Destructive Creation at Work: How Financial Distress Spurs Entrepreneurship*

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ABSTRACT

Using US Census employer-employee matched data, I show that employer financial distress accelerates the exit of employees to found start-ups. This effect is particularly evident when distressed firms are less able to enforce contracts restricting employee mobility into competing firms. Entrepreneurs exiting financially distressed employers earn higher wages prior to the exit and after founding start-ups, compared to entrepreneurs exiting non-distressed firms. Consistent with distressed firms losing higher-quality workers, their start-ups have higher average employment and payroll growth. The results suggest that the social costs of distress might be lower than the private costs to financially distressed firms.

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Why do people start new firms? Why don't they implement their entrepreneurial ideas within existing firms? These questions are particularly important, given that many successful firms are founded by workers who leave paid employment.[1] This paper examines one particular period in an employer's existence when it is less likely to be in a position to invest in developing ideas internally and to retain entrepreneurial employees: during financial distress. While a growing empirical literature studies the effects of firm financial distress on workers' outcomes in paid employment, this paper examines the impact of employer financial distress on the likelihood of employees exiting to found new firms.

To quantify the effect of financial distress on entrepreneurship, I use confidential US Census employer-employee matched panel data to measure the propensity of workers at public firms to transition into start-ups. Specifically, at each establishment of a given public firm, I calculate the percentage of workers who exit and found start-ups within two years after the employer's potential exposure to a distress shock. Using this constructed establishment-level entrepreneurship panel, I identify the impact of financial distress shocks in a difference-in-difference setting around large, unexpected, industry-wide shocks.[2] I then compare the effect of industry shocks on firms' with differential ex-ante exposure to the shock. I use ex-ante firm financial leverage as this vulnerability measure and identify the incremental effect of the shock on relatively more levered firms while also including industry-year, state-year and establishment fixed effects.

I document that, following unexpected industry shocks, employees at relatively more financially levered firms are more likely to exit to found new firms. A one standard deviation increase in ex-ante financial leverage is associated with an increase in the post-shock entrepreneurship rate of 25% from the mean entrepreneurship rate of 1.5% to 1.9%. I also find that neither industry distress itself nor elevated firm leverage prior to non-distress industry conditions is associated with higher exit rates of workers into start-ups. This result suggests that both are needed to have an effect on firms' retention of entrepreneurial workers.

[1] Bhide (2000) reports that 71% of firm founders in the *Inc. 500* (a list of the fastest-growing privately held firms in the US) claim that they had replicated or modified an idea that they had identified in previous employment, compared with only 4% who had found their idea through systematic search.

[2] Following Opler and Titman (1994), an industry shock is defined based on negative industry sales growth to identify cash flow shock and based on a large negative industry stock return to ensure that the shock is unanticipated.

The identification strategy described above has several advantages. First, the coefficients on leverage and industry shock variables captures unconditional effects of leverage and industry shocks on entrepreneurship. Second, the inclusion of industry-year fixed effects isolates the effect of firm financial leverage on workers who otherwise face the same industry conditions, and hence face the same job opportunities and incentives to found firms. Third, state-year fixed effects absorb regional variation that might drive changes in leverage and entrepreneurship. Last, adding establishment fixed effects addresses concerns that unobservable, time-invariant heterogeneity might correlate with leverage and entrepreneurship, such as differences in workforce characteristics or investment opportunities.

I next examine the robustness of the results to some additional concerns. The difference-in-difference identification strategy requires that financially distressed firms do not experience differential trends in entrepreneurship prior to the shock. I find no changes in the entrepreneurship rate leading up to financial distress. Additionally, the estimates do not change when I include time-varying firm-level variables, such as profitability and Tobin's Q, and establishment-level variables, such as average wages and proxies for workforce risk aversion. The stability of the coefficients helps mitigate the concerns that time-varying omitted factors, such as a decline in investment opportunities or changes in worker characteristics, drive both changes in leverage and entrepreneurship.

Having established the increase in departures to start-ups, I next consider several non-mutually exclusive channels. First, job insecurity and wage decreases ensuing employer distress might propel workers to seek outside employment opportunities, increasing overall employee turnover. Second, contracting and financing frictions associated with financial distress might prompt higher quality workers with ideas for products or services to leave distressed employers to found new firms (Maksimovic and Titman (1991)). Lastly, employer financial distress can increase the number of start-ups founded by laid-off employees perceived as low quality by other firms (Gibbons and Katz (1991)).

I first examine whether the result arises due to higher worker turnover in financially distressed firms. When I re-normalize the count of entrepreneurs by the number of departing employees to directly control for overall turnover, I again find that departing workers are more likely to found start-ups after employer financial distress. I next explore whether overall turnover also increases

following financial distress shocks. In this context, looking at general turnover helps distinguish between mechanisms affecting all workers (wage decrease, unemployment risk, etc.) and those affecting mainly entrepreneurial departures. I find no evidence that financial distress shocks trigger exit to other established firms or exit from the employment sample, suggesting that departures increase specifically to start-ups. These departures might have no effect on employing firms if they are able to re-staff entrepreneurial turnover. Therefore, to validate the strategy, I also test whether employment growth declines following financial distress shocks. I find that relatively more levered firms have lower future employment growth following industry downturns, suggesting that industry shocks negatively affect financially levered firms.

This lower employment growth might be driven by jettisoned workers who move to start-ups. While the data do not allow to distinguish quits from layoffs, I do explore whether higher- or lower-quality workers are responsible for the new firms. Generally, start-ups of laid-off workers are less likely to create jobs or survive (Parker (2009)). If the increase is driven by laid-off workers, we might observe a decline in the average quality of entrepreneurs and the firms they found.

Using earnings and start-up growth as proxies for quality, several findings suggest that workers who transition into entrepreneurship following financial distress shocks are higher-quality workers. First, within establishments of financially distressed firms, the exit of workers to found start-ups is not driven by lower wage earners. Second, entrepreneurs from financially distressed firms earn higher wages prior to departure and after joining start-ups than entrepreneurs from non-distressed firms. Moreover, the start-ups founded by workers exiting distressed employers have higher future employment and payroll growth, but similar survival rates to the start-ups spawned from non-distressed firms. These results favor the interpretation that the increase in entrepreneurship spawned from distressed firms is driven by exits of higher-quality workers.

What makes higher-quality workers at financially distressed firms leave to found new firms? Both contracting and financing frictions are likely important. Workers might not want to stay with a financially distressed employer that has poor incentives to honor its contracts (Maksimovic and Titman (1991)). Such a firm might also be less able to access external capital markets and face financing constraints to retain entrepreneurial workers. A worker with ideas for new products or

services might be less willing to develop them within a financially distressed firm and be particularly inclined to leave, causing a "brain drain."

I first examine the contracting frictions channel. I note that such frictions should be less relevant if firms have ex-ante contractual means to discourage their workers from competing activity. One of the standard ways to hold onto workers is through non-compete agreements, which restrict employee mobility into competing firms, existing or new. While these contracts are commonly used in all US states, significant inter-state variation exists in the degree of their enforcement. Using this variation, I find that the increase in entrepreneurship spawned from distressed firms is concentrated in states with less enforceable non-compete agreements.

I test the financing frictions channel in two ways. First, I look at a subset of distressed firms that are particularly likely to have limited access to external capital and hence be more financially constrained: smaller and younger firms. I test whether entrepreneurship rates are relatively higher in financially distressed firms that are smaller and younger compared to larger and older distressed firms. Indeed, I find that the treatment effect is higher in younger and smaller distressed firms, suggesting that financing constraints weaken a firm's ability to retain entrepreneurial workers. Second, I examine whether workers leave to pursue related economic activity that could have been undertaken by former employers in the absence of distress. To capture relatedness, I redefine entrepreneurship by limiting departures to start-ups in the same industry as the spawning establishment. Using this related entrepreneurship rate variable, I now find larger economic effects of financial distress on the entrepreneurship rate: a 43% increase from the mean rate compared to a 25% increase estimated with the definition that includes all start-ups.

Overall, my results suggest that corporate financial distress triggers the exit of workers to pursue entrepreneurship. Financial distress propels workers to create their own firms as a way to seek better opportunities. This "destructive creation" suggests that some new firms arise when existing firms, financially weakened by debt during shocks, are less able to pursue economic activity within their boundaries. While worker entrepreneurship does not likely benefit distressed firms, the findings suggest a silver lining to distress. Productive workers from financially distressed firms start successful new ventures at a higher rate, suggesting that productive resources get reallocated

from old to new firms and that the social costs of financial distress might be lower than the private costs to financially distressed firms.

This paper contributes to several literatures. More broadly, it is connected to empirical work on the boundaries of the firm. Baker and Hubbard (2004) examine the impact of a monitoring technology on the decision to vertically integrate, Robinson (2008) studies strategic alliances, Fresard, Hoberg, and Phillips (2014) and Seru (2014) examine the link between integration and innovation. This paper shows that the capital structure decisions of existing firms have implications for new firm creation, and hence affect firm boundaries.

This paper also adds to the research on costs of financial distress. A growing set of papers argues that part of the costs is borne by workers. While these worker costs have long been used to theoretically explain firms' capital structure decisions (Titman (1984); Berk, Stanton, and Zechner (2010)), few papers examine empirically how financial distress affects a firm's ability to retain and attract human capital. This paper complements findings of Brown and Matsa (2016) who use data from an online job search platform to show that distressed financial firms face reduced labor supply from job applicants. Using confidential US Census data, this paper examines the impact of financial distress shocks on firms' retention of human capital and makes several contributions. First, I document that financially distressed firms experience an increase in departures of higher-wage workers into start-ups, which are usually associated with higher productivity and faster growth (Foster, Haltiwanger, and Syverson (2008); Haltiwanger, Jarmin, and Miranda (2012)). Second, this paper finds no significant increase in employee departures to other established firms or non-employment, suggesting that employment losses are smaller as compared to those found in studies examining more severe cases of distress, such as bankruptcy (Hotchkiss (1995); Agrawal and Matsa (2013)).[3] Third, it shows heterogeneity in departure rates, which increase in firms' inability to

[3]Distressed firms also reduce wages (Benmelech, Bergman, and Enriquez (2012), Graham, Kim, Li, and Qiu (2015)). In addition to the labor market effects, financial distress may affect firm performance (Opler and Titman (1994); Andrade and Kaplan (1998)); real asset prices (Pulvino (1998)); competitors' collateral values (Benmelech and Bergman (2011)); and how firms compete in product markets, including entry (Chevalier (1995a)), exit (Kovenock and Phillips (1997); Zingales (1998)), pricing (Chevalier (1995b); Phillips (1995)), product quality (Rose (1990); Borenstein and Rose (2003); Matsa (2011); Phillips and Sertsios (2013)), and product prices (Hortaçsu, Matvos, Syverson, and Venkataraman (2013)). In concurrent work, Baghai, Silva, Thell, and Vig (2015) use Swiss data to examine pre-bankruptcy turnover of the top 5% of employees by military intelligence scores and earnings. This paper examines the impact of financial distress shocks on new firm creation, uses US Census data, documents employee

retain workers with ex-ante contracts.

This paper also contributes to our understanding of factors affecting start-up creation and start-up growth. First, it closely relates to studies examining why employees become entrepreneurs, coined "entrepreneurial spawning" by Gompers, Lerner, and Scharfstein (2005) who examine public firm characteristics that predict founding rates of VC-backed start-ups by former employees. They find that VC-backed, younger, and more focused firms spawn more start-ups. This paper documents that employees are more likely to found start-ups following employer financial distress.[4] Second, the paper shows that employer financial distress is associated with creation of faster growing start-ups. Third, this paper documents that firm creation is lower when distressed employers are better able to enforce non-compete agreements, contributing to the debate on the role of non-competes in start-up creation (Samila and Sorenson (2011)). Lastly, this paper also provides a novel explanation for why smaller and younger firms spawn more start-ups. The existing literature argues that preference sorting plays a major role in generating the small and young firm effect (Elfenbein, Hamilton, and Zenger (2010)). However, a new, finance-oriented explanation centers around the finding that younger firms are more financially levered than public firms (Robb and Robinson (2014)). This higher leverage makes younger, smaller firms more vulnerable to shocks and less able to retain entrepreneurial employees.

1 Data

1.1 Data Sources and Sample Selection

I use firm-, establishment-, and worker-level data from the US Census Bureau, and firm- and industry segment-level data from the Compustat/CRSP databases.

departures to start-ups as well as performance of those start-ups, and finds no significant departures to older firms.

[4]Papers theoretically studying the decision of workers to leave their employers to pursue entrepreneurship include Anton and Yao (1995); Gromb and Scharfstein (2002); Hellmann (2002, 2007). Empirically, Klepper (2007) looks at disagreement, Nanda and Sørensen (2010) examines influence of co-workers, Carnahan, Agarwal, and Campbell (2012) looks at within-firm pay structures, Babina, Ouimet, and Zarutskie (2015) examine public ownership. A working paper by Hacamo and Kleiner (2016) complements the findings of this paper and shows that workers laid-off due to employer bankruptcy are more likely to become entrepreneurs.

1.1.1 Establishment- and Worker-level Data

The US Census Bureau's Longitudinal Business Database (LBD) is one of the key databases used in this study. It is an annual panel data that covers all US business establishments with paid employees beginning in 1976. The data are derived from the register of establishments maintained by the Internal Revenue Service of the US Treasury Department. An establishment is a single physical location where business is conducted (Jarmin and Miranda (2002)). The LBD assigns each establishment a unique identifier that allows researchers to track the establishment through time, as well as a firm-level identifier to aggregate information to the firm level and track firms through time. Information is available on industry, physical location, total employment, and payroll, along with establishments' births and closures. Thus, the LBD allows the identification of start-ups among employer firms as well as start-ups' future employment growth, payroll, and exit.

I use the LBD to identify firms and to measure firm age. Age is available only at the establishment level, and a firm may consist of many establishments. For that reason, I follow the approach taken in the literature and define firm age as equal to the age of the oldest establishment that the firm owns in the first year the firm is observed in the LBD (Haltiwanger, Jarmin, and Miranda (2012)). This definition of firm age helps avoid misclassifying an establishment that changes ownership through mergers and acquisitions as a firm birth, since a firm is defined as new only when all of its establishments are new.

