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DISCUSSION PAPER SERIES

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# ABSTRACT

## Financing, Ownership, and Performance: A Novel, Longitudinal Firm-Level Database*

The Census Bureau's Longitudinal Business Database (LBD) underpins many studies of firm-level behavior. It tracks longitudinally all employers in the nonfarm private sector but lacks information about business financing and owner characteristics. We address this shortcoming by linking LBD observations to firm-level data drawn from several large Census Bureau surveys. The resulting Longitudinal Employer, Owner, and Financing (LEOF) database contains more than 3 million observations at the firm-year level with information about start-up financing, current financing, owner demographics, ownership structure, profitability, and owner aspirations – all linked to annual firm-level employment data since the firm hired its first employee. Using the LEOF database, we document trends in owner demographics and financing patterns and investigate how these business characteristics relate to firm-level employment outcomes.



**JEL Classification:** D22, G32, L26

**Keywords:** longitudinal business database, employment outcomes, profitability, owner characteristics, financing sources



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## I. Introduction

The Census Bureau's Longitudinal Business Database (LBD) has become a major empirical laboratory for the study of firm dynamics and performance. The LBD covers all employers in the nonfarm private sector back to 1976 but lacks information about business financing and owner characteristics. In this paper, we integrate rich micro data on business financing, owner characteristics, ownership structure, and more with firm-level data in the LBD. Specifically, we draw on micro data from the Census Bureau's on-going Annual Business Survey (ABS) and its predecessors, the Annual Survey of Entrepreneurs (ASE) and the Survey of Business Owners (SBO), using data starting in 2002.

Our resulting Longitudinal Employer, Owner, and Financing (LEOF) database contains more than three million observations at the firm-year level with information about business start-up financing, current financing, owner demographics, ownership structure, profitability, owner aspirations, and more – all linked to annual firm-level employment data since the firm hired its first employee or 1976, whichever is later. Our work builds on previous studies that use ASE and SBO data on firm financing and owner characteristics linked to LBD firm-level outcome measures such as Jarmin and Krizan (2010), Brown et al. (2017, 2019, 2022), Azoulay et al. (2020), and Lee et al. (2023). We contribute by providing a longer time frame and consistent measures of financing over time integrated with data that tracks firm growth and survival.

To illustrate the usefulness of the LEOF database, we use it to document trends in owner demographics and financing patterns and to investigate how these business characteristics relate to firm-level employment growth. We find that the share of employment-weighted startups with older owners rose substantially from 2002 to 2015, declined some through 2022, but remains above that in 2002. These patterns broadly align with an aging of the U.S. workforce but show some reversal post 2015. The share with no male owners also rose over this period, as did the share with no non-Hispanic White owners and the share with a college degree. On the financing side, we see a fall in the use of bank loans over this period and a fall in reliance on home equity.

We also explore the relationship of owner and business characteristics to the success of startups. Our main indicator of "success" is based on the firm's position in the employment size distribution at age 5 within its 4-digit NAICS industry. We define successful firms as those in the

top quartile. Successful firm owners tend to be younger and more educated. They are also more likely to be male and white. Firms with bank loans or outside investor funds at start-up are much more likely to become successful. Not surprisingly, firms with more start-up financing are more likely to be in the upper quartile of the employment size distribution within their industry. Firms owned by white men are more likely to have a bank loan at startup, even after controlling for industry and initial firm size. These descriptive results illustrate some of the richness in the LEOF database.

To build the database, we start with the annual LBD universe files described in Chow et al. (2021). LEOF uses the firm and establishment identifiers to enable longitudinal tracking of firms as well as the employment inputs from the LBD firm files and key firm characteristics including firm age, industry, and geography.[1] LEOF employment and firm age variables are conceptually consistent with those used in the public-domain statistics produced as part of the Business Dynamics Statistics (BDS).

The LEOF owner and firm characteristics are taken from three related Census Bureau business surveys. At a high-level, one can think of these three surveys as sequential collections with the common overarching goal to capture firm-level information on financing and business owners for the non-agricultural private economy. We use information from the SBO for survey years 2002, 2007, and 2012; the ASE for survey years 2014, 2015, and 2016; and the ABS for survey years 2018 to 2022.[2] Although the surveys have enough in common to create a core set of consistent variables over time, they differ in population coverage, sample size, and scope. Since these characteristics can also differ within a survey across different waves, we essentially have eleven different collections to harmonize.

There are multiple ways to use the LEOF. In this paper, we analyze the repeated cross-sections with linked longitudinal employment outcomes. We stack the eleven linked LEOF files and group firms by age, then compare outcomes by firm age group over time using the eleven

[1] In multi-establishment firms the geographic and industry identifiers for the firm are based on the largest establishment in that first year. Alternative approaches are also feasible with the LEOF data infrastructure as with the LBD (e.g., shares of activity for a firm by geography and industry).

[2] The ASE was conducted by the Census Bureau in partnership with the Ewing Marion Kauffman Foundation and the Minority Business Development Agency (see Foster and Norman (2017)). The ABS is conducted by the Census Bureau in partnership with the National Center for Science and Engineering Statistics.

surveys. We distinguish young (less than 60 months since first paid employee) and mature firms in each survey year. We further divide the young firm group into start-ups (ages 0 and 1 in the survey year) and toddlers (ages 2, 3, and 4). We show the importance of firm age in a series of exercises that examine growth rates by young and mature firms. We start by confirming that there is a strong up or out dynamic among young firms, and that the young-firm shares of employment and firm numbers have declined sharply over time, consistent with Decker et al. (2014). We then extend earlier analyses to consider owner demographics and financing.

The next section describes how we construct the LEOF (with additional details and validation in the appendix). Section III uses LEOF data to show trends in owner and firm characteristics for 2002 to 2022. Section IV shows how the LEOF helps us understand the demographic and financing characteristics of high-growth firms. Section V sketches other potential applications of the LEOF database and concludes.

## II. Combining Firm-Level Administrative and Survey Data

The LEOF dataset brings together administrative and survey firm-level inputs. The administrative input is an LBD spine file that has one record for every unique LBD firm between 1982 and 2022. The survey inputs are from eleven waves of periodic Census Bureau surveys conducted between 2002 and 2022, under the SBO, ASE, and ABS data collection programs. [3] The firm-level surveys have evolved over time in terms of questionnaire design, sample size, sampling strategy, mode, and response rates. Thus, creating consistent repeated survey cross-sections involves first finding a common set of owner demographic, firm characteristic, and financing variables, and then reweighting to approximate LBD distributions by age, size, and industry. We validate the representativeness of the LEOF across survey waves by comparing LEOF- and LBD/BDS-based estimates of employment shares by firm age.

[3] Another survey program—the Characteristics of Business Owners (CBO)—was conducted every five years prior to the first SBO in 2002. The 1992 CBO micro file is available, and we have linked those records to the LBD. Unfortunately, that dataset is much smaller than the SBO and later files, and the inability to distinguish between subchapter C corporations and subchapter S corporations in the LBD legal form of organization information in years before 2002 makes it impossible to properly reweight the micro file.

*LBD Spine File*

The administrative input is an LBD spine file that has one record for every unique LBD firm between 1981 and 2022.[4] The LBD is comprised of two interconnected cross-sectional data files, one for establishments, and one for firms (Chow et al., 2021). Every establishment is connected to a parent in the firm file using the identifier "lbdfid," which also lets us link firms across years.[5] The interconnections are important because the LEOF uses longitudinal employment from the firm file, but other key characteristics such as geography, industry, and the EINs needed to link to the survey files are only available in the establishment records.

The number of employer firms in the U.S. has grown from about 4 million in 1980 to about 6 million in 2022. Firms are born, and then they either survive, die, or their associated establishments are sold to another firm—what we refer to here as a "dissolver" firm. These dynamic processes lead to roughly 50 million *unique* firms in our LBD spine file over the period 1981 to 2022. For each of these unique firms, the LBD firm file contains the birth year, death year if they have gone out of business, and total employment in every year the firm exists.[6]

Most firms in the LBD are single establishments, so the incremental information we take from the establishment files (geography and industry) is directly associated with a unique firm. For multi-establishment firms the LEOF uses the location and industry of the largest establishment in the first year during which the firm had positive employment. This LEOF configuration —every firm has longitudinal employment along with a fixed birth year, death year, geographic location, and industry—is very simple but is only one way to construct the file. The advantage of this simplifying rule is that it keeps the file size manageable.[7]

The remaining LBD-related characteristic of LEOF firms involves the idea of firm "dissolution." A dissolver firm is one where the firm identifier disappears between two years but

[4] We start in 1981 since we have constructed the LEOF database so that we can track the dynamics of young and mature firms. This implies we are using the LBD to its origin year of 1976 to define firm age.
[5] See Appendix A for additional details on how lbdfid is used in our data construction.
[6] All firm level variables are the "BDS" versions, meaning our statistics are consistent with public use Business Dynamic Statistics (BDS) tabulations. See https://www.census.gov/programs-surveys/bds.html.
[7] One exception to the fixed establishment variable rule is Employer Identification Numbers (EINs). EINs are the key to linking survey records, but (1) some firms have multiple EINs and (2) EINs evolve over time. Linking survey records involves looping over all establishments for a given firm in the base year to find the matching EIN.

at least one of the underlying establishments that was part of the firm in the base year continues to have positive employment under another unique lbdfid. In the Business Dynamic Statistics, dissolvers are not considered firm deaths – that is in the BDS, a firm death is the disappearance of a *lbdfid* from one year to the next with all of the establishments shutting down. We adopt that convention in our analysis of firm growth and survival below. This approach of excluding dissolvers uses the underlying establishment-level data to overcome this specific limitation of using the *lbdfid* as a firm identifier. Dissolution is relative to a point in time—for example, in some of the analysis below we focus on firm size at age 5, starting in each possible base year. Firms that dissolve within the five-year horizon account for roughly 4.5 percent of (employment-weighted) firms in the 1980s and 1990s, and roughly 3.5 percent in the period after the Great Recession. For our purposes, it is important to note that our analysis of firm success excludes dissolver firms.

*Reconciling SBO, ASE, and ABS Data*

As shown in Table 1, the SBO, ASE, and ABS surveys collect information about business characteristics (panel A), owner demographics (panel B), and financing variables (panels C and D). The columns show the three surveys by their "survey year;" as we discuss later, the "survey year" is the *reference* year for the SBO and ASE but is the *collection* year for the ABS. The first block of variables is collected at the firm level, starting with an important qualifying question, which is whether any owner has a greater than 10 percent share.[8] The surveys in years after 2002 have questions about husband-and-wife ownership, including whether one or both spouses owns the business. The SBO and ASE surveys include questions about when the business was founded or acquired, and whether the business was operated out of the owner's home. There are many other variables collected in some or all survey years that we do not use here but are attached to the LEOF file and we expect will be made available to qualified researchers on approved research projects.

[8] If the responding company does not have any owners with more than a 10 percent share, the respondent is directed to skip the owner section and move to the business section of the instrument. See for example, question 4 in SBO-1 2012. The ASE and ABS use a similar screener question for their business owner sections.

The SBO, ASE, and ABS surveys contain extensive information about owner demographics (panel B, Table 1) and how that owner is generally involved with the firm. The demographic information (along with ownership shares) is collected for the top four owners (top three owners in 2002) in the reference year. The first three variables for each owner cover owner function, average hours worked in the business, and whether the business is the primary source of income for that owner. Standard demographics also include owner veteran status (and service-related disability), sex, age, race/ethnicity, and education. The surveys also ask how each owner acquired ownership, and when, and whether that owner had any previous business ownership experience. The surveys ask about immigrant status in different ways, whether "born in the U.S." or "born a citizen of the U.S." The ABS fields two questions that cover the birth location and citizenship questions. Beginning in 2014, the surveys ask owners why they want to run a business. The list of possible reasons varies by survey, including some common answers such as "wanted to be my own boss" or "could not find other work."

The final block of common survey variables involves business financing, including both retrospective questions about business start-up (panel C, Table 1) and on-going financing (panel D, Table 1). Common variables across all seven surveys include high-level sources of start-up financing such as bank loans, credit cards, home equity loans, and outside investors. Beginning in 2007, the surveys also collect owner reports of (nominal) start-up capital amounts. As with firm and owner characteristics, not all financial variables are collected in all LEOF years. For example, there is no information about start-up capital amounts in 2002, and home equity loans are not a separate start-up source in 2002. To date, the only ABS survey year for which we have start-up finance measures is 2018. Selected later versions of the ABS include finance questions and could be incorporated into the LEOF once the micro data are available.

In this paper we focus extensively on the correlation between start-up financing and firm growth, but as Table 1 shows, there is a wealth of other financing information across the LEOF survey years that can be used in future research. For example, the surveys also generally include questions about on-going financing. In the SBO years, these are just sources of current financing. Beginning in 2014, however, the surveys include questions about sources and levels of capital used for on-going capital investment. The questions include whether the firm sought new forms of financing, and if not, whether it did not seek new funding because of fear of being rejected.

*Linking Survey and LBD Files*

The SBO, ASE, and ABS survey micro files include the EIN identifier that lets us link a surveyed firm to its LBD records. However, the target populations, sample frames, survey mode, and other aspects of data collection have evolved substantially across the years. For example, one important change occurred between the SBO and ASE, when the surveys shifted from all firms to employer firms only. Also, the SBO was conducted using traditional paper mail-in responses, while the ASE and ABS are on-line. Another evolving factor is survey (item and unit) non-response rates.

There are two key timing changes across the three surveys that impact linkage to the LBD and introduce a distinction between the survey year and the "reference" year that respondents are instructed to use for reporting purposes. In the SBO, the survey year and reference year are the same. In the ASE, the reference year matches the survey year, but the LBD base year (the year for which the survey sample is drawn and thus the year for which we link survey firms to their LBD records) is the year preceding the survey. In the ABS, the LBD base year and the reference year for reporting are both equal to the year preceding the survey year. In what follows we continue to describe survey samples using the *survey* years, but we report results using the *reference* or base year.

The SBO, ASE, and ABS survey micro data files have records for firms that were never actually sampled or did not respond to the survey. Also, a very small fraction of firms (less than 1 percent) that should be in the LBD cannot be linked to an LBD record. Our "respondent" sample includes only firms that in the final sample, responded to the survey, and subsequently linked to an LBD record.

The respondent sample is the appropriate population for creating LBD-consistent weights, but some respondents are excluded from the LEOF "owner" sample because the survey records lack information about owner demographics. Firms lack owner characteristics because one of the earliest questions on every survey is whether any individual owns 10 percent or more of the firm. If the answer is no, the respondent is instructed to skip the demographics questions.

Some firms that answer yes to the 10 percent ownership question are also excluded because of item non-response on key demographics.[9]

Table 2 provides some basic facts about the LEOF respondent and owner samples (by reference year since we are showing results). The first row shows published Census response rates for the various surveys. Comparing across the three survey programs is complicated because of changes in sampling strategies and target populations, such as all versus employer firms. The second row of Table 2 highlights the fact that respondent samples are larger in quinquennial years ending in "2" or "7". Respondent samples in the other years are still quite large, between 166,000 and 188,000 firms. The total number of linked respondent firms is over 3.6 million. Finally, Table 2 shows that the ratio of owner to respondent samples is generally between 80 and 90 percent. In total, more than 3 million firms are included in the final LEOF owner sample.

*LEOF Sample Weights*

Knowing that virtually every eligible survey firm can be linked to an LBD firm is important but does not in and of itself address the question of whether the linked sample is representative. As with any survey, standard practice involves reweighting (or post-stratifying) to account for differences in sampling and/or response rates across key characteristics. Our goal is to represent the BDS population within the LBD universe in each survey year by firm age, firm size, and industry.

The distinction between *respondent* and *owner* survey populations is crucial for our reweighting algorithm. The BDS population within the LBD universe includes all employer firms regardless of legal form of organization and ownership shares. That implies many firms in the employer firm universe we are trying to represent would fail the 10 percent ownership test, thus the LEOF owner sample is inconsistent with that universe.

The solution is post-stratifying the entire linked respondent sample, which is conceptually the same as the employer firm population in the LBD. The LEOF owner sample is then a well-

[9] Census Bureau SBO, ASE, and ABS micro files are tabulated independently for regular table production and include (for example) imputations that affect the extent of item non-response across survey years.

defined subset of the reweighted respondent population, meaning only those firms that pass the 10 percent ownership test.[10] We know that the LEOF owner sample differs systematically from the LBD universe because the *owner* sample excludes most very large firms, but that is a feature, not a bug. Concepts like owner age, education, and gender are not meaningful for a large publicly traded corporation in which no individual owns at least 10 percent.

The details about our LEOF ratio-based reweighting algorithm are presented in Appendix A. Briefly, we compute cell-by-cell ratios of LBD to LEOF respondent samples across 12 firm age, 12 firm size, and 19 2-digit NAICS industry groups (some collapsed) in each survey year. In Appendix A we show that the ratio weighting procedures generate a representative linked LEOF respondent sample in every base year, as reflected in start-up and young firm employment shares across survey waves. We also show that start-up and young firm employment shares are always and everywhere greater for the LEOF owner samples, because the large firms that fail the 10 percent ownership test are more likely to be mature firms and thus excluded from the denominator in the employment share metrics. However, the validation exercise also shows the same pattern of declining young firm employment shares that motivates this research.

