the total number of such angel, pre/accelerator/incubator, seed, and early-stage venture deals. Restricted to state–years where Pitchbook reports at least 15 funded companies in these categories.
Angel capital prop.	Angel-backed capital proportion	The amount of capital raised by Pitchbook companies headquartered in a state with deal type coded as angel (excluding follow-on investments from the same set of investors) divided by the amount of capital raised in such angel, pre/accelerator/ incubator, seed, and early-stage venture deals. Restricted to state–years where Pitchbook reports at least 15 funded companies in these categories, and where the amount of angel capital is available for at least half of the companies reporting having raised angel capital.
Angel companies	Angel-backed companies	The number of Pitchbook companies headquartered in a state with deal type coded as angel (excluding follow-on investments from the same set of investors).
Angel capital	Angel-backed capital	The amount of capital raised by Pitchbook companies headquartered in a state with deal type coded as angel (excluding follow-on investments from the same set of investors). Restricted to state–years where Pitchbook reports the amount of angel capital raised for at least half of the companies reporting having raised angel capital.

(continued)

Table A1.
Variable definitions (cont.)

Variable	Description	Calculation
Non-acc. investor participation	Non-acc. investor participation proportion	The number of 504, 505, and 506 Form Ds (excluding those claiming a (3)(c) exemption for investment funds or indicating "Pooled Investment Fund" as the industry category; aggregating amended filings by CIK and date of first sale; and requiring the initial filing date be within 90 days of the first fundraising date) in a state that ever report participation by at least one non-accredited investor, divided by the total number of such Form Ds.
Non-acc. investor checkbox	Non-acc. investor checkbox proportion	The number of 504, 505, and 506 Form Ds (excluding those claiming a (3)(c) exemption for investment funds or indicating "Pooled Investment Fund" as the industry category; aggregating amended filings by CIK and date of first sale; and requiring the initial filing date be within 90 days of the first fundraising date) in a state that ever indicate via checkbox that they might seek investment from non-accredited investors, divided by the total number of such Form Ds.
NJC	Net job creation rate	For entering firms (age zero): Net job creation by age-zero firms (perhaps of a given size) in a state divided by the average of the total number of employees in the state at the beginning and end of the year. For incumbent firms (age $\geq$1): Net job creation by firms of a given age (and perhaps of a given size) in a state, divided by the average of the number of employees firms of the same age (and perhaps size) had in the state at the beginning and end of the year.
JC	Job creation rate	Job creation by firms of a given age (and perhaps of a given size) in a state, divided by the average of the number of employees firms of the same age (and perhaps size) had in the state at the beginning and end of the year.
JD	Job destruction rate	Job destruction by firms of a given age (and perhaps of a given size) in a state, divided by the average of the number of employees firms of the same age (and perhaps size) had in the state at the beginning and end of the year.

(continued)

Table A1.
Variable definitions (cont.)

Variable	Description	Calculation
Outcome variables: State–quarter–industry sample		
NJC	Net job creation rate	For entering firms (age zero and one): Ending employment for infant firms in a state, divided by the number of employees in the state and industry at the beginning of the quarter. We drop observations reported by the QWI as containing "significantly distorted" data (variable status codes 7, 9, and 12).
Outcome variables: Form D deal-level sample		
Non-acc. investor participation	Non-acc. investor participation	A binary indicator variable for each 504, 505, and 506 Form D (excluding those claiming a (3)(c) exemption for investment funds or indicating "Pooled Investment Fund" as the industry category; aggregating amended filings by CIK and date of first sale; and requiring the initial filing date be within 90 days of the first fundraising date) that ever reports participation by at least one non-accredited investor.
Non-acc. investor checkbox	Non-acc. investor checkbox	A binary indicator variable for each 504, 505, and 506 Form D (excluding those claiming a (3)(c) exemption for investment funds or indicating "Pooled Investment Fund" as the industry category; aggregating amended filings by CIK and date of first sale; and requiring the initial filing date be within 90 days of the first fundraising date) that ever reports via checkbox that they might seek investment from non-accredited investors.
Main explanatory variables		
After	Post-Dodd–Frank indicator	In the state–year sample and state–year–size sample: Years ending March 12, 2011 and later. In the state–quarter–industry sample: Quarter ending June 30, 2010 and later.
Frac	State-level treated fraction of accredited investors	The number of families in a state who may have been accredited investors under the pre-Dodd–Frank standard but not the post-Dodd–Frank standard, divided by the number who may have been accredited under the pre-Dodd–Frank standard. Calculated using Wave 10 of the 2008 SIPP panel as described in Section 2.2.

(continued)

Table A1.
Variable definitions (cont.)