The US Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) is the second key database used in this study. The database provides firm-worker matched data, allowing to track employees over time. It is a quarterly panel that identifies employees and records their compensation from the states' unemployment insurance benefit programs. It covers 95% of private sector employment.[5] The data coverage starts in 1990 for several states and coverage of states increases over time, ending in 2008. The project has access to 25 states, and Online Appendix Figure 1 shows the available states on the map.[6] The database links workers directly to the

[5] Abowd, Stephens, Vilhuber, Andersson, McKinney, Roemer, and Woodcock (2009) provides a detailed description of the program and the data it generates. Stevens (2007) discusses LEHD coverage issues.

[6] The covered states are Arkansas, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Louisiana, Maine, Maryland, Montana, Nevada, New Jersey, New Mexico, North Carolina, Oklahoma, Oregon, Rhode Island, South Carolina, Tennessee, Utah, Vermont, Virginia, Washington, and Wisconsin.

workers' employing entity in a given state, using State Employer Identification Numbers (SEIN), which are reporting units for a given firm within a given state. It also provides workers' quarterly earnings at each employing SEIN and reports individual employees' gender, race, place and date of birth, and citizenship status.

The database includes the federal employer identification number (EIN), which allows researchers to link the LEHD data to the firm identifiers in the LBD and to track employees dynamically from firm to firm. Matching data between the LBD and the LEHD is an imperfect process because the LBD infrastructure is based on physical establishments while the LEHD infrastructure uses reporting units, which may or may not match the physical establishments identified in the LBD. Since it is not generally possible to match employees uniquely to physical establishments, I take the SEINs as a unit of analysis. I then match SEINs in the LEHD data to firm identifiers in LBD as of the first quarter of each year using the internal Census bridge file.[7] That match yields an annual panel of SEINs of the LBD firms as of the first quarter of each year. With a slight abuse of notation, I call SEINs "establishments" throughout the paper.

For the sample of matched firms, I take a snapshot of all employees as of the first quarter of each year. This step creates an annual panel of the workforce potentially exposed to a distress shock during that year. Using longitudinally consistent individual identifiers available in the LEHD data, I then track these employees over time. I take a second snapshot of these same workers exactly three years later, allowing for two full years to pass since the end of the year during which a distress event is defined. Figure 1 presents the timeline. The lag is motivated by the time necessary to start a firm and to identify the effects, given that transitions to start-ups with employees are relatively rare.[8] I identify the following groups: (1) employees who remain working for the original firm; (2) employees who are now employed at a different firm that I define as a start-up (i.e., a firm founded during or after the year during which the distress is defined; or, equivalently, a firm that is three years old or younger); (3) employees who are now employed at a different firm, which had existed prior to the year during which the distress is defined (i.e., a firm that is more than three years old);

[7] I merge establishments of the two Census sets as of the first quarter of each year because the LBD measures employment as of March 12 of each year.

[8] Parker (2009) reports that the median time period needed by an entrepreneur to plan and open a company is more than a year.

(4) employees who are now employed at a different employer of unknown age; and (5) employees who are no longer observed in the data.[9] Employees may be dropped from the data because they either leave the work force or are now employed outside the LEHD data coverage.

Anyone who joins a start-up can be viewed as entrepreneurial due to the high risk associated with new ventures, but not all employees who move to start-ups are likely to be the start-up founders. I am interested in founders because they are more likely to have the idea that sparks start-up creation. The LEHD data do not designate the founders of a new firm. As a proxy for founders, I define an entrepreneur as an employee who moves to a start-up (group (2) employees from the previous step) and is one of its top five earners.[10] Using these assumptions, I then calculate the future establishment-level entrepreneurship rate as the percent of an establishment's employees in year zero who are defined as entrepreneurs three years later. I use this entrepreneurship rate variable as the main dependent variable in establishment-level analysis.

1.1.2 Industry Distress and Financial Leverage Data

Following Opler and Titman (1994), I classify a three-digit SIC code industry as distressed in a given year (base year, $t = 0$) if from the beginning of that year the median two-year sales growth of single-segment public firms is negative and the median two-year stock return is less than –30%. A fall in demand and an increase in input prices are typical drivers of industry distress (Gopalan and Xie (2011)).

Using the Compustat Fundamental Annual Database to obtain firm sales information, CRSP to get stock returns, and the Compustat Business Segment Database to retrieve firm industry segment sales data, I select all single industry firm-years (firm-years with a single SIC-3 industry segment with positive sales in the Compustat Business Segment Database). The industry distress annual panel is generated by excluding observations (1) for which the reported industry segment sales differ from the consolidated firm sales by more than 5% (to exclude firms that have sales in smaller, unreported segments); (2) with missing sales and stock return information; (3) with

[9] If the employee works for several firms in the future, I select the employer with the highest earnings. The age of some employers is unknown because some LEHD employers are non-profit and government entities not covered by the LBD, which is used to determine employer age.

[10] Similarly, Kerr, Kerr, and Nanda (2014) defines entrepreneurship based on earnings rankings in the LEHD data.

sales of less than $20 million US dollars; (4) in the financial sector (SIC codes 6000-6999); (5) in regulated industries (SIC codes 4900-4999); and (6) in industries with fewer than four firms. Online Appendix Table 1 shows distribution of industry shocks by year in Panel A and by Fama-French 12 industries in Panel B. While shocks are more likely to occur during economic downturns, there are a number of shocks occurring during non-recessionary periods. There is also heterogeneity of shocks across industries.

Using establishment industry information, I merge the establishment-level panel with the industry distress panel so that the workers are identified as of the first quarter of each industry distress year.

Since the Census data do not have information on firm leverage, I merge the establishment-level panel with Compustat using the internal Census Compustat/LBD crosswalk. This limits the sample of workers potentially exposed to financial distress to employees of public firms. However, these employees are tracked going forward to both public and private firms. I discuss the consequences of this restriction in Section 4.

For firm financial leverage, I use book leverage measured as the ratio of long-term debt plus debt in current liabilities normalized by total firm assets (Opler and Titman (1994); Lemmon, Roberts, and Zender (2008)). I use book leverage because market values might forecast future growth opportunities. Firms that experience a loss of growth opportunities will experience a decline in equity values and a corresponding increase in their leverage ratios, as measured by market values. If the exit of workers during financial distress is related to the lack of investment opportunities, using market-based leverage will bias upwards the estimates of worker entrepreneurship due to financial distress. I explore other commonly used measures of financial leverage in section 3.2.

1.2 Empirical Methodology

I define firm financial distress as occurring when a firm with relatively high ex-ante financial leverage is hit by a large, unexpected, negative industry-wide shock. Such a firm must pay debt holders out of its sparse cash flows, reducing the resources available to fulfill implicit obligations, such as investing in workers' ideas or keeping workers employed. The strategy was first proposed

by Opler and Titman (1994) and its variant was recently used by Giroud and Mueller (2015), who interacted ex-ante leverage with a demand shock measured by changes in housing prices.

Specifically, I use a difference-in-difference approach to examine the effect of firm financial distress on entrepreneurship. I estimate at the establishment-level:

$$\begin{aligned} y_{efist+3} = \beta_L \times Leverage_{ft-2} + \boldsymbol{\beta_{FD}} \times Leverage_{ft-2} \times IndDistress_{it} \\ + \alpha_{it} + \alpha_e + \alpha_{st} + \gamma' X_{efist} + \epsilon_{efist} \end{aligned} \tag{1}$$

where indices are: e - establishment; f - firm; i - industry; s - state; t - time in years; y is the dependent variable of interest (i.e., the percentage of employees at an establishment e of the firm f in industry i at time t who become entrepreneurs at $t+3$); $Leverage$ is the firm book financial leverage ratio lagged by two periods from the base year t (to avoid capturing high leverage due to industry distress); $IndDistress$ is the industry distress indicator variable equal to 1 if the industry i is in distress in year t; α_{it}, α_e, and α_{st} are industry-year, establishment, and state-year fixed effects, respectively; X is a vector of control variables; and ϵ is the error term. Since the industry distress indicator is collinear with the industry-year fixed effects, the coefficient on IndDistress cannot be estimated in this specification and hence omitted.

The main coefficient of interest identifying the effect of financial distress, β_{FD}, measures the incremental effect of the shock on more levered firms relative to the unconditional effect of financial leverage on entrepreneurship, measured by β_L. Under the null hypothesis that industry downturns do not accelerate the exit of employees from relatively more levered firms into entrepreneurship, β_{FD} should be equal to zero. Under the alternative hypothesis that industry shocks disproportionally affect more levered firms, β_{FD} is expected to be positive. For ease of exposition, I refer to relatively more levered firms with establishments in industry distress as being financially distressed.

This identification strategy has several advantages. First, the inclusion of leverage captures the unconditional effect of leverage and controls for factors that might correlate with leverage and entrepreneurship. Second, the definition of firm financial distress based on a shock unrelated to firm idiosyncratic performance helps reduce reverse-causality concerns. Third, the shock is based on industry stock return, making it less likely that firms will have adjusted their leverage

in anticipation. Fourth, a large shock is likely to affect the behavior of employees who face labor market frictions and are therefore unlikely to break employment relationships after smaller shocks. Finally, due to the severity of the shock, firms are likely to be sufficiently distant from their equilibrium leverage ratios, helping to identify the effect of financial distress on worker exit into start-ups (Hennessy and Strebulaev (2015)).

The rich data allow me to include a set of fixed effects to address some specific concerns. I include industry-year fixed effects to isolate the effect of firm financial leverage on workers who otherwise face the same industry conditions, addressing a possibility that industry conditions drive firms' demand for leverage as well as workers' job opportunities and the incentives to found firms. Industry-year fixed effects also subsumes industry and year fixed effects. I add establishment fixed effects to control for time-invariant heterogeneity, since firms' choice of capital structure might reflect unobservable characteristics that correlate with entrepreneurship. The direction of the potential bias is ambiguous. If more risk-tolerant workers, who are more likely to start new businesses, sort into riskier, higher-leverage firms, then this sorting would bias upward the estimates of rates of worker entrepreneurship in distressed firms. Conversely, the estimates might be biased downward if firms with high growth options, which are also likely to have more entrepreneurial workers, choose lower leverage levels (Myers and Majluf (1984); Gompers, Lerner, and Scharfstein (2005)). Finally, state-year fixed effects control for regional shocks, which may affect investments of existing firms and rates of entrepreneurship.

I also add time-varying establishment and firm-level controls to overcome some additional concerns. I control for establishment size (to address the possibility that changes in establishment size drive employee entrepreneurship in financially distressed firms) and establishment average wage (to address the possibility that more levered firms pay higher wages, relaxing capital constraints associated with opening a new business). The detailed description of variable construction is in Appendix A.

Another possibility is that economically weaker firms might become more levered and hence more vulnerable to the shock. For that reason, I control for past profitability and investment opportunities. I add the following one-year lagged firm-level variables: return on assets; sales

growth; Tobin's Q; as well as investments and research and development expenses, both normalized by total firm assets. I also include firm-level variables that have been found to correlate with the propensity of employees to found new firms. Gompers, Lerner, and Scharfstein (2005) find that more employees leave young and focused firms to join start-ups. I include firm age and diversification status as control variables. Lastly, I control for firm size, asset tangibility, and firm cash holdings to account for potential changes in firm scale and asset characteristics that might correlate with changes in firm investment policy and leverage.

An important residual concern is that serial correlation of the error term can lead to understated standard errors, especially in difference-in-differences estimations (Bertrand, Duflo, and Mullainathan (2004)). In all regressions, I cluster standard errors at the SIC–3 industry level, to account for any arbitrary correlation of the error terms across establishments in the same industry. I discuss additional robustness checks in section 3.2.

While this strategy has been used to show that relatively more levered firms are more negatively affected by industry shocks, I also validate the strategy in this setting. I estimate equation 1 with future establishment employment growth as the dependent variable. I provide regression estimates in Table 2 of the Online Appendix. Consistent with existing literature (Giroud and Mueller (2015)), I find that establishments of firms hit by financial distress shocks have negative future employment growth. This lower employment growth might stem from either layoffs, voluntary separations, or freezes in new hires. However, the data do not allow me to decompose the contribution of these factors.

1.3 Summary Statistics

The sample period extends from 1990 through 2003 (the worker-level data are available from 1990 through 2008. I stop in 2003 to observe five years post-distress to identify worker transitions to start-ups and then measure outcomes in entrepreneurship). To be included in the sample, a public firm's establishment must (1) have positive employment; (2) have industry distress information; (3) have all establishment- and firm-level variables used in this study; and (4) be in the scope of the

Economic Census.[11] The final sample contains 91,100 establishment-years (rounded to the nearest hundred due to the Census Bureau's disclosure policies).

The sample consists mainly of establishments from economically significant industries within the firm operations, since an average establishment comes from an industry segment that comprises 61% of the total firm employment. In the sample, 3.1% of establishment-years are classified as being in industry distress–similar to Opler and Titman (1994), who identify 3% of observations to be in industry distress. The small percentage of observations in industry distress reflects the severity of the shock.

To gauge the representativeness of observations exposed to industry shocks, Table 1-A provides summary statistics of ex-ante establishment and firm characteristics. Column [1] presents results using all available establishment-years. Column [2] ([3]) limits observations to non-distress (distress) industry-years. For each variable, columns [1] through [3] report the mean (standard deviation), which is calculated at the establishment-year level.[12] Column [4] provides differences in means for observations during industry distress vs. non-distress years. By ex-ante establishment characteristics, observations in industry distress do not differ significantly from those in non-distress years. By ex-ante firm characteristics, establishment-years in industry distress belong to older firms with lower financial leverage, fewer tangible assets, and more cash. By measures of total capital, profitability, and investment opportunities, establishment-years look similar across the two industry conditions.