*Importance of Firm Age*

In developing the LEOF data infrastructure, an important feature we take advantage of is the LBD's high-quality measurement of firm age. Analysis of firm dynamics by firm age using the LBD has yielded new insights and an extensive research literature exploring these insights. Younger firms have a higher dispersion of growth rates exhibiting an "up or out" dynamic (see, e.g., Davis and Haltiwanger (2014) and Decker et al. (2014, 2016)). That is, younger firms have higher exit rates than mature firms but, conditional on survival, higher average growth rates than mature firms. The latter is driven by the greater right skewness of growth rates of young firms relative to mature firms.

In innovation-intensive sectors, young firms exhibit these up or out dynamics and are more innovation-intensive (see, e.g., Acemoglu et al. (2018)). Relatedly, young firms are an

[10] For completeness, this also means that item non-response on crucial demographics are assumed missing at random.

important part of the experimentation associated with the development and adoption of new technologies (see Foster et al. (2021), who use the LBD to explore the hypotheses of Gort and Klepper (1982)).

To help illustrate the importance of firm age, in Figure 1 we present the average (over the LEOF sample period) growth rate distributions of incumbent firms using the LBD. The growth rate distribution presented is based on employment-weighted growth rates over a four-year horizon for all firms that exist in each base year 2002 through 2018 (so Figure 1 excludes the growth effect of firm entry but includes the effect of firm exit). Start-up firms are ages 0 and 1 in the base year, and toddler firms are ages 2, 3, and 4. Mature firms are 5 years or older.[11] Each type of firm is divided into 20 5-percentile groups of the employment growth rate distribution using the Davis, Haltiwanger, and Schuh (1996) (DHS) growth rates. We report the employment-weighted average growth rate for each of the percentile groups.

Start-up and toddler firms are much more likely to exit over the four-year horizon– Figure 1 shows that start-up firms with a DHS growth of -200 percent (the DHS growth rate for exiting firms, which is a -100 percent growth rate) account for between 25-29 percent of start-up firm employment. Surviving to age 2 (i.e,. for toddlers) decreases the likelihood of exit over the next four years to 15-19 percent. The corresponding share for mature firms is less than 5 percent. In the upper end of the growth rate distribution, younger firms are more likely to grow rapidly than mature firms. The average four-year growth rate for start-up firms in the 75-79 percentile group is 64 percent DHS change (an 85 percent growth rate) compared to 25 percent DHS change (a 29 percent growth rate) for mature firms. This gap becomes larger for the top growth rate percentile bins. Figure 1 thus illustrates lower survival rates for younger firms but higher right tail growth rates (i.e., up or out dynamics) – these patterns underlie the greater dispersion of growth rates for young firms.

In addition to the substantial cross-sectional differences by firm age, the age distribution of employment and the shape of the growth rate distributions have been changing over the last

[11] In BDS age statistics, young firms are those with firm ages 1-5 and firm entrants have firm age 0. Firm age is defined based upon the age of the oldest establishment at the firm at the time of the firm's legal entity coming into being.

few decades. The most dramatic change is that the shares of young firms and their employment have decreased substantially over time (see Figure 2). This decline in young firm activity has been the subject of a large literature (see, e.g., Alon et al. (2018), Davis et al. (2007), Davis and Haltiwanger (2014, 2024), Decker et al. (2014, 2016, 2020) and Karahan et al. (2024)) in terms of causes and consequences.

There have also been notable changes in the shape of the growth rate distribution for existing firms by firm age. We show the distribution of four-year growth rates for 1981-2001 for start-up, toddler, mature, and all firms (Figure 3). While the qualitative features of the growth rate distributions of existing firms remain similar, exit rates of young and mature firms have declined, and the average growth rate of high-growth firms (e.g., above the 75$^{th}$ percentile) has declined for both young and mature firms. These changes on the extensive and intensive margin underlie the decline in indicators of business dynamism that have also received much attention (see, e.g., the papers cited directly above and references therein).

The LEOF data infrastructure has the potential to help shed new light on the underpinnings of these cross sectional and changing patterns of firm dynamics by firm age. In what follows, we provide some basic facts that emerge from the LEOF data infrastructure about these owner and business characteristics by firm age in the cross section and over time. We also provide analysis of the pooled cross section and time series relationships between these characteristics and the propensity to be a high-growth firm by firm age. This analysis is intended to be illustrative of the variation that LEOF permits analyzing through exploiting the associations between firm dynamics by firm age and business owner and business characteristics in the LEOF data infrastructure.

## III. Trends in Owner Demographics and Financing

The LEOF combines longitudinal administrative and cross-sectional survey datasets, which makes it possible to answer many questions about the interplay between employment dynamics, owner characteristics, and financing. Our starting point for exploring the LEOF is to investigate what happened since 2002 in terms of the characteristics of firm owners and types of start-up financing. These trends are particularly interesting in light of the trend decline in young

firm employment shares that occurred over the same period, amplified by a sharp drop in young firm employment during the Great Recession (Davis and Haltiwanger, 2024).

The trends we investigate are essentially tabulations of the LEOF survey variables with weight adjustments for consistency between the survey and LBD populations. We also make use of the LBD component of the LEOF in two additional ways. First, the LBD gives us a consistent method for determining the firm's age, which is the (BDS-consistent) year in which the firm hired its first paid employee (technically, the age of the oldest establishment at the birth of the firmid; thus, a firmid that shows up as the result of a merger or acquisition would have an age based on the oldest establishment). Second, LBD employment makes it possible to look at trends on either a firm- or employment-weighted basis. Here we focus on employment-weighted outcomes, using reference year employment.[12] The employment-weighted internally consistent measurement of these outcomes is a novel and important feature of the LEOF.

*Owner Demographics*

The period for which we have processed LEOF surveys spans *reference* years 2002 through 2021. During that period, we have three SBO waves (2002, 2007, 2012), three ASE waves (2014, 2015, and 2016), and five ABS waves (2018 through 2022, with reference years 2017 through 2021). Between 2002 and 2021 the U.S. experienced large demographic shifts because of aging of baby boomers and the cumulative impact of increased female labor force participation and immigration.[13] What happened to the demographic characteristics of business owners during this period?

The short answer is that business owners, much like the labor force more generally, have gotten older, more female, and less non-Hispanic White.[14] In our next set of figures, we show

[12] The trends shown here are generally robust to the choice of firm- or employment-weighting.
[13] Regarding aging of baby boomers, see for example https://www.census.gov/library/stories/2023/05/2020-census-united-states-older-population-grew.html. The female labor force participation rate and female share of civilian labor market rose over time before flattening during our sample period (see https://fred.stlouisfed.org/series/LNS11300002 and https://www.dol.gov/agencies/wb/data/lfp/civilianlfbysex). The foreign-born share of the U.S. population rose from 11.1 percent in the 2000 Census to 13.7 percent in the 2017 American Community Survey (see MPI-Data-Hub_Immigrants_N-Percent-US-Population_2022_0.xlsx (live.com)).
[14] People aged 55 and over made up a larger share of the U.S. civilian labor force in 2017 (22.8 percent) than in 2000 (12.9 percent). Non-Hispanic Whites made up less of the labor force in 2017 (62.8 percent) than 2000 (73.1

shares of employment-weighted firms for selected series on start-up owner age, education, race/ethnicity, and gender. In addition to the outcome variables being measured, one question is how to think about owner characteristics when there are multiple owners. One possibility is to weight the characteristics of all owners using ownership shares, but then (for example) a firm with one young owner and one old owner would show up in the same category as a single middle-aged owner. The selected series shown in Figures 4 and 5 therefore use either "any" or "all" measures.

Figure 4 shows the shares of employment-weighted start-up firms with at least one owner aged 55 or older and at least one owner aged 35 or younger by the age of the firm (a firm could appear in both owner age categories). The lack of markers on the lines for non-survey years is a reminder that we do not have ownership data in those years, and those values are interpolations between the survey years. The trends in owner ages clearly reflect the broader demographic aging experienced during this period, with the fraction of firms with any older owner rising substantially from 33 percent to 40 percent among start-up firms before declining after 2016 (while remaining higher than 2002 through 2022). For mature firms, the fraction of firms with any older owner rises from 57 to 73 percent from 2002 to 2022 (see Table B.4). The shares of firms with any young owner are much lower and decline slightly across all firm age groups over this same period.[15]

Figure 5 focuses on three other sets of owner demographics where we use the "all" designation in classifying start-up firms. The share of employment-weighted start-up firms in which all owners have at least a college education rose from 43 percent in 2002 to 51 percent by 2021. Start-up firms in which no owners are non-Hispanic White surged from 10 percent of young firms in 2002 to 27 percent by 2021, and start-ups with all female owners increased from 10 percent to 18 percent.

percent). The female share of the labor force rose slightly from 46.6 percent in 2000 to 46.9 percent in 2017. The 2000 numbers are from Toossi (2002), and the 2017 numbers are from Bureau of Labor Statistics (2018).

[15] Appendix Table B.4 has additional details on owner characteristics across LEOF survey years and firm age groups.

*Start-up Financing Sources*

As shown in Table 1, the SBO, ASE, and ABS ask owners to check "all that apply" when presented with a list of the funding sources they used when they started the business. The list includes items such as "personal or family savings" and "personal or family assets" which are checked by most owners in all the surveys. The list also contains more focused sources of funding, which we aggregate into several broader types. Figure 6 shows the reported incidence of bank loans, credit cards, home equity loans, and outside investors for start-up firms across the seven LEOF survey years for which those measure are available.[16]

The trends in employment-weighted start-up financing sources reported by start-up firms tell a compelling story. As shown in Figure 6, the incidence of bank loans fell from about 34 percent in 2002 to near 20 percent by 2012, where it has remained. Outside investors were involved in just over 8 percent of start-ups in 2002, and that share remained essentially flat ending just under 8 percent. The incidence of home equity loans—unfortunately not captured in 2002—fell from about 15 percent in 2007 to 6 percent by 2017. There is only modest long-run trend in reported use of credit cards by start-ups, at just over 12 percent in 2002 and 2017.

These observed declines in the incidence of larger-scale financing sources (bank loans, home equity loans, and outside investors) are consistent with the general decline in start-up activity discussed in the previous section, and with the causal mechanisms described in Davis and Haltiwanger (2024). But these statistics only reflect outcomes for firms that *came into existence* during this period. If the availability of financing deteriorates, that is likely to also cause a decline in start-up activity generally, but we cannot see data on the firms that were never founded. In the next section we explore the second possible financing channel, which is the correlation between financing and employment outcomes for LEOF firms.[17]

[16] The start-up financing questions are most salient (and relevant) for young firms, because asking the owner of a mature firm what sources they used to start the firm is likely to be more subject to recall error and less relevant for the impact on growth as a mature firm (which we show in the next section).

[17] The strong correlation we find between financing and employment outcomes does have implications for the first channel, even if we do not have data on the firms that did not come into existence because financial conditions prevented the start-up. We show that successful firms are more likely to have large-scale financing, and if we interpret that to mean that potential success depends on the ability to get financing, then the fact that potential owners refrain from starting firms when financing is constrained becomes a key part of the overall story.

## IV. Correlations Between Owner Characteristics, Financing, and Employment Outcomes

In addition to looking at trends in owner characteristics and financing, the LEOF is designed to study the relationships between longitudinal employment outcomes and the additional information available on the SBO, ASE, and ABS surveys. What types of owners are most likely to start firms that survive? What types of owners start firms that are relatively large when entering adulthood? What is the relationship between start-up financing and employment outcomes, and how do those interactions depend on owner demographics? The LEOF is well suited to address these questions in a descriptive fashion and contains variation (e.g., detailed industry and geography) that can be used for causal identification.

This section provides examples of simple (but new) correlations that can be gleaned from the LEOF infrastructure. We make no attempt at an identification strategy that relies on plausibly exogenous financing, for example, as in Davis and Haltiwanger (2024). The correlations we identify are generally consistent with the idea that financing constraints have played a role in the decreased "dynamism" observed in LBD and BDS data, however, because well-financed firms are more likely to grow faster.

The measure of success we study here is whether at age five a firm that was ages 0 or 1 in the survey reference year is in the top 25 percent of its own four-digit industry age-five size distribution.[18] Our four-digit industry age-five employment cutoffs for the top quartile are derived from the LBD, and they are fixed at the average for the LEOF sample period.[19] Crossing the 75$^{th}$ percentile of size in (for example) the period 2007-2011 is potentially very different than crossing the 75$^{th}$ percentile under more normal periods.

We investigate correlations between the employment-based measure of success, owner demographics, and start-up financing using a linear probability model. Specifically,

$$(1) \qquad \Pr(\text{success}_{i,t}) = \Sigma_t I_t \lambda_t + X_{it}' \beta + Z_{it}' \gamma + \varepsilon_{it}$$

[18] Another interesting use of the LEOF data infrastructure is to study the impact of financing conditions on start-up activity. We leave that for future work.
[19] The LBD age 5 size distribution is conditional on surviving to age five.

Where I is a vector of birthyear dummies, X are owner demographic characteristics, and Z are firm financing variables. The birthyear dummies are the starting point for estimating correlations because we want to remove (for example) the dramatic differences between the incidence of the success outcomes in 2007-2011 versus other years. We run a series of regressions, incrementally adding owner demographics and then start-up financing variables from the surveys, then further controlling for initial employment size interacted with four-digit industry from the LBD.

Complete regression results for start-up firm success at age five are shown in Appendix Tables B.1 and B.2. There are two sets of regressions, where the first set includes all LEOF years for which we have the key start-up sources, and the second set uses years 2007 and later, for which we have both start-up sources and start-up amounts. The regressions confirm the importance of owner demographics and financing, and they also show that the birthyear dummies are important in their own right and vary systematically across the series of regressions.

Our primary focus here is on the correlations between success and the LEOF owner and financing characteristics. These correlations are summarized in Figures 7, 8, and 9. Remembering that each of these dummies is relative to the average success probability of (25 percent)*(probability of survival to age five), the estimated correlations between success and demographics, financing sources, and start-up amounts are generally economically (as well as statistically) significant.

Figure 7 shows that having at least one owner aged 35 or younger raises the probability of success by about 3 percentage points, and the magnitude of the correlation increases slightly as additional controls are added. The role of the additional controls—especially the initial size*industry interactions—is much more pronounced for the other coefficients of interest. For example, having at least one owner aged 55 or older has little impact in the raw correlations, but lowers the probability of success by just under 2 percentage points after controlling for initial size and industry. College-educated owners are more likely to run successful firms, while all female and non-white or Hispanic firms are less likely to cross the age 5 success threshold. Controlling for financing, industry, and initial size differences explains about half the raw correlations for those three variables. Table B1 shows that this dampening is especially due to

controlling for industry by initial size differences. This pattern highlights that the interaction of owner and financing characteristics influence five-year success both in terms of initial industry and size and in post-entry growth.

Variation in the incidence of start-up financing sources (Figure 8) and start-up financing amounts (Figure 9) are also both statistically significant and economically meaningful. Without controls for initial size and industry, the probability of success based on the financing source at start-up increases by over 9 percentage points for bank loans, by over 5 percentage points for outside investor funds, and over 2 percentage points for home equity loan. By contrast, reliance on credit cards lowers the probability of success by close to 2 percentage points. Not surprisingly, having more funds at start-up leads to higher probability of success (close to 25 percentage points for $1 million). As with the key owner demographics, controlling for industry and initial size substantially diminish the estimated coefficients. In these cases, the mitigation is operating purely through the industry and initial size interactions. Consistent with the discussion above, there is an important relationship between financing sources and amounts and initial size by industry variation.

The contribution of the owner, financing variable and industry by initial size effects suggests taking a close look at changes in the birthyear dummy coefficients as we move from raw correlations to the fully specified regressions – as depicted in Figures 10 and 11. The patterns with or without controls are similar with firms born around the onset of the Financial Crisis much less likely to cross the age five success threshold. Beginning in 2012, however, there is a clear separation of the estimated birthyear dummies when we move from raw correlations to the fully specified regressions. Thus, the regressions imply that changes in owner demographics, financing, industry, and initial size have combined to systematically decrease the probability of success over time.

Disentangling whether changes in owner demographics and financing are correlated with changes in start-up firm success rates is confounded by the correlation between start-up financing and firm success. That is, certain types of owners may be more likely to have certain types of financing. This is indeed the case, which we capture using regressions of the incidence of bank loans (Figure 12 and Table B.3) and outside investors (Figure 13 and Table B.3) on

birthyear dummies and owner characteristics. Focusing on bank loan results, we find that the probability of a start-up firm of having a bank loan is slightly higher for young and old owners (about 1 percentage points) and about 4 percentage points lower for female and non-white or Hispanic owned firms. Adding industry and initial size controls mitigates the age effects, but other demographics remain economically and statistically significant.