Variable	Description	Calculation
1–4/5–9/10+ employees	Number of employees	Categorized using end-of-year employment for entrants and beginning-of-year employment for incumbents.
Annual state-level variables		
Population log	Population	The natural log of population measured in the middle of the prior calendar year, from the Bureau of Economic Analysis.
Income per capita log	Income per capita	The natural log of total personal income in the prior calendar year divided by the midyear population, from the Bureau of Economic Analysis.
VC log	Venture capital volume	The natural log of (one plus) the total venture amount, in thousands, from SDC's Venture Xpert. The round date, the firm's location, and the amount of the round must be available, and we exclude stages coded as acquisitions, real estate, and other.
House price index change	House price change	The annual percentage change in the seasonally-adjusted house price index measured as of the first quarter of the year, from the Federal Finance Housing Agency.
State-level variables		
High VC	Above-median 2010 venture capital volume	State has above-median levels of venture capital invested in 2010, calculated from SDC's Venture Xpert. (AZ, CA, CO, CT, DC, FL, GA, IL, IN, MA, MD, MI, MN, MO, NC, NJ, NY, OH, OR, PA, TX, UT, VA, WA, WI.)
High ΔHPI	Above-median 2009–10 house price index change	State has above-median house-price appreciation from 2009 to 2010 based on the percentage change in the Federal Finance Housing Agency house price index. (CA, CO, DC, IA, IN, KS, KY, LA, MA, ME, MO, MS, MT, ND, NE, NM, NY, OH, OK, PA, SD, TX, VA, VT, WY.)
High loan	Above-median 2010 fraction of small-bank branches	State has above-median proportion of bank branches at banks with less than $1B in assets per FDIC Summary of Deposits data. (AL, AR, CO, IA, IL, KS, KY, LA, ME, MN, MO, MS, MT, ND, NE, NH, NM, OK, SC, SD, TN, TX, VT, WI, WY.)

(continued)

Table A1.
Variable definitions (cont.)

Variable	Description	Calculation
High non-accredited	Above-median 2010 fraction of Form Ds reporting non-accredited investors	State has above-median proportion of Form Ds (with amended filings aggregated by CIK and date of first sale) having reported raising funds from non-accredited investors. (AK, AL, CO, DE, FL, IA, ID, IL, KS, KY, LA, MN, MO, MS, MT, NE, NV, OH, OR, RI, SD, TX, VT, WI, WY.)
Industry-level variables		
Low-VC industry	Below-median venture capital	Two-digit NAICS industry has below-median venture capital volume, calculated from SDC's Venture Xpert. (NAICS 11, 21, 42, 53, 55, 56, 61, 71, 72.)
Concentrated industry	Above-median employment concentration	Two-digit NAICS industry has above-median fraction of total employment at 50 largest firms, from the 2007 Economic Census. (NAICS 22, 44–45, 48–49, 51, 52, 56, 72. Note: Data is not available for NAICS 11, 21, 23, 31–33, 55.)
High-cap industry	Above-median start-up capital	Two-digit NAICS industry has above-median reported amount of start-up capital, from the 2007 Survey of Business Owners. (NAICS 21, 22, 31–33, 44–45, 51, 53, 55, 71, 72.)

Table A2. State-level treated fraction of accredited investors

This table reports the treated fraction of accredited investors as a result of Dodd–Frank (Frac) for each state and the District of Columbia. Note that the treatment is undefined for West Virginia.

State	Frac	State	Frac	State	Frac
Hawaii	75%	Virginia	41%	Delaware	30%
Rhode Island	70%	Indiana	41%	Missouri	28%
Montana	67%	Oklahoma	40%	Michigan	27%
Maine	60%	Massachusetts	39%	Nebraska	27%
North Carolina	60%	New Jersey	38%	New Mexico	25%
New York	59%	Minnesota	38%	Mississippi	22%
California	56%	Wisconsin	37%	Florida	22%
Arkansas	55%	Ohio	37%	Louisiana	19%
Wyoming	50%	Utah	36%	Iowa	18%
New Hampshire	50%	Pennsylvania	35%	Texas	17%
Maryland	49%	Connecticut	35%	Georgia	17%
Tennessee	48%	Oregon	35%	Alabama	17%
South Carolina	47%	Arizona	34%	Kansas	17%
Colorado	45%	North Dakota	33%	Kentucky	6%
Idaho	44%	Nevada	33%	South Dakota	0%
Washington	44%	Alaska	33%	Vermont	0%
DC	43%	Illinois	32%	West Virginia	

Table A3. Entry and angel investment: Dynamic estimation

This table reports coefficients, standard errors, and statistical significance from WLS regressions of the firm entry rate (column 1), proportion of Pitchbook companies reporting having raised angel capital (column 2), and proportion of capital raised by Pitchbook companies reported as coming from angel investors (column 3) estimated using the state–year sample described in Section 3. The key explanatory variables are year-fixed effects interacted with the state-level treated fraction of accredited investors (Frac); regressions also include annual state-level control variables (log population, log income per capita, log venture capital volume, and house price index change), state-fixed effects, and year-fixed effects. Variables are calculated as described in Section 3. For angel investment, the samples are restricted to state–years where Pitchbook reports at least 15 angel or early-stage companies (column 2); or at least \$15M of funding in such deals, and the amount of angel capital available for at least half of the companies reporting having raised angel capital (column 3). Standard errors clustered by state are reported in parentheses. Significance levels are indicated by *, **, *** for 10%, 5%, and 1% respectively.