Table 1-B provides summary statistics of future worker entrepreneurship calculated at the establishment level. According to the main definition of entrepreneurship used in this paper (variable "Pct Entrepreneurs"), an average of 1.5% of public firm employees will separate and become identified as entrepreneurs three years later. Similarly, using the LBD/LEHD matched data Kerr, Kerr, and Nanda (2014) find that 1.7% of workers transition to entrepreneurship over a four-year period.[13]

[11] Industries not in the scope include Agriculture, Forestry and Fishing (SIC Division A), Railroads (SIC 40), US Postal Service (SIC 43), Elementary and Secondary Schools (SIC 821), Colleges and Universities (SIC 822), Labor Organizations (SIC 863), Political Organizations (SIC 865), Religious Organizations (SIC 866), Certificated Passenger Air Carriers (part of SIC 4512), and Public Administration (SIC Division J).

[12] Due to the Census Bureau's disclosure policy, I cannot report median or other percentile values.

[13] The annual transitions into self-employment are substantially higher. The Kauffman Foundation estimates that 0.3% of people start a new business (employer or non-employer) per *month* in 2012 (Fairlie (2013), 4, 6).

On average, among employees who switch employers, only 4% will become entrepreneurs (variable "Pct Entrepreneurs/Change Employer"). When I consider only the top earners in a start-up as a founder, the mean future entrepreneurship rate falls to 0.5% (variable "Pct Main Founder"), highlighting rare worker-to-top-founder transitions.

To get a sense of correlation between industry shocks and post-shock worker entrepreneurship, Table 1-B also provides statistics on worker entrepreneurship by industry distress indicator. The rates of entrepreneurship become slightly higher after industry distress years, but the difference is significant in only one case. These univariate statistics hint at differences across the two industry conditions, but to get better tests and control for industry condition, I next turn to multivariate analysis.

2 Results

2.1 Employer Financial Distress and Quantity of Employee Entrepreneurship

In this section, I use the difference-in-difference approach, described in section 1.2, to study the effects of financial distress on the rate of employee entrepreneurship.

2.1.1 Main Results

Table 2 shows the relationship between employer financial leverage and employee entrepreneurship after non-distressed and distressed industry-years. In Column [1], I control for time-varying industry conditions by including industry-year fixed effects. In this specification, high leverage is defined relative to peers in the same industry and year. After non-distress industry-years, financial leverage has a positive, but economically small correlation with entrepreneurship. The effect increases dramatically after industry distress years. A one standard deviation increase in leverage prior to industry shocks is associated with a quarter of a percentage point increase in the rate of departures to entrepreneurship, representing a 16% increase from the average establishment-level entrepreneurship rate of 1.5%.[14]

[14] 16% = 1.167 x 0.204 / 1.5%, where 0.204 is a standard deviation of book leverage.

In column [2], the inclusion of the state-year fixed effects does not materially change the estimate of the interaction coefficient, indicating that local shocks do not drive the results. In column [3], I account for the possibility that time-varying establishment or firm factors drive the results. Establishment-level controls are establishment size and average wage. Firm-level controls are firm age, diversification, sales growth, return on assets, investments, R&D expenses, Tobin's Q, firm size, asset tangibility, and cash holdings. The estimates of the interaction coefficient do not attenuate, suggesting that time-varying establishment or firm characteristics are unlikely to drive the results.

In Columns [4] through [6], I present the results estimated with an establishment fixed effects model, which controls for time-invariant heterogeneity.[15] In these regressions, high leverage in an establishment in a given year is defined relative to average firm leverage within-establishment, so the effect is identified by within-firm changes in leverage. Column [4] only includes establishment fixed effects. It shows that elevated leverage is not associated with a higher entrepreneurship rate after non-distress industry-years. However, higher leverage is, indeed, followed by an increase in the entrepreneurship rate after industry distress years. The estimate of the interaction term increases to 1.9% from 1.2%, estimated with industry-year fixed effects, potentially suggesting that firms more exposed to industry shocks might choose lower leverage levels and that industry-year fixed effects might not control for that unobserved heterogeneity. Columns [5] and [6] control for the possibility that time-variant omitted variables drive changes in leverage and worker entrepreneurship. The inclusion of these controls has little effect on the estimate of the interaction coefficient.

In Columns [7] through [9], I add industry-year fixed effects to establishment fixed effects to address the concern that industry factors drive changes in leverage. In these regressions, the within-establishment changes in leverage are adjusted for industry-year means. The interaction coefficient is little changed, and remains statistically significant. When all controls are included in Column [9], a one standard deviation increase in leverage prior to industry shocks is followed by an increase in the entrepreneurship rate of 25% from the mean. Lastly, the results are robust to including all control variables interacted with the industry distress indicator, addressing a concern that more

[15] Since each establishment can be located in only one state and very few establishments change industry definition, the inclusion of establishment fixed effects controls for time-invariant state of location and industry. I use establishment as opposed to firm fixed effects to control for possible unobserved heterogeneity not just at the firm, but also at the establishment level. The results with firm fixed effects are similar (in Table 3 of the Online Appendix).

levered firms might have different sensitivity to shocks due to other observable factors (Online Appendix Table 4).

The results presented in this section suggest that an increase in financial leverage prior to industry shocks predicts a subsequent increase in entrepreneurship. To show the results graphically, in Figure 2 I plot the average predicted percentage of workers who become entrepreneurs after distress vs. non-distress industry-years as a function of leverage (estimated from Column 4 of Table 2). The figure highlights that an increase in leverage prior to non-distress industry-years has a minimal effect on entrepreneurship. However, employers with an increase in leverage prior to industry shocks experience a higher exodus of employees into entrepreneurship. The graph also shows that the effect of the industry shock is practically zero for a firm with average leverage, since the rate of entrepreneurship is essentially the same following industry distress vs. non-distress years. This intuition is confirmed by including an industry shock indicator without the interaction with leverage, such that the indicator captures the unconditional effect of the industry shock on the entrepreneurship rate (Online Appendix Table 5). Thus, in this context, economic distress, as measured by industry shocks, is not associated with a higher entrepreneurship rate.

2.1.2 Entrepreneurship Prior to Distress

Next, I look at the pre-shock trend in entrepreneurship within financially distressed firms. In this setting, the difference-in-difference identification strategy requires that relatively more levered firms do not experience a differential trend in entrepreneurship rates prior to the shock. Table 2 shows that, on average, within a given establishment, relatively higher leverage is not positively related to the exit of workers into start-ups after non-distress industry-years. However, a run-up in entrepreneurship might still occur just prior to the industry shock. If that were the case, then some yet uncontrolled-for, time-variant variable might be driving changes in leverage and the subsequent exit of workers into start-ups.

I perform two tests to address this possibility. First, I look at dynamic effects around industry shocks. I supplement the industry shock dummy in equation 1 with a set of dummies indicating the difference in years between when a given establishment-year observation is recorded and the year

of an industry shock occurring around it. I use four dummies. The first dummy, IndDistress$_{t-2}$, equals 1 if the establishment-year observation is recorded two years before the shock occurring during year t. For example, if an establishment is in industry shock during 2002, then for this establishment, IndDistress$_{t-2}$ equals 1 in 2000. The other dummies are defined accordingly with respect to years -1, 0, $+1$ around the year of the shock at $t = 0$. When I interact financial leverage with these industry distress indicators and estimate the establishment fixed effects model to observe time-series patterns within establishments, I find that relatively more levered firms do not experience differential exit rates of workers into entrepreneurship during the periods leading up to industry distress (see Table 3). Second, I lag the dependent variable by three years to measure entrepreneurship from the year before leverage is measured to the year right before the industry shock is defined. I rerun equation 1 to test whether entrepreneurship is elevated in more levered firms prior to the industry shocks. However, I do not find that this is the case.[16] The results of both tests do not show differential entrepreneurship rates in more levered firms prior to the shock, and are consistent with causal interpretation of the effect of employer financial leverage on employee entrepreneurship.

2.1.3 Alternative Measures of Entrepreneurship

In this section I summarize several supplemental analyses that extend the main results. I start by exploring whether the results are sensitive to using a more restrictive definition of entrepreneurship. The main variable defines any of the top five earners in a start-up as founders, likely mis-classifying some employees as founders. As a proxy for the main founder, I re-define only the top earner in a start-up as the founder. As with the main definition, I normalize the number of future entrepreneurs by pre-distress establishment employment. Online Appendix Table 6 (columns [1] and [2]) show that this more restrictive definition yields economically larger effects. A one standard deviation increase in *ex-ante* leverage is followed by a 41% increase in the mean entrepreneurship rate post-

[16] I acknowledge that describing these results without showing the actual regression coefficients is not ideal. Census policies, which protect the confidentiality of the data, make it more difficult to disclose results generated on new samples and can limit future analysis. Once I am assured of no further changes to the sample, I intend to clear these regression coefficients.

industry shock.[17] This result suggests that distressed firms are even more likely to supply important founders, than indicated by the main results.

I next verify that financial distress is followed by an increase in the number of start-ups. If financial distress encourages co-worker team starts, then the total number of start-ups might not increase even though the total number of workers moving to start-ups increases. Redefining the dependent variable as the number of unique start-ups associated with the founders leaving public firms, normalized by pre-distress employment, yields similar results (columns [3] and [4]).

The analysis presented in this section extends the main results by showing that financial distress spurs new firm creation and increases the supply of more important firm founders. Since the increase might be due to higher worker turnover in financially weaker firms, I next analyze the role of overall turnover in generating the results.

2.1.4 The Role of Worker Turnover in the Increased Rate of Entrepreneurship

Earlier tests use a definition of entrepreneurship that normalizes the number of future entrepreneurs by the pre-distress period employment to capture the effect of financial distress on the likelihood of ex-ante employees of becoming entrepreneurs. However, if more workers separate from financially distressed firms, then more workers are likely to become entrepreneurs. With the aim of controlling for turnover directly, I define two additional variables. First, I re-normalize the number of future entrepreneurs by the number of workers employed by a different firm in the post-distress period, and present the results in Table 4. Second, I re-normalize the number of future entrepreneurs by the number of workers who, after three years, work for a different firm or drop out of the employment sample, and present the results in Online Appendix Table 7. Both alternative definitions produce similar estimates in terms of statistical and economic significance, suggesting that financial distress affects the transition rates of workers specifically to entrepreneurship.

Next, I examine if turnover increases more generally or if it is specific to entrepreneurship. In this context, looking at general turnover helps understand whether the results might be explained by mechanisms affecting all workers (wage decrease, unemployment risk, etc.) or only entrepreneurial-

[17] From Column [2], 41% = 1.057 x 0.204 / 0.52%, where 0.204 is a standard deviation of book leverage and 0.52% is the mean of the dependent variable.

minded workers (opportunity cost of postponing implementation of an idea, tying it to the distressed firm, etc.). To measure the effect of firm distress on general worker turnover, I calculate the percentage of workers at each establishment who work at their current firm for three years, matching the timing with the measurement of the main entrepreneurial variable. In the sample, an average of 36% of public firm workers remain with their employer over a subsequent three-year period. The estimate is consistent with high turnover statistics from the Bureau of Labor Statistics (BLS). The BLS's JOLT data on private employment show that in 2001, a year with a high frequency of shocks, an average *monthly* rate of separations is 4.4% of employment (1.7% layoffs + 2.5% voluntary quits + 0.3% other separations + 0.1% rounding error). Columns [1] and [2] in Table 5 show that indeed, fewer workers stay with more financially levered employers following industry shocks, consistent with the evidence of lower employment growth presented in section 1.2.

The departures from distressed firms can be driven by the documented increase in entrepreneurial separations. Alternatively, workers moving to other established firms or becoming unemployed might also contribute to the overall increase in turnover. I analyze different departures in which the separating workers (1) move to work for firms that existed prior to the shock (variable "Pct Move Existing"); (2) drop out from the LEHD sample ("Pct Drop-out"); or (3) move to start-ups– firms founded since the shock ("Pct Move Start-ups"). Over the same three-year period, 32% of workers leave to work for firms that existed prior to the base year, 17% of workers drop out from the LEHD employment sample, 3.8% move to work for start-ups. The remaining 11% of workers leave to work for employers with unknown age (see footnote 9). I estimate equation 1 using these turnover variables as the dependent variables and present the results in Table 5. The findings do not show that employees at more levered public firms are significantly more likely to move to other established firms or drop out from the employment sample following industry shocks. Conversely, workers are more likely to move to start-ups.

One way to interpret these findings is that, due to firm-specific investments or labor market frictions, workers with no aspirations for entrepreneurship stay with the financially weak employer to wait out the storm, while entrepreneurial workers leave because of the opportunity cost of post-

poning the development of an entrepreneurial idea.[18] Another possibility is that workers who found start-ups are poor performers who are let go by the financially distressed firm. I cannot observe whether the start-up founders were laid-off, so I turn to examining the quality of entrepreneurs and the firms they found.

2.2 Employer Financial Distress and Quality of Employee Entrepreneurship

In the previous section, I documented that employer financial distress is followed by an increase in entrepreneurship. In this section, I explore whether that increase is driven by higher- or lower-quality workers. Layoffs are more common among lower-quality workers (Gibbons and Katz (1991)), while start-ups founded by laid-off workers are less likely to create jobs or survive (Parker (2009)). Thus, we might observe a decline in the average quality of entrepreneurs and the firms they found. Understanding the type of entrepreneurs spurred by financial distress helps to shed light on economic mechanisms responsible for the results and assess implications of the increase in entrepreneurship triggered by financial distress.

2.2.1 The Effect of Firm Financial Distress on the Quality of Entrepreneurs

I use employee wages provided in the LEHD database as a proxy for quality in three ways: (1) to examine entrepreneurship rates among high- vs. low-wage workers; (2) to compare entrepreneurs by their earnings in paid employment; and (3) in entrepreneurship.

The first approach tests whether entrepreneurship during distress is driven by lower quality workers. In my sample of public firms, I separately count future entrepreneurs within sub-samples of employees in the top and bottom halves of establishment-year wage distributions and repeat the main analysis from Table 2. The mean entrepreneurship rate among the top half wage earners is 1.58% and is slightly larger than among the bottom half, which equals 1.44%. I present the regression analysis for the top (bottom) half of wage distribution in Panel A (Panel B) of Online Appendix Table 8, which shows that the sensitivity of the entrepreneurship rate to financial distress

[18] Results presented in this paper do not imply that general worker separations would not increase in more severe cases of financial distress, such as bankruptcy.

is more pronounced among the top half of wage earners, suggesting that entrepreneurship spawned by financial distress is not driven by lower-quality workers within a firm.