The estimated correlations should be viewed relative to the incidence of the funding source, so, for example, the fact that young start-up owners are roughly 2 percentage points more likely to have outside investors is notable given an overall incidence of 7 to 8 percent over the sample period (Figure 6). In terms of bank loans, a key finding (Table B.3) is that the decrease in funding over time is widespread, as suggested by the fact that owner demographics do not materially change the pattern of birthyear dummies.

An additional feature of the results from these descriptive exercises is that the covariates collectively (including industry by initial size) account for only about 20 percent of variation in startup success and only about 3 percent of the variation in the likelihood of obtaining specific financing sources. Idiosyncratic factors dominate these outcomes. Exploring the nature of these idiosyncratic factors for these key outcomes is a rich area for future research for which the LEOF is well suited.

## V. Concluding Remarks

We construct a new Longitudinal Employer, Owner, and Financing (LEOF) database, which contains over three million firm-year observations from 2002 to 2021, linked to annual firm-level employment observations back to 1976 or the firm's first year with paid employees. The LEOF includes data on owner demographics and the firm's start-up financing sources and amounts and the firm's current financing. The data exhibit several clear trends in the 21st century. Firms with older owners, only female owners, no non-Hispanic White owners, and college-educated owners have become more common. Fewer entrepreneurs use bank loans or home equity financing to start their businesses in 2017 as compared to 2002.

The propensity to become a successful firm varies significantly with owner and firm characteristics. Firms with young, more educated owners, those with at least one male owner,

those with at least one white owner, and young firms with a bank loan or outside investor at start-up are more likely to be in the upper quartile of the age-5 employment size distribution for the firm's industry. Start-up financing is strongly correlated with demographic characteristics. For example, women and non-white or Hispanic owned firms are much less likely to have a bank loan at start-up, even after controlling for the firm's industry and its initial size.[20]

The LEOF offers a rich laboratory for future research on several topics. For example, the LEOF is well suited for investigations into how changes in business owner characteristics and startup financing have influenced business dynamism and entrepreneurship in recent decades. It also opens new avenues for research on the sources of rising industry-level concentration and the performance of innovation-intensive industries. The LEOF also offers extensive opportunities to investigate whether and how the effects of local conditions and policies on business outcomes differ by business owner characteristics and financing. Additional outcome measures could be examined as well.[21] In exploring these and other issues, the LEOF makes it possible to exploit variation by industry, geography, size, age, cohort, and time at the firm-level with rich information about outcomes, owner characteristics, and the sources and nature of financing.

The LEOF data could potentially contribute to the BDS program, which is studying how financial administrative and private data from sources such as Securities and Exchange Commission filings and Compustat could be used to produce business statistics by type of financing. The SBO/ASE/ABS collect financing data on firms in these administrative and private data sources, as well as data on the young and small firms that infrequently appear in such sources. The LEOF could thus supplement and validate these other data sources and situate them in a broader context. In addition, the LEOF exercises that we conduct could provide useful information for experimental BDS statistical products that track high-growth firms.[22]

We hope the LEOF and this paper will encourage researchers to explore other uses and questions that we have not considered. It would be possible to update the LEOF as the ABS

[20] For additional details on financing sources and growth among Black-owned firms, see Kim et al. (2021).
[21] For example, Lee et al. (2023) link LBD revenue and U.S. Patent and Trademark Office patent data to the ASE to study associations between owner nativity and innovation and productivity.
[22] The full set of existing and planned BDS experimental products is described in: https://www.census.gov/programs-surveys/ces/data/public-use-data/experimental-bds.html.

continues to collect business and owner characteristics on a yearly basis and on financing in select years. The user base would help determine whether this would be useful. Researcher input is a critical component of the feedback loop that enables the Census Bureau's Center for Economic Studies to continuously refine and improve its research datasets.

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**Table 1. LEOF Business, Owner, and Financing Variables by Survey Year**

| *Panel A: Business Characteristics* | Surveys by Survey Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | SBO | | | ASE | | | ABS | | | | |
| | 2002 | 2007 | 2012 | 2014 | 2015 | 2016 | 2018 | 2019 | 2020 | 2021 | 2022 |
| Does any individual own more than 10%? | X | X | X | X | X | X | X | X | X | X | X |
| Husband and wife owned (and equal or not)? | | X | X | X | X | X | X | X | X | X | X |
| Year business established | X | X | X | X | X | X | | | | | |
| Home-based business? | X | X | X | X | X | X | | | | | |
| Family owned? | X | X | X | X | X | X | X | X | X | X | X |
| Franchise? | X | X | X | X | X | X | | X | X | X | X |
| Total number of owners | | X | X | X | X | X | X | X | X | X | X |
| Types of workers (FT, PT, day labor, contractors) | X | X | X | X | X | X | X | X | X | X | X |
| Types/sales shares of customers (government, private, ...) | X | X | X | X | X | X | X | X | X | X | X |
| Types of benefits (health, retirement, paid leave, ...) | | X | X | X | X | X | X | | | | |
| Currently operating? If not, reasons… | | X | X | X | X | X | X | X | X | X | X |
| Domestic versus international sales | | X | X | X | X | X | X | X | X | X | X |
| Business profitability and factors affecting profitability | | | | X | X | X | X | | | | |
| Operations outside United States, primary language | | X | X | X | X | X | | | | | |
| Business aspirations (larger, smaller, same size) | | | | X | X | X | | | | | |
| Website and e-commerce details | | X | X | X | X | X | | | | | |

**Table 1. LEOF Business, Owner, and Financing Variables (Continued)**

| *Panel B: Owner Characteristics (Top 4 owners)* | Surveys by Survey Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | SBO | | | ASE | | | ABS | | | | |
| | 2002 | 2007 | 2012 | 2014 | 2015 | 2016 | 2018 | 2019 | 2020 | 2021 | 2022 |
| Ownership share top four owners (0 to 100%) | X | X | X | X | X | X | X | X | X | X | X |
| Owner function (production, management, finance, none) | X | X | X | X | X | X | X | | | | |
| Average hours | X | X | X | X | X | X | X | | | | |
| Primary source of income for this owner? | X | X | X | X | X | X | X | X | X | X | X |
| Veteran status and service-related disability | X | X | X | X | X | X | X | X | X | X | X |
| Sex | X | X | X | X | X | X | X | X | X | X | X |
| Age | X | X | X | X | X | X | X | X | X | X | X |
| Hispanic | X | X | X | X | X | X | X | X | X | X | X |
| Race | X | X | X | X | X | X | X | X | X | X | X |
| Education | X | X | X | X | X | X | X | X | X | X | X |
| Field of highest degree | | | | | | X | X | X | X | X | X |
| How acquired (founded, purchased, inherited, gifted) | | X | X | X | X | X | X | | | | |
| Year ownership acquired? | X | X | X | X | X | X | X | X | X | X | X |
| Previous business ownership/self-employment? | | X | X | X | X | X | X | X | X | X | X |
| Born in the United States? | | X | | | | | X | X | X | X | X |
| Born a citizen of the United States? | | | X | X | X | X | | | | | |
| Currently a citizen of United States? | | | | | | | X | X | X | X | X |
| Reasons for being a business owner (choices vary) | | | | X | X | X | X | X | X | X | X |

**Table 1. LEOF Business, Owner, and Financing Variables (Continued)**

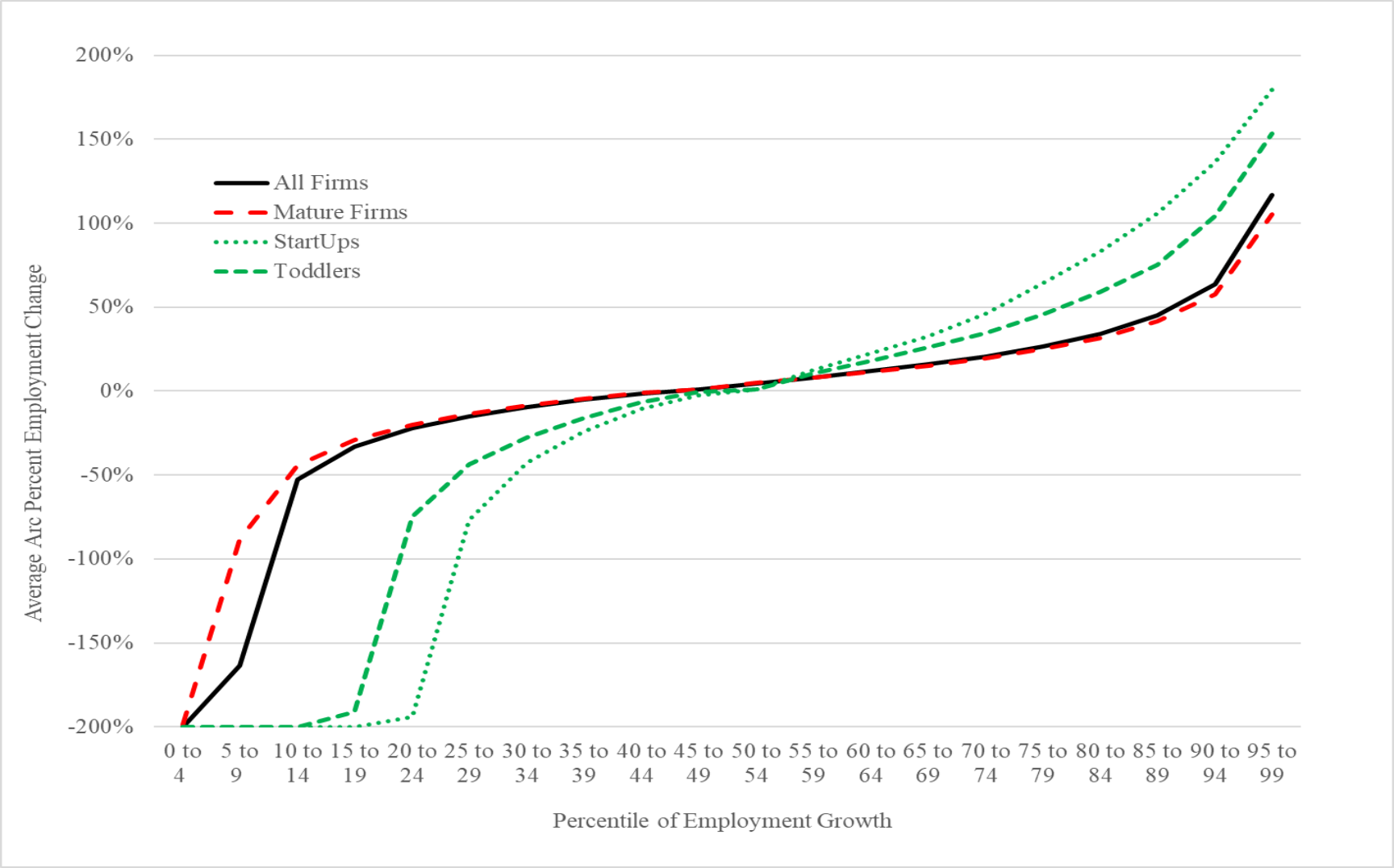
| | Survey by Survey Years | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | SBO | | | ASE | | | ABS | | | | |
| ***Panel C: Start-up Financing*** | **2002** | **2007** | **2012** | **2014** | **2015** | **2016** | **2018** | **2019** | **2020** | **2021** | **2022** |
| Personal/family savings | X | X | X | X | X | X | X | | | | |
| Personal/family assets other than savings | X | X | X | X | X | X | X | | | | |
| Personal/family home equity loan | | X | X | X | X | X | X | | | | |
| Personal/business credit card | X | X | X | X | X | X | X | | | | |
| Government (direct or guaranteed) loan | X | X | X | X | X | X | X | | | | |
| Government guaranteed loan | X | X | X | X | X | X | X | | | | |
| Bank loan | X | X | X | X | X | X | X | | | | |
| Business loan from family/friends | | X | X | X | X | X | X | | | | |
| Outside investor/venture capitalist | X | X | X | X | X | X | X | | | | |
| Grants | | X | X | X | X | X | X | | | | |
| Don't know or other | | X | X | X | X | X | X | | | | |
| None needed | X | X | X | X | X | X | X | | | | |
| Total start-up capital (dollar ranges) | | X | X | X | X | X | X | | | | |
| ***Panel D: Ongoing Financing*** | | | | | | | | | | | |
| Sources of funds for expansion (list varies) | X | X | X | X | X | X | X | | | | |
| Total capital used for expansion | | | | X | X | X | X | | | | |
| New funding, received or not; if avoided applying, why? | | | | X | X | X | X | | | | |

**Table 2. LEOF Linked Sample Statistics by Reference Year**

| | SBO | | | ASE | | | ABS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **2002** | **2007** | **2012** | **2013** | **2014** | **2015** | **2017** | **2018** | **2019** | **2020** | **2021** |
| Published survey response rate | 81.0% | 62.0% | 66.2% | 74.0% | 66.9% | 64.7% | 67.8% | 68.2% | 68.0% | 65.3% | 63.4% |
| Survey respondent sample | 878,000 | 763,000 | 288,000 | 188,000 | 170,000 | 165,000 | 503,000 | 180,000 | 178,000 | 170,000 | 167,000 |
| Minus firms without owner characteristics | 177,000 | 166,000 | 20,000 | 25,000 | 20,000 | 15,000 | 62,000 | 35,000 | 35,000 | 34,000 | 26,000 |
| Equals owner sample | 701,000 | 597,000 | 268,000 | 163,000 | 151,000 | 150,000 | 441,000 | 145,000 | 144,000 | 136,000 | 141,000 |
| Owner/respondent sample ratio | 79.8% | 78.2% | 93.1% | 86.7% | 88.8% | 90.9% | 87.7% | 80.6% | 80.9% | 80.0% | 84.4% |

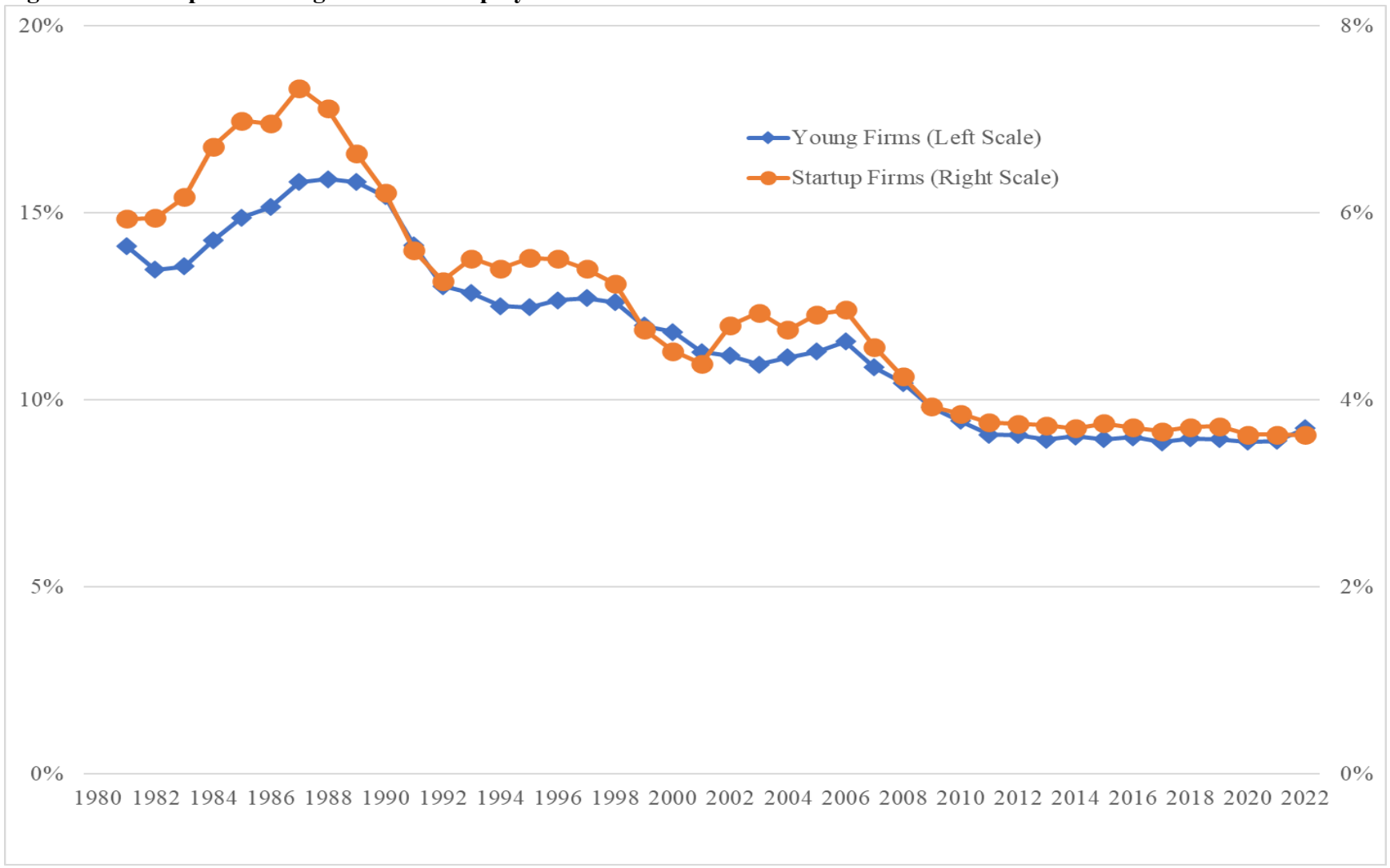
Notes: The data presented in this table are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