	(1)	(2)	(3)
		Angel investment	
	Entry	Company prop.	Capital prop.
t_{-3}×Frac	0.00184	0.110	0.0554
	(0.00691)	(0.0898)	(0.0712)
t_{-2}×Frac	0.00405	0.0471	0.0660
	(0.00465)	(0.107)	(0.0655)
t_0×Frac	-0.00400**	0.0353	0.0194
	(0.00199)	(0.0768)	(0.0680)
t_1×Frac	-0.00340	0.0378	0.0112
	(0.00372)	(0.0779)	(0.0578)
t_2×Frac	-0.00429	-0.0827	-0.0345
	(0.00483)	(0.0643)	(0.0883)
t_3×Frac	-0.00253	0.0224	0.00173
	(0.00684)	(0.107)	(0.0675)
Annual state-level controls	✓	✓	✓
State FE	✓	✓	✓
Annual FE	✓	✓	✓
Observations	350	195	189
Adjusted R^2	0.963	0.276	0.005
Mean dependent var.	0.0742	0.0801	0.0201

Table A4. Entry: Alternate control variables, sample restrictions, and regression weights

This table reports coefficients, standard errors, and statistical significance from WLS regressions of the firm entry rate, estimated using the state–year sample described in Section 3. Column 1 reprises our baseline estimates as in columns 1 of Tables 4 and 7. The key explanatory variable is the state-level treated fraction of accredited investors after Dodd–Frank (After×Frac); regressions also include annual state-level control variables (log population, log income per capita, log venture capital volume, and house price index change), state-fixed effects, and year-fixed effects. Variables are calculated as described in Section 3. Column 2 drops the BDS year running March 2008 to March 2009. Columns 3, 5, and 6 include fewer control variables. Columns 4–5 omit California, Arizona, and Nevada from the sample. Columns 6–8 consider alternate weights: equal weighting (column 6; we restrict to states where the SIPP includes more than 10 pre-accredited observations), and weighting by state population (column 7) or total employment (column 8). Standard errors clustered by state are reported in parentheses. Significance levels are indicated by *, **, *** for 10%, 5%, and 1% respectively.

	(1) Baseline	(2) Drop GFC	(3) Ctrl. only chHPI	(4) No CA AZ NV	(5) No CA AZ NV	(6) Unweighted	(7) Pop. weight	(8) Emp. weight
After×Frac	-0.00551**	-0.00487*	-0.00460*	-0.00529*	-0.00549*	-0.00506	-0.00550**	-0.00567**
	(0.00267)	(0.00281)	(0.00252)	(0.00311)	(0.00285)	(0.00371)	(0.00263)	(0.00266)
Population log	-0.0604**	-0.0800**		-0.0516*			-0.0478*	-0.0476*
	(0.0281)	(0.0303)		(0.0290)			(0.0255)	(0.0249)
Income per capita log	0.0429**	0.0535**		0.0206			0.0423**	0.0435**
	(0.0198)	(0.0211)		(0.0197)			(0.0170)	(0.0171)
VC log	0.000280	0.000308		0.000283			0.000236	0.000249
	(0.000234)	(0.000205)		(0.000223)			(0.000203)	(0.000207)
House price index change	0.0163***	0.0187***	0.0151***	0.0220**			0.0162***	0.0168***
	(0.00361)	(0.00494)	(0.00435)	(0.0104)			(0.00371)	(0.00383)
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Annual FE	✓	✓	✓	✓	✓	✓	✓	✓
Observations	350	300	350	329	329	238	350	350
Adjusted R^2	0.963	0.965	0.958	0.958	0.952	0.946	0.964	0.963
Mean dependent var.	0.0742	0.0746	0.0742	0.0728	0.0728	0.0750	0.0742	0.0742

Table A5. Entry: Rolling-window placebo treatments

This table reports estimates from WLS regressions of the firm entry rate with "placebo" timing of treatment; samples span three years before and up to three years after the year indicated in each column heading, replicating the analysis of Table 4 (column 1) and Table 7 (column 1) for rolling sample windows. Regressions include annual state-level control variables (log population, log income per capita, log venture capital volume, and house price index change), state-fixed effects, and year-fixed effects. Variables are calculated as described in Section 3. Column 3 represents the true treatment timing: BDS year ending March 2011; the estimates differ slightly from those in Table 7 because the venture capital control variable is calculated from a different download in order to extend the sample periods. Standard errors clustered by state are reported in parentheses. Significance levels are indicated by *, **, *** for 10%, 5%, and 1% respectively.