The second and third approaches aim to understand how distress-spurred entrepreneurs compare to typical workers departing to entrepreneurship. I focus on the sample of entrepreneurs leaving public firms and use their wages as a proxy for quality: wages earned prior to exiting paid employment as a proxy for worker quality (ex-ante earnings) and wages earned after joining start-ups as a proxy for quality in entrepreneurship (ex-post earnings). I define ex-ante earnings as the natural logarithm of the real wages earned at a public firm during the quarter the worker is identified with that firm. I define ex-post earnings as the natural logarithm of total, three-year, real wages earned from the time an employee is identified as a start-up founder.[19] Summary statistics on entrepreneur wages and other personal characteristics are in Table 8-A, which shows that workers founding start-ups following industry distress years do not differ significantly by proxies of risk aversion (such as gender and age), by tenure at a public firm, or by earnings. I next turn to multivariate analysis to determine if earnings of workers exiting after industry shocks are correlated with the leverage of spawning firms.

As a relatively rare event, entrepreneurship provides limited variation for within-establishment difference-in-difference comparisons. For that reason, I use an industry-year fixed effects regression specification, with the caveat that the results should be interpreted as comparing entrepreneurs leaving establishments in the same industry and year, but from more- vs. less-levered parent firms. In particular, I estimate the following model at the entrepreneur level:

$$\begin{aligned} y_{wefist} = \beta_L \times Leverage_{ft-2} + \boldsymbol{\beta_{FD}} \times Leverage_{ft-2} \times IndDistress_{it} \\ + \alpha_{it} + \alpha_{is} + \gamma' X_{wefist} + \epsilon_{wefist} \end{aligned} \tag{2}$$

where w indexes workers and all other indices are as defined in equation 1, y is the dependent variable of interest (ex-ante or ex-post real earnings of worker w identified at establishment e in

[19] For example, for the employee identified at a public firm in the first quarter of 1998 who left and was identified as a start-up founder in the first quarter of 2001, I take a natural logarithm of the total real earnings over 2001, 2002, and 2003. I do not restrict earnings to those derived from the start-up because that would require the start-up's survival for at least three years. I study start-up survival in the next section.

industry i of public firm f in state s and at time t), and α_{it} and α_{is} are industry-year and state-year fixed effects, respectively. X is a vector of firm and establishment control variables included in the main analysis, as well as worker-level control variables.

Columns [1] and [2] of Table 9 present the results on ex-ante earnings. Column [1] includes worker-level controls. Column [2] adds establishment- and firm-level controls.[20] In these specifications, earnings are not significantly correlated with employer leverage for workers who found start-ups following non-distress industry-years. However, among workers who become entrepreneurs following industry downturns, entrepreneurs, who exit relatively more financially levered employers, earn higher wages prior to exit than those who leave less-levered firms. When all controls are included, a one standard deviation increase in leverage is associated with 10% higher earnings. Given that prior to leaving paid employment a typical entrepreneur earns more than a typical worker (Hamilton (2000); Giannetti and Simonov (2009), Online Appendix Table 10), the results also suggest that a distress-spurred entrepreneur earns more than an average worker.

Columns [3] and [4] present the results on ex-post earnings, controlling for the differences in ex-ante earnings and essentially measuring the impact on earnings growth. Similar to ex-ante earnings, future earnings growth is positively associated with employer financial distress, suggesting that workers who become entrepreneurs due to employer financial distress are less likely to be "overpaid" workers who are let go by their employers.

The earnings results suggest that workers who transition into entrepreneurship due to financial distress are not necessarily worse workers. On the contrary, they do better in paid employment and after pursuing entrepreneurship than typical entrepreneurs leaving public firms, making it less likely that mechanisms by which low-quality workers found new firms explain the main results.

2.2.2 The Effect of Firm Financial Distress on the Quality of Start-ups

The next logical question is about the quality of start-ups founded by workers from distressed firms: whether these start-ups grow or fail, producing no lasting economic benefit. I test whether

[20] Worker-level controls include worker age, age squared, female indicator, white indicator, worker education (years of education, which is partially imputed in the LEHD data), foreign born indicator, born in state indicator, total experience (number of years in the LEHD data), and tenure (number of years at the establishment).

start-up performance varies with the financial distress of the spawning firm. I start by selecting all start-ups associated with employee-entrepreneurs studied in section 2.2.1. Using the LBD, I measure start-up performance as future survival, employment growth, and payroll growth. For exit, I define an indicator variable equal to 1 if a start-up exits within five years after it became associated with an entrepreneur. For surviving start-ups, I measure future employment (payroll) growth as the log-differences between five-year future and initial employments (payroll). Table 8-B provides summary statistics. In this table, because start-up variables are highly positively skewed, I also report a quasi-median statistic, which averages observations within an inter-quartile range. In the sample, start-ups are, on average, 1.6 years old (with maximum age of 3 years) and have an average (quasi-median) of 13 (6) employees. Start-ups spawned after industry distress have smaller initial average employment and payroll compared to non-distress periods. However, median statistics look more similar across the two industry conditions. Consistent with prior literature, about 52% of start-ups survive for five years (Robb and Reedy (2012)). In five years, an average (quasi-median) surviving start-ups have 15 (8) employees. I next turn to a multivariate analysis.

As with the entrepreneur-level analysis, I estimate an industry-year fixed effects regression specification at the start-up–entrepreneur pair level. Columns [1] and [2] of Table 10 present analysis of start-up survival as a function of financial distress estimated with a linear probability model.[21] Column [1] presents coefficients estimated while controlling for worker and start-up characteristics. Column [2] also adds firm- and establishment-level control variables. Start-up exit is negatively associated with financial distress, as the interaction term between ex-ante financial leverage and industry distress is negative, but the estimate becomes insignificant when all controls are included.

Future start-up employment growth (in columns [3] and [4]) and payroll growth (in columns [5] and [6]) are both significantly positively correlated with the degree of financial distress of the spawning public firms. The interaction between ex-ante financial leverage and industry distress remains stable when I include firm, establishment, worker, and start-up-level control variables. Among start-ups founded after an industry shock, a one standard deviation increase in ex-ante

[21] I use a linear probability model because my coefficient of interest is an interaction, which cannot be interpreted as marginal effects in logit or probit models due to non-linearity. I verify that the sign and significance of the interaction coefficient between financial leverage and industry distress is similar if estimated with the logit model.

leverage is associated with 4% higher five-year employment growth.

Overall, the results are consistent with financial distress triggering creation of better quality start-ups with higher growth outcomes. I next explore potential mechanisms that might explain these results.

3 Potential Channels

The empirical findings so far illustrate that employers experiencing financial distress have a higher rate of and better quality of entrepreneurial spawning. I first present a hypothesis relying on a positive selection of workers into entrepreneurship and provide empirical evidence aimed at testing this story. I then go over several other hypotheses.

3.1 Brain Drain Hypothesis

While using debt financing might be optimal ex-ante, given tax and other benefits of debt, having debt makes contracting more difficult during a negative shock. Workers might not want to deal with a financially weak firm, since such a firm has poor incentives to honor contracts (Maksimovic and Titman (1991)). Higher-quality workers with ideas for new products or services might be unwilling to tie them up in a financially distressed employer and be more inclined to exit to experiment in entrepreneurship (Manso (2013)), causing a "brain drain." As firms become more distressed, they are likely to face tighter financing constraints and are less likely to be in a position to invest in developing the ideas internally (Hackbarth, Mathews, and Robinson (2014)). In this hypothesis, financial distress serves as an agent of destructive creation, reallocating economic activity from existing to new firms.

I perform several analyses to evaluate this mechanism. First, I re-examine the effects when employers are less able to discourage employees from entrepreneurship with ex-ante contracts. Second, I examine the role of financial constraints in the increase of entrepreneurial spawning. Third, I test whether entrepreneurship increases in industries related to those of the former employers.

The first test evaluates the contracting frictions channel. I note that such frictions should be less

relevant if firms have ex-ante contractual means to discourage their workers from competing activity. One of the standard ways for firms to hold onto employees is through non-compete agreements, which are used by firms to protect their intangible assets from being used by the departed workers. By signing these agreements, employees are contractually restricted from joining or establishing a competing firm for a specified period of time, usually two to three years. Non-competes are commonplace in employment contracts and are particularly relevant for high-human-capital workers (Starr, Bishara, and Prescott (2016)). While non-compete agreements are commonplace in all US states, significant inter-state variation exists in the degree of their enforcement. The degree to which they are enforced was found to restrict worker movement across firms (Marx, Strumsky, and Fleming (2009)).

I examine whether entrepreneurship *within* financially distressed firms is higher in states that less strictly enforce these contracts. I obtain data on the enforceability of non-compete agreements from Garmaise (2009), who constructs a Noncompetition Enforceability Index for each state. The index ranges from 0 for states that do not enforce the agreements, to 9 for states that enforce the agreements the most. I define two indicator variables: Low (High) Enforceability Non-Competes, as equal to 1 for establishments in states whose index value is less than 5 (5 or above), the median value of the index. Online Appendix Figure 2 maps states by these indicator variables. Using the median value splits observations into two roughly equal groups (57.5% in high enforceability and 42.5% in low enforceability states). I estimate the following model at the establishment level:

$$\begin{aligned} y_{efist+3} = {} & \alpha_{ie} + \alpha_{st} + \gamma' X_{efist} + \beta_I \times IndDistress_{it} + \beta_L \times Leverage_{ft-2} \\ & + \boldsymbol{\beta_{FD}^{Low}} \times Leverage_{ft-2} \times IndDistress_{it} \times Low \\ & + \boldsymbol{\beta_{FD}^{High}} \times Leverage_{ft-2} \times IndDistress_{it} \times High + \epsilon_{efist} \end{aligned} \tag{3}$$

All variables are as defined in Equation 1 with the exception of α_{ie}, which is industry-year and/or establishment fixed effects, and $High$ (Low), which is a High (Low) Enforceability Non-Competes indicator variable. In addition to other control variables used in the main specification, X now also includes $High$ and interactions of $High$ with leverage and industry distress. In this specification, the inclusion of state-year fixed effects absorbs the direct effect of non-competes as well as any

other state-level variation (e.g., wrongful discharge laws, right-to-work laws, etc.). Hence the effect is identified by cross-sectional variation of the index within distressed firms.

I present the results in Table 11. In states that less strictly enforce non-compete agreements, entrepreneurship spawned from financially distressed firms is three to five times larger than that in states with stronger enforcement. The evidence suggests that when financially weak firms are less able to use ex-ante contractual means to discourage their workers from starting competing new firms, worker exit to found firms accelerates, supporting contracting frictions part of the story.

Second, I test whether financially distressed firms, which might be less able to access external capital markets, are also more likely to have higher entrepreneurship rates. Smaller and younger, less established firms are likely to be characterized by a higher degree of information asymmetry and higher costs of external financing (Hadlock and Pierce (2010)). Thus, I identify smaller and younger firms as likely to face greater financial constraints during distress shocks. Using firm assets as a proxy for size and age as a public firm as a measure of length of the relationship with capital markets, I find that, among firms in financial distress, smaller and younger firms spawn more entrepreneurs (Online Appendix Table 12). The results suggest that financially distressed firms might be financially constrained to retain entrepreneurial workers.

Lastly, I examine whether workers leave to pursue related economic activity that could have been undertaken by former employers in the absence of distress. To capture relatedness, I regenerate the main entrepreneurship variable by only considering start-ups in the same SIC-1 industry as the spawning establishment.[22] On average, 35.1% of the founded start-ups are in the same industry. The regression analysis, presented in Online Appendix Table 13, reveals larger economic effects than with the main definition. From column 6, a one standard deviation increase in leverage prior to industry shocks is followed by a 43% increase in entrepreneurship rate from the mean rate of 0.64% (compared to 25% increase in the mean entrepreneurship rate in the main analysis).

While the cross-sectional tests seem to support the "brain drain" hypothesis, the ability of workers to fund their start-ups following industry downturns remains puzzling. Although I cannot observe start-up funding sources, I test whether the increase in start-ups is more prominent when

[22] I use SIC-1, as supposed to a finer industry partition due to the imprecision of matching the industry of large public firms to that of newly created largely small firms.

an entrepreneur needs less cash to start a firm. I analyze whether entrepreneurs exiting firms in financial distress are more likely to come from industries with lower start-up costs. I find that, indeed, the effect is more prevalent in industries with lower start-up capital requirements (Online Appendix Table 14).

Combined with the results on entrepreneurial wages and start-up performance, the evidence presented in this section is consistent with the "brain drain" hypothesis. Financial distress creates higher-quality entrepreneurship, but mostly when employers are less able to enforce ex-ante contracts discouraging employees from pursuing related economic activity. However, during economic shocks, financial leverage can exacerbate many frictions; therefore, multiple and non-mutually exclusive potential stories can arise. I will next consider several alternative explanations, but the list is not meant to be exhaustive.

3.2 Other Explanations and Robustness Checks

In this section, I argue that the documented increase in start-ups is unlikely driven by: (1) spin-offs; (2) small subsidiaries; (3) differences in worker characteristics; (4) definition of financial leverage variable; or (5) economic distress.

The first alternative interpretation is that new firms might be establishment sales from distressed firms to former employees or firm-initiated spin-offs. However, this is unlikely to explain the results. First, the definition of a new firm controls for the possibility of a transfer from one entity to another. Only newly created establishments are defined as firm births. Second, spin-offs are likely to "inherit" former employees. But the results do not change materially when I exclude establishments from which more than 50% of employees move to start-ups (Online Appendix Table 15, columns [3] and [4]) or consider only smaller start-ups with 10 or fewer employees (Online Appendix Table 6, columns [5] and [6]). Lastly, spin-offs are likely to start at a larger scale than a typical start-up, but I do not find that start-up initial employment depends on past employer distress (Online Appendix Table 16).

The second alternative interpretation is that establishments in industries that represent a small percentage of total firm employment might disproportionally affect the results, possibly because

firms in distress are more likely to reduce activity in economically small industries. However, the main results are unchanged, when industries that represent less than 10% of firm employment are excluded (Online Appendix Table 15, columns [1] and [2]).