**Figure 1. Distribution of Firm Four-Year Growth Rates, 2002 to 2018 (Employment Weighted)**



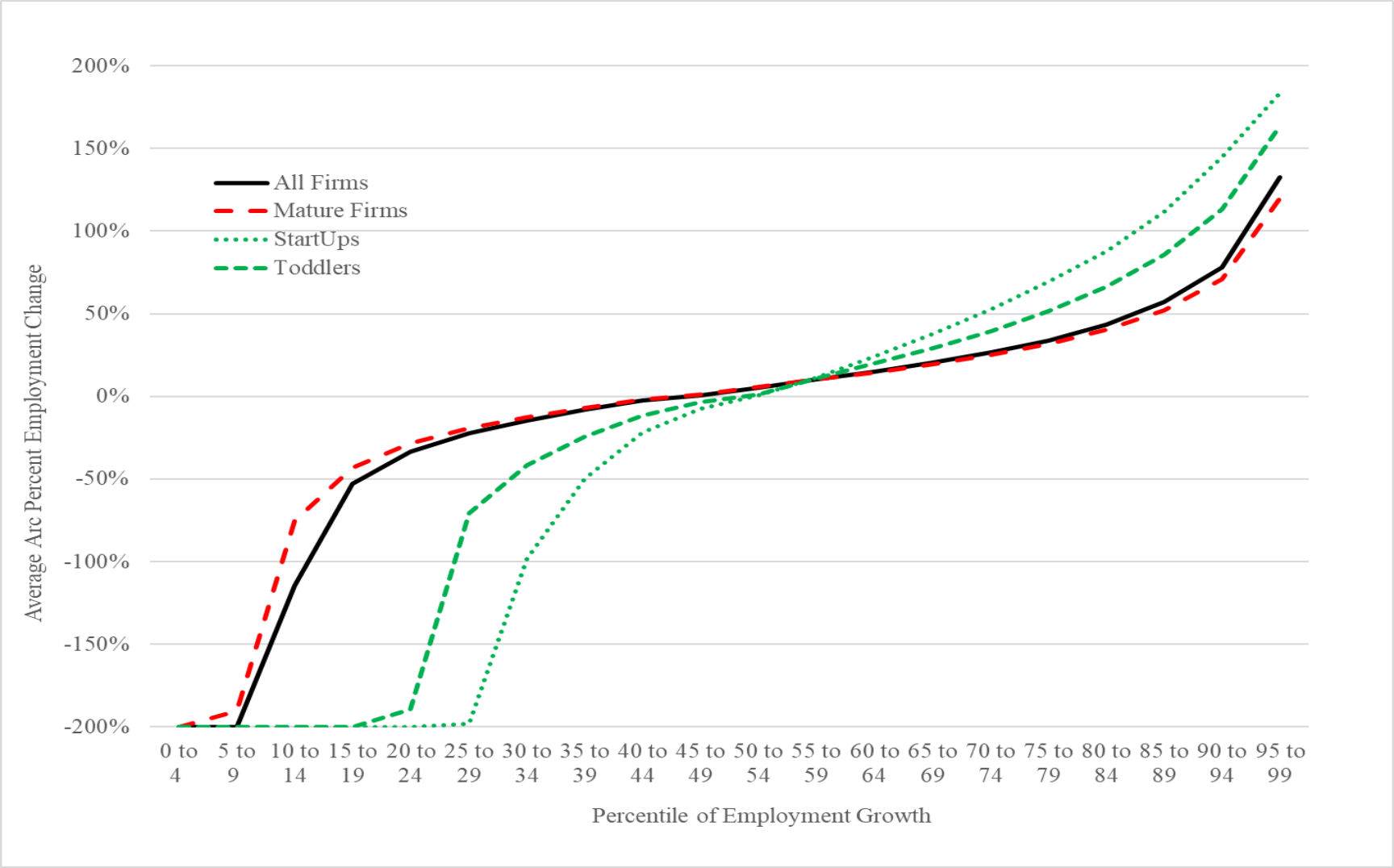

Notes: Tabulations from authors using the LBD. Start-up firms are firms ages 0,1, toddlers ages 2 to 4, mature firms are age 5+. The data presented in this figure are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

**Figure 2. Start Up and Young Firm and Employment Shares**



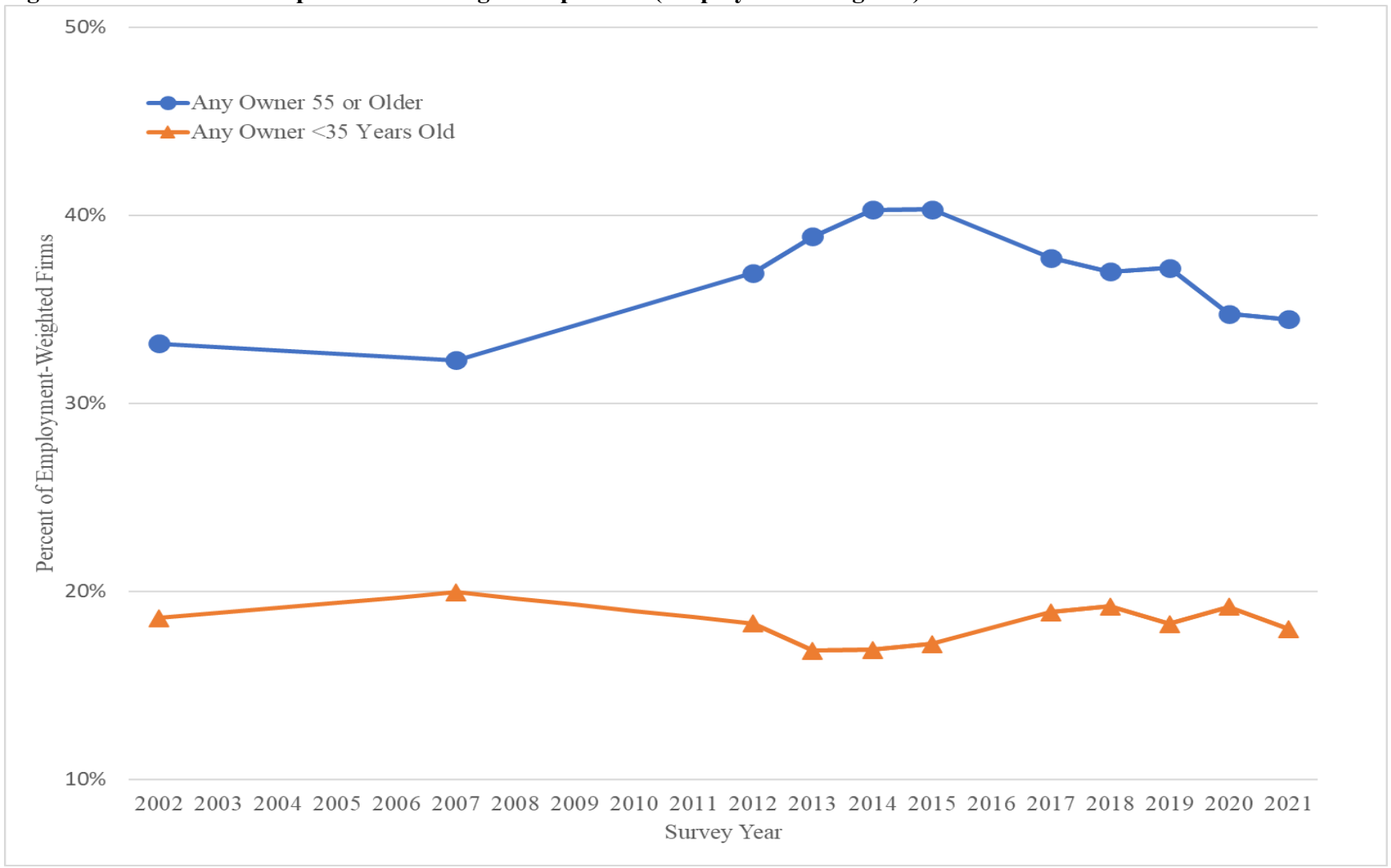

Notes: Tabulations by authors using the BDS. Start-ups are firms age=0 or 1, young firms ages 0 to 4.

**Figure 3. Distribution of Firm Four-Year Growth Rates, 1981 to 2001 (Employment Weighted)**



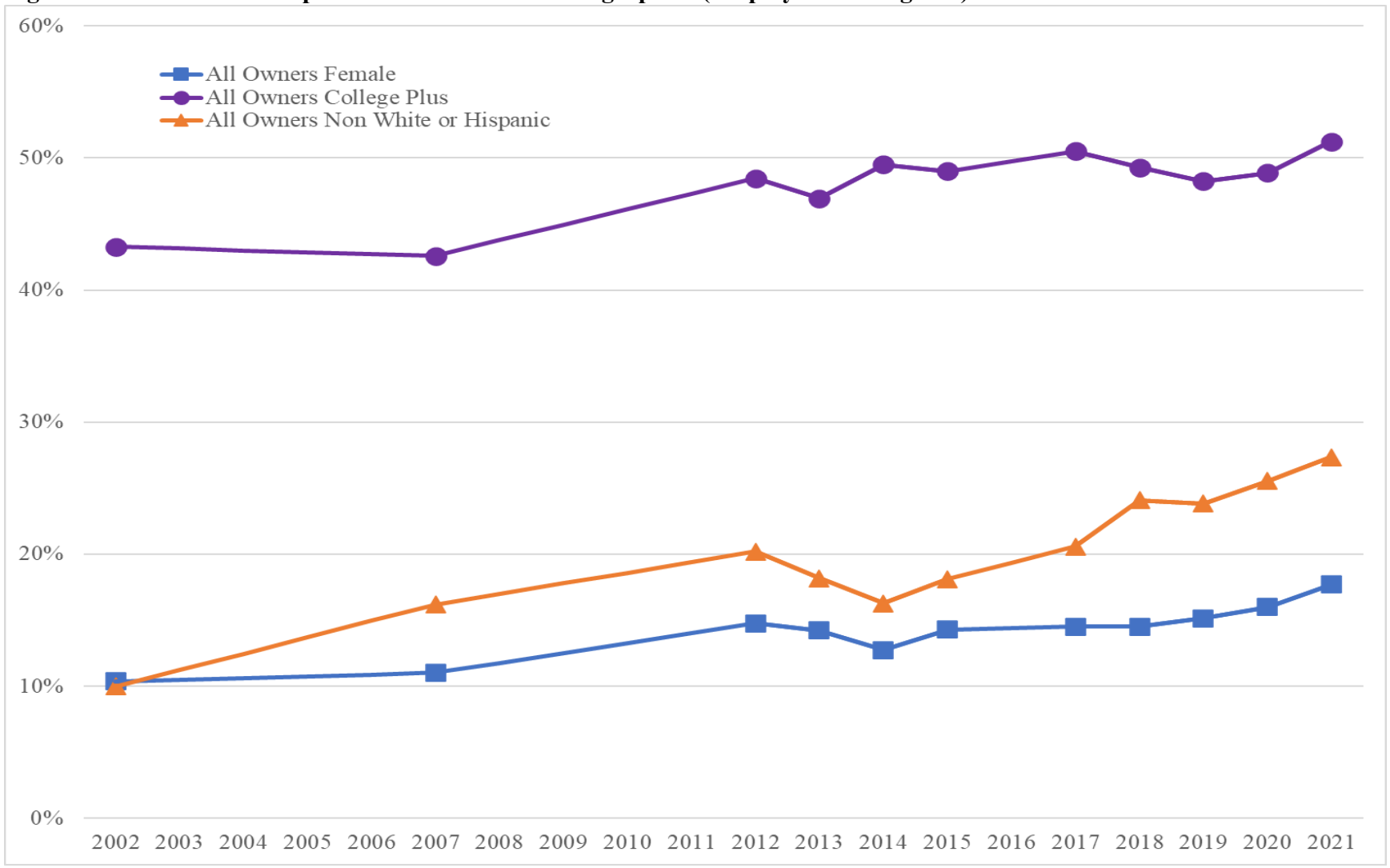

Notes: See notes to Figure 1. The data presented in this figure are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

**Figure 4. Trends in Start-up Firm Owner Age Composition (Employment Weighted)**



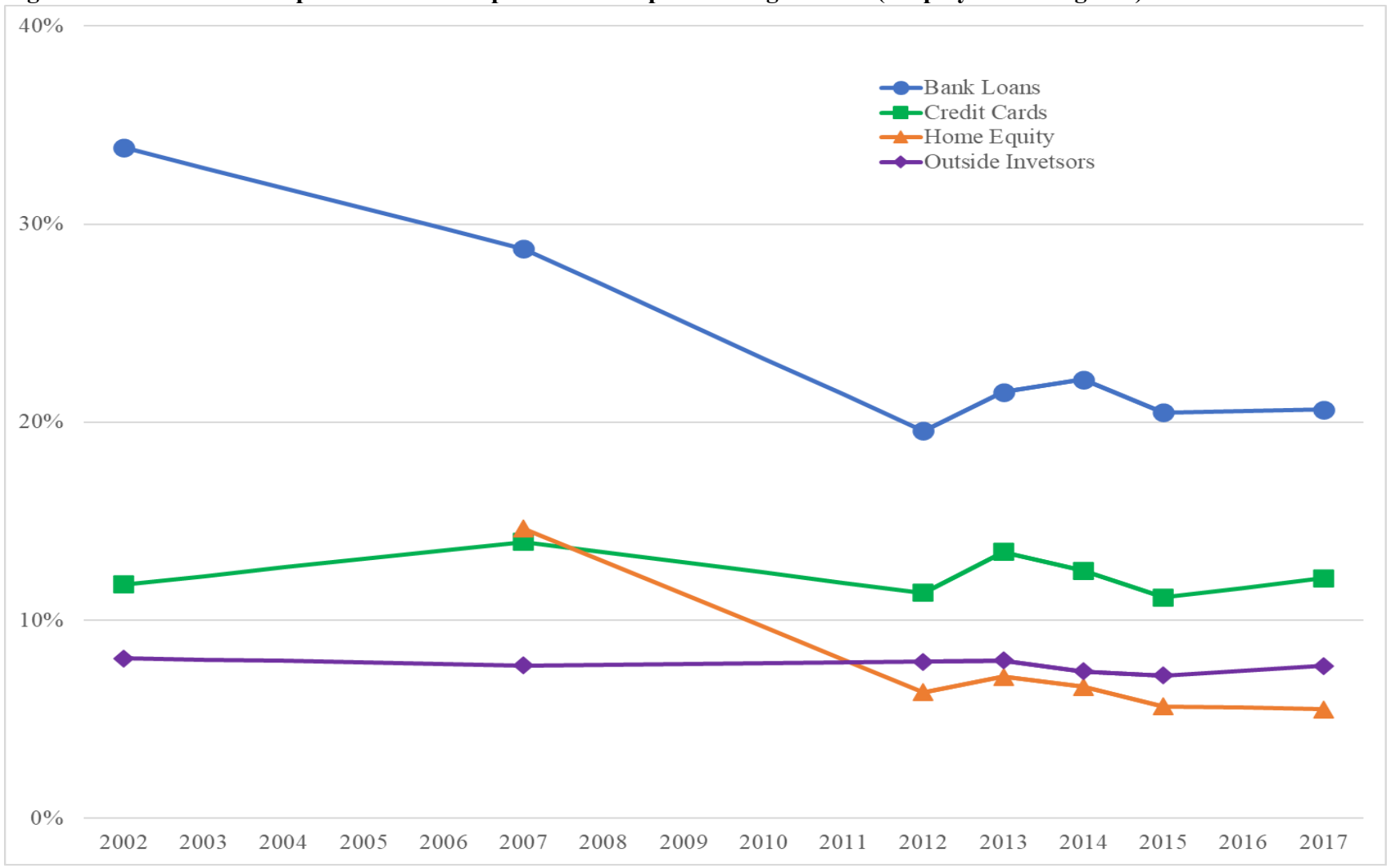

Notes: Tabulations from authors using LEOF data infrastructure. Start-up firms are ages 0,1. The data presented in this figure are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