	(1) 2009	(2) 2010	(3) 2011	(4) 2012	(5) 2013
After×Frac	-0.00295	-0.00580	-0.00545**	-0.00210	-0.000130
	(0.00605)	(0.00515)	(0.00266)	(0.00356)	(0.00468)
Population log	-0.167***	-0.138***	-0.0602**	0.00513	-0.00285
	(0.0613)	(0.0458)	(0.0282)	(0.0272)	(0.0408)
Income per capita log	0.0548**	0.0527**	0.0430**	0.0261	0.0433**
	(0.0265)	(0.0226)	(0.0198)	(0.0170)	(0.0190)
VC log (alt. download)	0.000221	0.000150	0.000213	-0.0000180	-0.000128
	(0.000227)	(0.000293)	(0.000198)	(0.000210)	(0.000236)
House price index change	0.0318***	0.0234***	0.0163***	0.00794**	0.00900*
	(0.00687)	(0.00606)	(0.00359)	(0.00355)	(0.00507)
State FE	✓	✓	✓	✓	✓
Annual FE	✓	✓	✓	✓	✓
Observations	350	350	350	300	250
Adjusted R^2	0.969	0.966	0.963	0.967	0.971
Mean dependent var.	0.0818	0.0775	0.0742	0.0722	0.0721

Table A6. Entry: House-price placebo treatments

This table reports estimates from WLS regressions of the firm entry rate using a variety of "placebo" treatment measures, replicating the analysis of Table 4 (column 1). The sample consists of state–year observations as described in Section 3. Column 1 is our baseline result, where the key explanatory variable is the state-level fraction of households that lost accreditation status after passage of Dodd–Frank (After×Frac). Columns 2–7 replace the Frac measure with state-level house price measures. Columns 2–5 use the 2010 median value of owner-occupied housing units and the fraction of such houses valued above $1M, $750K, and $500K, respectively, from 2010 American Community Survey. Columns 6–7 use the percentage change in the seasonally-adjusted house price index measured as of the first quarter of the year (from the Federal Finance Housing Agency) over 2002–07 and 2007–10. Regressions include annual state-level control variables (log population, log income per capita, log venture capital volume, and house price index change), state-fixed effects, and year-fixed effects. Variables are calculated as described in Section 3. Standard errors clustered by state are reported in parentheses. Significance levels are indicated by *, **, *** for 10%, 5%, and 1% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Fraction of house prices above			House price index change	
	Frac	Median HP ($K)	$1M	$750K	$500K	2002–07	2007–10
After×Measure	-0.00551**	0.00000321	0.000801	0.000825	0.00128	0.000486	0.00388
	(0.00267)	(0.00000612)	(0.0200)	(0.00961)	(0.00484)	(0.00213)	(0.00584)
Population log	-0.0604**	-0.0575*	-0.0577*	-0.0578*	-0.0580*	-0.0591*	-0.0582*
	(0.0281)	(0.0314)	(0.0313)	(0.0315)	(0.0315)	(0.0340)	(0.0296)
Income per capita log	0.0429**	0.0436**	0.0427**	0.0427**	0.0428**	0.0440**	0.0359*
	(0.0198)	(0.0206)	(0.0205)	(0.0206)	(0.0205)	(0.0188)	(0.0191)
VC log	0.000280	0.000215	0.000223	0.000222	0.000218	0.000224	0.000226
	(0.000234)	(0.000242)	(0.000241)	(0.000242)	(0.000243)	(0.000244)	(0.000240)
House price index change	0.0163***	0.0131***	0.0142***	0.0141***	0.0137***	0.0137**	0.0179**
	(0.00361)	(0.00487)	(0.00527)	(0.00518)	(0.00509)	(0.00552)	(0.00715)
After	-0.0141***	-0.0171***	-0.0163***	-0.0163***	-0.0165***	-0.0166***	-0.0151***
	(0.00338)	(0.00332)	(0.00312)	(0.00312)	(0.00311)	(0.00280)	(0.00305)
State FE	✓	✓	✓	✓	✓	✓	✓
Annual FE	✓	✓	✓	✓	✓	✓	✓
Observations	350	350	350	350	350	350	350
Adjusted R^2	0.963	0.962	0.962	0.962	0.962	0.962	0.962
Mean dependent var.	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742

