Entrepreneurs' Wealth and Firm Dynamics*

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Abstract

Owners of privately-held firms typically invest a large amount of their personal wealth into their firm. In principle, the wealth not invested in the firm may be used as a buffer to smooth shocks to the firm. Is such buffer stock behavior observed among privately-held firm owners? Does such buffer stock behavior affect the firm's performance? To address these questions, we use matched employer-employee data, together with information on the assets held by every shareholder of every Norwegian firm from 2004 to 2013. We document three facts: (1) Wealthy entrepreneurs start larger businesses and in sectors that require high initial capital investment. (2) Entrepreneur's private wealth improves firm performance, lowers the exit rate, and increases profitability. (3) Firms owned by wealthy shareholders are less sensitive to revenue and value added shocks in many dimensions. Specifically, at the top of the owner's wealth distribution, survival rate, employment growth and employees' wage growth react less to the shocks than at the bottom. We discuss a model of the firm with costly external financing that rationalizes our results.

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1 Introduction

Many private-sector workers are employed by small, privately held firms.[1] Despite their relevance, so far economists have devoted little – but increasing – attention to how privately held firms (and especially those held and managed by the same person) finance themselves, respond to economic shocks and compensate their workers.

This dimished attention is for the simple reason that data on firms' financial status, ownership and workers' compensation are typically available only for publicly traded firms, which are often mandated to disclose such information by law. In contrast, data on small and micro enterprises are rare and less rich than those of publicly traded firms.

Private equity owners often manage the firm, a fact that induces a natural correlation between their financial portfolio and their "human capital portfolio". In other words, owners of privately held firms are often exposed to the firm's specific shocks both through the financial channel (i.e.„ the return from their financial capital investment) and through the wage channel (i.e.„ the return from their human capital investment). Consequently, the idiosyncratic firm risk in their financial portfolio is likely to underestimate the overall risk the owners face. In contrast, public equity holders are less prone to this double exposure, and at least theoretically, can allocate their financial investment to hedge against the human capital risk. On top of it, it has been documented that privately held firms have a significantly higher employment growth volatility than publicly traded firms (Davis, Haltiwanger, Jarmin, and Miranda, 2006), making the hedging motive quantitatively relevant.

Private firms are often smaller and younger than the typical firm, and, for this reason, more likely to face higher than average costs of external financing. Thus, the amount of private wealth the owner holds outside the firm may act as a *buffer* that can be used to smooth the aggregate and idiosyncratic shocks faced by the firm. Consider a transitory demand shock which makes the operations of a liquidity constrained firm less profitable. A wealthy owner can decide to use his personal wealth to "bail out" the firm, either injecting liquidity into the firm or using his assets as

[1] In 2012, 50% of all private sector workers in the OECD countries were employed by firms with fewer than 50 employees. A similar figure holds for Norway, the country we focus on in this paper. In the United States, approximately 20% of the private sector workers are employed by firms with fewer than 20 employees and 40% by firms with fewer than 100 employees (see `http://www.census.gov/data/tables/2013/econ/susb/2013-susb-annual.html`). The figures are similar if we consider payroll rather than employees.

a collateral to obtain external financing, in order to keep the firm afloat. The same firm might shut down if the owner were unable to provide such liquidity.

Motivated by the previous considerations, in this paper we study the relationship between the private wealth of the owner and the way economic shocks affect small and privately held firms' and workers' outcomes. This is a novel topic, which we are in a unique position to investigate thanks to access to a rich set of Norwegian administrative data. The data enable us to link high quality matched employer-employee data, together with information on the wealth of every shareholder of every Norwegian firm from 2004 to 2013.

We provide three sets of results. First, entrepreneurs who were in the top tercile of the wealth distribution before the business was started, are 10 percent more likely to start a business in sectors that require higher initial capital investment (such as manufacturing and transportation) and in the professional sector than entrepreneurs in the bottom tercile. Conditional on the sector, they start larger businesses. On average, the initial value of assets of firms founded by the wealthier tercile is more than twice as large as the that of the bottom tercile.

Second, accounting for the initial heterogeneity across firms, we find that the personal wealth of the entrepreneur improves firm performance. The share of surviving businesses is 71 percent among firms owned by entrepreneurs in the top tercile and 58 percent among firms owned by entrepreneurs in the bottom tercile. Moreover, the difference in the return on assets between top and bottom wealth terciles ranges between 11 and 9 percentage points at 1 and 8 years of firm age respectively. Part of these differences can be traced back to differences in capital structure across the two groups of firms.[2]

Third, we show that high personal wealth reduces the sensitivity of the firm to idiosyncratic and sector level shocks. The effect of a negative shock on the probability of exiting is stronger for firms owned by entrepreneurs in the bottom quartile of the wealth distribution than for firms owned by those in the top quartile: the probability of exiting is 5.1% for the former group of firms (60% higher than the average exit rate) and only 3% for the latter group. Not only are wealthy households more likely to start a business – as already documented in previous work – but they are

[2] These results are consistent with those in Holtz-Eakin, Joulfaian, and Rosen (1993), but they are in contrast with Bates (1990) and Cressy (1996) who find that human capital is the "true" determinant of survival and that the correlation between financial capital and survival is spurious. While we find that controlling for human capital related variables, the differences in survival are attenuated; but still economically and statistically significant.

also more likely to stay afloat in response to temporary (and possibly insurable) shocks.

Similarly, employment growth and employees' compensation display a lower sensitivity at higher levels of entrepreneur's personal wealth.[3]

Our empirical analysis poses several challenges. First, the correlation between wealth and firm performance might come from the effect of a successful business on the personal savings; to reduce this concern, we always condition on the wealth rankings five years prior to the shock. Second, it is possible that owners who are wealthy at a given point in time are inherently different from owners who are not. In all our specifications, we include a rich set of firm and entrepreneur's level controls, and we show that our results are robust to these sources of observable heterogeneity. Moreover, whenever possible, we use firm and owner's fixed effects to account for time invariant unobserved heterogeneity and show that most of our results are robust to the inclusion of such effects. A final concern is that individuals became wealthier because they have a high propensity to save, perhaps because of high risk aversion, or because they are faced with a "better entrepreneurial idea" that will require more funds.[4] To assess the relevance of this concern, we estimate some of our specification instrumenting actual wealth with a simulated level of wealth obtained by combining the individual's portfolio composition with aggregate changes in asset returns. When we use the last estimation strategy, our results change in magnitude, but convey the same qualitative message. The last part of the analysis requires studying how privately held firms respond to economically relevant shocks. Unfortunately, our administrative data do not provide us with quasi-experimental variation in firm profitability. We then follow an established literature in labor and macro economics (Guiso et al., 2005; Lagakos and Ordonez, 2011) and obtain measures of unpredictable firm growth as deviations of firm revenues and value added from firm specific averages, controlling for a rich set of observable firm characteristics.[5]

[3]The analysis of the employee level outcomes (earnings and employment risk) relate to the labor economics literature on rent sharing and the insurance content of labor market contracts (Azariadis (1975); Baily (1978); Guiso et al. (2005); Card et al. (2014)). Contrasting the outcomes of workers employed by wealthy owners with those of workers employed by less wealthy ones, we investigate whether the insurance content embedded in the employer-employee relationship varies with the wealth of the owner. One can conjecture that wealthier and possibly more diversified owners are willing to offer more insurance to their workers. Our results provide some evidence supporting this idea.

[4]The idea that individual's saving behavior interacts with the entrepreneurship is present in many papers. In the model by Cagetti and De Nardi (2006) entrepreneurs can use their wealth as a collateral; thereby they will save more, the greater is the amount they need to borrow to bring their firm to an optimal scale. Ghatak, Morelli, and Sjöström (2001) also allow young workers to work harder prior to becoming entrepreneurs to accumulate more wealth. In both cases, these mechanisms are justified by the presence of (endogenous) frictions in the financial markets.

[5]Card, Devicienti, and Maida (2014) follow a different strategy to estimate the elasticity of wages to value added,

The paper connects to several strands of literature. Many papers in corporate finance have documented that retained earnings act as an important self-financing device for small and likely financially constrained firms. With perfect financial markets, the investment of the firms should only react to changes in the future value of the firm (typically measured with the Tobin-Q): among many others, Fazzari, Hubbard, and Petersen (1987), Gilchrist and Himmelberg (1999) and Rauh (2006) show that even conditioning on Tobin-Q, firm investment reacts significantly to the cash flow of the firm, especially among small firms.[6] Our paper complements this literature, insofar as we consider the owner's personal wealth as an additional channel of self-financing as well as its interconnections with the firms' retained earnings.

As far as we know, there has been little research on the importance of this financing channel. To some extent, an exception is represented by the literature that connects entrepreneurial choice to saving decisions. Hurst and Lusardi (2004) have shown that the relationship between personal wealth and the propensity to become an entrepreneur is mild, and they find it to be positive only at high levels of wealth. In a life cycle model with entrepreneurial choice and bequest motives, Cagetti and De Nardi (2006) show that these empirical findings can be rationalized by the presence of borrowing constraints. In their model, individuals with high entrepreneurial ability become entrepreneurs only if their wealth is high enough, thus displaying high saving rates before reaching this threshold, and keep on saving to foster firm growth when the firm is small in order to enjoy the high returns from business. In our data, we observe the entrepreneur's level of ex-ante wealth ranging substantially – i.e., it is not only the wealthy people that start a business – and we investigate empirically how this affects several firm outcomes. Our analysis of the firm performance after it is created expands on the results of this literature.