**Figure 5. Trends in Start-up Firm Other Owner Demographics (Employment Weighted)**



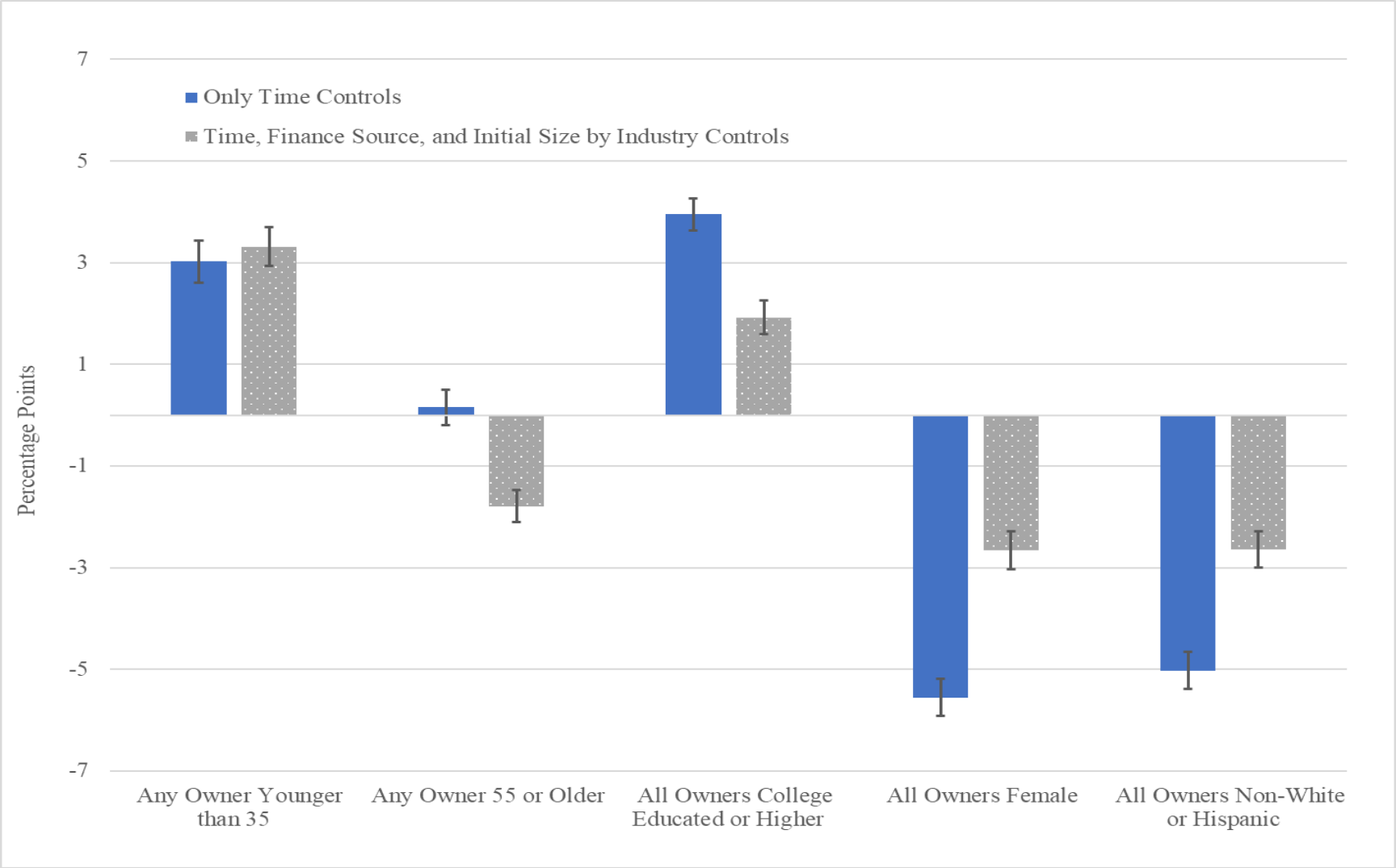

Notes: See notes to Figure 4. The data presented in this figure are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

**Figure 6. Trends in Start-up Firm Owner-Reported Start-up Financing Sources (Employment Weighted)**



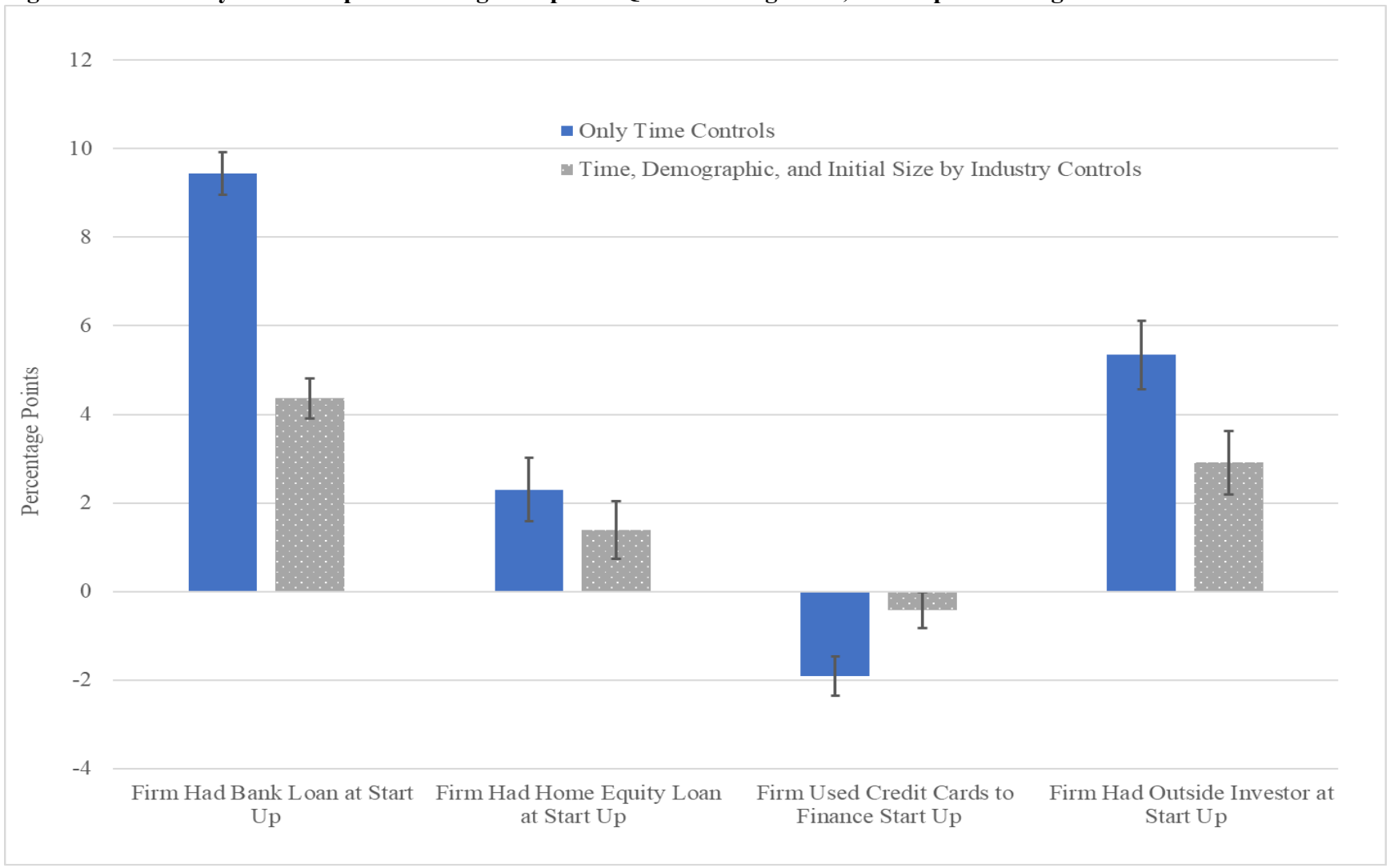

Notes: See notes to Figure 4. The data presented in this figure are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

**Figure 7. Probability of Start-up Firm Being in Top Size Quartile at Age Five, Owner Characteristic Coefficients**



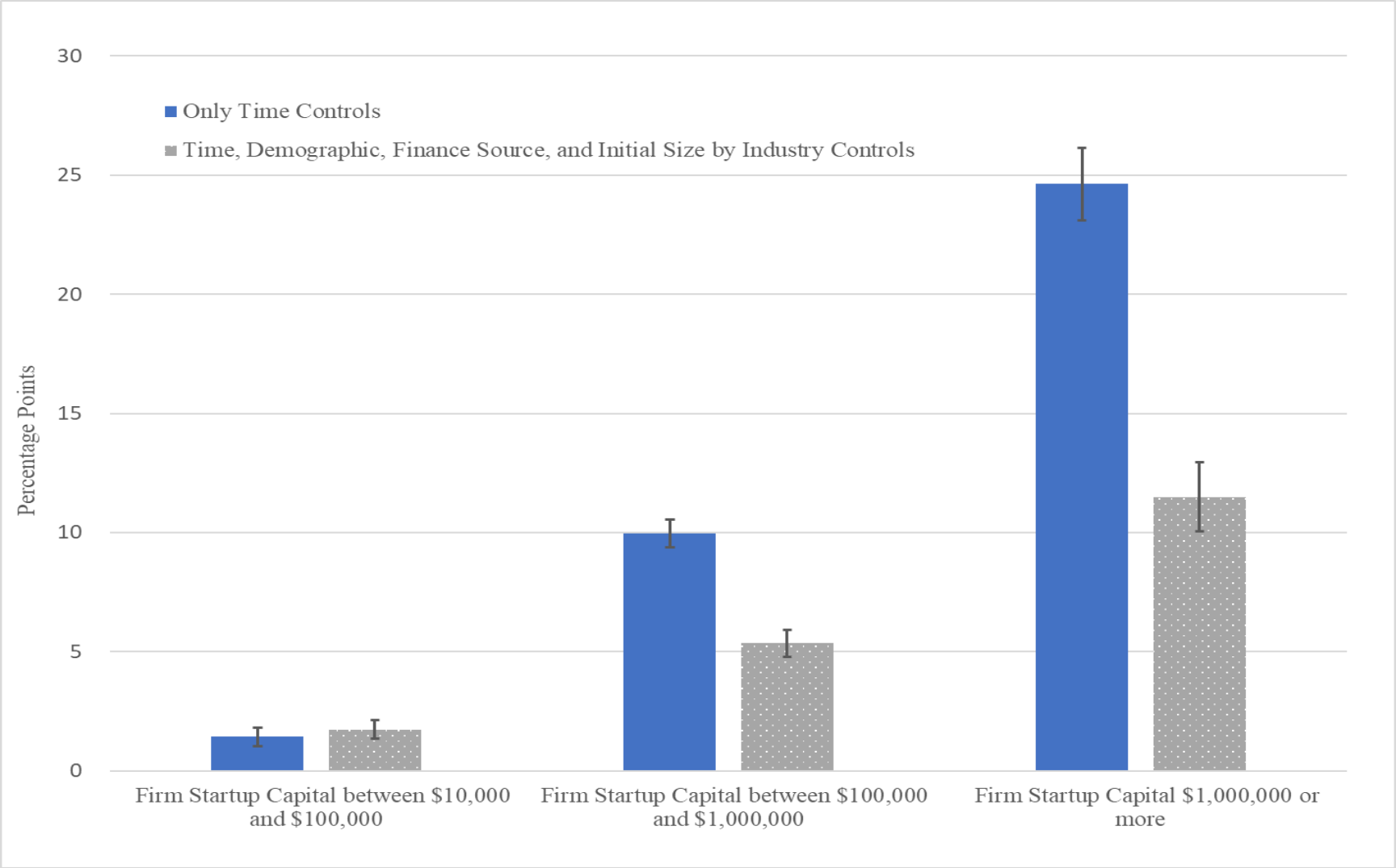

Notes: Tabulations by authors from LEOF data infrastructure using regression specification (1), start-up firms ages 0,1 in survey year. The data presented in this figure are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

**Figure 8. Probability of Start-up Firm Being in Top Size Quartile at Age Five, Start-up Financing Source Coefficients**



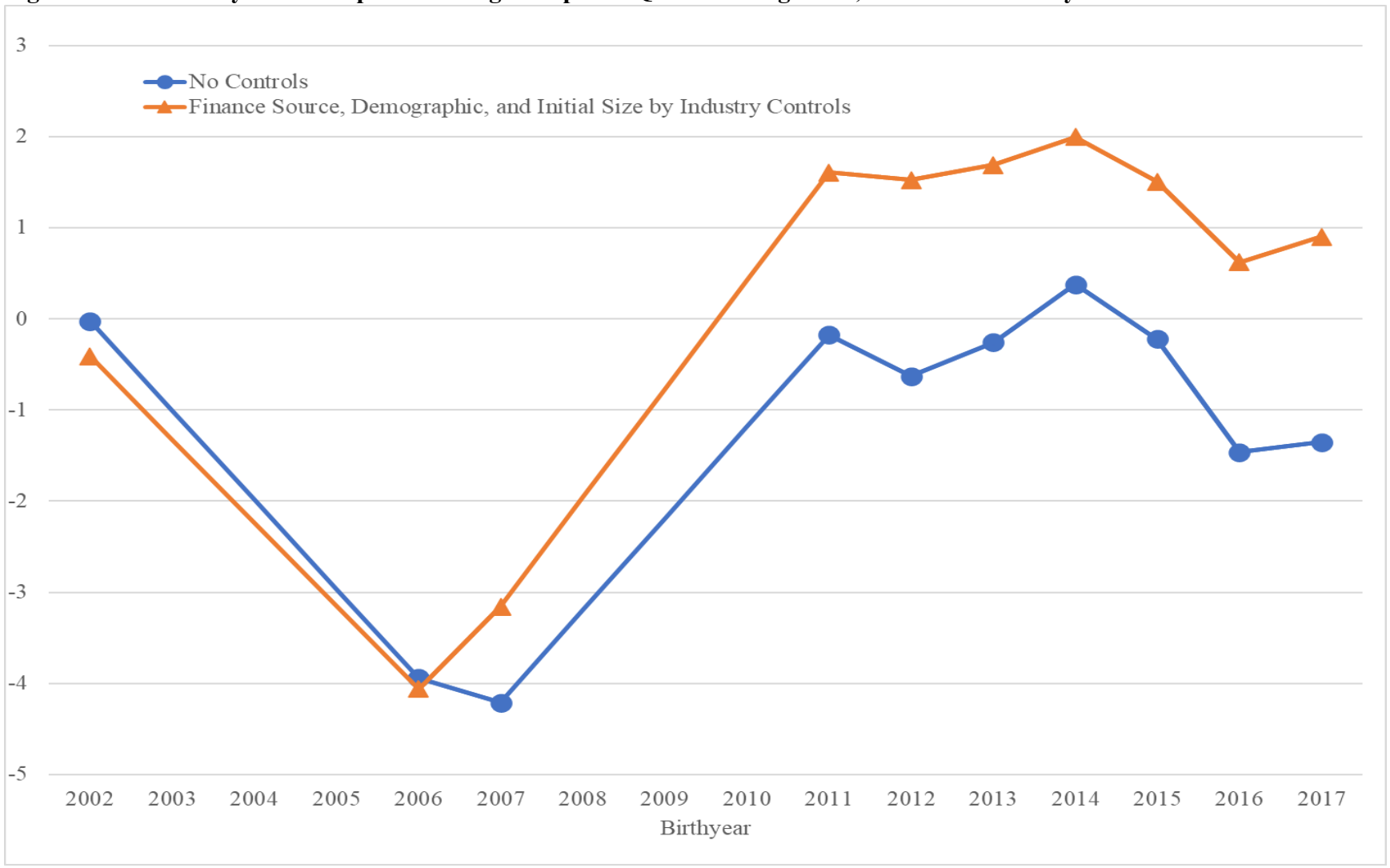

Notes: See notes to Figure 7. The data presented in this figure are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

**Figure 9. Probability of Start-up Firm Being in Top Size Quartile at Age Five, Start-up Financing Amount Coefficients**