Table A7. Entry and employment by firm size: Dynamic estimation

This table reports coefficients, standard errors, and statistical significance from WLS regressions of the firm entry rate by firm size (column 1), entering firms' net job creation rate by firm size (column 2), net job creation at young incumbent firms aged 1–5 years (columns 3), net job creation at older incumbents aged ≥6 years (4), job creation at young incumbents (5), and job destruction at young incumbents (6). All are estimated using the state–year–size sample described in Section 3. The key explanatory variables are year-fixed effects interacted with the state-level treated fraction of accredited investors (Frac), and these variables interacted with indicators for firm-size categories. Additional details are as described in Tables 4 and 5. Standard errors clustered by state are reported in parentheses. Significance levels are indicated by *, **, *** for 10%, 5%, and 1% respectively.

	(1) Entry	(2) NJC, Entrants	(3) NJC, Young	(4) NJC, Old	(5) JC, Young	(6) JD, Young
2008×Frac	-0.000520	0.00196	0.0309	0.00715	0.00196	-0.0290
	(0.00169)	(0.00222)	(0.0332)	(0.0193)	(0.0164)	(0.0214)
1–4×2008×Frac	0.00193	-0.00187	-0.0287	0.0343	-0.0110	0.0177
	(0.00400)	(0.00232)	(0.0715)	(0.0270)	(0.0580)	(0.0186)
5–9×2008×Frac	0.00146	-0.00160	-0.0409*	0.0145	-0.00818	0.0327**
	(0.000903)	(0.00220)	(0.0207)	(0.0173)	(0.0140)	(0.0156)
2009×Frac	0.00106	0.00295	-0.0389	-0.00310	-0.0119	0.0270
	(0.00148)	(0.00362)	(0.0318)	(0.0206)	(0.0173)	(0.0209)
1–4×2009×Frac	0.000939	-0.00287	0.0245	0.00320	0.0148	-0.00972
	(0.00188)	(0.00359)	(0.0717)	(0.0427)	(0.0582)	(0.0186)
5–9×2009×Frac	-0.0000871	-0.00280	-0.0183	0.00284	0.00184	0.0201
	(0.00112)	(0.00356)	(0.0225)	(0.0259)	(0.0114)	(0.0142)
2011×Frac	-0.00118	0.00243	-0.0373	-0.00324	-0.0183	0.0189
	(0.000947)	(0.00211)	(0.0288)	(0.0158)	(0.0124)	(0.0205)
1–4×2011×Frac	-0.000437	-0.00246	0.0555	0.00966	0.0295	-0.0261
	(0.00215)	(0.00212)	(0.0619)	(0.0386)	(0.0589)	(0.0168)
5–9×2011×Frac	-0.0000219	-0.00251	0.0242	-0.00744	0.0156	-0.00867
	(0.000743)	(0.00210)	(0.0303)	(0.0257)	(0.0125)	(0.0229)
2012×Frac	0.000715	0.00173	0.00826	-0.0171	0.00786	-0.000404
	(0.000709)	(0.00298)	(0.0272)	(0.0145)	(0.0183)	(0.0193)
1–4×2012×Frac	-0.00419	-0.00165	-0.0135	0.0391	-0.00796	0.00552
	(0.00314)	(0.00291)	(0.0376)	(0.0305)	(0.0427)	(0.0180)
5–9×2012×Frac	-0.00136	-0.00165	-0.0449	0.0101	-0.00827	0.0367
	(0.00110)	(0.00309)	(0.0315)	(0.0202)	(0.0187)	(0.0269)
2013×Frac	0.00184	0.00464	-0.0147	0.0230	0.00591	0.0206
	(0.00118)	(0.00322)	(0.0322)	(0.0222)	(0.0202)	(0.0236)
1–4×2013×Frac	-0.00736*	-0.00488	0.0791**	0.0407	0.0446	-0.0345
	(0.00382)	(0.00327)	(0.0355)	(0.0335)	(0.0316)	(0.0220)
5–9×2013×Frac	-0.00245	-0.00454	0.0214	-0.000662	0.00186	-0.0195
	(0.00192)	(0.00333)	(0.0249)	(0.0189)	(0.0132)	(0.0241)
2014×Frac	0.000572	0.00467**	-0.0384	-0.00728	0.0102	0.0486*
	(0.00118)	(0.00196)	(0.0249)	(0.0166)	(0.0221)	(0.0244)
1–4×2014×Frac	-0.00325	-0.00474**	0.108	0.0300	0.0560	-0.0515*
	(0.00638)	(0.00197)	(0.0762)	(0.0362)	(0.0656)	(0.0303)
5–9×2014×Frac	-0.000998	-0.00451**	0.0662*	0.0135	0.0297***	-0.0364
	(0.000831)	(0.00188)	(0.0356)	(0.0254)	(0.0106)	(0.0343)
Annual state-level controls	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Annual FE	✓	✓	✓	✓	✓	✓
Size FE	✓	✓	✓	✓	✓	✓
Frac×(Size FE)	✓	✓	✓	✓	✓	✓
(Year×Size) FE	✓	✓	✓	✓	✓	✓
Observations	1050	1050	1050	1050	1050	1050
Adjusted R^2	0.966	0.936	0.893	0.873	0.941	0.859
Mean dependent var.	0.0247	0.00640	-0.0354	-0.0142	0.203	0.238