Our work is linked to the literature on entrepreneurship and financial constraints – reviewed by Buera, Kaboski, and Shin (2015)[7] – and models of resources misallocation (Moll, 2014; Hsieh and Klenow, 2009) which suggest that the best projects might not be the ones to thrive, if borrowing constraints are present. With well-functioning credit markets, only the most productive

by instrumenting the firm value added per worker with revenue per worker in firms in the same 4 digits industry and same year in other geographical areas. We performed a similar exercise and find results (not reported) that are qualitatively similar to our main findings.

[6] In a recent paper, Melcangi (2016) shows that retained earnings played a relevant role to help British firms reduce the impact of the last recession: firms increased their cash ratio during the recession, and cash-intensive firms displayed higher employment growth thereafter.

[7] Some examples include Dupas and Robinson (2013), Fafchamps, McKenzie, Quinn, and Woodruff (2011)

entrepreneurs would run a business, while unproductive agents would lend their money to the more productive ones. If credit markets are imperfect, then some wealthy unproductive entrepreneurs will run businesses while some more productive, but poorer individuals will not. On the one side, our paper offers new micro level insights that are be consistent with the ideas above. On the other side, the exploration of the interactions between the owner's personal wealth and the employees who work for the firm is a new margin not considered in the literature. The lower sensitivity to shocks experienced by firms owned by wealthy entrepreneurs suggests that the possible efficiency costs of having a rich but unproductive entrepreneur could be balanced in part by the insurance benefits coming from the ability of a wealthy entrepreneur to shield the employees from the shocks hitting the firm.

In the reminder of the paper, we first summarize how previous studies strongly suggest that firm dynamics and personal wealth should be connected: credit constraints are at the core of this idea. Richer individuals start the operations of the firm relying less on external financing, and closer to an optimal production scale. At each point in time, they are more likely to provide additional financing to the firm in the presence of negative shocks and less likely to pay themselves dividends upon the realization of a positive shock. This translates to a lower sensitivity of the firm dynamics to productivity, demand and in general external shocks. We then describe our data, documenting who are the owners of private Norwegian firms and how they compare to the general population. After discussing our estimation strategy, we analyze the early life cycle of the firms in our sample and then present evidence that wealthier owners are better able to insulate their firms from idiosyncratic and unanticipated changes to the firm's value added and revenues. We then discuss the implication of our findings and conclude.

2 Entrepreneurial firms outcomes and personal wealth

Many empirical studies of "costly external financing" have focused on investment decisions of large publicly traded firms, for which rich data are available. These studies emphasize that, to the extent that information and incentive problems in capital markets raise the cost of external financing relative to internal financing, shifts in internal funds can affect investment, holding constant true underlying investment opportunities. In this section, we summarize the ideas behind these studies and illustrate the mechanism connecting personal wealth with business investment through a simple framework.

The personal assets of the entrepreneur affect the firm's performance in different ways. A large body of literature has established that high personal wealth increases entry into entrepreneurship: we do not directly investigate this margin, and instead focus on two aspects of the relationship between personal wealth and entrepreneurship that concern *continuing entrepreneurs*, i.e., individuals who had already chosen to become entrepreneurs. The first aspect is more *static* in nature: conditional on entry, a high level of assets allows the entrepreneurs to start their business at a larger and more profitable scale, relaxing the bounds induced by costly external financing: we will provide some evidence consistent with this idea. Second, in a more *dynamic* sense, at each point in time firms exposed to similar unexpected and unavoidable shocks will react differently if the entrepreneur's personal assets can be used as a buffer.

Since decreasing absolute risk aversion is a plausible feature of individual preferences, we may also expect wealthier entrepreneurs to optimally decide to start their business closer to its optimal scale and to use a higher fraction of their personal resources in the enterprise – even conditional on their entrepreneurial ability. Intuitively, the marginal cost of reducing their consumption to finance the venture is lower for those individuals. In models of endogenous credit constraints like that of Clementi and Hopenhayn (2006), this initial decision will translate to a persistent advantage for these firms, as a higher equity at each point in time will translate to a relaxation of the credit constraints. Empirically, cross sections of similarly aged firms with different initial equity to asset ratios will display heterogeneous profitability and likelihood of exiting. In our data, we document that richer households start larger businesses – as measured by book value of assets – and finance the investment relying less on debt (in particular, we observe a lower debt to asset ratio in the first year of business activity). Moreover, we study the age profiles of firms founded by households with different ex-ante personal assets, finding that wealthy households own firms that display higher profitability in the first 8 years of firm life.

More directly related to the *dynamic* effects, Gentry and Hubbard (2004) emphasize how one should expect entrepreneurial ventures (i.e., privately held firms) to be even more prone to be affected by costly external financing and write:

Just as related margins for larger businesses can be influenced by the availability of internal funds, the "saving" and "investment" decisions of entrepreneurs are likely to be related. These linkages can affect both entrepreneurial investment and entrepreneurial selection. [...] For continuing entrepreneurs, costly external financing implies that personal assets should affect the level of business investment. In the spirit of "excess sensitivity" tests in the consumption literature [...] and the investment literature [...], one could test whether personal assets affect business investment.

The intuition behind their claims is that, as long as external financing is more costly than internal financing, predetermined nonbusiness assets (the private wealth of the entrepreneur not invested in the firm) should not affect the business growth.[8] The intuition can be formalized by a model where an entrepreneur maximizes the profits of his firm, and finance the capital investment using a combination of personal assets and external debt. If the cost of external debt is high and the entrepreneur is risk neutral, the optimal decision is to invest all private assets in the firm and finances the rest of the capital through private debt (we offer a simple formalization of this idea in Section 6). If the entrepreneur is risk averse, and the firm outcome is risky, it might be optimal to allocate part of the private wealth to consumption and safe assets, and increase the amount of financing through external debt. In our data, all entrepreneurs keep part of their wealth outside the firm, and we see this fact as evidence that entrepreneurs make their decisions as risk averse agents (this is consistent with most models of entrepreneurship; see for instance Cagetti and De Nardi (2006)).

In the remainder of the paper we will test some of these ideas. Specifically, we will first show that private wealth matters both for the type of firm that is created and for its performance and then test whether a lower sensitivity to firm level shocks can help rationalizing these findings.

3 Data description

3.1 Data sources

To study the relationship between personal wealth and firm dynamics, we combine high-quality data from several sources made available by the Norwegian authorities. All data are collected from

[8] Using the Survey of Consumer Finances they provide a test that offers some support for the interdependence of entrepreneurial saving and investment decisions.

administrative sources, minimizing the concerns about measurement errors. The different data sets can be linked through unique identifiers assigned to each individual and firms (similar to the Social Security Number and the Employer Identification Number for the United States).

Here we provide an overview of the different sources, and we illustrate the features of the data in greater details in Appendix C. Most data sets cover the fiscal years 1995-2013.

The **Central Population Register** contains basic end-of-year demographic information (such as gender, birth date, county of residence and marital status) on all Norwegian residents. It also contains family identifiers allowing us to match spouses and cohabiting couples who have a common child. We merge this data to information on educational attainment – type and level of education – from the **National Educational Database** and information on end-of-year financial assets from tax records available in the **Administrative Tax and Income Register**.

Information on tax payers' wealth data is crucial for our analysis, and the Norwegian administrative wealth records are high quality: to comply with the wealth tax, each year Norwegians must report to the tax authority the value of all real and financial assets holdings as of the end of the previous calendar year. Data on traded financial assets, for a broad spectrum of assets categories, are reported (at their market value) directly by the financial institution that has the assets in custody (e.g., a mutual fund or a deposit bank). Given the administrative nature of the data, financial assets are measured with virtually no error; moreover, because they are reported by a third party, the scope for tax evasion is absent. For stocks of non-listed and non-traded companies, asset valuation is based on annual reports submitted to the tax authority by the companies themselves. If the tax authority finds the proposed evaluation unrealistically low, it can start a formal audit process, which limits the scope for undervaluation.

We obtain another key piece of information from the **Register of Shareholders**, spanning the period 2004-2013. Through the unique individual and firm identifiers, the register connects every Norwegian private and publicly traded firm to all its owners (either firms or individuals) and reports how many firm shares each owner holds as well as the total number of shares in the firm.

We use this last register to identify the main owner of each firm: we define ownership at the household level, i.e., we sum up all the shares of married or cohabiting couples. We do this because we think of households as the economically relevant unit of analysis, and moreover, in Norway, married couples are taxed jointly when it comes to wealth tax, and therefore we cannot meaningfully separate the personal wealth of the different components of a couple.

We combine the household level financial information with firm level information contained in the **Central Register of Establishments and Enterprises** and the **Balance Sheet Register** through the unique firm ID present in all of these data sets. The former contains information on the year of firm establishment, industry classification and institutional sector, whereas the other contains accounting data on the firm's assets, liabilities and income statements. Among other items, the Balance Sheet register includes data on the firm's value added and revenues that we use to construct (statistically) shocks to the firm profitability. Since 2002, we also have information about the board of each firm: we know who serves on the board and what role each has (e.g. CEO, CFO, manager, owner). We use the information on the boards to restrict our sample to entrepreneurial firms, i.e., firms that are managed by the owner.

Finally, we use the **Employer-Employee Register** that provides a link between workers and firms. For each worker, it reports all employment spells with each employer and the compensation received. This makes it possible to perform the final part of our analysis, where we investigate how a firm's shocks relate to employee level outcomes heterogeneously across an owner's financial wealth.