Third, changes in leverage associated with changes in labor characteristics are unlikely to drive the results (e.g., firms become more levered because their workforce becomes less valuable, etc.). This is because the inclusion of worker characteristics that might be correlated with changes in human capital (education), propensity to take risks (age and gender), or the experience required to open up a business (total labor market experience) does not affect the magnitude or the significance of the main coefficients (Online Appendix Table 17).

I next show that the results are similar when using other commonly used measures of leverage, such as market and net financial leverage ratios (Online Appendix Table 18). Additionally, I obtain similar economic estimates when the book leverage is redefined as long-term debt over book assets, excluding current liabilities from the numerator. Lastly, I verify that the results are identified by firms with relatively high interest payments. Redefining financial leverage as two-year lagged interest expense normalized by assets yields similar results. That stability suggests that when hit by a shock, firms with relatively high interest expense obligations are more affected because they have to allocate a greater share of their sparse cash flows to paying debt holders.

The last alternative explanation I consider, that economically weaker firms are the ones that become more levered, whereby leverage serves as an agent of Schumpeterian creative destruction. However, this alternative is unlikely to drive the main results. While Table 2 shows that controlling for past profitability does not change the main results, I perform additional tests to further explore this story. First, following Andrade and Kaplan (1998), I identify firms with negative operating income prior to industry distress as more likely to be economically weaker. I find that the results are not driven by firms with poor performance prior to industry distress (Online Appendix Table 19). Second, I do not find that the results are driven by firms with below industry performance as measured by either sales growth or operating income over one, two, or three years prior to industry shocks. Overall, the evidence is inconsistent with the economic distress story.

4 External Validity

In this section, I discuss the generalization of the results presented in this paper. The sample consists of public firms. Given that most firms are private, one might question whether the results extend to a broader set of firms. By excluding private firms, my estimates likely underestimate the extent of employee entrepreneurship in financially distressed firms, since public firms are likely to have better access to capital.

Another potential difficulty in generalizing the results is a concern that they are driven by high tech-firms that were most affected by the dot-com bubble, the timing of which overlaps with the data used in this study. While high tech-firms are probably more likely to experience employee entrepreneurship during financial distress due to higher growth opportunities, high-tech firms are also less likely to use debt in their capital structure. Nevertheless, when I split industries into high-tech vs. non-high-tech following the definition in Ouimet and Zarutskie (2014), I find the effect in non-tech industries as well (Online Appendix Table 14).

The coverage of the LEHD data used in this study extends to 25 states. A potential concern with the incomplete coverage is that some employees from distressed firms might drop out because they move to a non-covered state. I believe this does not introduce a bias, since I find that employer distress is not followed by an increase in the fraction of workers who drop out from the LEHD sample (Table 5, columns [5] and [6]).

5 Conclusions

In this paper, I identify an important but largely overlooked effect of firm financial leverage on new firm creation. My findings show that financial leverage, by making firms more vulnerable during times of economic stress, weakens firm-worker ties and propels higher wage workers to start their own firms. This new firm creation is higher when firms are less able to enforce ex-ante contracts discouraging workers from pursuing competing economic activity. Thus, from the corporate finance perspective, this paper provides empirical support for an old theoretical idea that firms might be reluctant to use debt financing to avoid losing productive workers during financial distress (Titman

(1984)).

While worker entrepreneurship does not likely benefit distressed firms, the findings suggest a silver lining to financial distress. Workers from financially distressed firms start successful new ventures at a higher rate, suggesting that productive resources get reallocated from old to new firms and that the social costs of financial distress might be lower than the private costs to financially distressed firms. Firms do not exist in a vacuum. If employers in financial distress forgo investment opportunities, employees might still pursue those opportunities, but within the boundaries of new firms.

This paper contributes to the recent discussion concerning the slowdown in new firm creation and labor turnover over the past 30 years in the US (Davis and Haltiwanger (2014); Decker, Haltiwanger, Jarmin, and Miranda (2014)). The results in this paper suggest that, to the extent that firms can learn how to better weather financial shocks and better retain workers, fewer new firms might not necessarily be an economically undesirable outcome.

By providing evidence that employee entrepreneurship in financially distressed firms is driven by smaller and younger firms, this paper also provides a novel explanation for why smaller and younger firms spawn more start-ups. The existing literature argues that preference sorting plays a major role in generating the small and young firm effect; i.e., small and young firms attract workers with prior preferences for autonomy, who are similarly drawn into entrepreneurship (Elfenbein, Hamilton, and Zenger (2010); Ouimet and Zarutskie (2014)). However, an alternative finance-oriented explanation centers around the finding that younger firms are more financially levered than public firms (Robb and Robinson (2014)). This higher leverage makes smaller, younger firms more vulnerable to shocks and less able to retain entrepreneurial employees.

Many successful firms are founded by people who leave paid employment. Yet, we know relatively little about the role of the employers' corporate choices in that decision. As Luigi Zingales put it in Zingales (2000) "Human capital is emerging as the most crucial asset. As a result of these changes, the boundaries of the firms are in constant flux, and financing and governance choices can easily change them." This paper is the first to show that capital structure decisions of existing firms have implications for new firm creation, and hence affect firm boundaries. But much remains

unknown about the roles of existing firms in new firm creation. Answering these questions has implications for our understanding of firm boundaries, economic growth, and occupational choices.

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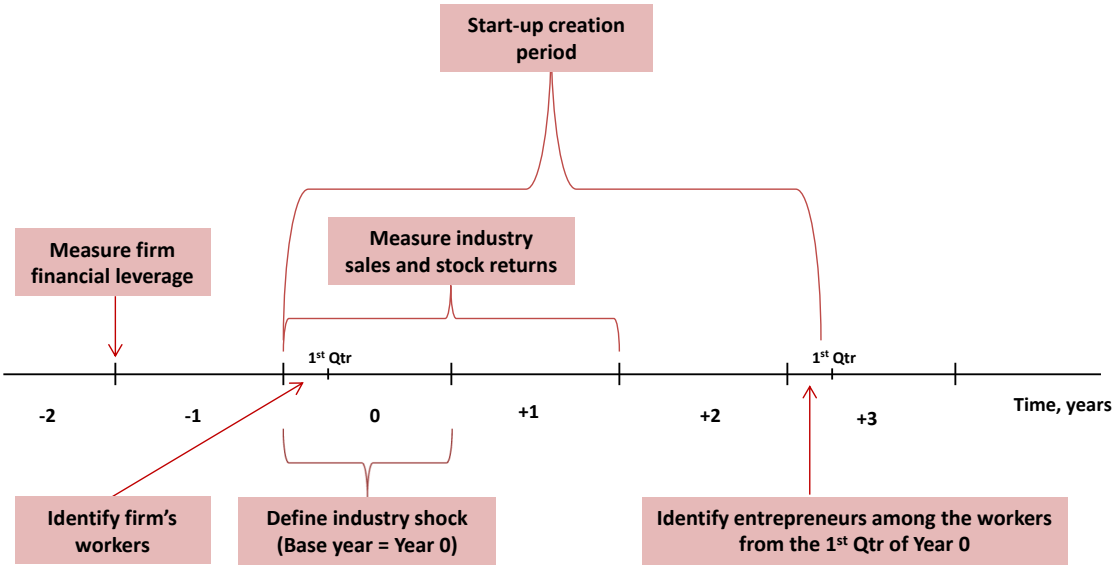

Figure 1
The Timeline

This graph shows when the main variables used in the analysis are measured. Following Opler and Titman (1994), I identify an industry to be in distress in a base year, $t = 0$, if from the beginning of that year the median two-year sales growth of firms in that industry is negative and the median two-year stock return is less than -30%. Following Opler and Titman (1994), I measure firm book financial leverage ratio (long-term debt plus debt in current liabilities, normalized by total firm assets) two years prior to the base year, at $t = -2$. Firms' workers, who are potentially exposed to the distress shock, are identified as of the first quarter of the base year, at $t = 0$. Allowing for two full years to pass since the end of the base year, I determine where those workers are in the first quarter of $t = +3$: stay with the firm, leave to work for another firm that existed prior to $t = 0$, drop out from the employment sample, or leave to work for a startup (a firm founded from $t = 0$ to $t = +3$, inclusively). In the first quarter of $t = +3$, a former worker is an entrepreneur if he works at a startup and is one of the top five earners at that start-up.

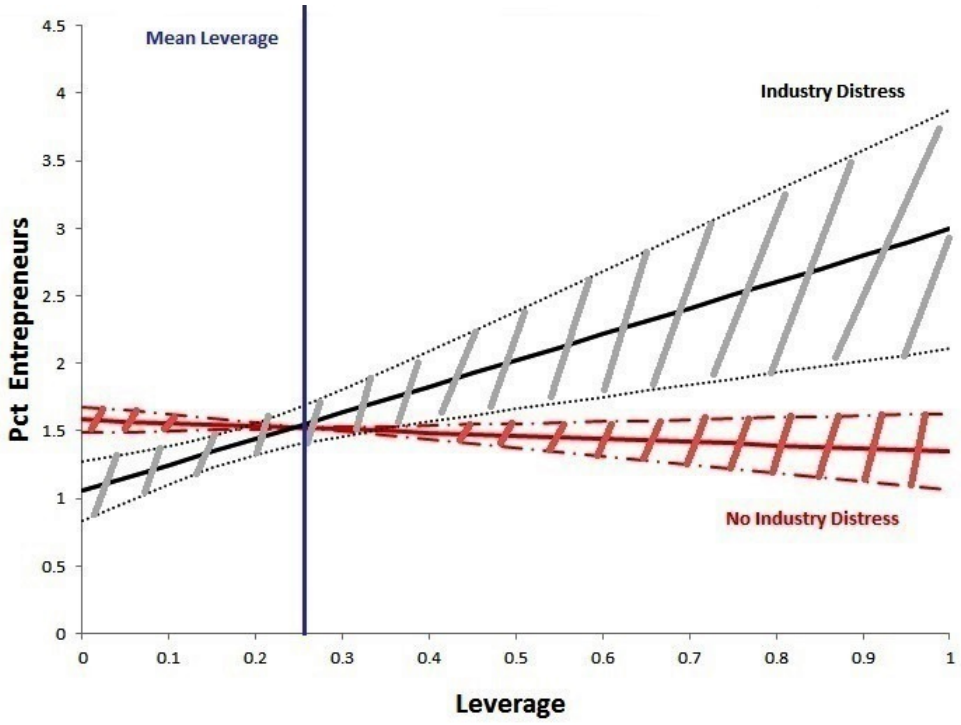

Figure 2
Predicted Entrepreneurship Rate as a Function of Employer Financial Leverage After Distress vs. Non-Distress Industry Years

This graph shows predicted future worker entrepreneurship rate as a function of employer financial leverage after distress and non-distress industry years. The predicted values are plotted along with the corresponding confidence intervals. The predicted values and their confidence intervals are from the following equation (the regression estimates are in Table 2, column 4):

$$y_{efit+3} = \beta_L \times Leverage_{ft-2} + \beta_I \times IndDistress_{it} + \boldsymbol{\beta_{FD}} \times Leverage_{ft-2} \times IndDistress_{it} + \alpha_e + \epsilon_{efit}$$

where e indexes establishments, f indexes firm, i indexes industry, t indexes time in years; y is the percent of employees at the establishment e of the firm f in industry i at time t who become entrepreneurs at *t+3*; *Leverage* is the firm book financial leverage ratio (long-term debt plus debt in current liabilities, normalized by total firm assets) measured at *t-2*; *IndDistress* is an indicator variable equal to one if the industry-year *it* is in distress; α_e is establishment fixed effects; and ϵ is the error term. The vertical bar "Mean Leverage" is an average firm leverage across all establishment-years. The difference between the two slopes equals the regression coefficient on the interaction between leverage and industry shock, β_{FD}. The difference between the two intercepts equals the regression coefficient on industry shock, β_I.

Table 1-A
Summary Statistics: Ex-Ante Establishment and Parent Firm Characteristics

This table presents establishment-level summary statistics. The sample consists of an annual panel of establishments of US public firms, and extends from 1990 through 2003. All refers to all observations in the sample. Not Industry Distress refers to observations not in industry distress years. Industry Distress refers to observations in industry distress years. 3.1% of establishment-years are classified as being in industry distress years. In columns [1] through [3] sample means (standard deviations) are computed across all establishment-year observations. Column [4] provides differences in means. All ex-ante establishment characteristics are measured as of the first quarter of the base year (the year during which distress is defined). Leverage is the firm book financial leverage ratio (long-term debt plus debt in current liabilities, normalized by total firm assets) lagged by two years from the base year. Firm Age is equal to the age of the oldest establishment that a firm owns when it first appears in the data. Diversified Firm is an indicator variable equal to one if a firm owns establishments in more than one SIC–3 industry. The remaining ex-ante firm characteristics are lagged by one year from the base year. Detailed variable definitions are in the Appendix A. Standard errors are clustered at the SIC–3 industry code. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	All	Not Industry Distress	Industry Distress	Difference ([3] - [2])
	[1]	[2]	[3]	[4]
Ex-Ante Establishment Characteristics				
Log(Establishment Employment)	4.208	4.199	4.458	0.258
	(1.762)	(1.757)	(1.920)	
Log(Establishment Payroll/Employment)	9.090	9.082	9.339	0.257
	(0.857)	(0.853)	(0.933)	
Establishment Mean Worker Age, in years	37.187	37.150	38.338	1.188
	(6.805)	(6.829)	(5.921)	
Establishment Percent of Female Workers	0.440	0.442	0.383	−0.059
	(0.275)	(0.276)	(0.248)	
Establishment Percent of White Workers	0.771	0.771	0.754	−0.017
	(0.214)	(0.214)	(0.211)	
Establishment Mean Worker Education, in years	13.610	13.604	13.824	0.220
	(1.079)	(1.077)	(1.106)	
Establishment Mean Worker Tenure, in years	1.984	1.983	2.021	0.038
	(1.596)	(1.595)	(1.638)	
Ex-Ante Firm Characteristics				
Leverage	0.255	0.257	0.213	−0.043**
	(0.204)	(0.205)	(0.175)	
Firm Age, in years	21.285	21.237	22.777	1.541***
	(5.262)	(5.252)	(5.360)	
Diversified Firm	0.941	0.942	0.920	−0.022
	(0.236)	(0.234)	(0.271)	
Firm Sales Growth	0.163	0.162	0.185	0.023
	(0.315)	(0.313)	(0.364)	
Firm Return on Assets	0.172	0.173	0.155	−0.018
	(0.114)	(0.113)	(0.121)	
Firm Investments/Total Assets	0.077	0.077	0.064	−0.013
	(0.074)	(0.074)	(0.062)	
Firm R&D/Total Assets	0.016	0.016	0.027	0.012
	(0.041)	(0.041)	(0.056)	
Firm Tobin's Q	1.817	1.815	1.893	0.079
	(1.136)	(1.130)	(1.305)	
Log(Firm Total Assets)	6.831	6.827	6.960	0.133
	(1.870)	(1.866)	(1.987)	
Firm Net PP&E/Total Assets	0.313	0.317	0.196	−0.121***
	(0.208)	(0.208)	(0.158)	
Firm Cash/Total Assets	0.086	0.085	0.114	0.029**
	(0.113)	(0.112)	(0.150)	
Number of Observations	91,100	88,276	2,824	