Table A8. Entry and employment by firm size: Population weights

This table reports coefficients, standard errors, and statistical significance from WLS regressions of the firm entry rate by firm size (column 1), entering firms' net job creation rate by firm size (column 2), net job creation at young incumbent firms aged 1–5 years (columns 3), net job creation at older incumbents aged ≥6 years (4), job creation at young incumbents (5), and job destruction at young incumbents (6) using alternate weights. Here, state population weights are used. All are estimated using the state–year–size sample described in Section 3. The key explanatory variable is the state-level treated fraction of accredited investors after Dodd–Frank (After×Frac) interacted with indicators for firm-size categories. Additional details are as described in Tables 4 and 5. Standard errors clustered by state are reported in parentheses. Significance levels are indicated by *, **, *** for 10%, 5%, and 1% respectively.

	(1) Entry	(2) NJC, Entrants	(3) NJC, Young	(4) NJC, Old	(5) JC, Young	(6) JD, Young
After×Frac	0.000537	0.00141	-0.0178	-0.00166	0.00405	0.0218
	(0.000586)	(0.000906)	(0.0157)	(0.00643)	(0.00910)	(0.0148)
1-4	0.0462***	-0.00948***	0.158***	0.0424***	0.158***	0.000289
	(0.00607)	(0.00118)	(0.0109)	(0.00688)	(0.00849)	(0.00680)
5-9	-0.000263	-0.0108***	0.0300***	-0.0346***	0.0345***	0.00451
	(0.000305)	(0.00128)	(0.00894)	(0.00524)	(0.00403)	(0.00698)
1-4×After	0.00180	0.00154***	-0.0547***	-0.0295***	-0.0318***	0.0229***
	(0.00114)	(0.000278)	(0.00691)	(0.00733)	(0.00537)	(0.00729)
5-9×After	0.000806***	0.00143***	-0.0199**	-0.00430	-0.00987***	0.0100
	(0.000274)	(0.000302)	(0.00911)	(0.00561)	(0.00309)	(0.00841)
1-4×Frac	0.0105	0.00396	-0.0728**	-0.0153	-0.0356	0.0371*
	(0.0140)	(0.00262)	(0.0281)	(0.0163)	(0.0236)	(0.0191)
5-9×Frac	0.00306***	0.00289	-0.0123	0.00101	0.00250	0.0148
	(0.000919)	(0.00286)	(0.0203)	(0.0108)	(0.00873)	(0.0159)
1-4×After×Frac	-0.00558*	-0.00152*	0.0628***	0.0228	0.0360***	-0.0268*
	(0.00279)	(0.000836)	(0.0159)	(0.0154)	(0.0121)	(0.0159)
5-9×After×Frac	-0.00153**	-0.00144	0.0382*	0.00167	0.0160*	-0.0222
	(0.000605)	(0.000941)	(0.0192)	(0.0115)	(0.00846)	(0.0194)
Annual state-level controls	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Annual FE	✓	✓	✓	✓	✓	✓
Observations	1050	1050	1050	1050	1050	1050
Adjusted R^2	0.955	0.935	0.884	0.841	0.933	0.832
Mean dependent var.	0.0247	0.00640	-0.0354	-0.0142	0.203	0.238

Table A9. Entry and employment by firm size: Employment weights

This table reports coefficients, standard errors, and statistical significance from WLS regressions of the firm entry rate by firm size (column 1), entering firms' net job creation rate by firm size (column 2), net job creation at young incumbent firms aged 1–5 years (columns 3), net job creation at older incumbents aged ≥6 years (4), job creation at young incumbents (5), and job destruction at young incumbents (6) using alternate weights. Here, state level employment weights are used. All are estimated using the state–year–size sample described in Section 3. The key explanatory variable is the state-level treated fraction of accredited investors after Dodd–Frank (After×Frac) interacted with indicators for firm-size categories. Additional details are as described in Tables 4 and 5. Standard errors clustered by state are reported in parentheses. Significance levels are indicated by *, **, *** for 10%, 5%, and 1% respectively.