3.2 Sample selection

From the shareholders' register, we aggregate the holdings in each firm at the household level (partners such as husband and wife or people living together; we do this since this is the level at which wealth is taxed). We then identify the main owner of the firm which can be a household or another firm. We only keep those firms whose main owner is a household in some year between 2005 and 2013 (in most cases, the main owner owns more than two thirds of the firm's equity, and 44 percent of them owns more than 95 percent of the equity). We further restrict our focus to owners who hold at least 10% of the firm's equity and have a managerial role in the board of the firm. We make this choice to restrict our focus on owners who are likely to affect the management of the firm more directly. Perhaps surprisingly, relaxing these selection criteria does not affect the conclusions of our analysis. We then match the main owners to all the information contained in the firm register and we restrict our attention to firms that appear at least once with 3 to 50 employees in the period 2005-2013 and for which we have multiple observations.

In the first part of our analysis, we further restrict the sample to those firms that were started after 2004. This sample includes 18,278 firms for a total of 84,336 firm-year observations.

In the second part, we include all firms that respect the criteria above regardless of their start-up year. The total number of firms in this sample is 44,500 for a total of 230,000 observations.

3.3 Descriptive statistics

Figure 1 illustrates what percentage of the total equity of the firms in our sample is owned by the main owner. The figure refers to the full sample of firms in 2010: this sample includes both young and relatively old firms, yet in almost one out of two firms, the main owner of the firm owns more than 95 percent equity, and only 23 percent of the firms in our sample have a main owner with less than 50 percent of the total equity. The high concentration of principal equity ownership in privately held firms is consistent with similar figures obtained from different surveys referring to the U.S. economy by Bitler et al. (2005), where in fewer than 30% of the majority entrepreneur owns less than 50% of the equity in the firm.

Table 1 panel A summarizes the observable characteristics of the entrepreneurs who founded firms included in the analysis. For comparison, in the appendix (table A.1), we report the statistics for the general population older than 18. The entrepreneurs in our sample are significantly younger than the average Norwegian with a median age of 41 compared to 46 in the total population. They are as educated as the average Norwegian (71 percent have at most a high school diploma), but they are 3 percentage points more likely to hold a degree in business or economics. Moreover, most individuals in the sample are not at their first experience as firm owners; only 34 percent of them did not have any participation in private companies before appearing as owner of one of the firms in our sample.

Panel B of Table 1 compares the observables characteristics of entrepreneurs in the bottom 33 percent of the financial wealth distribution (bonds, deposits, outstanding claims, mutual funds and stocks in publicly traded companies), with those in the top third *5 years before the start-up year* – i.e., entrepreneurs that independent of the firm's performance had low or high levels of private financial wealth. The median entrepreneurial household in the first group has 2,500 USD in financial wealth five years before starting the firm, a figure that corresponds to the 25th percentile of the distribution in the general population.[9] The median entrepreneur in the top third of the distribution has approximately 83,000 USD, corresponding to the 86th percentile of the general household financial wealth distribution. The differences reported in the table show that less wealthy entrepreneurs are younger, less educated and less likely to have a degree in economics or business. Moreover they are more likely to be at their first entrepreneurial experience. These are all dimensions we will account for in our empirical analysis.

Table 2 panel A describes firms included in the life cycle analysis, i.e., those started after 2004, while panel B compares the characteristics of the firms founded by the two groups of entrepreneurs in the bottom and in the top tercile of the distribution. More detailed statistics, as well as the descriptive statistics for the full sample of entrepreneurial firms, are reported in the appendix (table A.2).

The median firm among those we can observe since birth was founded in 2009 (reported in appendix). The average equity to asset ratio (both measured at book value) is 0.17: 11 percentage points lower than the one for the full sample. In the sample of young firms, one out of three firms operates in the service sector or in the construction sector (classified as low capital sectors as in Hurst and Lusardi (2004)), 57% in manufacturing and other sectors with high initial capital requirements and the remainder (8%) in the professional sector. The figures are similar when looking at the full sample. 77 percent of the firms are still alive in 2013 (the last year in our sample), and we account for this censoring problem in our survival analysis. The comparison between firms founded by wealthy (top third) and less wealthy (bottom third) entrepreneurs reveals some interesting patterns. In the first year of operations, firms founded by wealthy entrepreneurs are 10 percentage points less likely to operate in a low capital intensive sector, their initial book value of assets is more than twice that of the other group, and they have more employees. Moreover, the share of equity used to finance the assets of the firm is 60 percent higher for firms founded by wealthy entrepreneurs (21 percentage points against 13 percentage points).

In the appendix (Table A.1 panel B), we also report summary statistics for the outcome variables we will study in the second part of our analysis. 97 percent of the firms alive in year t are still present in the sample in year $t+1$. Both the average hiring and separation rates are 17 percent;

[9] Notice that the median household in the bottom third of the distribution corresponds to the 16 percentile of the distribution; this means that the sample of new entrepreneurs is wealthier than average.

these figures represent approximately one employee hired or separated each year in a firm with 6 employees (the median number of employees in the full sample). The average employment growth is 1 percent, with a wide range of variation (-29 percent at the 10th percentile, and 39 percent at the 90th percentile).

4 Entrepreneurs' wealth and firm age profiles

The availability of personal resources can be expected to affect both the decision of starting a business and the type of activity performed. This is for a number of reasons.

First, wealthy individuals can use their resources to finance the business from the early stage of the activity. Consistent with this intuition, Figure A.2 show that higher ex-ante wealth is associated with a higher level of equity both in absolute terms (panel a) and in proportion to the assets (panel b). Additionally, we already saw that wealthier owners tend to start their businesses in more capital-intensive sectors and rely less on external financing. Second, wealthier individuals might be willing to engage in riskier and potentially more remunerative activities. Ultimately, the extent of heterogeneity in firm financing and profitability associated to different amounts of personal wealth is an empirical matter, and we start by documenting some patterns without relying on a parametric framework. To this end, we split the sample of firms according to the owners' personal wealth five years before the firm report its first balance sheet.

In Figure A.3, panel (a), we split the firms in two groups: the first group comprises firms whose owner is in the bottom 66 percent of the owners' wealth distribution (this correspond to a cutoff of approximately $50,000 five years prior to the start up year), the second group includes the other firms.

Panel (a) in Figure A.3 shows that the firms in the two groups operate in slightly different sectors. Firms owned by owners with limited resources are more likely to operate in the professional, food, retail and construction sector, while firms owned by wealthier households are more likely to belong to the financial, real estate and manufacturing sectors. As all sectors include enough firms of both types, in most of our subsequent analysis we control for sector fixed effect. In order to understand whether this heterogeneous partition is related to the characteristics of the sectors, we follow Hurst and Lusardi (2004) and classify the sectors into high-starting capital industries and low-starting capital industries. High-starting capital industries include mining, manufacturing, transportation, communication, and public utilities; wholesale and retail trade; and finance, insurance, and real estate. Low-starting capital industries include construction and services, excluding professional activities. Panel (b) reports the share of firms in the two types of industry (high and low capital intensive) plus the shares in the professional services. The figure shows that the share of firms in high capital intensive sectors increases from 55 to 61 percent as we move from the bottom third to the top third of the wealth distribution, while the share of firms in low capital intensive sectors declines from 40 to 30 percent. Figure A.1 is a histogram of the maximum size (measured with number of employees) reached by the firms in our sample in the first 8 years of their life cycle. Firms owned by wealthy owners are more likely to reach a size of 50 employees or more in the first 8 years of life, but also to stay relatively small and never employ more than 2 workers. This pattern is consistent with the hypothesis that wealthier households engage in riskier activities, which can potentially yield to a fast employment growth in the early part of the firm life cycle, but can also limit the firms to a particularly small size. An alternative possibility is that this type of firm is just most likely to survive regardless of the success of the business, again as proxied by the employment size. For this reason, before turning to the comparison of different firm outcomes across the owners' wealth groups of firms, it is worth analyzing the survival patterns across groups of firms.

4.1 Survival analysis

Figure 2 shows the survival rate of all firms which we are able to match with the main owner since foundation. In this case, we split the sample into three groups, according to the owner's wealth tercile (wealth below \$10,000, between \$10,000 and \$50,000 and above \$50,000). In order to ease the exposition, we will refer to firms in the first group as L-firms (for Low wealth), to those in the second group as M-firms (for Medium wealth) and to those in the third group as H-firms (for High wealth). As our data ends in 2013, some of our firm level observations are truncated in terms of observability of the closing event – 77 percent of them as reported in Table A.2.

We use a Kaplan-Meier estimator to compute the survival rate and the standard errors for the survival curves. The differences between the three groups in terms of survival rate are striking. H-firms are consistently more likely to survive; already in the second year of their life cycle, H-firms are approximately 5 percentage points more likely to survive than L-firms (95 vs 90 percent survival rate). The gap between H-firms and L-firms widens monotonically during the first 8 years of life, reaching more than 10 percentage points difference by the eighth year of life (slightly more than 70 percent vs slightly less than 60 percent). Although M-firms are systematically less likely to survive than H-firms, the difference in survival rate between the two groups becomes significant only after 4 years of life, and widens to approximately 5 percentage points eight years after start up.

In Figure A.4 we show the smoothed hazard rate estimate for the same split of firms. Each group hazard rate rises steeply between 2 and 5 years of age and then declines thereafter, but the level of the estimated hazard rate is significantly higher for L-firms than for the other two groups, both statistically and in magnitude, being approximately 3 percentage points higher than the estimate for the H-firms.