Table 1-B
Summary Statistics: Ex-Post Worker Entrepreneurship

This table presents establishment-level summary statistics. The sample consists of establishments of US public firms, and extends from 1990 through 2003. All refers to all observations in the sample. Not Industry Distress refers to observations not in industry distress years. Industry Distress refers to observations in industry distress years. 3.1% of establishment-years are classified as being in industry distress years. In columns [1] through [3] sample means (standard deviations) are computed across all establishment-year observations. Column [4] provides differences in means. Pct Entrepreneurs is the percentage of an establishment's employees as of the first quarter of the base year (the year during which distress is defined) who are identified as entrepreneurs three years later; a worker is a future entrepreneur if he works at a start-up (a firm founded during or after the base year) and is also one of the top five earners at that start-up (main definition). Pct Entrepreneurs/Change Employer is the count of an establishment's employees as of the first quarter of the base year defined as future entrepreneurs according to the main definition, normalized by the number of employees who work for a different employer three years later, and expressed in percentage terms. Pct Main Founder is the count of an establishment's workers as of the first quarter of the base year who work at start-ups three years later and are also the top earners at those start-ups, normalized by base year establishment employment and expressed in percentage terms. Pct Start-ups is the count of unique start-ups associated with future entrepreneurs defined according to the main definition, normalized by base year establishment employment and expressed in percentage terms. Detailed variable definitions are in the Appendix A. Standard errors are clustered at the SIC–3 industry code. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	All	Not Industry Distress	Industry Distress	Difference ([3] - [2])
	[1]	[2]	[3]	[4]
Pct Entrepreneurs	1.509	1.504	1.643	0.139
	(3.937)	(3.944)	(3.700)	
Pct Entrepreneurs/Change Employer	4.070	4.069	4.127	0.058
	(9.003)	(9.007)	(8.885)	
Pct Main Founder	0.520	0.518	0.605	0.087*
	(2.351)	(2.362)	(1.994)	
Pct Start-ups	1.385	1.382	1.467	0.085
	(0.915)	(0.913)	(0.979)	
Number of Observations	91,100	88,276	2,824	

Table 2
The Effect of Employer Financial Distress on the Rate of Entrepreneurship

This table presents establishment-level analysis and shows the main results of the paper. The sample consists of an annual panel of establishments of US public firms, and extends from 1990 through 2003. The dependent variable, Pct Entrepreneurs, is the percentage of an establishment's employees as of the first quarter of the base year (the year during which distress is defined) who are identified as entrepreneurs three years later; a worker is a future entrepreneur if he works at a start-up (a firm founded during or after the base year) and is also one of the top five earners at that start-up. IndDistress is an indicator variable equal to 1 if an industry-year is in distress. Leverage is the firm book financial leverage ratio (long-term debt plus debt in current liabilities, normalized by total firm assets) lagged by two years from the base year. All ex-ante establishment characteristics are measured as of the first quarter of the base year (the year during which distress is defined). Firm Age is equal to the age of the oldest establishment that a firm owns when it first appears in the data. Diversified Firm is an indicator variable equal to 1 if a firm owns establishments in more than one SIC–3 industry. The remaining ex-ante firm characteristics are lagged by one year from the base year. Detailed variable definitions are in the Appendix A. Note, the coefficient on IndDistress cannot be estimated in columns that include industry-year fixed effects due to collinearity of the industry distress indicator with the fixed effects. Standard errors are clustered at the SIC–3 code industry-level and are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

Dependent Variable:	Pct Entrepreneurs								
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
IndDistress				-0.456***	-0.463***	-0.467***			
				(0.113)	(0.123)	(0.111)			
Leverage	0.336**	0.336**	0.308**	-0.235	-0.179	-0.122	-0.219	-0.195	-0.153
	(0.154)	(0.153)	(0.146)	(0.191)	(0.192)	(0.196)	(0.200)	(0.196)	(0.204)
Leverage × IndDistress	1.167**	1.186***	1.275**	1.939***	1.952***	1.957***	1.846***	1.851***	1.857***
	(0.459)	(0.442)	(0.611)	(0.541)	(0.558)	(0.536)	(0.571)	(0.595)	(0.588)
Log(Establishment Employment)			-0.144***			0.059			0.068
			(0.021)			(0.060)			(0.065)
Log(Establishment Payroll/Employment)			-0.061			0.099			0.113
			(0.053)			(0.094)			(0.100)
Firm Age, in years			-0.019***			-0.007			-0.013
			(0.005)			(0.011)			(0.014)
Diversified Firm			-0.179***			0.015			0.015
			(0.066)			(0.125)			(0.121)
Firm Sales Growth			0.220***			-0.006			-0.042
			(0.067)			(0.068)			(0.074)
Firm Return on Assets			-0.841**			-0.104			-0.161
			(0.330)			(0.279)			(0.330)
Firm Investments/Total Assets			0.990**			0.244			0.269
			(0.413)			(0.271)			(0.235)
Firm R&D/Total Assets			-0.177			2.784*			2.753*
			(0.941)			(1.480)			(1.526)
Log(Firm Tobin's Q)			-0.018			0.100*			0.063
			(0.062)			(0.060)			(0.072)
Log(Firm Total Assets)			-0.062***			0.008			0.023
			(0.015)			(0.044)			(0.055)
Firm Net PP&E/Total Assets			-0.416***			-0.093			-0.159
			(0.152)			(0.368)			(0.391)
Firm Cash/Total Assets			0.001			-0.193			-0.103
			(0.267)			(0.292)			(0.303)
Industry–Year FE	Yes	Yes	Yes				Yes	Yes	Yes
State–Year FE		Yes	Yes		Yes	Yes		Yes	Yes
Establishment FE				Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.024	0.028	0.035	0.510	0.512	0.512	0.519	0.520	0.520
Number of Observations	91,100	91,100	91,100	91,100	91,100	91,100	91,100	91,100	91,100

Table 3
The Trend in Worker Entrepreneurship Within Financially Distressed Firms

This table presents establishment-level analysis and shows dynamic effects of financial distress shocks on entrepreneurship rate. The sample consists of an annual panel of establishments of US public firms, and extends from 1990 through 2003. The dependent variable, Pct Entrepreneurs, is the percentage of an establishment's employees as of the first quarter of the base year (the year during which distress is defined) who are identified as entrepreneurs three years later; a worker is a future entrepreneur if he works at a start-up (a firm founded during or after the base year) and is also one of the top five earners at that start-up. Leverage is the firm book financial leverage ratio (long-term debt plus debt in current liabilities, normalized by total firm assets) lagged by two years from the base year. IndDistress_{t-3} (IndDistress_{t-2}, IndDistress_{t-1}) equals 1 if the establishment-year observation is recorded three (two, one) year(s) before the shock occurring during year t. IndDistress_{t+1} equals 1 if the establishment-year observation is recorded one year after the shock occurring during year t. All columns include leverage and industry distress indicators. Establishment controls are the natural logarithm of establishment employment and the natural logarithm of establishment employment to payroll. Firm controls are firm age, diversification, and the following financial variables lagged by one year: sales growth, return on assets; investments, R&D expenses, net PP&E, and cash holdings (all normalized by total assets); the natural logarithm of Tobin's Q and of total firm assets. Detailed variable definitions are in the Appendix A. Standard errors are clustered at the SIC–3 code industry-level and are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

Dependent Variable:	Pct Entrepreneurs					
	[1]	[2]	[3]	[4]	[5]	[6]
Leverage × IndDistress_{t-2}	-0.087	-0.111	-0.134	-0.154	-0.148	-0.154
	(0.333)	(0.331)	(0.333)	(0.330)	(0.553)	(0.551)
Leverage × IndDistress_{t-1}	-0.278	-0.319	-0.322	-0.362	-0.303	-0.284
	(0.239)	(0.237)	(0.235)	(0.235)	(0.242)	(0.243)
Leverage × IndDistress_{t}	1.819***	1.810***	1.821***	1.813***	1.735***	1.743***
	(0.511)	(0.487)	(0.523)	(0.500)	(0.596)	(0.593)
Leverage × IndDistress_{t+1}	0.500	0.526	0.487	0.513	0.514	0.525
	(0.389)	(0.391)	(0.387)	(0.390)	(0.693)	(0.705)
Establishment FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes				
State–Year FE			Yes	Yes	Yes	Yes
Industry–Year FE					Yes	Yes
Establishment Controls		Yes		Yes		Yes
Firm Controls		Yes		Yes		Yes
R-squared	0.511	0.511	0.512	0.512	0.520	0.520
Number of Observations	91,100	91,100	91,100	91,100	91,100	91,100

Table 4
The Effect of Employer Financial Distress on the Rate of Entrepreneurship Among Departing Employees

This table presents establishment-level analysis and shows that financial distress increases transition to entrepreneurship among departing workers. The sample consists of an annual panel of establishments of US public firms, and extends from 1990 through 2003. The table reports the results with alternative normalization of the count of future entrepreneurs. The dependent variable, Pct Entrepreneurs/Change Employer, is the count of an establishment's employees as of the first quarter of the base year (the year during which distress is defined) identified as future entrepreneurs according to the main definition, normalized by the number of employees who work for a different employer three years later, and expressed in percentage terms. According to the main definition, a worker is a future entrepreneur if he works at a start-up (a firm founded during or after the base year) and is also one of the top five earners at that start-up. Leverage is the firm book financial leverage ratio (long-term debt plus debt in current liabilities, normalized by total firm assets) lagged by two years from the base year. IndDistress is an indicator variable equal to 1 if an industry-year is in distress. Establishment controls are the natural logarithm of establishment employment and the natural logarithm of establishment employment to payroll. Firm controls are firm age, diversification, and the following financial variables lagged by one year: sales growth, return on assets; investments, R&D expenses, net PP&E, and cash holdings (all normalized by total assets); the natural logarithm of Tobin's Q and of total firm assets. Detailed variable definitions are in the Appendix A. Standard errors are clustered at the SIC–3 code industry-level and are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

Dependent Variable:	Pct Entrepreneurs/Change Employer					
	[1]	[2]	[3]	[4]	[5]	[6]
IndDistress			-1.312**	-1.308***		
			(0.509)	(0.456)		
Leverage	0.256	0.375	-0.540	-0.391	-0.545	-0.450
	(0.309)	(0.266)	(0.471)	(0.491)	(0.488)	(0.516)
Leverage × IndDistress	3.508***	3.885***	4.567**	4.541**	4.644**	4.651**
	(1.026)	(1.396)	(2.089)	(1.983)	(2.210)	(2.154)
Industry–Year FE	Yes	Yes			Yes	Yes
State–Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Establishment FE			Yes	Yes	Yes	Yes
Establishment Controls		Yes		Yes		Yes
Firm Controls		Yes		Yes		Yes
R-squared	0.027	0.030	0.455	0.455	0.465	0.466
Number of Observations	91,100	91,100	91,100	91,100	91,100	91,100

Table 5
Worker Turnover in Financially Distressed Firms

This table presents establishment-level analysis and examines employee turnover following financial distress shocks. The sample consists of an annual panel of establishments of US public firms, and extends from 1990 through 2003. The dependent variables are Pct Stay in columns [1] and [2], Pct Move Existing in columns [3] and [4], Pct Drop-out in columns [5] and [6], and Pct Move Start-ups in columns [7] and [8]. Pct Stay is the percentage of an establishment's workers as of the first quarter of the base year (the year during which distress is defined) who still work at the employing firm three years later. Pct Move Existing is the percentage of an establishment's workers as of the first quarter of the base year who work at a different firm that existed prior to the base year. Pct Drop-out is the percentage of an establishment's workers as of the first quarter of the base year who are not observed in the employment sample three years later. Pct Move Start-ups is the percentage of the establishment's workers as of the first quarter of the base year who work at start-ups (a firm founded during or after the base year) three years later. Leverage is the firm book financial leverage ratio (long-term debt plus debt in current liabilities, normalized by total firm assets) lagged by two years from the base year. IndDistress is an indicator variable equal to 1 if an industry-year is in distress. Establishment controls are the natural logarithm of establishment employment and the natural logarithm of establishment employment to payroll. Firm controls are firm age, diversification, and the following financial variables lagged by one year: sales growth, return on assets; investments, R&D expenses, net PP&E, and cash holdings (all normalized by total assets); the natural logarithm of Tobin's Q and of total firm assets. Detailed variable definitions are in the Appendix A. Standard errors are clustered at the SIC–3 code industry-level and are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

Dependent Variable:	Pct Stay		Pct Move Existing		Pct Drop-out		Pct Move Start-ups	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Leverage	0.549	0.342	0.911	1.047	-0.598	-0.571	-0.371	-0.231
	(1.180)	(1.208)	(1.063)	(1.108)	(0.484)	(0.502)	(0.381)	(0.372)
Leverage × IndDistress	-7.541*	-7.516*	4.586	4.524	0.264	0.264	2.458***	2.450***
	(4.276)	(4.302)	(3.699)	(3.538)	(1.612)	(1.662)	(0.816)	(0.792)
Industry–Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State–Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Establishment FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Establishment Controls		Yes		Yes		Yes		Yes
Firm Controls		Yes		Yes		Yes		Yes
R-squared	0.794	0.795	0.737	0.739	0.609	0.610	0.577	0.577
Number of Observations	91,100	91,100	91,100	91,100	91,100	91,100	91,100	91,100