	(1) Entry	(2) NJC, Entrants	(3) NJC, Young	(4) NJC, Old	(5) JC, Young	(6) JD, Young
After×Frac	0.000583	0.00139	-0.0193	-0.00222	0.00385	0.0232
	(0.000538)	(0.000881)	(0.0155)	(0.00635)	(0.00935)	(0.0144)
1-4	0.0459***	-0.00940***	0.158***	0.0418***	0.159***	0.000833
	(0.00608)	(0.00120)	(0.0108)	(0.00678)	(0.00844)	(0.00698)
5-9	-0.000272	-0.0106***	0.0306***	-0.0348***	0.0352***	0.00460
	(0.000303)	(0.00131)	(0.00869)	(0.00511)	(0.00399)	(0.00678)
1-4×After	0.00171	0.00153***	-0.0544***	-0.0288***	-0.0314***	0.0231***
	(0.00117)	(0.000277)	(0.00734)	(0.00722)	(0.00529)	(0.00732)
5-9×After	0.000804***	0.00142***	-0.0205**	-0.00415	-0.0101***	0.0104
	(0.000275)	(0.000303)	(0.00885)	(0.00556)	(0.00314)	(0.00827)
1-4×Frac	0.0111	0.00389	-0.0748**	-0.0155	-0.0375	0.0373*
	(0.0142)	(0.00268)	(0.0279)	(0.0162)	(0.0237)	(0.0199)
5-9×Frac	0.00308***	0.00277	-0.0148	0.000735	0.000798	0.0156
	(0.000911)	(0.00296)	(0.0201)	(0.0109)	(0.00866)	(0.0158)
1-4×After×Frac	-0.00583**	-0.00148*	0.0636***	0.0223	0.0360***	-0.0275*
	(0.00274)	(0.000808)	(0.0172)	(0.0152)	(0.0120)	(0.0161)
5-9×After×Frac	-0.00158**	-0.00141	0.0409**	0.00263	0.0177**	-0.0233
	(0.000606)	(0.000912)	(0.0191)	(0.0116)	(0.00864)	(0.0195)
Annual state-level controls	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Annual FE	✓	✓	✓	✓	✓	✓
Observations	1050	1050	1050	1050	1050	1050
Adjusted R^2	0.954	0.934	0.884	0.840	0.933	0.833
Mean dependent var.	0.0247	0.00640	-0.0354	-0.0142	0.203	0.238

Table A10. Employment at entrants by industry: Excluding FIRE

This table reports coefficients, standard errors, and statistical significance from WLS regressions of the net job creation rate at firms aged 0–1 years by industry, estimated using the state–quarter–industry sample described in Section 3 as in Table 6, but excluding the finance and insurance (NAICS code 52) and real estate, rental, and leasing (53) sectors. The key explanatory variable is the state-level treated fraction of accredited investors after Dodd–Frank (After×Frac), and (in columns 2–4) its interactions with indicators for various industry characteristics (less funded by venture capital, highly concentrated, requiring high startup capital). Regressions also include annual state-level control variables (log population, log income per capita, log venture capital volume, and house price index change), state-fixed effects, quarter-fixed effects, and industry-fixed effects. Columns 2–4 also include interactions of indicators for various industry characteristics with a post-Dodd–Frank indicator and with the state-level treated fraction of accredited investors. Variables are calculated as described in Section 3. Standard errors clustered by state are reported in parentheses. Significance levels are indicated by *, **, *** for 10%, 5%, and 1% respectively.

	(1)	(2)	(3)	(4)
After×Frac	-0.00712	-0.0119**	-0.0128**	-0.0129**
	(0.00425)	(0.00589)	(0.00598)	(0.00598)
Low-VC industry×After		-0.00287		
		(0.00268)		
Low-VC industry×Frac		-0.0264*		
		(0.0149)		
Low-VC industry×After×Frac		0.0101*		
		(0.00592)		
Concentrated industry×After			-0.00401*	
			(0.00224)	
Concentrated industry×Frac			-0.0160	
			(0.0186)	
Concentrated industry×After×Frac			0.00755*	
			(0.00443)	
High-cap industry×After				-0.00506**
				(0.00230)
High-cap industry×Frac				-0.0225
				(0.0204)
High-cap industry×After×Frac				0.0131**
				(0.00616)
Annual state-level controls	✓	✓	✓	✓
State FE	✓	✓	✓	✓
Quarterly FE	✓	✓	✓	✓
Industry FE	✓	✓	✓	✓
Observations	18528	18528	13427	18528
Adjusted R^2	0.712	0.715	0.736	0.714
Mean dependent var.	0.0415	0.0415	0.0432	0.0415
p-val: $\beta_{\text{Aft}\times\text{Frac}} + \beta_{\ldots\text{industry}\times\text{Aft}\times\text{Frac}} = 0$		0.672	0.331	0.956