As the differences in the survival rates and in the hazard rates could be a reflection of the heterogeneity in sectors documented in Figure A.3, or might simply mirror different business cycle conditions at the year of entry or geographical differences, we estimate a Cox-proportional hazard rate model including year of entry fixed effects, sector fixed effects and county fixed effects. Although the nonparametric estimates of the hazard function suggest that such a model is miss-specified (the hazard rate is non-monotonic), the parametric feature of the model is helpful in assessing how much of the observed heterogeneity in the survival behavior across the different groups of firms can be attributed purely to the different owners' wealth level once controlling for other differences across firms. Moreover, we are concerned that even lagged wealth might be correlated with the ability of the entrepreneur, a possibility that would create a spurious correlation between hazard rates and wealth ranks. To address this concern, we add a rich set of entrepreneur level controls that includes level and type of education as well as a dummy that takes value one if the entrepreneur had some shares of private companies before founding the firm under analysis. Moreover, we control for quadratic polynomials in average labor and business income separately and average shares of risky assets held by the entrepreneur in the years before start up. The polynomials in the two different types of income are added as a proxy of ability on the labor market; by separating between labor and business income, we account for the fact that the types of ability driving one's success as an employee or a self-employed might be different. The polynomial in the share of risky assets is added to account for heterogeneous risk preferences as reflected in the household portfolio composition.

We report the estimates from the model in Table 3. The first column reports the results from the model estimated with no controls: M-firms' hazard rate is 27 percent lower than that of L-firms, while H-firms' hazard rate is 37 percent lower. Interestingly, adding firms' specific controls (year of entry, county and sector fixed effects) changes this result by a limited amount: the difference between M and L firms declines by 2.5 percentage points and that between H and L firms by less than 4 percentage points (compare column 1 to column 4). Moreover, the difference in hazard rates between M and H firms remains statistically significant as shown by the low p-values reported just below the estimates of the coefficients. Once we control for the entrepreneur's characteristics, however, the hazard rates converge across groups of firms. Conditional on the entrepreneur's characteristics, the hazard rate of M-firms is 0.8 times that of L-firms (a difference of 7 percentage points, approximately one fourth of the difference estimated in the most parsimonious specification), and we cannot reject the equality between the hazard rates of the two groups of firms owned by entrepreneurs in the top two-thirds of the wealth distribution.

In summary, owners' personal wealth is associated with higher survival chances of the business. In the row data, a firm founded by an entrepreneur in the middle third of the wealth distribution shows a 27 percent lower hazard rate than a firm founded by someone in the bottom third; however almost one quarter of this difference can be accounted for by observable characteristics of the entrepreneurs (such as education) and by measures of income and portfolio composition meant to capture heterogeneous ability and risk attitude. Still, even in our most saturated specification, we find important differences in the hazard rates.

This finding is novel and consistent with the idea that business owners can leverage their personal resources to offer a buffer to their firm (other things being equal), and in principle also overcome potential financial frictions that might force a less wealthy entrepreneur to shut down her activities when faced by short-term and possibly transitory adversities. Notice that this is especially true when we move from low to middle level of wealth. An alternative explanation for the findings is that wealthy individuals engage in business activities only if they expect the returns from their investment to be higher than what would suffice for a less wealthy individual to start a business. This hypothesis would determine a selection of ex-ante better businesses which could be reflected in higher survival chances. However, the result is not obvious, as one might think that the opposite type of selection could also take place. In this case, it is possible that conditional on the intrinsic value of a project, wealthier individuals would have the resources to start a business; hence, one would end up with a negative correlation between the ex-ante value of the project and the wealth of the entrepreneur. This would be the case if both high start-up costs and financial frictions play a role in determining the ability of starting a business (see for instance Buera et al. (2015)). To shed some light on the mechanisms behind the observed differences in survival rates, we now turn to the analysis of different firm outcomes over the early stage of the firm life cycle and across the owners' wealth groups.

4.2 Firm dynamics across wealth groups

To understand how the initial wealth of the owner affects the dynamics of the firms in our sample over time, we analyze four different firm characteristics: employment, value of total assets, debt to asset ratio and returns on assets, defined as profits over assets.

We develop our analysis in three parts. First, we plot the results from local polynomial regressions of the variable of interest over the age of the firm and show the evolution of the outcomes for the three groups of firms defined above. [10]

Second, we turn to a more parametric approach and estimate the age profiles of the variable of interest through OLS. First we look at survival and estimate the likelihood that each firm j owned by entrepreneur $i(j)$ and started in year t_0 survives for a years or more, for $a \in \{2, \dots 8\}$ throught the the following models:

$$P(S_{j,i(j),t_0}) = \alpha_a + \beta_{2,a} \times T_{2,i(j)} + \beta_{3,a} \times T_{3,i(j)} + \gamma_a X_{j,i(j),t_0} + \varepsilon^{surv}_{a,i(j),jt_0} \tag{2}$$

The controls include both firm and entrepreneurs level controls. In Figure 4 we plot the coefficients obtained from the previous regressions with and without the set of controls. The addition of

[10] In order to assess the role of observed heterogeneity in generating differences across the three groups, we also repeat the full analysis on the residuals from the regression

$$y_{jt} = \alpha + \theta_t + \theta_c + \theta_s + \gamma X_{i(j)} + \varepsilon_{jt} \tag{1}$$

where y_{jt} is the outcome of interest, the θ's represent year, county and sector fixed effects and $X_{i(j)}$ includes entrepreneur's level controls which refer to the year in which the firm was founded. The set of controls includes a quadratic in age, fixed effects for type and length of education, and a dummy for previous experience as entrepreneurs.

the controls lower the differences in survival probability in each year from 1 to 5 percentage points w.r.t. the same model estimated without controls, suggesting that part of the detected differences are driven by the observed heterogeneity across firms and entrepreneurs.

When looking at the other outcomes (return on assets and debt to asset ratio), we estimate the following models:

$$
\begin{aligned}
y_{jt} =& \alpha + \sum_{a=0}^{8} \beta_{1,a}(Age_{j,t} = a) \times T_{1,i(j)} + \sum_{a=1}^{8} \beta_{2,a}(Age_{j,t} = a) \times T_{2,i(j)} + \\
& \sum_{a=0}^{8} \beta_{3,a}(Age_{j,t} = a) \times T_{3,i(j)} + \theta_t + \theta_c + \theta_s + \gamma X_{i(j)} + \varepsilon_{jt}^{ols}
\end{aligned} \tag{3}
$$

where, in addition to the controls in model (1), we include three different age profiles, one for each tercile of the wealth distribution. This specification makes it possible to control for several dimensions of heterogeneity, thereby assessing the amount of spurious correlation between wealth and firm performance driven by entrepreneur's and firm's specific characteristics. For example, one could think that older entrepreneurs might manage the firm in a more cautious way or that a technical education could improve the managerial ability of the entrepreneur. More importantly, one might think that more able individuals are both more likely to accumulate more wealth and to own a successful firm.

To account for these issues, we enrich our specification by controlling for a rich set of covariates. First, we include age polynomials to account for differences in the managerial styles along the entrepreneur's life cycle. Second, we control for a dummy for previous ownership of private firms to proxy for past entrepreneurial experience, as it is likely that previous experience improves the management of current ventures. Third, we control for the average share of risky assets (mutual funds and stocks in publicly traded firms) in the years before the firm was founded, to account for differences in risk preferences. Finally, as more able individuals are likely to be wealthier and at the same time to manage better performing firms, we enrich our specification with a set of controls that proxy for the ability level of the entrepreneur. First, we condition on fixed effects for type and length of education. Second, we include two quadratic polynomials in average business and non-business taxable income before the start-up year. These controls increase significantly the ability of our model to explain the variation in the dependent variable, suggesting that ability – or at the very least variables highly correlated with it – is an important determinant of firm performance. Even if some residual variation in ability is likely to occur within groups of entrepreneurs which are similar according to these characteristics, the significant differences we identify after those controls are still sizable and not too different with respect to the initial parsimonious specification. Our interpretation of these findings is that the true effect of wealth on the outcomes (that we would be able to estimate if we could measure ability perfectly) is unlikely to be null, unless one is willing to assume an implausibly high degree of conditional variation in ability within education and past earnings bins.

Finally, we address the issue of endogenous wealth accumulation (see Cagetti and De Nardi (2006)) via instrumental variables. Using the long panel dimension of our data on household wealth, we follow the simulated instruments literature (see, for instance, Gruber and Saez (2002)) and generate a simulated wealth level exploiting variation in portfolio composition and asset price movements, described more in details below.

4.3 Local polynomial regressions and OLS

Figure 3 shows the evolution of employment (in logs), book value of assets (in logs), debt to asset ratio and returns on asset (ROA) over the first 8 year of the firms' life cycle, estimated via local polynomial regression.

Panel (a) and (b) show that H-firms are bigger than M-firms and L-firms at birth, both in terms of employment and book value of assets. While the size of the firms as measured by employment seems to converge over time, the "advantage" in terms of assets is preserved for the first 8 years of the firm life cycle. The difference of approximately of 0.5 log points between L-firms and H-firms in terms of book value of assets at the beginning of the firm's life is preserved and slightly widens for this two groups in the first 8 years. The difference between L and M-firms tends instead to narrow, a fact which might be induced by the better selection of L-firms that survive for 8 years.[11]

In Figure 3 panel (c), we observe that the debt to asset ratio at birth is more than 10 percentage

[11] The patterns are preserved in panels (a) and (b) of Figure A.5, where we first residualize all the variables with a linear regression which includes a set of firm and entrepreneur level controls and then re-estimate the local polynomial regression. This lead us to conclude that they are not induced by differences in the business cycle condition or other observable dimensions.

points higher for L-firms than for H-firms. Consistent with the idea that richer individuals can use their personal resources to finance the firm's activities since start up, H-firms rely on 80 cents of debt for each dollar of assets at the beginning of their life, M-firms on 85 cents and L-firms on more than 90 cents a dollar. Also, the gradient of the debt to asset ratio in the first year of the firm life cycle displays some interesting heterogeneity across the three groups. The ratio grows faster the less wealthy the owner was 5 years prior to the beginning of the firm's life cycle. L-firms' debt to assets ratio grows from 0.9 to more than 1 in the first year (an increase higher than 10%), while it stays approximately constant for H-firms. In all cases, it declines quite monotonically after the first year of life, but after 8 years it is still approximately 0.8 to 0.9 for L-firms and M-firms, while it declines to less than 0.7 for H-firms. While the groups of firms founded by the ex-ante wealthiest group of households rely less and less on external funding, this is not the case for the other groups of firms.