Table 8-A
Summary Statistics: Workers Who Become Entrepreneurs

This table presents statistics on worker-level variables. The sample consists of workers who are identified as start-up founders after exiting establishments of US public firms from 1990 through 2003. All refers to all observations in the sample. Not Industry Distress refers to workers who found new firms after leaving public firms in non-distressed industry-years. Industry Distress refers to workers who found new firms after leaving public firms in distressed industry-years. In columns [1] through [3] sample means (standard deviations) are computed across all observations. Column [4] provides differences in means. Worker Female (White) is an indicator variable equal to 1 if a worker is female (white). Worker Tenure is the number of years a worker is at the establishment of the public firm. Worker Ex-Ante Earnings, in '000, is the real wages earned at a public firm during the quarter the worker is identified with that firm, expressed in thousands of dollars. Worker Ex-Post Earnings, in '000, is the total three-year real wages earned since the worker became identified as an entrepreneur, expressed in thousands of dollars. All real earnings are in constant 2014 dollars. Detailed variable definitions are in the Appendix A. Standard errors are clustered at the SIC–3 industry code. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	All	Not Industry Distress	Industry Distress	Difference ([3] - [2])
	[1]	[2]	[3]	[4]
Worker Age, in years	32.195	32.116	33.585	1.468
	(11.180)	(11.181)	(11.073)	
Worker Female	0.462	0.464	0.424	−0.039
	(0.499)	(0.499)	(0.494)	
Worker White	0.782	0.785	0.733	−0.052***
	(0.413)	(0.411)	(0.443)	
Worker Education, in years	13.221	13.218	13.268	0.050
	(2.430)	(2.430)	(2.432)	
Worker Tenure, in years	1.495	1.508	1.264	−0.244
	(1.766)	(1.773)	(1.637)	
Worker Ex-Ante Earnings, in '000	30.759	30.788	30.237	−0.552
	(43.459)	(43.227)	(47.364)	
Worker Ex-Post Earnings, in '000	33.006	33.115	31.079	−2.036
	(36.144)	(36.235)	(34.443)	
Number of Observations	315,200	298,179	17,021	

Table 8-B
Summary Statistics: Start-ups Founded by Former Workers

This table presents statistics on start-ups founded by workers who exit establishments of US public firms from 1990 through 2003 ("All Start-ups") and a sub-sample of those start-ups surviving for five years ("Surviving Start-ups"). All refers to all observations in the sample. Not Industry Distress refers to new firms founded by workers leaving public firms not in industry distress years. Industry Distress refers to new firms founded by workers leaving public firms in industry distress years. In columns [1] through [3] sample means (standard deviations) are computed across all observations; [quasi-medians] are mean values computed for observations within an inter-quartile range. Column [4] provides differences in means. Start-up Age is the start-up age in years during the year it became identified with the entrepreneur, taking values from one to three, inclusively. Start-up Initial Empl (Payroll, in '000) is the employment (payroll expressed in thousands of dollars) during the year an entrepreneur became associated with the start-up. Start-up Exit is an indicator variable equal to 1 if a start-up exits by the fifth year since it became identified with the entrepreneur. Start-up Future Empl (Payroll, in '000) is the employment (payroll expressed in thousands of dollars) in five years since it became identified with the entrepreneur. Detailed variable definitions are in the Appendix A. Standard errors are clustered at the SIC–3 industry code. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

Period:	All	Not Industry Distress	Industry Distress	Difference ([3] - [2])
	[1]	[2]	[3]	[4]
All Start-ups				
Start-up Age	1.609	1.611	1.569	−0.042***
	(1.008)	(1.007)	(1.020)	
Start-up Initial Employment	13.405	13.546	10.903	−2.644***
	[5.898]	[5.908]	[5.272]	
	(32.766)	(32.995)	(28.286)	
Start-up Initial Payroll, in '000	770.221	785.226	504.859	−280.367**
	[111.835]	[112.445]	[100.483]	
	(12,959.626)	(13,193.159)	(77,37.763)	
Start-up Exit	0.482	0.482	0.487	0.005
	(0.500)	(0.500)	(0.500)	
Number of observations	315,200	298,179	17,021	
Surviving Start-ups				
Start-up Future Employment	15.384	15.479	13.682	−1.798***
	[7.636]	[7.646]	[6.346]	
	(28.463)	(28.577)	(26.290)	
Start-up Future Payroll, in '000	574.096	574.817	561.220	−13.597
	[166.148]	[166.323]	[158.396]	
	(1,776.217)	(1,782.141)	(1,666.914)	
Number of Observations	163,300	154,645	8,655	

Table 9
The Effect of Employer Financial Distress on the Quality of Entrepreneurs

This table presents entrepreneur-level analysis and shows that employer financial distress is associated with the selection of higher-wage workers into entrepreneurship. The sample consists of workers who are identified as start-up founders after exiting establishments of US public firms from 1990 through 2003. The dependent variables are Worker Ex-Ante Earnings in columns [1] and [2], and Worker Ex-Post Earnings in columns [3] and [4]. Worker Ex-Ante Earnings is the natural logarithm of real wages earned at a public firm during the quarter the worker is identified with that firm. Worker Ex-Post Earnings is the natural logarithm of total three-year real wages earned since the worker became identified as an entrepreneur. All real earnings are in constant 2014 dollars. Leverage is the firm book financial leverage ratio (long-term debt plus debt in current liabilities, normalized by total firm assets) lagged by two years from the base year. IndDistress is an indicator variable equal to 1 if an industry-year is in distress. Worker-level control variables include worker age, worker age squared, female indicator, white indicator, worker foreign born indicator, worker in-state born indicator, worker education, worker total experience, and worker tenure. Online Appendix Table 8 provides estimates of the coefficients on worker control variables. Detailed variable definitions are in the Appendix A. Standard errors are clustered at the SIC–3 code industry-level and are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

Dependent Variable:	Worker Ex-Ante Earnings		Worker Ex-Post Earnings	
	[1]	[2]	[3]	[4]
Leverage	0.056	0.038	-0.032	-0.037
	(0.094)	(0.029)	(0.032)	(0.025)
Leverage × IndDistress	0.862**	0.481***	0.225**	0.139**
	(0.413)	(0.088)	(0.110)	(0.059)
Log(Establishment Employment)		-0.063***		-0.034***
		(0.008)		(0.005)
Log(Establishment Payroll/Employment (Excl. Worker))		0.869***		0.147***
		(0.078)		(0.030)
Firm Age, in years		0.001		-0.000
		(0.004)		(0.002)
Diversified Firm		-0.059*		-0.045***
		(0.034)		(0.017)
Firm Sales Growth		0.091***		-0.018**
		(0.025)		(0.009)
Firm Return on Assets		-0.090		-0.097*
		(0.067)		(0.054)
Firm Investments/Total Assets		0.133*		0.240***
		(0.077)		(0.070)
Firm R&D/Total Assets		-0.084		0.168
		(0.161)		(0.262)
Log(Firm Tobin's Q)		0.010		0.004
		(0.013)		(0.011)
Log(Firm Total Assets)		0.001		-0.005
		(0.006)		(0.005)
Firm Net PP&E/Total Assets		-0.074		-0.080*
		(0.062)		(0.041)
Firm Cash/Total Assets		0.005		-0.029
		(0.077)		(0.044)
Industry–Year FE	Yes	Yes	Yes	Yes
State–Year FE	Yes	Yes	Yes	Yes
Worker Controls	Yes	Yes	Yes	Yes
Worker Ex-Ante Earnings			Yes	Yes
R-squared	0.410	0.458	0.231	0.235
Number of Observations	315,200	315,200	315,200	315,200

Table 10
The Effect of Employer Financial Distress on the Quality of Start-ups

This table presents a regression analysis of start-ups founded by workers who exit establishments of US public firms from 1990 through 2003. The table shows that employer financial distress is associated with the creation of faster growing start-ups. The dependent variables are Start-up Exit in columns [1] and [2], Start-up Employment Growth in columns [3] and [4], and Start-up Payroll Growth in columns [5] and [6]. Start-up Exit is an indicator variable equal to 1 if a start-up exits by the fifth year after it became identified with the entrepreneur. For surviving start-ups, Start-up Empl (Payroll) Growth is the log-difference between a start-up's five-year future employment (payroll) and initial employment (payroll), which is measured during the year an entrepreneur became associated with the start-up. Establishment- and firm-level control variables are measured at the public employer-firm level. Worker-level control variables include worker age, worker age squared, female indicator, white indicator, foreign born indicator, in-state born indicator, education, total experience, as well as tenure and wages at the public employer. Start-up-level control variables include start-up age at the time it became identified with the entrepreneur and start-up initial employment. Online Appendix Table 10 provides estimates of the coefficients on worker and start-up control variables. Detailed variable definitions are in Appendix A. Standard errors are clustered at the SIC–3 code industry-level and are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

Dependent Variable:	Start-up Exit		Start-up Empl Growth		Start-up Payroll Growth	
	[1]	[2]	[3]	[4]	[5]	[6]
Leverage	0.006	0.011	0.065***	0.057***	0.017	0.028
	(0.006)	(0.007)	(0.024)	(0.022)	(0.021)	(0.021)
Leverage × IndDistress	-0.052**	-0.039	0.181***	0.174***	0.184**	0.176**
	(0.024)	(0.025)	(0.059)	(0.065)	(0.103)	(0.124)
Log(Establishment Employment)		0.002*		-0.020***		0.002
		(0.001)		(0.006)		(0.003)
Log(Establishment Payroll/Employment (Excl. Worker))		-0.010***		-0.066***		0.030***
		(0.003)		(0.022)		(0.008)
Firm Age, in years		-0.001***		-0.003*		-0.000
		(0.000)		(0.001)		(0.001)
Diversified Firm		-0.001		-0.002		0.047***
		(0.007)		(0.023)		(0.016)
Firm Sales Growth		-0.007		0.018		0.024**
		(0.006)		(0.017)		(0.011)
Firm Return on Assets		0.011		-0.091		-0.074
		(0.015)		(0.057)		(0.050)
Firm Investments/Total Assets		0.027*		0.215***		0.079
		(0.016)		(0.076)		(0.066)
Firm R&D/Total Assets		0.165***		0.621**		0.352**
		(0.051)		(0.307)		(0.148)
Log(Firm Tobin's Q)		-0.001		-0.016		0.010
		(0.003)		(0.015)		(0.010)
Log(Firm Total Assets)		0.003***		-0.001		-0.003
		(0.001)		(0.004)		(0.002)
Firm Net PP&E/Total Assets		-0.006		-0.103**		-0.035
		(0.009)		(0.040)		(0.034)
Firm Cash/Total Assets		0.002		-0.072		-0.015
		(0.023)		(0.044)		(0.036)
Industry–Year FE	Yes	Yes	Yes	Yes	Yes	Yes
State–Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Worker Controls	Yes	Yes	Yes	Yes	Yes	Yes
Start-up Controls	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.021	0.022	0.226	0.227	0.041	0.041
Number of Observations	315,200	315,200	163,300	163,300	163,300	163,300

Table 11
The Enforceability of Non-compete Agreements and Worker Departures to Entrepreneurship from Financially Distressed Firms

This table presents establishment-level analysis and provides the estimates of the heterogeneous effect of employer financial distress on entrepreneurship rate by variation in enforceability of non-compete agreements. The sample consists of an annual panel of establishments of US public firms, and extends from 1990 through 2003. The dependent variable, Pct Entrepreneurs, is the percentage of an establishment's employees as of the first quarter of the base year (the year during which distress is defined) who are identified as entrepreneurs three years later; a worker is a future entrepreneur if he works at a start-up (a firm founded during or after the base year) and is also one of the top five earners at that start-up. Leverage is the firm book financial leverage ratio (long-term debt plus debt in current liabilities, normalized by total firm assets) lagged by two years from the base year. IndDistress is an indicator variable equal to 1 if an industry-year is in distress. Low (High) Enforceability Non-competes is an indicator variable equal to 1 for establishments in states with the Noncompetition Enforceability Index value less than (greater or equal to) the median value of the index, which is from Garmaise (2009). Non-compete agreements are employment contracts restricting worker mobility to competing firms. All columns include leverage, industry distress indicator, as well as indicator variable High Enforceability Non-Competes and its interactions with leverage and an industry distress indicator. Establishment controls are the natural logarithm of establishment employment and the natural logarithm of establishment employment to payroll. Firm controls are firm age, diversification, and the following financial variables lagged by one year: sales growth, return on assets; investments, R&D expenses, net PP&E, and cash holdings (all normalized by total assets); the natural logarithm of Tobin's Q and of total firm assets. Detailed variable definitions are in Appendix A. The F-test (and its corresponding p-value) is for the two-sided test of the difference between coefficients on "Leverage × IndDistress × Low Enforceability Non-competes" and "Leverage × IndDistress × High Enforceability Non-competes." Standard errors are clustered at the SIC–3 code industry-level and are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

Dependent Variable:	Pct Entrepreneurs					
	[1]	[2]	[3]	[2]	[3]	[4]
Leverage × IndDistress × Low Enforceability Non-competes	2.315***	2.458***	3.207***	3.196***	3.058***	3.047***
	(0.685)	(0.824)	(1.123)	(1.102)	(1.151)	(1.143)
Leverage × IndDistress × High Enforceability Non-competes	0.399	0.446	1.100***	1.115***	0.979**	0.996**
	(0.371)	(0.505)	(0.348)	(0.337)	(0.445)	(0.444)
Industry–Year FE	Yes	Yes			Yes	Yes
State–Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Establishment FE			Yes	Yes	Yes	Yes
Establishment Controls		Yes		Yes		Yes
Firm Controls		Yes		Yes		Yes
R-squared	0.028	0.035	0.512	0.512	0.520	0.521
Number of Observations	91,100	91,100	91,100	91,100	91,100	91,100
F-test (difference)	9.990	11.732	3.585	3.525	2.971	2.898
p-val (difference)	0.002	0.001	0.060	0.062	0.087	0.091