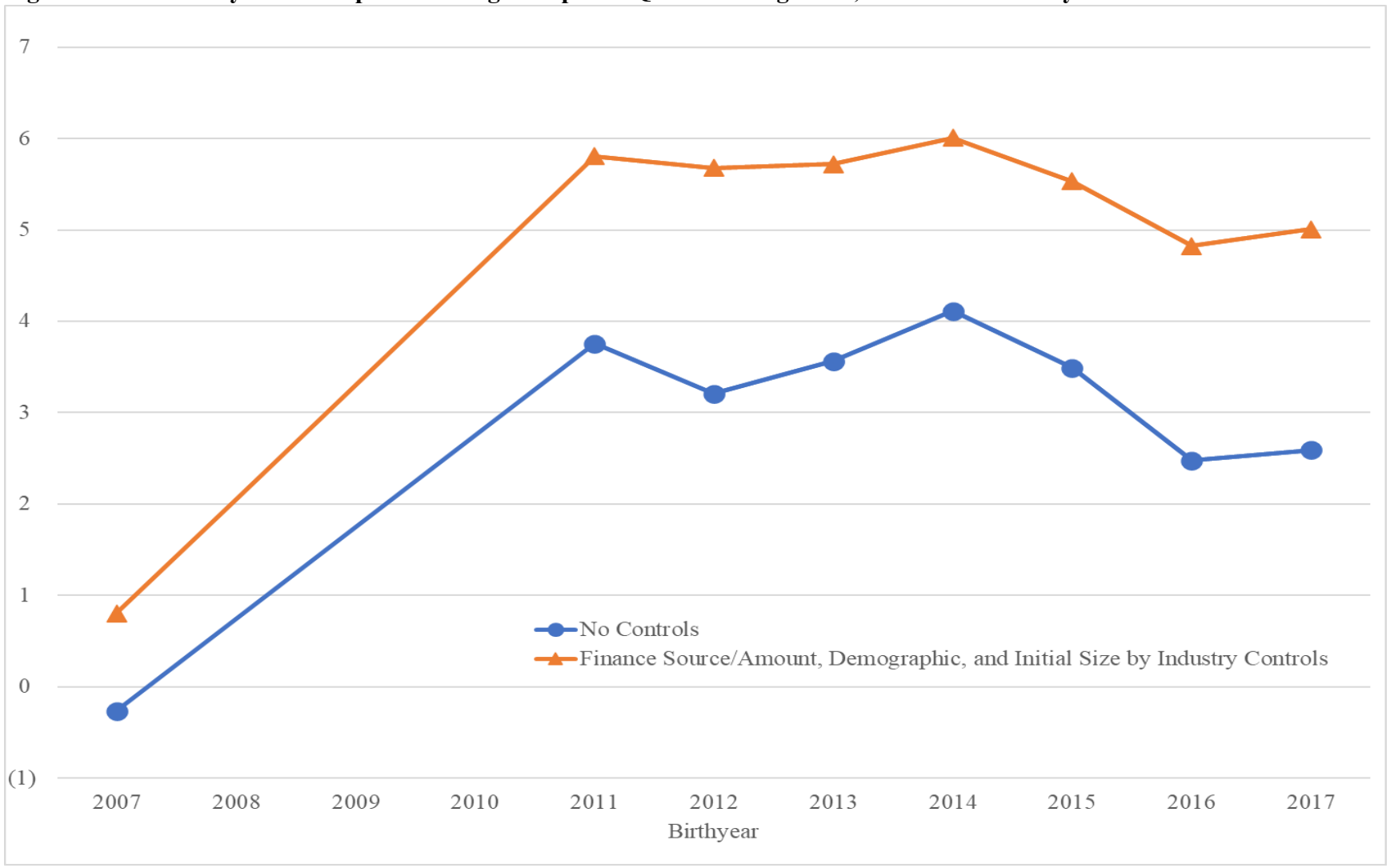

Notes: See notes to Figure 7, years 2007 to 2017 only. The data presented in this figure are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

**Figure 10. Probability of Start-up Firm Being in Top Size Quartile at Age Five, Birth Year Dummy Coefficients**



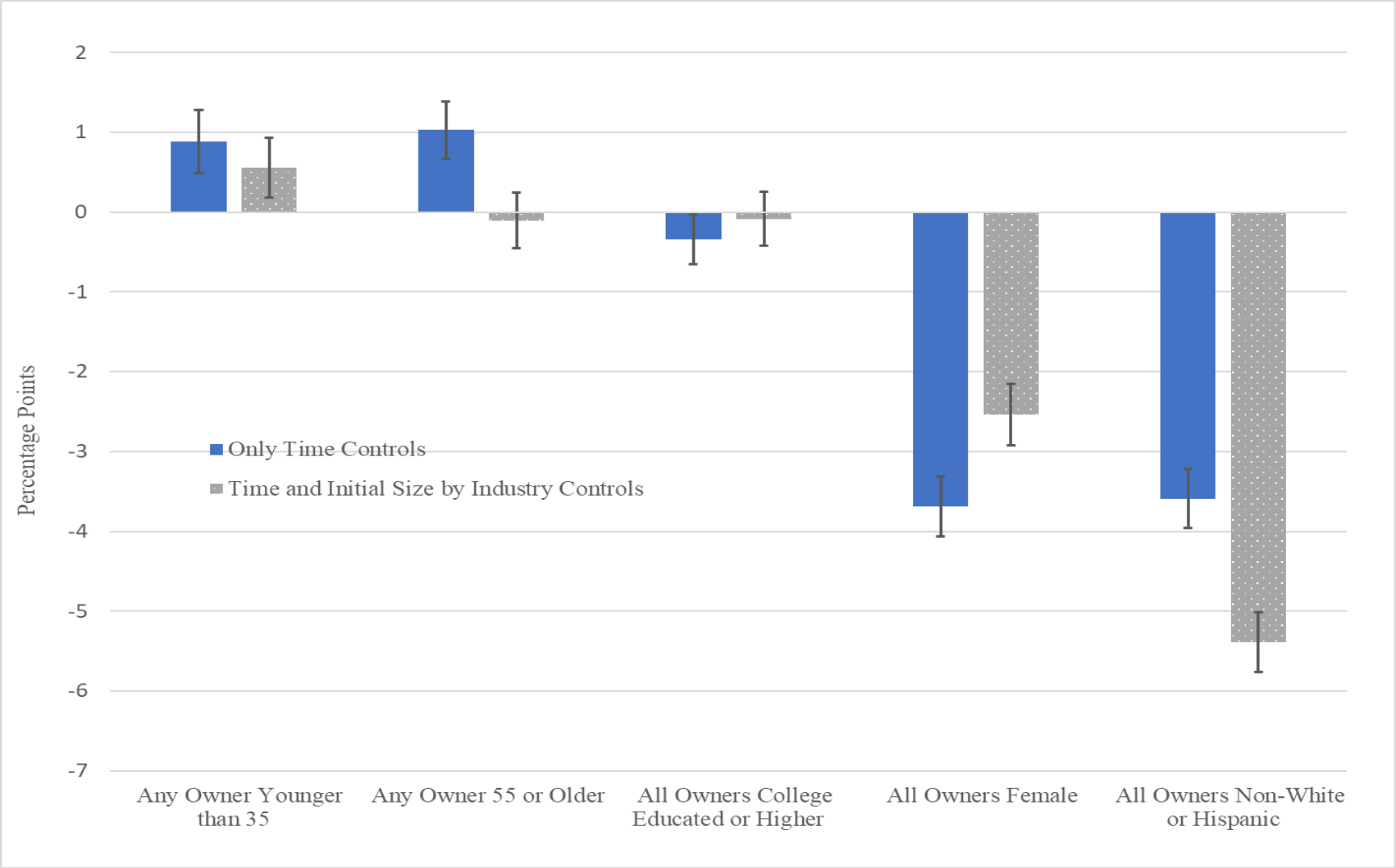

Notes: See notes to Figure 7. The data presented in this figure are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

**Figure 11. Probability of Start-up Firm Being in Top Size Quartile at Age Five, Birth Year Dummy Coefficients**



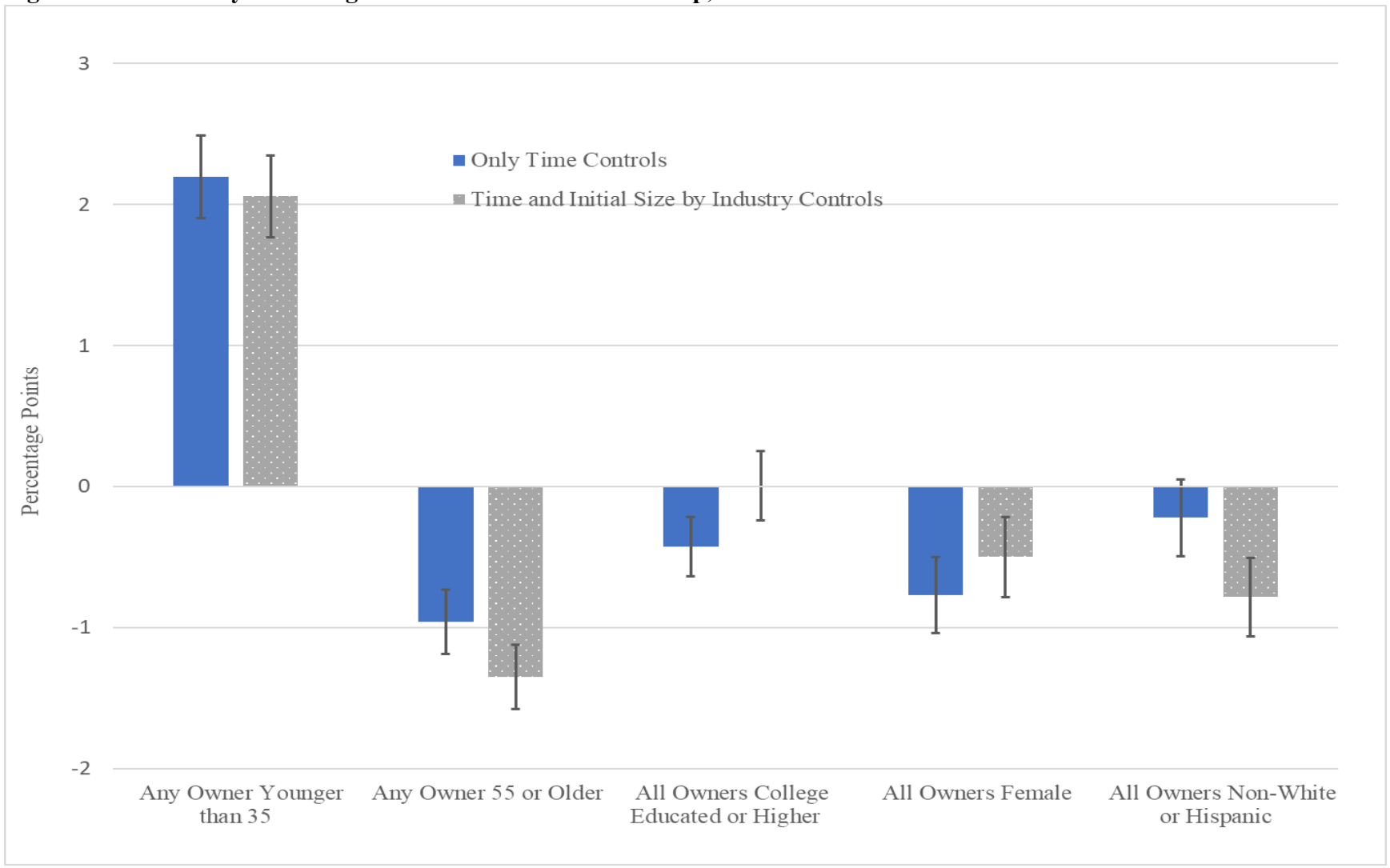

Notes: See notes to Figure 7, years 2007 to 2017 only. The data presented in this figure are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

**Figure 12. Probability of Start-up Firm Having a Bank Loan, Owner Characteristic Coefficients**




Notes: Tabulations by authors from LEOF data infrastructure, start-up firms ages 0,1 in survey year. The data presented in this figure are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

**Figure 13. Probability of Having an Outside Investor at Start-up, Owner Characteristic Coefficients**




Notes: See notes to Figure 12. The data presented in this figure are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

## Appendix A. Constructing and Validating the LEOF

The Longitudinal Employer, Owner, and Financing (LEOF) data set combines Longitudinal Business Database (LBD) records with periodic Census Bureau business surveys conducted between 2002 and 2022. The linked LEOF records currently have (1) longitudinal firm employment (from the LBD) for all years 1982 through 2022, (2) geographic and industry identifiers for years in which the firm has positive employment, (3) cross-sectional owner demographics and other firm characteristics for the year in which the firm participated in a periodic survey, and (4) look-back start-up financing source and financing amount variables for the year in which the firm was founded.

*Creating the LBD Longitudinal Files*

Longitudinal firm employment is constructed using the cross-section LBD variable "lbdfid." The primary role of lbdfid is to be a longitudinally consistent firm identifier. Although the lbdfid reflects the state of the art in LBD processing, it has limitations as a longitudinal identifier connecting firms over time. The only "improvement" currently baked into lbdfid is the treatment of recycled firmids. That is, if a firmid comes back into the data after not being seen for 7 or more years, then LBD assigns a new lbdfid. Linking multi-unit firms over time comes with several important caveats that are not applicable at the level, which, in the LBD are tracked using the "lbdnums" identifier. An establishment, so long as it is the same type of business (industry) in the same physical location will always (conceptually) get the same lbdnum.

However, lbdfids may change for any number of reasons. A single unit firm that re-organizes will have the same lbdnum over time but its firmid might change. Another important structural break in the longitudinal properties of lbdfids occurs with single-unit (SU) to multi-unit (MU) transitions, where the firmid (and thus the lbdfid) necessarily change for some mixture of "true" and administrative reasons. In some cases the SU--MU transition occurs along with a change in ownership (resulting in what we would think of as a "true" change in lbdfid), and in others it changes because of how treats MUs vs. SUs. To mitigate the uncertainty associated with using lbdfid, our analysis of high-growth firms limits the sample to include "non-dissolver" firms, meaning all establishments associated with the firm have ceased to exist or at least one of

the establishments in the base year continues to exist. For further discussion of lbdfid, see the data appendix to Sterk, Sedlacek, and Pugsley (2021).

*Timing of LBD and Survey Year Linkage*

It would seem natural to match the reference year of the survey to the corresponding year of the LBD when constructing firm weights for the linked samples. We use such as an approach for the SBO. However, for the ASE and ABS this approach fails to capture very young firms. For the vintage of the LEOF infrastructure used in this paper, when matching to the ASE and ABS we use the LBD in the year prior to the survey reference year to yield larger samples of young firms. In considering these issues it is instructive to keep in mind the timing of Business Register (BR) operations at the Census Bureau. For a given reference year, the BR is closed out in the fall of the succeeding year. However, the BR for a given reference year undergoes considerable refinement in County Business Patterns (CBP) processing (which is not completed until spring of the second year relative to the reference year). Moreover, the LBD is not completed for a reference year until September of that second year.

This timing is relevant, since surveys such as the ASE and ABS for a given reference year are drawn from a BR sample and in the field by fall of the year following the reference year. Importantly, our use of ratio-based matching to construct firm weights implies that for whatever year we use as our LBD base year, our linked sample replicates the firm size, age, and industry patterns for that year. The implication is that our linked sample in the LBD base year is an inverse probability-weighted sample for that base year, which in the ASE and ABS is different from the reference year. Moreover, key questions in the ASE and ABS explicitly refer to firm financing conditions at start-up, which we take to be the base year.

*Other Survey File Linkage Considerations*

In addition to timing, linking the LBD longitudinal file to the periodic survey micro files involves a few other considerations specific to the SBO, ASE, and ABS. The sample size of the micro data files for each of these eleven survey years spanning the three survey programs is shown in line 1 of Table A1. The last row of Table A1 is the first row of Table 2 in the main text, which has the count of the LEOF respondent sample. But as the other rows in Table A1 indicate,

the micro files contain firms that cannot be not linked to the LBD. The large number of unlinked firms in the SBO years is because those surveys included non-employer firms. In the ASE and ABS years, only a small fraction of firms in the survey micro file (generally less than 1 percent) cannot be linked. There are also differences across years in terms of which firms in the survey year micro file are ever included in the fielded survey. Note especially the large number of non-sampled/non-response firms in the ASE and (especially) ABS years, and keep in mind (table 2) that overall response rates have changed little over time.

*Ratio Weights and LEOF Validation*

Our approach to weighting LEOF effectively controls for evolving survey differences by using the LBD population to create a set of ratio-based weights for the respondent firm population in each survey. The LEOF universe for each of the periodic surveys is employer firms with positive LBD employment in the year for which the survey sample is drawn, and LEOF records are weighted to match the corresponding LBD population in the LBD base year.[23] Each linked survey file is reweighted to match the LBD universe by firm age, firm size, and two-digit NAICS industry in the corresponding LBD base year. The reweighting uses the ratios of LBD to survey firm counts across 12 firm age, 12 firm size, and 19 two-digit NAICS industry cells.

The ratio-based reweighting generates a respondent sample that closely aligns with LBD (and thus BDS) employment trends. Figures A1 and A2 show that the share of employment in young and start-up firms in the reweighted LEOF respondent samples closely track the BDS employment shares shown in Figure 2 of the main text. Thus, LEOF captures the trends in employer firm start-ups and growth that motivate this research.

Figures A1 and A2 make another important point about LEOF. The LEOF owner sample includes only those firms for which we have owner characteristics, which means they must have passed the "at least one owner with 10 percent ownership" test at the beginning of each survey. The LEOF owner-sample employment shares are all well above the BDS (and LEOF respondent

[23] Firms appear in LEOF multiple times if they participated in multiple surveys. Our weighting algorithm uses every occurrence of a given firm, but the analysis in the main text is limited to one occurrence (randomly chosen) per unique firm identifier (LBDFID). Although we have not yet done so, it is possible to merge LEOF records for the firms that participate in multiple surveys to study how changes in owner of firm characteristics are associated with employment dynamics.

sample) values because the owner population excludes the large firms that are more likely to fail the 10 percent ownership test.