Lastly, panel (d) shows the evolution of the returns on assets over the firm's life cycle, as measured by the ratio of profits to book value of assets. Once more, this measure of profitability shows important differences across the three groups of firms. First, at birth, H-firms display a 5% return on asset, while the same figure for M-firms and L-firms are -0.5% and -10%. In other words, wealthy founders are able to get positive profits since the very beginning of their firm's life, while the other owners do not. Second, H-firms' ROA life cycle profile is quite flat: the profit over asset ratio grows from 5 to 8 percent over 10 years. A similar gradient is observed when looking at M-firms: for this group of firms, the profit to assets ratio grows from -0.5 to 4 percent in 8 years. L-firms, instead, experience a much steeper growth in profitability, as the profit to asset ratio grows to 2% (+12 percentage points from birth) at 6 years of age, and declines back to approximately 0 percent in the subsequent two years. Combining the previous observations, we can say that firms founded by relatively poor owners undergo losses for the first part of their life cycle, but then reduce the gap with H-firms from 15 percentage points to approximately 7 percentage points. This finding, combined with the previous results about the survival rates, can be rationalized by a "survival of the fittest argument": those L-firms that experience losses tend to leave the sample, thereby increasing the average profitability of the surviving sample of firms. Panel (d) Figure A.5 shows analogous patterns for the residuals of regression (1), ruling out the hypothesis that the patterns in terms of profitability result from further selection on observables. These results are robust to the inclusion of year, sector and geographic controls. It should be noted that the differences between groups are probably reinforced by the survival patterns documented above. Correcting for the selection induced by the survival patterns would possibly produce even more striking differences.

Tables 4 and 5 report the results from the estimation of the model in equation (3); for readability, in each table we only report the estimated coefficients at age 1 and 8 referring to entrepreneurial households in the three different terciles of the distribution. The estimated age profiles are also plotted in Figures 5 and 7 for the top and bottom tercile.[12]

Columns (1) and (3) in each table include only year, county and sector fixed effects. A possible concern with this specification is that observable and unobservable characteristics of the entrepreneur could affect both the personal wealth observed before the firms were founded and the outcomes analyzed. As emphasized in the previous subsection, we add a rich set of entrepreneur's level controls to account for this. We report the results in columns (2) and (4) of each table.

Overall, the OLS results confirm the findings from the local polynomial regressions: employment grows over time but does not show interesting differences across wealth groups, while H-firms start their operations with more assets, and this is preserved in the first 8 years of the life of the firm. Moreover, richer households own firms that rely less on debt and display higher profitability. The comparison between the uncontrolled and controlled specification is reassuring: the estimated coefficients display minor differences when we add the controls, indicating that even if part of the estimated patterns is driven by observable characteristics of the entrepreneur, it is unlikely that conditional variation in unobserved characteristics would be able to reduce the effects of wealth on the outcomes to 0. Moreover, the joint stability of the coefficients and substantial increase in the R^2 (which in most specifications increases significantly once the controls are added) offer some evidence that the unobservable components – say variation in the ability of the entrepreneur within age and educational groups – are unlikely to be the main driver of the observed differences across groups of firms.[13] In the next section, we offer additional evidence that the patterns we document reflect a causal relationship between wealth and firm outcomes, complementing our analysis with additional evidence coming from estimates based on a two stage least square model.

[12] Other estimated coefficients are reported in the appendix, in tables A.3 to A.6.

[13] For a more formal discussion of this idea, see Altonji, Elder, and Taber (2005)

4.4 IV results

In order to build the instrument, we proceed in three steps. First, we assign to each entrepreneur his/her value of safe assets (including cash, bonds and outstanding claims) and risky assets, excluding private equities (i.e., we use the value of publicly traded stocks and mutual funds) ten years before the firm was founded. Then, we fix those values and compound the yields over 5 years for each asset class. In particular, to assess the returns on the safe and risky assets, we use the annualized returns on Norwegian three months treasury bills, and those on the Oslo Stock Exchange index respectively. In this way, we obtain the value of safe and risky assets the household would have had five years before the firm was founded if no money was added or subtracted from either asset class. Summarizing, we obtain our measure of simulated financial wealth as follows:

$$\widetilde{W}_{i,t_0-5} = S_{i,t_0-10} \prod_{j=t_0-4}^{t_0} (1 + r_{safe,j}) + R_{i,t_0-10} \prod_{k=t_0-4}^{t_0} (1 + r_{risky,j}) \tag{4}$$

where S_{i,t_0-10} is the amount of safe assets 10 years before the firm was founded (t_0), R_{i,t_0-10} is the amount of risky assets, $r_{safe,j}$ is the annualized returns on the three months Norwegian treasury bills in year j, and $r_{risky,j}$ is the annual return on the Norwegian stock market. We then rank each entrepreneur according to the simulated measure of wealth obtaining three simulated terciles. Interacting the simulated tercile with the age dummies, we obtain as many instruments as endogenous variables, and estimate the model in equation (3) via IV.

The IV results are reported in columns (3) and (6) of Tables 4 and 5, and the coefficients relative to the age profiles are plotted in Figures 5 and 7. The differences in survival probability estimated via IV are instead plotted in figure 6.

The main results are summarized in Table 9, panel A. The IV results differ from the OLS results in two main respects: first, the difference between the H-firm group and L-firms group in terms of firm leverage is larger, and more stable (around 30 to 20 percentage points) along the firm age dimension. After one year, the estimated difference is 10 percentage points according to our preferred OLS specification and rises to 29 percentage points if we look at the two stage least squares estimates. However, the latter estimates are more imprecise, and we cannot rule out statistically a difference as small as 8 percentage points (column LB in the panel). After 8 years, both estimation strategies predict a 23 percentage point difference between the two groups – with the less wealthy group depending more on external financing. This difference is not statistically different from zero if we consider the IV estimates.

Second, the difference in terms of profitability, despite being larger in magnitude, are not statistically different across the two groups after just 3 years (in the first year, the point estimate from the IV is 23 percentage points compared to 11 percentage points from the OLS specification; however the IV estimates cannot rule out a difference as small as 7 percentage points). This indicates that the OLS estimates somewhat overstate the difference in profitability induced by differences in wealth. This is consistent with the model in Cagetti and De Nardi (2006): in the presence of borrowing constraints, an individual with high entrepreneurial ability is likely to save more possibly generating a spurious correlation between wealth and profitability. The instrument removes the effect of this saving behavior by only exploiting variation in aggregate returns. The presence of financial frictions can explain the difference in profitability in the early stages of the firm life cycle, but – conditional on surviving – this effect attenuates over time as the firms become less constrained.

Summarizing, ex-ante owner's wealth matters: L-firms start their operation on a smaller scale, and while there seems to be a catch up in terms of employment in the medium run, the amount of assets stays lower than that of H-firms over the first 8 years of the firm life cycle. L-firms also rely more on external debt, both at the beginning of the firm's life and over the first 8 years of operations. Finally, this group of firms seems to bear losses for most of the early life of the firm and just partly catch up in terms of profitability after 8 years. Re-estimating the model using the simulated wealth preserves most of the results, but the differences in terms of profitability become insignificant from the third year of life of the firm. It is worth noticing that the two results might be correlated: if external financing is particularly costly for young firms[14] since less wealthy entrepreneurs are to rely more on external debt, this would mechanically reduce the profits of their firm due to higher costs born to repay this debt. However, other mechanisms could drive the documented differences and their persistence over time. As argued in section 2, availability of personal assets can help the firm to keep their activities at a scale that is close to the optimal ones, and shocks to the firm productivity should have a lesser impact on firm's scale, outcomes and likelihood of survival. In

[14] There is ample evidence that this is the case: see Gentry and Hubbard (2004); Hubbard (1998) and references therein.

the next section, we investigate whether we can find evidence of these differences in sensitivity in the data.

5 Entrepreneurs' wealth as a buffer

The empirical question we address in this section is whether and how owners of private firms use their personal resources as a buffer to insulate their firm against economic shocks. As discussed in Section 3, consider a firm which is subject to demand driven price shocks. Assume these shocks are relatively transitory so that the firm's owner would be willing to experience some short-term losses, and minimally adjust the number of employees in response to the shock. In other words, the owner would like to smooth the shocks as much as possible. Mild liquidity constraints would still show up as changes in firm outcomes (say firm size, although in our empirical analysis we will consider many other outcomes) as a response to the shock. If all firms were subject to the liquidity constraints, and the owner's personal wealth could not be used to overcome these constraints, it would be meaningful to model the relationship between firm size and shocks in a simple way:

$$\log\left(Size_{jt}\right) = \alpha + \beta \log\left(Price\ Shock_{jt}\right) + \gamma X_{jt} + \phi_t + \varepsilon_{jt}$$

where the parameter β would provide an estimate of the elasticity of firm size to the price shocks, where the inclusion of firm level controls (X_{jt}) and time fixed effects (ϕ_t) would capture other firm characteristics that change with the size and the shock, or even affect the elasticity (for example, a measure of cash flow could be added to the controls). On top of it, we could also think of adding firm fixed effect to estimate the elasticity off of deviations in size and shocks from the within-firm average and control for time invariant unobserved heterogeneity.