Appendix A: Variable Definitions

Establishment-level Variables

Pct Entrepreneurs – the percentage of an establishment's employees as of the first quarter of the base year (the year during which distress is defined) who are identified as entrepreneurs three years later; a worker is a future entrepreneur if he works at a start-up (a firm founded during or after the base year) and is also one of the top five earners at that start-up. This is the main definition of entrepreneurship used in the paper. Source: Longitudinal Business Database (LBD) and Longitudinal Employer-Household Dynamics (LEHD)

Pct Entrepreneurs/Change Employer – the count of an establishment's employees as of the first quarter of the base year defined as future entrepreneurs according to the main definition, normalized by the number of employees who work for a different employer three years later, and expressed in percentage terms; according to the main definition, a worker is a future entrepreneur if he works at a start-up (a firm founded during or after the base year) and is also one of the top five earners at that start-up. Source: LBD and LEHD

Pct Entrepreneurs/Leave – the count of an establishment's employees as of the first quarter of the base year identified as future entrepreneurs according to the main definition, normalized by the number of employees who work for a different employer or drop out from the employment sample three years later, and expressed in percentage terms. According to the main definition, a worker is a future entrepreneur if he works at a start-up (a firm founded during or after the base year) and is also one of the top five earners at that start-up. Source: LBD and LEHD

Pct Main Founder – the count of an establishment's workers as of the first quarter of the base year who work at start-ups three years later and are also the top earners at those start-ups, normalized by base year establishment employment and expressed in percentage terms. Source: LBD and LEHD

Pct Start-ups – the count of unique start-ups associated with future entrepreneurs defined according to the main definition (i.e., Pct Entrepreneurs), normalized by base year establishment employment and expressed in percentage terms. Source: LBD and LEHD

Pct Small Start-ups – the percentage of an establishment's employees as of the first quarter of the base year who are identified as entrepreneurs three years later; a worker is a future entrepreneur if he works at a start-up (a firm founded during or after the base year) with 10 or fewer employees and is also one of the top five earners at that start-up. Source: LBD and LEHD

Pct Entrepreneurs (Same Industry) – the percentage of an establishment's employees as of the first quarter of the base year who are identified as entrepreneurs three years later; a worker is a future entrepreneur if he works at a start-up (a firm founded during or after the base year) in the same SIC-1 industry as the spawning establishment and is also one of the top five earners at that start-up. Source: LBD and LEHD

Pct Stay – the percentage of an establishment's workers as of the first quarter of the base year who still work at the employing firm three years later. Source: LBD and LEHD

Pct Move Existing – the percentage of an establishment's workers as of the first quarter of the base year who work at a different firm that existed prior to the base year. Source: LBD and LEHD

Pct Drop-out – the percentage of an establishment's workers as of the first quarter of the base year who are not observed in the employment sample three years later. Source: LBD and LEHD

Pct Move Start-ups – the percentage of the establishment's workers as of the first quarter of the base year who work at start-ups (a firm founded during or after the base year) three years later. Source: LBD and LEHD

Log(Establishment Employment) – the natural logarithm of the number of an establishment's (i.e., SEIN) workers plus one, measured as of the first quarter of the base year to reflect characteristics of the workers in the establishment-worker panel. The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: LEHD

Log(Establishment Payroll/Employment) – the natural logarithm of the ratio of an establishment's payroll to employment, measured as of the first quarter of the base year. Payroll is quarterly and measured in constant 2014 dollars. The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: LEHD

Establishment Mean Worker Age, in years – the mean age of workers at an establishment-year measured as of the first quarter of the base year. Source: LEHD

Establishment Percent of Female Workers – the percentage of female workers at a given establishment-year measured as of the first quarter of the base year. Source: LEHD

Establishment Percent of White Workers – the percentage of workers classified as white at a given establishment-year measured as of the first quarter of the base year. Source: LEHD

Establishment Mean Worker Education, in years – the worker education, averaged at an establishment-year level. It is measured as of the first quarter of the base year. Education is imputed for some workers in the LEHD database. Source: LEHD

Establishment Mean Worker Tenure, in years – the number of years a worker is at the employing establishment (i.e., SEIN), averaged at an establishment-year level. It is measured as of the first quarter of the base year. The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: LEHD

Establishment Percent Foreign Born – the percentage of an establishment-year's workers born outside of the US. It is measured as of the first quarter of the base year. Source: LEHD

Establishment Percent In-State Born – the percentage of an establishment-year's workers born in the state of location of the employing establishment. It is measured as of the first quarter of the base year. Source: LEHD

Establishment Mean Worker Total Experience, in years – the number of years a worker is in the LEHD database, averaged at an establishment-year level. It is measured as of the first quarter of the base year and winsorized at the 1st and 99th percentiles of its empirical distribution. Source: LEHD

Big Industry – an indicator variable equal to 1 if an establishment belongs to an industry that comprises at least 10% of the parent firm's total employment. It is measured as of the first quarter of the base year. Source: LBD

No Spin-offs – an indicator variable equal to 1 when less than 50% of an establishment-year's employees work for start-ups three years after the first quarter of the base year. Source: LBD and LEHD

Establishment Employment Growth – is the log-difference between three-year future and base year employments, both measured as of the first quarter; and expressed in percentage terms. It is measured over the same period as the main entrepreneurship variable. The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: LEHD

Firm-level Variables

Leverage – the firm book financial leverage ratio (long-term debt plus debt in current liabilities, normalized by total firm assets) lagged by two years from the base year. It is set to missing if negative and set equal to 1 if larger than 1. Source: Compustat

Firm Age, in years – the age of the oldest establishment that the firm owns in the first year the firm is observed in the LBD (Haltiwanger, Jarmin, and Miranda (2012)). The firm then ages by one year for each additional year it is observed in the data. This definition of firm age helps avoid misclassifying an establishment that changes ownership through mergers and acquisitions as a firm birth, since a firm is defined as a new firm only when all the establishments at the firm are new. Since the LBD coverage starts in 1976, firm age is left censored for firms that existed prior to 1976. Source: LBD

Diversified Firm – an indicator variable equal to 1 when a firm has establishments in more than one SIC–3 industry. Source: LBD

Firm Sales Growth – the firm sales growth lagged by one year from the base year. The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: Compustat

Firm Return on Assets – the firm operating income (EDITDA) normalized by total firm assets and lagged by one year from the base year. The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: Compustat

Firm Investments/Total Assets – the firm CAPEX minus property, plant, and equipment sales divided by total firm assets and lagged by one year from the base year. The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: Compustat

Firm R&D/Total Assets – the firm research and development expenses divided by total firm assets. Research and development expenses are set to zero when missing. The variable is lagged by one year from the base year and winsorized at the 1st and 99th percentiles of its empirical distribution. Source: Compustat and CRSP

Log(Firm Tobin's Q) – the natural logarithm of a ratio of firm market value of assets (market value of common equity plus total assets minus book value of common equity) divided by book value of total firm assets. The market value of common equity is the number of common shares times stock price at the end of the fiscal year. The book value of common equity is common equity plus deferred taxes and investment tax credit. It is lagged by one year from the base year and winsorized at the 1st and 99th percentiles of its empirical distribution. Source: Compustat

Log(Firm Total Assets) – the natural logarithm of total firm assets. It is lagged by one year from the base year and winsorized at the 1st and 99th percentiles of its empirical distribution. Source: Compustat

Firm Net PP&E/Total Assets – the firm property, plant, and equipment (PP&E) normalized by total firm assets. The variable is lagged by one year from the base year and winsorized at the 1st and 99th percentiles of its empirical distribution. Source: Compustat

Firm Cash/Total Assets – the firm cash and short-term investments divided by total firm assets. The variable is lagged by one year from the base year and winsorized at the 1st and 99th percentiles of its empirical distribution. Source: Compustat

Small (Large) Firm – an indicator variable equal to 1 for establishments of firms with one year lagged total assets below (above or equal to) the median firm's assets. The sorting is done within each year and at the firm-level. Source: Compustat

Young (Old) Firm – an indicator variable equal to 1 for establishments of firms existing in Compustat for five years or fewer (more than five years). Source: Compustat

Market Leverage – the firm market financial leverage ratio (long-term debt plus debt in current liabilities, normalized by total market value of firm assets) lagged by two years from the base year. Total market value of firm assets is equal to market value of common equity plus total assets minus book value of common equity. The market value of common equity is the number of common shares times stock price at the end of the fiscal year. The book value of common equity is common equity plus deferred taxes and investment tax credit. The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: Compustat

Net Leverage – the firm net book financial leverage ratio (long-term debt plus debt in current liabilities minus cash and short-term securities, normalized by total market value of firm assets) lagged by two years from the base year. The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: Compustat

Long-term Leverage – the firm long-term debt normalized by total firm assets, and lagged by two years from the base year. The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: Compustat

Interest Expense/Assets – the firm interest and related expense normalized by total firm assets, and lagged by two years from the base year. The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: Compustat

Negative (Non-Negative) Oper Income – an indicator variable equal to 1 for firms with negative (non-negative) operating income (EBITDA) one year prior to the base year. Source: Compustat

Industry-level Variables

IndDistress – an indicator variable equal to 1 if an industry-year is in distress during the base year and zero otherwise. See section 1.1.2 for detailed explanation. Source: Compustat and CRSP

IndDistress$_{t-2}$ *(IndDistress*$_{t-1}$*, etc.)* – an indicator variable equal to 1 if the establishment-year observation is recorded two (one, etc.) year(s) before the shock occurring during the base year t. Source: Compustat and CRSP.

High (Low) Startup Cost Ind – an indicator variable equal to 1 for establishments in industries with high (low) start-up costs. Two-digit NAICS sector industries are sorted by the average capital amount necessary to start a business. Industries above (below) the median get assigned into high (low) start-up cost industries. The data are from the Survey of Business Owners (SBO) Public Use Microdata Sample (PUMS) using responses to the question "Amount of start-up or acquisition capital" for each firm with employees in the 2007 survey year. Source: Adelino, Schoar, and Severino (2015), Table A5 in the internet appendix.

High (Non-High) Tech Ind – is an indicator variable equal to 1 for establishments in a high-tech (non-high tech) industry, which includes Biotech (SIC codes 2830-2839, 3826, 3841-3851, 5047, 5048, 5122, 6324, 7352, 8000-8099, or 8730-8739 excluding 8732); Computers (SIC codes 5370-5379, 5044, 5045, 5734, or 7370-7379);

Electronics (SIC codes 3600-3629, 3643, 3644, 3670-3699, 3825, 5065, or 5063); and Telecom (SIC codes 3660-3669 or 4810-4899). Source: Ouimet and Zarutskie (2014), Table 6.

State-level Variables

Low (High) Enforceability Non-Competes – an indicator variable equal to 1 for establishments in states with the Noncompetition Enforceability Index value less than (greater or equal to) 5, the median value of the index. The index measures how strictly states enforce non-compete agreements, which are contracts between employers and employees that restrict worker post-employment mobility into competing firms. The index is available for states from 1992 to 2004. For 1990 and 1991, I back-fill the values of the index from 1992. Source: Garmaise (2009)

Worker-level Variables

Worker Age, in years – the worker age in years. The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: LEHD

Worker Female – an indicator variable equal to 1 if a worker is female. Source: LEHD

Worker White – an indicator variable equal to 1 if a worker is white. Source: LEHD

Worker Education, in years – the number of years of education. Note: education is imputed for some workers in the LEHD database. The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: LEHD

Worker Tenure – the number of years a worker is at the establishment of a public firm. Note: since the LEHD coverage starts in 1990, the variable is left censored. The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: LEHD

Worker Ex-Ante Earnings – the natural logarithm of the real wages earned at a public firm during the quarter the worker is identified with that firm. Real earnings are in constant 2014 dollars. The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: LEHD

Worker Ex-Post Earnings – the natural logarithm of total three-year real wages earned since the worker became identified as an entrepreneur. For example, for the employee at a public firm in the first quarter of 1998 who left and was identified with a start-up in the first quarter of 2001, I sum his real earnings in 2001, 2002, and 2003 earned at any employing firm in the LEHD. Real earnings are in constant 2014 dollars. The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: LEHD

Log(Establishment Payroll/Employment (Excl. Worker)) – the natural logarithm of an establishment's payroll to employment. It is calculated for a given worker. It is equal to the the natural logarithm of an establishment's quarterly real payroll minus the worker real wage divided by the number of workers at the establishment, not counting the worker; measured as of the first quarter of the base year to reflect characteristics of the workers in the establishment-worker panel. Real earnings are in constant 2014 dollars. The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: LEHD

Worker Foreign Born – an indicator variable equal to 1 if a worker was born outside of the US. Source: LEHD

Worker In-State Born – an indicator variable equal to 1 if a worker was born outside the state of location of the establishment of a public firm. Source: LEHD

Worker Total Experience – the number of years a worker is in the LEHD. Note: since LEHD coverage starts in 1990, the variable is left censored. The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: LEHD

Start-up-level Variables

Start-up Age – the start-up age in years during the year it became identified with the entrepreneur, taking the values from 1 to 3, inclusively. Source: LBD

Start-up Initial Employment (Payroll, in '000) – the employment (payroll expressed in thousands of dollars) during the year an entrepreneur became associated with the start-up. The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: LBD

Start-up Exit – an indicator variable equal to 1 if a start-up exits by the fifth year since it became identified with the entrepreneur. Source: LBD

Start-up Future Employment (Payroll, in '000) – the employment (payroll expressed in thousands of dollars) in the five years after the start-up became identified with the entrepreneur. It is calculated for

start-ups surviving for five years (i.e., for which "Startup Exit" equals zero). The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: LBD

Start-up Empl (Payroll) Growth – the log-difference between start-up's five-year future employment (payroll) and initial employment (payroll), which is measured during the year an entrepreneur became associated with the start-up. It is calculated for start-ups surviving for five years (i.e., for which "Startup Exit" equals zero). The variable is winsorized at the 1st and 99th percentiles of its empirical distribution. Source: LBD