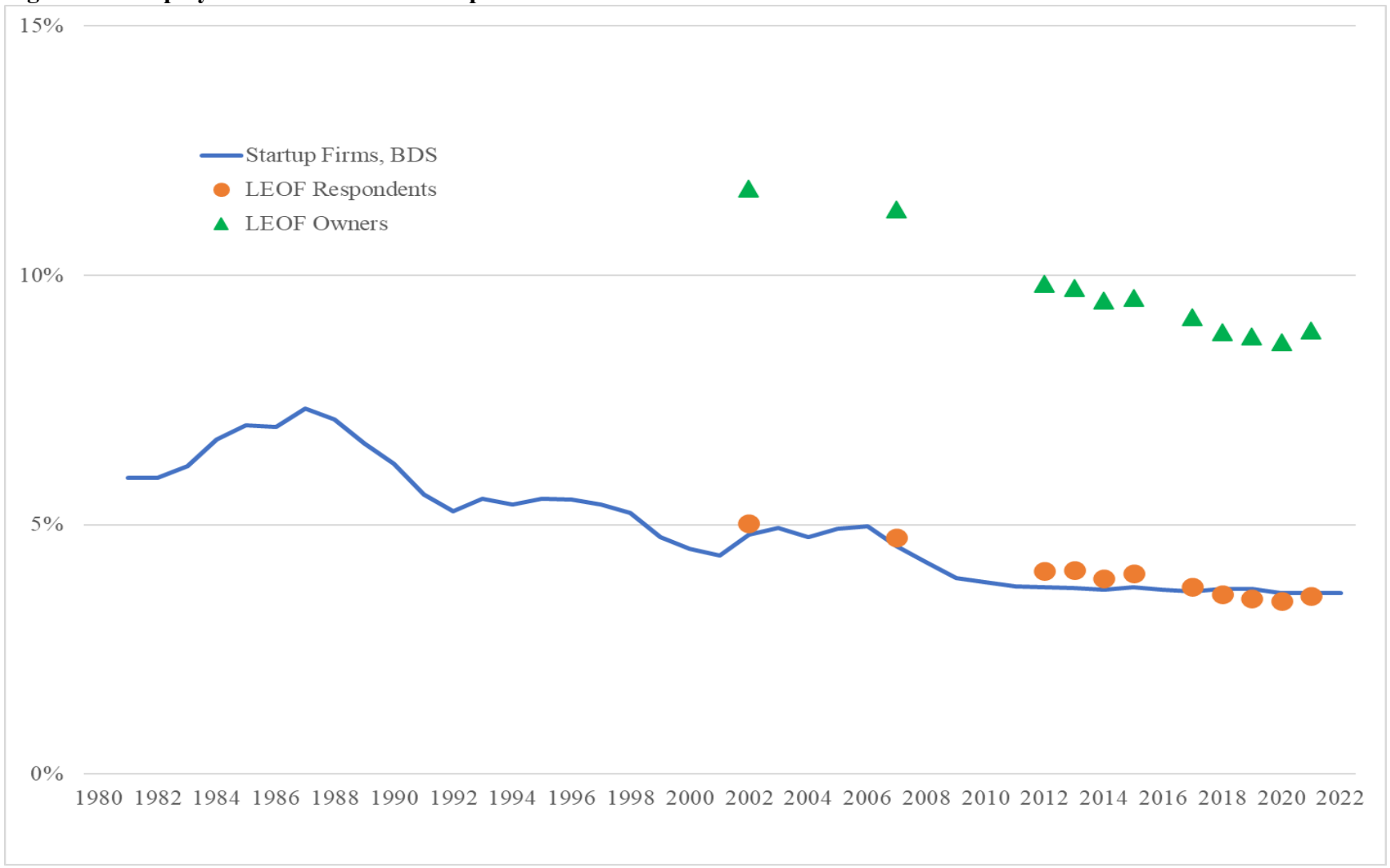
Excluding the largest firms because they fail the 10 percent ownership test does not have much impact on the young firm sample and the analysis here because (1) relatively few young firms fail the test, and (2) because we are reweighting the entire respondent sample across detailed age and size categories within industries and using those weights when working with the owner sample. As such, although the LEOF owner sample employment shares are well above the BDS and respondent sample values in Figures A1 and A2, the trends are very similar. In addition, the modest variability in the relative positions of the respondent and owner sample employment shares suggests that any noise generated by reweighting is also small.

**Table A1. LEOF Linked Sample Statistics**

| | SBO | | | ASE | | | ABS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2002 | 2007 | 2012 | 2013 | 2014 | 2015 | 2017 | 2018 | 2019 | 2020 | 2021 |
| Survey file record count | 2,247,000 | 2,245,000 | 1,045,000 | 420,000 | 430,000 | 435,000 | 1,483,000 | 879,000 | 863,000 | 864,000 | 960,000 |
| Minus survey records not linked to LBD | 994,000 | 1,175,000 | 587,000 | 3,000 | 3,000 | 4,000 | 18,000 | 9,000 | 10,000 | 8,000 | 8,000 |
| Equals linked record count | 1,253,000 | 1,070,000 | 458,000 | 417,000 | 427,000 | 431,000 | 1,465,000 | 870,000 | 854,000 | 856,000 | 952,000 |
| Minus non-sampled/non-respondents | 375,000 | 307,000 | 170,000 | 229,000 | 257,000 | 266,000 | 962,000 | 689,000 | 676,000 | 686,000 | 786,000 |
| Equals survey respondent sample | 878,000 | 763,000 | 288,000 | 188,000 | 170,000 | 165,000 | 503,000 | 180,000 | 178,000 | 170,000 | 167,000 |

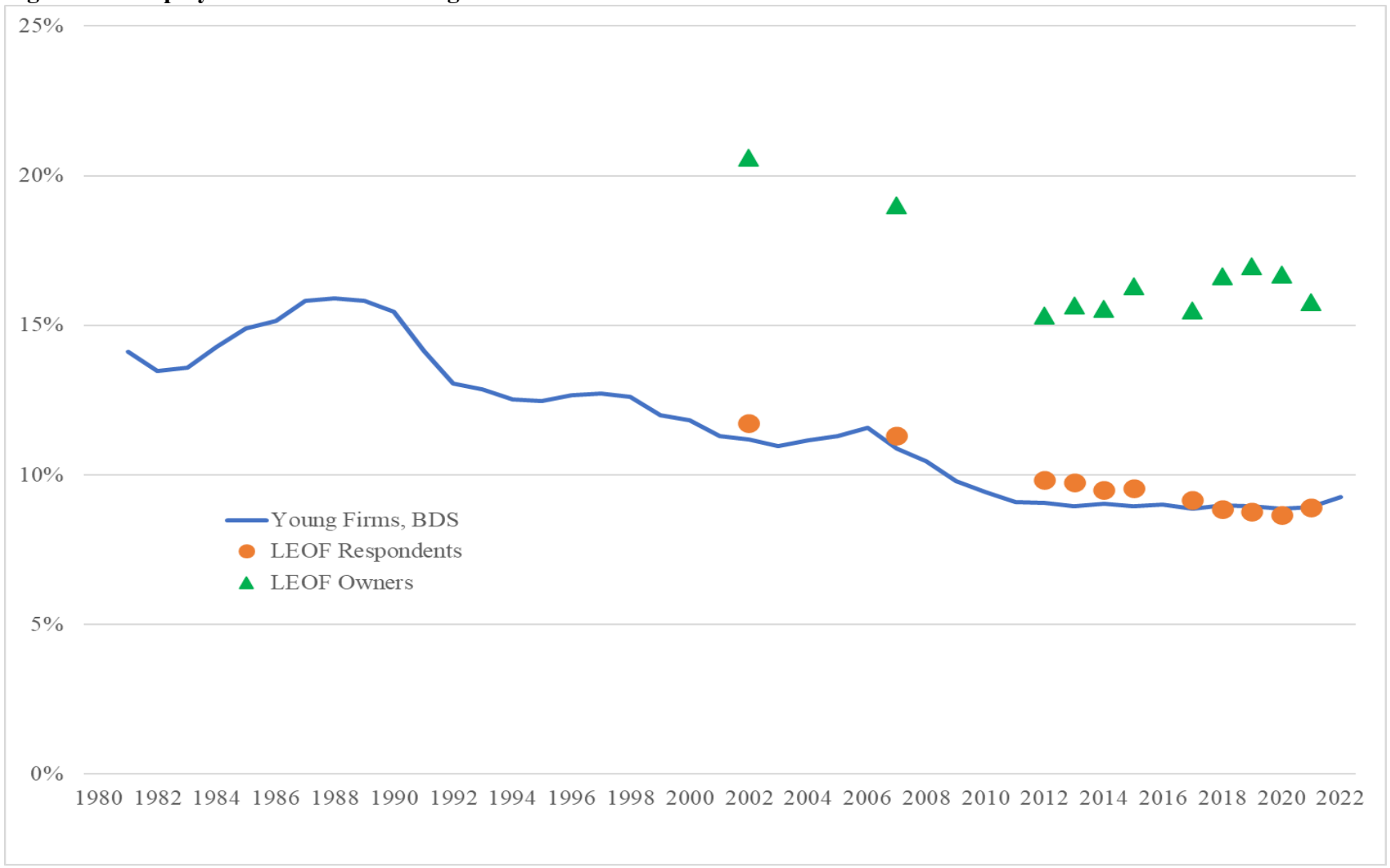
Notes: The data presented in this table are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

**Figure A1. Employment Shares for Start-up Firms in the BDS and LEOF**




Note: Start-ups are firms age 0 or 1 in the survey year. The data presented in this figure are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

**Figure A2. Employment Shares for Young Firms in the BDS and LEOF**




Note: Young firms are ages 0 to 4 in the survey year. The data presented in this figure are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

**Appendix B. Detailed Regression Results**

This appendix reports the detailed regression results underlying Figures 7 through 13 in the main text. The regressions are all linear probability models, with observations weighted using base year employment. The samples are firms age 0 or 1 in the survey year, referred to in the main text as start-up firms. Tables B1 and B2 show regression results for the probability of being in the top quartile by age five size within four-digit industry, otherwise referred to as "success" in the text. Table B3 shows regression results for the probability of having bank loans and outside investors in reported start-up financing sources.

Tables B1 and B2 are structured the same, incrementally expanding the list of potential correlates from just birthyear dummies (column 1) to adding owner demographic characteristics (column 2), then start-up financing sources and amounts (column 3), and finally LBD-based initial employment size categories interacted with LBD-based four-digit industry dummies (column 4). The only difference between Tables B1 and B2 is the inclusion of start-up financing amounts in the last two columns, which requires restricting the sample to 2007 and later.

Table B3 shows three regressions each for the probability of having a bank loan at start-up (columns 1 to 3) and an outside investor (columns 4 to 6). The progression across columns is like the age five success regressions, with the first column in each time dummies only, the second column adding owner characteristics, and the third column adding LBD-based initial employment size interacted with four-digit industry.

Tables B4 and B5 provide details about the owner characteristics and financing sources shown in Figures 4 to 6, but with additional measures and for all firm age groups. Note that even for older firms, the use of finance sources question instructs respondents to refer to the year of start-up, so for mature firms these can be lagged many years. Demographic characteristics are measured as of the LEOF reference year.

## Table B1. Probability of Start-up Firm Being in Top Size Quartile at Age Five, 2002-2017

*(Firms age 0 or 1 in year of survey; survey years 2002 to 2017)*

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Year and Age Dummies | Plus Demographics | Plus Startup Financing Sources | Plus Startup Size*Industry Interactions |
| Birthyear 2002 | -0.0244 | 0.141 | 0.188 | -0.411 |
| | (0.463) | (0.460) | (0.458) | (0.420) |
| Birthyear 2006 | -3.942*** | -3.758*** | -3.726*** | -4.059*** |
| | (0.253) | (0.252) | (0.255) | (0.237) |
| Birthyear 2007 | -4.209*** | -3.934*** | -3.878*** | -3.157*** |
| | (0.462) | (0.460) | (0.461) | (0.424) |
| Birthyear 2011 | -0.188 | 0.568 | 1.231*** | 1.607*** |
| | (0.380) | (0.379) | (0.379) | (0.350) |
| Birthyear 2012 | -0.735* | 0.0133 | 0.669* | 1.523*** |
| | (0.393) | (0.393) | (0.393) | (0.360) |
| Birthyear 2013 | -0.378 | 0.215 | 0.761 | 1.691*** |
| | (0.508) | (0.505) | (0.505) | (0.466) |
| Birthyear 2014 | 0.172 | 0.812 | 1.375*** | 1.997*** |
| | (0.505) | (0.503) | (0.502) | (0.461) |
| Birthyear 2015 | -0.451 | 0.319 | 0.949* | 1.505*** |
| | (0.560) | (0.558) | (0.557) | (0.510) |
| Birthyear 2016 | -1.464*** | -0.854*** | -0.111 | 0.621** |
| | (0.304) | (0.303) | (0.303) | (0.279) |
| Birthyear 2017 | -1.351*** | -0.708 | 0.0218 | 0.900* |
| | (0.508) | (0.506) | (0.505) | (0.463) |
| Age=1 Dummy | 2.425*** | 2.554*** | 2.427*** | 1.973*** |
| | (0.397) | (0.394) | (0.393) | (0.359) |
| Any Owner Younger than 35 | | 3.024*** | 2.874*** | 3.318*** |
| | | (0.211) | (0.210) | (0.196) |
| Any Owner 55 or Older | | 0.152 | 0.0149 | -1.789*** |
| | | (0.181) | (0.181) | (0.164) |
| All Owners College Educated | | 3.949*** | 3.981*** | 1.925*** |
| | | (0.162) | (0.161) | (0.170) |
| All Owners Female | | -5.555*** | -5.129*** | -2.658*** |
| | | (0.189) | (0.188) | (0.187) |
| All Owners Non-White or Hispanic | | -5.028*** | -4.694*** | -2.644*** |
| | | (0.186) | (0.186) | (0.181) |
| Bank Loan at Start-up | | | 9.438*** | 4.361*** |
| | | | (0.248) | (0.230) |
| Home Equity Loan at Start-up | | | 2.302*** | 1.392*** |
| | | | (0.364) | (0.331) |
| Credit Cards at Start-up | | | -1.919*** | -0.421** |
| | | | (0.226) | (0.211) |
| Outside Investor at Start-up | | | 5.344*** | 2.908*** |
| | | | (0.396) | (0.365) |
| Constant | 15.56*** | 14.72*** | 12.63*** | 13.07 |
| | (0.438) | (0.448) | (0.451) | (12.27) |
| R-squared | 0.002 | 0.014 | 0.024 | 0.207 |
| Number of observations | 301,000 | 301,000 | 301,000 | 301,000 |

Notes: The data presented in this table are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

## Table B2. Probability of Start-up Firm Being in Top Size Quartile at Age Five, 2007-2017

*(Firms age 0 or 1 in year of survey; survey years 2007 to 2017)*

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Year and Age Dummies | Plus Demographics | Plus Startup Financing Sources and Amounts | Plus Startup Size*Industry Interactions |
| Birthyear 2007 | -0.267 | -0.177 | -0.310 | 0.801* |
| | (0.457) | (0.455) | (0.450) | (0.416) |
| Birthyear 2011 | 3.754*** | 4.325*** | 5.224*** | 5.809*** |
| | (0.374) | (0.373) | (0.371) | (0.345) |
| Birthyear 2012 | 3.207*** | 3.775*** | 4.563*** | 5.679*** |
| | (0.387) | (0.387) | (0.384) | (0.354) |
| Birthyear 2013 | 3.564*** | 4.000*** | 4.512*** | 5.720*** |
| | (0.503) | (0.501) | (0.497) | (0.460) |
| Birthyear 2014 | 4.114*** | 4.593*** | 5.102*** | 6.008*** |
| | (0.500) | (0.498) | (0.494) | (0.456) |
| Birthyear 2015 | 3.491*** | 4.102*** | 4.701*** | 5.533*** |
| | (0.556) | (0.554) | (0.548) | (0.505) |
| Birthyear 2016 | 2.478*** | 2.912*** | 3.837*** | 4.824*** |
| | (0.296) | (0.296) | (0.294) | (0.273) |
| Birthyear 2017 | 2.591*** | 3.057*** | 3.844*** | 5.009*** |
| | (0.504) | (0.501) | (0.497) | (0.458) |
| Age=1 Dummy | 2.425*** | 2.572*** | 2.289*** | 1.911*** |
| | (0.397) | (0.394) | (0.390) | (0.359) |
| Any Owner Younger than 35 | | 3.364*** | 3.351*** | 3.646*** |
| | | (0.246) | (0.244) | (0.228) |
| Any Owner 55 or Older | | -0.227 | -1.347*** | -2.192*** |
| | | (0.206) | (0.204) | (0.186) |
| All Owners College Educated | | 3.740*** | 2.984*** | 1.510*** |
| | | (0.186) | (0.185) | (0.194) |
| All Owners Female | | -5.311*** | -3.952*** | -2.153*** |
| | | (0.214) | (0.213) | (0.212) |
| All Owners Non-White or Hispanic | | -4.861*** | -4.686*** | -2.617*** |
| | | (0.207) | (0.206) | (0.201) |
| Bank Loan at Start-up | | | 5.834*** | 3.039*** |
| | | | (0.312) | (0.288) |
| Home Equity Loan at Start-up | | | 0.00718 | 0.271 |
| | | | (0.371) | (0.338) |
| Credit Cards at Start-up | | | -1.438*** | -0.439* |
| | | | (0.263) | (0.247) |
| Outside Investor at Start-up | | | 2.521*** | 1.817*** |
| | | | (0.451) | (0.417) |
| Start-up Capital $10,000 to $100,000 | | | 1.427*** | 1.733*** |
| | | | (0.203) | (0.195) |
| Start-up Capital $100,000 to $1,000,000 | | | 9.962*** | 5.353*** |
| | | | (0.300) | (0.292) |
| Start-up Capital $1,000,000 or more | | | 24.63*** | 11.49*** |
| | | | (0.778) | (0.737) |
| Constant | 11.62*** | 11.00*** | 7.277*** | 9.393 |
| | (0.432) | (0.450) | (0.457) | (13.58) |
| R-squared | 0.003 | 0.013 | 0.041 | 0.210 |
| Number of Observations | 203,000 | 203,000 | 203,000 | 203,000 |