As we argued before, assuming that all firms in the economy react in a similar way to a transitory demand shock might not be appropriate. Indeed, the corporate finance literature suggests that this may not be the case, as small and younger firms are more likely to be financially constrained and might display higher sensitivity to shocks, and even conditional on size, firms that accumulated more cash through retained earnings might be better able to smooth the shocks. Finally, even conditional on the availability of firm specific resources, the owner's assets could play a role in the dynamic response of firms' outcomes to the shock. To investigate this possibility, we augment the model, to answer allowing the parameter β to depend on the amount of wealth held by the owner outside the firm; i.e., we posit

$$\log\left(Size_{jt}\right) = \alpha + \beta\left(j\right)\log\left(Price\ Shock_{jt-1}\right) + \gamma X_{jt} + \phi_t + u_{jt}$$

where $\beta\left(j\right)$ is a function of the the private wealth of the owner of firm j . Since we acknowledge that the past performance of the firm could be correlated both with the wealth of the owner and the outcomes, we use lagged wealth – 5 years before the measurement of the outcome. Moreover, as we are interested in estimating the role of the private assets *on top of* retained earnings, we control for the cash to asset ratio in our preferred specification.

Finally, as we have no reason to think that the role of wealth would be symmetric in response to modulate positive and negative shocks, we parametrize the function $\beta(j)$ to allow for differential responses to positive and negative shocks, and across different quartiles of the wealth distribution.

As we do not have an obvious source of firm level shocks in our data, we connect to a large literature in labor economics (Guiso, Pistaferri, and Schivardi, 2005) and macroeconomics (Lagakos and Ordonez, 2011) and estimate statistically changes in two measures of firm performance which cannot be predicted by a linear regression model which controls for firm and time fixed effects and firm observables and time varying characteristics. In particular, we focus on two different measures: value added per worker and revenue per worker. The advantages of the first measure are discussed in detail by Guiso, Pistaferri, and Schivardi (2005): in particular, among the reasons to prefer value added (the sum of profits, wages and perks) to profits, they mention that value added is the variable that is directly subject to stochastic fluctuations, and it is harder than profits to manipulate for accounting reasons. Value added contains wages, and this might create endogeneity problems when regressing firm level outcomes on it. For this reason, we consider changes in log revenues as our primary measure (again, revenues are harder to manipulate than profits, and revenues are most directly affected by fluctuation in prices which are more likely to be driven by factors outside the control of the firm).

Specifically, we model log revenues in the following way:

$$\log(Revenues_{jt}) = \theta_t + \theta_j + \Theta\left(Age_{jt}, Size_{jt}\right) + \epsilon_{jt} \quad (5)$$

where θ_t and θ_j are time and firm fixed effects and $\Theta(\cdot,\cdot)$ represents a quadratic polynomial in firm size and firm age.[15] Then, we define a shock as the change in residuals from the regression. Aggregate fluctuations in the economy are captured by the time fixed effects, and sector specific characteristics as well as any other time invariant firm-specific determinant of revenues are captured by the firm fixed effects. Controlling for age and size accounts for possible differences in revenue fluctuations across firms of different scale.[16]

In the text, we only report results obtained from the measure based on revenues, and sometimes comment on how they compare to the alternative set of results. In appendix D we report the results relative to the value added shocks.

First, we present results on firm level outcomes: exit rate, size growth, hiring and separation rates, and wage bill per worker growth. In the second part of the analysis, we focus on employee level outcomes: in particular, we focus on employees who stay in the firm both in the year of the growth and in the subsequent year – we refer to these workers as stayers. On the one side, the earnings growth of the stayers is less sensitive to the change in revenues if the owner of the firm is wealthy. On the other side, while negative growth affects the overall probability of a stayer of experiencing some underemployment in the following year, this probability does not vary systematically with the owner's buffer. We find similar (and more pronounced) results when we consider shocks to value added per worker rather than shocks to the revenues.

5.1 Firm level outcomes

After defining the unpredictable component of revenue growth as specified in equation 5, we consider the following specification:

$$y_{jt} = \alpha + \sum_{d=1}^{4} \beta_d \mathbf{1}\left\{\Delta\hat{\epsilon}_{jt-1} < 0\right\} \mathbf{1}\left\{Quartile_{o(j),t-5} = d\right\} + \\ + \sum_{d=2}^{4} \delta_d \mathbf{1}\left\{\Delta\hat{\epsilon}_{jt-1} \geq 0\right\} \mathbf{1}\left(Quartile_{o(j),t-5} = d\right) + X_{jt}\gamma + u_{jt} \tag{6}$$

[15] We compute shocks to value added per worker in a similar way.

[16] We also performed robustness checks by including sector specific time trends in the specification above, and the results are qualitatively the same.

where $\mathbf{1}\{\Delta\hat{\epsilon}_{jt-1} < 0\}$ is a dummy that takes value one if the firm experienced a negative growth in year $t-1$, and $\mathbf{1}\{\Delta\hat{\epsilon}_{jt-1} \geq 0\}$ is a dummy that takes value 1 if the growth was positive.

$\mathbf{1}\left(Quartile_{o(j),t-5} = d\right)$ is a dummy that takes value 1 if the firm's owner was in the d-th quartile of the owner's wealth distribution five years prior to the shock.[17] X_{jt} is a vector of controls including firm size and age polynomials, year dummies, 2-digits NACE industry dummies and county dummies. y_{jt} represents the outcome of interest. We estimate the specification with and without firm fixed effects. We consider different outcomes: firm exit rate, employment growth, hiring and separation rates and growth in wage bill per worker.

To interpret this parametrization, one should notice that the element

$$\mathbf{1}\{\Delta\hat{\epsilon}_{jt-1} < 0\} \times \mathbf{1}\left(Quartile_{o(j),t-5} = d\right)$$

is excluded from the specification. This means that the coefficients of interest (the β's and the δ's) will identify differences in the expected outcome with respect to a firm that experienced positive growth and whose owner was in the lowest quartile 5 years prior to the measurement. This implies, for instance, that the coefficient β_1 estimates the difference in the average outcome between a firm with negative revenue growth, whose owner was in the first quartile of the wealth distribution, and that of an equally wealthy owner's firm that experienced positive growth. The parameters δ_2, δ_3 and δ_4 estimate the difference in expected outcome between firms that experienced positive growth, whose owner is in the second, third and fourth quartile respectively of the wealth distribution, and the baseline group of firms. Recall that all parameters are estimated conditional on firm age, size and industry, so that effectively we compare similar firms in terms of life cycle and baseline number of employees as well as operating in a similar economic environment. The inclusion of firm fixed effects controls for any time invariant heterogeneity and for firm specific average growth paths. In this case, the coefficients of interest are identified out of variation in owner's wealth ranks across time. The source of this variation is twofold. On the one side, a change in quartile between year $t-1$ and year t might reflect a change in the owner's wealth between year $t-6$ and year $t-5$. On the other side, it might follow a change in main-ownership: if the new owner is sufficiently

[17] We compute the quartiles in the following way. First, we assign to each firm the wealth of the owners *five years* prior to year t; then we compute the quartiles in each year t. The inclusion of the wealth held in privately owned companies makes a little difference.

more/less wealthy than the previous one, we might observe a change in the quartile within firm and across years. Most of the variation comes from the first source, as 85% of the firms in the sample never change main owner in the panel.

Tables 6 to 7 collect the results for our firm level analysis. The coefficients of interest (β_1 to β_4, and δ_2 to δ_4) are plotted in Figure 8.

The results concerning the **exit rate** of the firm are collected in Figure 8, panel (a). The first thing to notice is that negative revenue growth predicts lower survival probability. This is *prima facie* evidence that our statistical measure of shocks captures economically relevant changes in the value of the firm. If this was not the case, it would be hard to rationalize the 1.1 to 0.7 percentage point difference in the probability of exiting between firms subject to a positive shock (black dashed line) and firms subject to a positive shock (red solid line). As, on average, 3.2 percent of the firms operating in year t cease operations in year $t+1$, the difference between the two groups of firms is economically important, representing 30 to 22 percent of the likelihood of exiting from one year to the next. Second, as the lagged owner's wealth increases, negative shocks become less likely to impact the firm's survival. Consider the difference in survival probability between two firms hit by a negative shock, one owned by a household in the fourth quartile and the other owned by a household in the first quartile; i.e., one should consider $\hat{\beta}_4 - \hat{\beta}_1$. On the graph, this boils down to a comparison between the rightmost coefficient and the leftmost coefficients within those connected by the solid red line. This difference is approximately 1.5 percentage points ($\hat{\beta}_4 - \hat{\beta}_1 = 0.015$) and is statistically significant ($p = 0.000$), and similarly $\hat{\beta}_3 - \hat{\beta}_1 = 0.011$, $p = 0.000$ and $\hat{\beta}_2 - \hat{\beta}_1 = 0.007$, $p = 0.000$. This finding is consistent with the intuition that wealthier owners can use their personal resources to avoid closing their firm after a negative and unpredictable change in revenues. Third, positive shocks are associated with a higher survival rate, and once more the magnitude of this association depends on the owner's buffer stock wealth. Firms that experienced a negative growth, owned by households in the second, third and fourth quartile of the wealth distribution, are approximately 1.0 to 1.2 percentage points more likely to exit than firms which experienced a revenue increase but are owned by households in the first quartile, and all these differences are highly significant.