Table A11. Employment at young incumbents by industry

This table reports coefficients, standard errors, and statistical significance from WLS regressions of the net job creation rate at firms aged 2–5 years by industry, estimated using the state–quarter–industry sample described in Section 3. Net job creation for incumbent firms in each state–quarter–industry group are normalized by the average of the number of employees firms of the same age and industry had in the state at the beginning of the quarter. The key explanatory variable is the state-level treated fraction of accredited investors after Dodd–Frank (After×Frac), and (in columns 2–4) its interactions with indicators for various industry characteristics (less funded by venture capital, highly concentrated, requiring high startup capital). Regressions also include annual state-level control variables (log population, log income per capita, log venture capital volume, and house price index change), state-fixed effects, quarter-fixed effects, and industry-fixed effects. Columns 2–4 also include interactions of indicators for various industry characteristics with a post-Dodd–Frank indicator and with the state-level treated fraction of accredited investors. Variables are calculated as described in Section 3. Standard errors clustered by state are reported in parentheses. Significance levels are indicated by *, **, *** for 10%, 5%, and 1% respectively.

	(1)	(2)	(3)	(4)
After×Frac	0.00643	0.00681	-0.0000532	0.00930
	(0.00575)	(0.00656)	(0.00423)	(0.00693)
Low-VC industry×After		-0.00635**		
		(0.00283)		
Low-VC industry×Frac		0.00901		
		(0.00671)		
Low-VC industry×After×Frac		-0.00157		
		(0.00660)		
Concentrated industry×After			0.00568*	
			(0.00298)	
Concentrated industry×Frac			-0.00139	
			(0.00427)	
Concentrated industry×After×Frac			0.00938	
			(0.00677)	
High-cap industry×After				0.00512**
				(0.00224)
High-cap industry×Frac				0.00559
				(0.00623)
High-cap industry×After×Frac				-0.00665
				(0.00516)
Annual state-level controls	✓	✓	✓	✓
State FE	✓	✓	✓	✓
Quarterly FE	✓	✓	✓	✓
Industry FE	✓	✓	✓	✓
Observations	19124	19124	14725	19124
Adjusted R^2	0.148	0.148	0.181	0.148
Mean dependent var.	0.00791	0.00791	0.00758	0.00791
p-val: $\beta_{\text{Aft}\times\text{Frac}} + \beta_{\ldots\text{industry}\times\text{Aft}\times\text{Frac}} = 0$		0.439	0.309	0.620

Table A12. Form D non-accredited investment robustness

This table reports coefficients, standard errors, and statistical significance from WLS regressions using an alternate measure for non-accredited investors and an alternate (non-aggregated) Form D sample. Columns 1 and 2 are estimated using the state–year sample described in Section 3 (excluding 2008, for which Form D data is not generally available). In columns 3 and 4, each Form D filing (updated with information from any amendments) is the unit of observation. Column 1 reprises the result from column 1 Table 8 for comparison, for which the dependent variable is the state–year-level proportion of Form D filings reporting having raised from non-accredited investors. In column 2, the dependent variable is the state–year-level proportion of Form D filings that indicate non-accredited investors may be included in fundraising via a checkbox. Columns 3 and 4 employ as dependent variables indicators for whether the company reports having received an investment from a non-accredited investor or indicates that such investors might be included via the checkbox. The key explanatory variable is the state-level treated fraction of accredited investors after Dodd–Frank (After×Frac); regressions also include annual state-level control variables (log population, log income per capita, log venture capital volume, and house price index change), state-fixed effects, and year-fixed effects. Variables are calculated as described in Section 3. Standard errors clustered by state are reported in parentheses. Significance levels are indicated by *, **, *** for 10%, 5%, and 1% respectively.

	(1)	(2)	(3)	(4)
	State×Year-level (proportion)		Deal-level (indicator)	
	Nonacc. > 0	Nonacc. box	Nonacc. > 0	Nonacc. box
After×Frac	0.0796***	0.101*	0.0435***	0.0856***
	(0.0237)	(0.0518)	(0.0149)	(0.0243)
Population log	0.143	0.176	-0.0847	0.0960
	(0.183)	(0.550)	(0.205)	(0.466)
Income per capita log	-0.164	-0.123	-0.128	-0.162
	(0.107)	(0.183)	(0.0999)	(0.167)
VC log	-0.000672	0.00254	-0.00207	-0.00877**
	(0.00230)	(0.00488)	(0.00324)	(0.00417)
House price index change	0.0114	0.0523	0.0472**	0.0980**
	(0.0243)	(0.0521)	(0.0232)	(0.0431)
State FE	✓	✓	✓	✓
Annual FE	✓	✓	✓	✓
Observations	300	300	52903	52903
Adjusted R^2	0.506	0.623	0.004	0.012
Mean dependent var.	0.0736	0.146	0.0585	0.116