Notes: The data presented in this table are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

## Table B3. Probability of Start-up Having a Given Finance Source, 2002 to 2017

| *(Firms age 0 or 1 in year of survey; survey years 2002 to 2017)* | (1) | (2) | (3) |
|---|---|---|---|
| | Year and Age Dummies | Plus Demographics | Plus Startup Size*Industry Interactions |
| Birthyear 2002 | -1.668*** | -1.649*** | -1.593*** |
| | (0.284) | (0.283) | (0.272) |
| Birthyear 2006 | -3.791*** | -3.679*** | -3.513*** |
| | (0.301) | (0.301) | (0.289) |
| Birthyear 2007 | -5.320*** | -5.181*** | -4.434*** |
| | (0.287) | (0.287) | (0.276) |
| Birthyear 2011 | -10.07*** | -9.453*** | -9.122*** |
| | (0.374) | (0.375) | (0.361) |
| Birthyear 2012 | -10.18*** | -9.628*** | -9.092*** |
| | (0.310) | (0.311) | (0.300) |
| Birthyear 2013 | -9.349*** | -8.966*** | -8.380*** |
| | (0.376) | (0.377) | (0.364) |
| Birthyear 2014 | -9.292*** | -8.832*** | -8.244*** |
| | (0.379) | (0.379) | (0.365) |
| Birthyear 2015 | -10.34*** | -9.804*** | -9.200*** |
| | (0.397) | (0.398) | (0.383) |
| Birthyear 2016 | -9.818*** | -9.280*** | -8.949*** |
| | (0.314) | (0.314) | (0.303) |
| Birthyear 2017 | -10.83*** | -10.29*** | -9.437*** |
| | (0.329) | (0.330) | (0.320) |
| Any Owner Younger than 35 | | 0.885*** | 0.554*** |
| | | (0.201) | (0.192) |
| Any Owner 55 or Older | | 1.029*** | -0.108 |
| | | (0.183) | (0.178) |
| All Owners College Educated | | -0.344** | -0.0839 |
| | | (0.159) | (0.173) |
| All Owners Female | | -3.685*** | -2.536*** |
| | | (0.191) | (0.197) |
| All Owners Non-White or Hispanic | | -3.589*** | -5.388*** |
| | | (0.190) | (0.190) |
| Constant | 23.05*** | 23.80*** | 1.593*** |
| | (0.216) | (0.239) | (0.272) |
| R-squared | 0.010 | 0.014 | 0.105 |
| Number of observations | 301,000 | 301,000 | 301,000 |

| *(Firms age 0 or 1 in year of survey; survey years 2002 to 2017)* | (1) | (2) | (3) |
|---|---|---|---|
| | Year and Age Dummies | Plus Demographics | Plus Startup Size*Industry Interactions |
| Birthyear 2002 | -0.0570 | -0.0985 | -0.0825 |
| | (0.146) | (0.146) | (0.146) |
| Birthyear 2006 | 0.603*** | 0.652*** | 0.729*** |
| | (0.164) | (0.165) | (0.165) |
| Birthyear 2007 | 0.847*** | 0.823*** | 1.014*** |
| | (0.160) | (0.160) | (0.160) |
| Birthyear 2011 | 0.866*** | 1.073*** | 1.040*** |
| | (0.241) | (0.242) | (0.241) |
| Birthyear 2012 | 0.766*** | 0.925*** | 0.955*** |
| | (0.190) | (0.191) | (0.191) |
| Birthyear 2013 | 1.323*** | 1.497*** | 1.582*** |
| | (0.247) | (0.248) | (0.247) |
| Birthyear 2014 | 0.866*** | 1.048*** | 1.142*** |
| | (0.241) | (0.242) | (0.241) |
| Birthyear 2015 | 0.647** | 0.859*** | 1.046*** |
| | (0.259) | (0.261) | (0.260) |
| Birthyear 2016 | 0.177 | 0.385** | 0.317* |
| | (0.183) | (0.184) | (0.185) |
| Birthyear 2017 | 0.00330 | 0.116 | 0.137 |
| | (0.197) | (0.198) | (0.198) |
| Any Owner Younger than 35 | | 2.198*** | 2.059*** |
| | | (0.150) | (0.149) |
| Any Owner 55 or Older | | -0.961*** | -1.349*** |
| | | (0.116) | (0.117) |
| All Owners College Educated | | -0.427*** | 0.00696 |
| | | (0.107) | (0.125) |
| All Owners Female | | -0.769*** | -0.498*** |
| | | (0.137) | (0.145) |
| All Owners Non-White or Hispanic | | -0.220 | -0.784*** |
| | | (0.139) | (0.142) |
| Constant | 4.985*** | 5.076*** | 0.0825 |
| | (0.110) | (0.129) | (0.146) |
| R-squared | 0.000 | 0.003 | 0.023 |
| Number of observations | 301,000 | 301,000 | 301,000 |

Notes: The data presented in this table are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

## Table B4. Owner Characteristics by Firm Age and LEOF Survey Years (Employment Weighted)

| | SBO | | | ASE | | | ABS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2002 | 2007 | 2012 | 2014 | 2015 | 2016 | 2018 | 2019 | 2020 | 2021 | 2022 |
| **All Owners Female** | | | | | | | | | | | |
| All Firms | 7.2% | 7.2% | 9.9% | 10.0% | 9.5% | 9.9% | 10.2% | 10.8% | 11.5% | 11.6% | 11.6% |
| Age 0,1 | 10.4% | 11.0% | 14.8% | 14.2% | 12.7% | 14.3% | 14.5% | 14.5% | 15.2% | 16.0% | 17.7% |
| Age 2,3,4 | 9.8% | 10.8% | 14.1% | 13.5% | 14.2% | 14.4% | 13.6% | 14.7% | 15.0% | 15.9% | 15.0% |
| Mature Firms | 6.6% | 6.4% | 9.2% | 9.3% | 8.8% | 9.2% | 9.5% | 10.1% | 10.9% | 10.8% | 10.8% |
| **Any Owner <35** | | | | | | | | | | | |
| All Firms | 7.7% | 7.6% | 6.6% | 5.7% | 5.7% | 6.1% | 6.7% | 6.6% | 6.7% | 6.6% | 5.6% |
| Age 0,1 | 18.6% | 19.9% | 18.3% | 16.8% | 16.9% | 17.2% | 18.9% | 19.2% | 18.3% | 19.2% | 18.0% |
| Age 2,3,4 | 15.6% | 14.8% | 13.7% | 12.2% | 11.7% | 12.2% | 14.4% | 15.0% | 15.0% | 14.5% | 13.3% |
| Mature Firms | 5.6% | 5.6% | 5.1% | 4.3% | 4.3% | 4.6% | 5.1% | 4.7% | 4.9% | 4.8% | 3.9% |
| **Any Owner 35 to 54** | | | | | | | | | | | |
| All Firms | 65.7% | 63.1% | 56.0% | 53.3% | 52.1% | 51.5% | 51.7% | 53.0% | 53.1% | 53.1% | 49.6% |
| Age 0,1 | 72.8% | 73.3% | 68.8% | 68.2% | 66.3% | 65.0% | 68.3% | 70.2% | 69.6% | 68.5% | 69.1% |
| Age 2,3,4 | 76.3% | 75.4% | 70.3% | 68.2% | 67.9% | 67.7% | 67.6% | 69.7% | 68.9% | 69.6% | 68.2% |
| Mature Firms | 63.6% | 60.7% | 53.7% | 50.7% | 49.5% | 48.8% | 48.9% | 49.9% | 50.1% | 50.1% | 46.3% |
| **Any Owner 55 plus** | | | | | | | | | | | |
| All Firms | 52.6% | 59.7% | 65.5% | 66.4% | 68.8% | 68.4% | 68.6% | 66.7% | 66.9% | 66.3% | 67.6% |
| Age 0,1 | 33.2% | 32.3% | 36.9% | 38.9% | 40.3% | 40.3% | 37.7% | 37.0% | 37.2% | 34.7% | 34.5% |
| Age 2,3,4 | 31.7% | 36.0% | 41.1% | 42.4% | 44.6% | 44.5% | 42.5% | 40.4% | 40.6% | 39.4% | 40.6% |
| Mature Firms | 57.4% | 65.1% | 69.9% | 70.8% | 73.3% | 73.0% | 73.4% | 71.8% | 72.1% | 71.6% | 72.7% |
| **All Owners College Plus** | | | | | | | | | | | |
| All Firms | 47.9% | 49.8% | 54.0% | 52.2% | 53.9% | 52.8% | 52.8% | 51.9% | 51.5% | 52.7% | 55.0% |
| Age 0,1 | 43.3% | 42.6% | 48.5% | 46.9% | 49.5% | 49.0% | 50.5% | 49.3% | 48.2% | 48.9% | 51.2% |
| Age 2,3,4 | 45.2% | 45.6% | 49.5% | 48.7% | 50.3% | 47.9% | 51.4% | 51.0% | 49.8% | 50.5% | 50.2% |
| Mature Firms | 48.7% | 50.9% | 54.8% | 52.9% | 54.6% | 53.6% | 53.1% | 52.2% | 51.9% | 53.2% | 55.8% |
| **All Owners Non-White or Hispanic** | | | | | | | | | | | |
| All Firms | 5.9% | 7.9% | 10.5% | 10.9% | 10.7% | 11.9% | 11.3% | 13.6% | 13.5% | 13.8% | 14.9% |
| Age 0,1 | 10.0% | 16.2% | 20.2% | 18.2% | 16.3% | 18.1% | 20.6% | 24.1% | 23.8% | 25.6% | 27.3% |
| Age 2,3,4 | 9.4% | 13.8% | 18.7% | 18.0% | 17.5% | 17.8% | 19.3% | 20.9% | 21.5% | 23.3% | 24.1% |
| Mature Firms | 5.1% | 6.4% | 9.0% | 9.7% | 9.7% | 10.9% | 9.9% | 12.0% | 11.8% | 11.9% | 13.0% |
| **Any Owner Veteran** | | | | | | | | | | | |
| All Firms | 25.0% | 21.4% | 17.7% | 16.1% | 15.7% | 14.6% | 13.7% | 12.8% | 12.4% | 11.7% | 10.4% |
| Age 0,1 | 18.5% | 14.4% | 11.5% | 11.8% | 11.0% | 10.3% | 9.3% | 9.9% | 9.2% | 8.4% | 8.9% |
| Age 2,3,4 | 17.6% | 15.1% | 12.8% | 12.5% | 12.0% | 11.3% | 9.9% | 8.6% | 9.5% | 9.0% | 8.4% |
| Mature Firms | 26.6% | 22.7% | 18.6% | 16.7% | 16.4% | 15.3% | 14.3% | 13.5% | 13.0% | 12.2% | 10.7% |
| **Any Owner Immigrant** | | | | | | | | | | | |
| All Firms | | 12.8% | 13.7% | 13.1% | 13.0% | 13.3% | 16.6% | 18.2% | 17.8% | 18.2% | 18.1% |
| Age 0,1 | | 21.3% | 22.5% | 20.1% | 19.1% | 20.2% | 26.7% | 28.9% | 26.5% | 29.0% | 27.3% |
| Age 2,3,4 | | 19.5% | 21.9% | 19.3% | 19.2% | 19.0% | 25.1% | 27.4% | 26.7% | 28.6% | 27.5% |
| Mature Firms | | 11.2% | 12.2% | 12.0% | 11.9% | 12.2% | 15.1% | 16.4% | 16.1% | 16.3% | 16.4% |

Notes: The data presented in this table are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).

## Table B5. Financing Sources by Firm Age and LEOF Survey Year (Employment Weighted)

| | SBO | | | ASE | | | ABS |
|---|---|---|---|---|---|---|---|
| | 2002 | 2007 | 2012 | 2014 | 2015 | 2016 | 2018 |
| **Incidence of Bank Loans at Startup** | | | | | | | |
| All Firms | 33.1% | 25.3% | 22.0% | 24.4% | 24.1% | 23.5% | 21.7% |
| Age 0,1 | 33.9% | 28.8% | 19.5% | 21.5% | 22.1% | 20.5% | 20.6% |
| Age 2,3,4 | 33.8% | 27.8% | 23.1% | 22.4% | 23.2% | 20.9% | 20.5% |
| Mature Firms | 33.0% | 24.7% | 22.1% | 24.8% | 24.3% | 24.0% | 21.9% |
| **Incidence of Home Equity Loans at Startup** | | | | | | | |
| All Firms | | 6.6% | 5.4% | 6.9% | 6.4% | 5.9% | 5.0% |
| Age 0,1 | | 14.6% | 6.4% | 7.1% | 6.6% | 5.7% | 5.5% |
| Age 2,3,4 | | 11.6% | 9.0% | 8.5% | 7.3% | 6.1% | 5.3% |
| Mature Firms | | 5.3% | 5.0% | 6.8% | 6.3% | 5.9% | 5.0% |
| **Incidence of Credit Cards at Startup** | | | | | | | |
| All Firms | 6.4% | 6.2% | 5.7% | 7.9% | 7.6% | 7.1% | 7.2% |
| Age 0,1 | 11.8% | 13.9% | 11.4% | 13.5% | 12.5% | 11.1% | 12.1% |
| Age 2,3,4 | 11.1% | 12.2% | 11.0% | 12.9% | 12.2% | 11.4% | 11.0% |
| Mature Firms | 5.2% | 4.8% | 4.8% | 7.0% | 6.8% | 6.4% | 6.5% |
| **Incidence of Outside Investor at Startup** | | | | | | | |
| All Firms | 8.0% | 7.0% | 5.8% | 7.3% | 7.0% | 6.4% | 5.7% |
| Age 0,1 | 8.1% | 7.7% | 7.9% | 8.0% | 7.4% | 7.2% | 7.7% |
| Age 2,3,4 | 9.0% | 7.7% | 6.4% | 7.7% | 7.4% | 6.4% | 6.5% |
| Mature Firms | 7.8% | 6.9% | 5.6% | 7.2% | 6.9% | 6.4% | 5.5% |
| **Startup Capital < $10,000** | | | | | | | |
| All Firms | | 32.9% | 27.2% | 26.3% | 26.7% | 27.2% | 29.1% |
| Age 0,1 | | 22.4% | 24.8% | 22.7% | 22.5% | 24.6% | 24.5% |
| Age 2,3,4 | | 22.9% | 21.6% | 20.4% | 21.3% | 21.9% | 24.7% |
| Mature Firms | | 35.5% | 28.2% | 27.4% | 27.7% | 28.0% | 30.1% |
| **Startup Capital $10,000 to <$100.000** | | | | | | | |
| All Firms | | 27.8% | 30.9% | 30.6% | 29.6% | 30.2% | 29.3% |
| Age 0,1 | | 28.6% | 32.0% | 32.4% | 30.5% | 30.0% | 28.8% |
| Age 2,3,4 | | 29.8% | 30.5% | 32.1% | 32.8% | 31.4% | 29.8% |
| Mature Firms | | 27.4% | 30.9% | 30.2% | 29.2% | 30.0% | 29.3% |
| **Startup Capital $100,000 to <$1,000,000** | | | | | | | |
| All Firms | | 27.5% | 29.1% | 30.5% | 30.5% | 30.2% | 29.4% |
| Age 0,1 | | 37.0% | 32.6% | 33.9% | 36.6% | 35.0% | 34.7% |
| Age 2,3,4 | | 35.7% | 36.0% | 36.7% | 34.4% | 35.5% | 35.1% |
| Mature Firms | | 25.2% | 27.9% | 29.4% | 29.5% | 29.1% | 28.2% |
| **Startup Capital $1,000,000 plus** | | | | | | | |
| All Firms | | 11.9% | 12.7% | 12.7% | 13.2% | 12.4% | 12.2% |
| Age 0,1 | | 12.0% | 10.6% | 11.0% | 10.4% | 10.4% | 12.0% |
| Age 2,3,4 | | 11.7% | 11.9% | 10.7% | 11.4% | 11.2% | 10.4% |
| Mature Firms | | 11.9% | 13.0% | 13.1% | 13.7% | 12.8% | 12.4% |

Notes: The data presented in this table are approved for dissemination by the DRB (CBDRB-FY25-CES014-005).