Finally, combining the two results above, the difference in survival probability between firms that are subject to growth in revenues of different signs is approximately 0.7 percentage points when the owner is in the top quartile of the wealth distribution, against 1.1 percentage points when the owner is in the lowest quartile: this half point difference is significant ($p = 0.043$). In other words, the difference in the sign of revenue growth matters more, the fewer personal resources the firm owner has. The differences are reported in Figure 9 panel (a).

In Figure 8 panel (b) we observe a similar pattern for **employment growth**. Once more, we find that a negative shock reduces employment growth while a positive shock increases it. Moreover, wealthier owners smooth the impact of the shock to a larger extent than those who have less wealth. Again, we find evidence of this type of smoothing after positive and negative shocks. After negative shocks, employment decreases less when the owner has more personal wealth: in this case the difference between $\hat{\beta}_4$ and $\hat{\beta}_1$ is 1.0 percentage points (the predicted growth is -1.4% at the fourth quartile versus -2.4% at the first quartile) and marginally insignificant (p-value 8%). After a positive shock, employment increases by 11% percent at the first quartile and just by 8.2% percent in the fourth (the difference in this case is highly significant). Overall, when looking at employment growth, we observe a "symmetric convergence" – i.e., employment growth is less sensitive to shocks of either sign in the upper part of the wealth distribution than in the lower. To capture this visual result with a single number, we can compute the difference in differences:

$$\underbrace{\left(\hat{\delta}_4 - \hat{\beta}_4\right)}_{\text{difference at the top}} - \underbrace{\left(0 - \hat{\delta}_1\right)}_{\text{difference at the bottom}} = -0.031, \; p - value = 0.000 \tag{7}$$

This fact is once more consistent with the buffer stock story: the employment policy of the firm is less tied to contingent economic conditions when the owner has the ability to insulate the firm through his personal finances.

In order to shed some light on the previous result, we turn to **hiring and separation rates**: we plot the relevant coefficients for these two outcomes in panel (c) and (d) of Figure 8. Firms subject to positive shocks have higher hiring rates, but the difference with respect to the baseline group declines with the wealth of the owner. This might suggest that the hiring policies of rich households' firms are less sensitive to past positive shocks and probably follow a more long-run strategy. The increase in hiring rate that we observe among firms subject to a negative shock seems to provide further evidence in support of this idea (for example, $\hat{\beta}_4 - \hat{\beta}_1 = 0.011$ with a p-value smaller than 0.1 percent). Again, we find that the association between shocks and hiring rate is higher at the bottom than at the top of the wealth distribution (the difference in differences is 2.6 percentage points, more than 10% of the hiring rate in the baseline group, which is 22 percent). The results in terms of separation rate (panel d) are less conclusive but still economically meaningful. On the one side, the differences between negatively and positively shocked firms are significant: firms hit by negative shocks have 1.1 to 1.4 percentage points higher separation rates – where the baseline rate is approximately 18 percent. On the other side, there is not a distinct pattern characterizing the responses of firms to value added shocks along the owner's wealth rank dimension. It is important to highlight that the separation rate combines layoffs (involuntary separations) and quits (voluntary separations), two types of flows that might react differently to the same type of shocks. The difference in separation rates associated with shocks of different sign is 0.4 percentage points lower for firms owned by individuals in the bottom quartile, than for firms owned by the wealthiest owners, but it is not statistically significant (a double difference as the one in equation (7) has a p-value greater than 0.17). Overall, the observed "convergence" (visually represented by the converges in the differences towards 0 in Figure 9) – lower sensitivity to shocks in the upper part of the wealth distribution – in terms of growth rate of the firm is mainly explained by an analogous pattern in terms of hiring rates, rather than by separation rates.

The results above are similar – and more pronounced – when we look at unpredicted growth in the firm value added per worker (Figure A.6, and Tables A.14 to A.18 panel a).

Before turning to the employee level analysis, we look at the growth of the **wage bill per worker**, measured from the firms' balance sheets. The results are summarized in Figure A.18. Negative revenue growth is associated to negative salary per worker growth, but less and less so, the richer the firm's owner. As the baseline growth is 23 percent, the figure ranges from minus 14 percent in the first quartile to minus 7 percent in the highest quartile. Positive shocks are associated instead with a positive growth in wage bill per worker: the growth is 23 percent at the lowest quartile and declines to approximately 16 percent at the top of the distribution. The results are similar if we focus on value added growth (in panel a). These results can be interpreted as reflecting higher "insurance" enjoyed by workers employed by wealthy owners. In those firms, negative shocks are mostly absorbed by the firm and not passed through to the wage bill – through the earnings or the hiring/separation margins, while at the same time, positive shocks are associated to lower growth in the wage bill. Workers pay a "premium" (low earnings growth) in good times in exchange for insurance in bad times. However, some caution with this interpretation is in order, as changes in the wage bill per worker come from a mix of changes in the wage bill and in the number of employees. The following section focuses on employee level outcomes, in an attempt to separate these two margins.

5.2 Employee level outcomes

In order to understand how single employees are affected by firm level shock, we use the following regression framework:

$$
\begin{aligned}
y_{ijt} = \alpha + & \sum_{d=1}^{4} \beta_d \mathbf{1}\left\{\Delta\hat{\epsilon}_{jt-1} < 0\right\} \mathbf{1}\left\{Quartile_{o(j),t} = d\right\} + \\
& + \sum_{d=2}^{4} \delta_d \mathbf{1}\left(Quartile_{o(j),t} = d\right) + X_{jt}\gamma \\
& + Demographics_{it}\zeta + u_{ijt} \qquad (8)
\end{aligned}
$$

y_{ijt} is the outcome of a worker i employed by firm j in year t. We focus on two different outcomes: individual earnings growth and the probability of underemployment. The first outcome is simply defined as the difference in log earnings between the year of the revenue shock and the subsequent year. Underemployment is measured by a dummy that takes value one if the worker received any unemployment related benefits in the year after the shock. In Norway, workers can apply for unemployment benefits both when they are jobless and when they experience a significant reduction in the number of hours worked (more than 40% reduction with respect to the previous year). Moreover, they can apply for the benefits regardless of the reason for their underemployment; i.e., layoffs and voluntary quits are treated in the same way.

Workers employed by wealthier owners tend to be more educated and slightly older and more likely to be married. In order to account for the heterogeneous population of workers that are employed by different firms, we include a set of controls ($Demographics_{it}$) which include marital status, gender dummies, type and length of education, on top of the aforementioned firm level controls.

In Figure 10 we plot some other relevant employee level statistics. The top-left panel shows that the number of employees included in our sample grows with the wealth of the employer.

This is consistent with the finding that wealthier owners run larger firms. The baseline level of earnings is also slightly higher at the top of the owner's personal wealth distribution (top right panel). In the bottom panel, we plot the raw outcomes (individual earnings growth and probability of underemployment) across the owner's wealth distribution, contrasting firms that experienced a positive shock (+) with firms that experience a negative shock (-) within each decile. The difference in earnings growth between firms subject to different shocks (left panel) tend to decrease as one moves from the first to the tenth decile of the distribution, consistent with what we will find in our regression analysis. The probability of underemployment (right panel) is consistently lower for workers employed by firms that experienced a negative shock, but there is no clear visual pattern emerging across the wealth distribution.

The results from the specification (8) are reported in Table 8. The coefficients of interest are also plotted in Figure 11, where we normalized the coefficients by adding the value of the baseline group of workers (those employed by firms that underwent a positive shock and are owned by a household in the first quartile of the personal wealth distribution).

Figure 11 panel a (which plots the results relative to individual earnings growth related to revenues unpredictable growth) displays a pattern which is qualitatively similar to that in Figure A.7 (in which the dependent variable is instead firm level salary per worker growth). As firms owned by entrepreneurs in different quartiles of the distribution could differ in their compensation schemes for unobserved reasons, we estimate the model including firm fixed effect to account for this type of time invariant firm heterogeneity. The results show that at the bottom of the wealth distribution, the predicted earnings growth associated to a negative firm revenue growth is slightly negative, while they are positive (2.1 percent) at the top. Looking at the effect of positive revenue shocks, the growth in employees' earnings declines from 13 percent at the bottom of the owner's wealth distribution to 9.5 percent at the top. The difference in earnings growth between workers employed by firms subject to revenue growth of opposite sign – plotted in panel b – is lower at the top than at the bottom of the owner's wealth distribution (7.4 against 13.7 percentage points), offering evidence for the buffer role of the owner's wealth in the form of earnings insurance enjoyed by the workers.[18]

Figure 11 panels (c) and (d) illustrate the results on the probability of underemployment.

[18] The results are similar if we look at value added shocks (see Table A.19 panel a, and Figure A.8).

Negative firm level shocks are associated with a higher probability of underemployment, and as we move along the wealth distribution, we observe a decline in the probability of underemployment both within the group of firms that underwent a positive shock (dashed black line in panel (a)) and within the group of firms that experienced a negative shock (red solid line). However, only part of these results are robust to the inclusion of firm fixed effects (panel b); the decline in the probability of underemployment with the wealth rank of the owner is not statistically significant once we include the fixed effects. The resulting figures illustrate once again that the association between firm level revenue shocks and the outcome of interest becomes milder as we focus on firms owned by wealthier owners. The difference in the probability is 1.1 percentage point at the bottom of the distribution (more than 20% of the 5 percentage points baseline probability), while it is 0.9 percentage points at the top of the wealth distribution.[19]

Taken together, the results suggest that there is a differential response to economic shocks in terms of earnings growth, but not in terms of employment risk. The smaller difference between firms that received shocks of different sign at the top of the distribution is suggestive that employment relationships with wealthy owners have a higher insurance content than those between workers and less wealthy owners. The insurance content is revealed by a smaller earnings growth decline associated with a negative shock, jointly with a smaller increase associated with a positive shock.

6 A simple framework of the firm with costly external financing

Although in our analysis we do not directly look at investment as suggested by Gentry and Hubbard (2004), we have tested an idea which is closely connected: whether at each point in time the personal resources of the firms' owners affect the chances of firm survival, as well as employment growth. More specifically, and in the spirit of the consumption smoothing literature (Zeldes, 1989) we have tested whether firm and employee level outcomes display more sensitivity to firm idiosyncratic shocks the poorer the firm owner is. We have found that this is the case, even conditional on firm specific cash ratios, which suggests that personal wealth is an important channel of self-financing on top of the cash holdings built over time through retained earnings.

The larger response to negative idiosyncratic shocks is consistent with an intuitive idea: consider

[19] We observe similar patterns when we focus on value added growth; the results are reported in Figure A.9 (probability of underemployment).

two firms that before a shock find themselves on their (possibly constrained) optimal trajectory. However, the owners of the two firms dispose of different amounts of wealth. A negative shock would require both owners to adjust firm inputs to avoid large reductions in profits. If external financing is costly, the richer owner can use his personal assets and avoid profits dropping or even shutting down the firm, but the poorer owner might be constrained in his choice and as a consequence, one would observe higher sensitivity to a negative shock when looking at his firm.

Consider a simple framework – designed to emphasize the interdependence of entrepreneurial saving and investment decisions – where an entrepreneur solves the profit maximization problem:

$$\max_k \theta k^\alpha - R(k-a) - \phi k \tag{9}$$

where k is capital, θ captures the productivity of the firm, a the nonbusiness assets of the entrepreneur and

$$\phi = \begin{cases} 0 & if\ a > k \\ \phi\left(\frac{k-a}{k}\right) & if\ a < k \end{cases}$$

is an increasing function that captures the costs of uncollateralized external financing $k-a$.[20]

Define k^* to be the optimal capital scale, i.e., the amount of capital that would be invested if $\phi\left(\frac{k-a}{k}\right) = 0,\ \forall k$, i.e., if the entrepreneur were not to face costly external financing or equivalently were to solve the problem

$$\max_k \theta k^\alpha - R(k-a). \tag{10}$$

The optimal scale is then given by:

$$k^* = \left(\frac{\alpha\theta}{R}\right)^{\frac{1}{1-\alpha}}.$$

and if $a > k^*$ the entrepreneur will make the optimal investment k^*.

However, for low level of wealth the first order condition for capital reads

[20] Following Gentry and Hubbard (2004) – we model costly external financing not by a nonnegativity constraint on net worth, as typically done, but by an upward-sloping supply schedule for uncollateralized external financing.

$$\alpha\theta k^{\alpha-1} - R - \phi\left(\frac{k-a}{k}\right) - \phi'\left(\frac{k-a}{k}\right)\frac{a}{k} = 0$$

implying that the chosen level of capital is now lower than optimal:

$$\tilde{k} = \left[\frac{\alpha\theta}{R - \phi\left(\frac{\tilde{k}-a}{\tilde{k}}\right) - \phi'\left(\frac{\tilde{k}-a}{\tilde{k}}\right)\frac{a}{\tilde{k}}}\right]^{\frac{1}{1-\alpha}} < k^*$$

Other things being equal, in this environment, capital is increasing in θ[21], implying that when faced with higher productivity, the entrepreneur will decide to increase his investment. To understand how this change is affected by the private wealth of the entrepreneur, we can look at the cross partial:

$$\frac{\partial^2 k}{\partial\theta\partial a} = \frac{-\left[2\phi''\left(\frac{k-a}{k}\right)\frac{a}{k^2} - \phi'''\left(\frac{k-a}{k}\right)\frac{a^2}{k^3}\right]\alpha k^{\alpha}}{\left(\alpha\left(1-\alpha\right)\theta k^{\alpha-1} + \phi''\left(\frac{k-a}{k}\right)\frac{a^2}{k^2}\right)^2}.$$

The sign of this derivative depends on the functional form assumption on ϕ[22] which implies that the sensitivity of investment to productivity shocks can in general increase or decrease with the amount of non-business assets owned by the entrepreneurs. As shown in appendix A, however, the only case in which the sensitivity is independent on a is when ϕ is linear. If this is not the case, personal assets affect the sensitivity of business investment; in particular, if we assume a quadratic functional form the sensitivity decreases in a, so that firms owned by wealthier entrepreneurs should display smaller outcome changes upon receiving shocks of either sign. Without further assumptions, however, we cannot sign the change in sensitivity implied by changes in a, and even if our ex-ante intuition was that wealth should act as a buffer – therefore smoothing firm level shocks – we consider the documented lower sensitivity at higher levels of financial wealth as the answer an empirical matter.

[21] Indeed, applying the implicit function theorem:

$$\frac{\partial k}{\partial\theta} = \frac{\alpha k^{\alpha}}{\alpha\left(1-\alpha\right)\theta k^{\alpha-1} + \phi''\left(\frac{k-a}{k}\right)\frac{a^2}{k^2}} > 0$$

[22] And in particular $sign\left(\frac{\partial^2 k}{\partial\theta\partial a}\right) = sign\left(-\left[2\phi''\left(\frac{k-a}{k}\right) - \phi'''\left(\frac{k-a}{k}\right)\frac{a}{k}\right]\right)$.

The comparative static above is obtained in a very simplified environment. For instance, in this simple formulation, the premium in the cost of external financing applies only when entrepreneurial investment exceeds assets. However, if entrepreneurs require saving for other reasons (e.g., housing or precautionary saving) or value diversification, these extra costs could apply when $k < a$. For simplicity, our model abstracts from these considerations, but we will try to account for those in a more sophisticated model we plan to develop in future research.

The response to positive shocks might not follow a symmetric pattern: on the one side, the availability of funds coming from the personal assets could act as a "multiplier" of the positive shock, implying larger responses to positive shocks for firms owned by wealthy individuals. On the other side, one might think that less wealthy owners react the most to positive shocks, as they represent an opportunity to escape the constraints. Given the possible asymmetries in the firm response to shocks of different sign, in our empirical analysis we have adopted a specification that allows one to estimate different responses in face of positive or negative shocks.

7 Discussion and conclusions

Table 9 summarizes the results from the analysis in the previous section. In most cases, the difference in outcomes induced by shocks of opposite sign is smaller at the top of the wealth distribution (first column) than at the top. This difference is always statistically significant with $p < 0.05$, except in the case of separation rates.

The change in survival rate between firms that experienced unpredictable revenue growth of opposite sign is 1.1 percentage points at the bottom of the distribution (column 2) and almost half at the top of the distribution. This effect is sizable, especially if we consider that, in our sample, only 3 percent of the firms die from one year to the next.

We find similarly important effects when looking at size: the difference in mean growth between the groups of firms experiencing different revenue growth drop from 13.5 at the bottom to 10 percent at the top of the owner's wealth distribution, a decline of 27 percent. This 3.5 percent decline corresponds to more than 10 percent of the employment growth standard deviation one obtains pooling the full sample, which is 31 percent. This figure is somewhat smaller than the 0.42 employment growth volatility reported by Davis et al. (2006) about privately held firms in the US, but of the same order of magnitude. Most of the effects, can be attributed to a lower sensitivity at the top of the owner's wealth distribution of hiring rates: the decline in the differences is in this case of 1.7 percentage points, which correspond to 7 percent of the pooled and unconditional standard deviation.

Finally, while the differences in separation rates do not display any sensible patterns across the owner's wealth distribution – this holds both when looking at firm and employee level results – we find important differences in average earnings growth. While earnings grow 13.7 percent more in firms with past positive revenue growth at the bottom of the distribution (almost one third of a standard deviation), the difference is 7.4 percentage points at the top, corresponding to a 43% decrease. Taken together, these results suggest that while the employment margin is not affected by the wealth of the employer, the earnings margin is much more insured by wealthy employers.

In this paper, we document new facts about the relationship between entrepreneurs' personal wealth and firm dynamics. Our empirical evidence offers support to the idea that self-finance is an important substitute to credit; adding to the literature on firm internal financing, we show that the personal wealth of the entrepreneur matters both to improve the firm performance at the beginning of the firm life cycle and to smooth idiosyncratic fluctuations in revenues and value added among operating firms. We see this as an important empirical complement to the literature on entrepreneurship, and in line with the line of research proposed by Buera et al. (2015).

Our rich set of data made it possible to isolate the effect of personal wealth on firms and employees, by conditioning on rich sets of owner's, worker's and firm level observables. Moreover, we have proposed the use of a cross sectional instrument based on variation in portfolio composition to avoid exploiting variation in initial wealth coming from endogenous saving decisions. Although the instrument has some limitations, we think that the idea of using aggregate fluctuations in asset prices to isolate exogenous variation in wealth is promising and can be used in many applications. We acknowledge however, that more work is needed to cleanly quantify these effects, as we still have some concerns about the selection into entrepreneurship of more able individuals which can be correlated with the portfolio choice even before the creation of the venture. As shown in the second part of the paper, the inclusion of firm specific fixed effects – which in most cases coincide with owner's fixed effects – do not alter significantly our results, a fact that makes us confident that owner's specific unobservable and time invariant characteristics (such as her ability) are unlikely to be a major driver of our findings.

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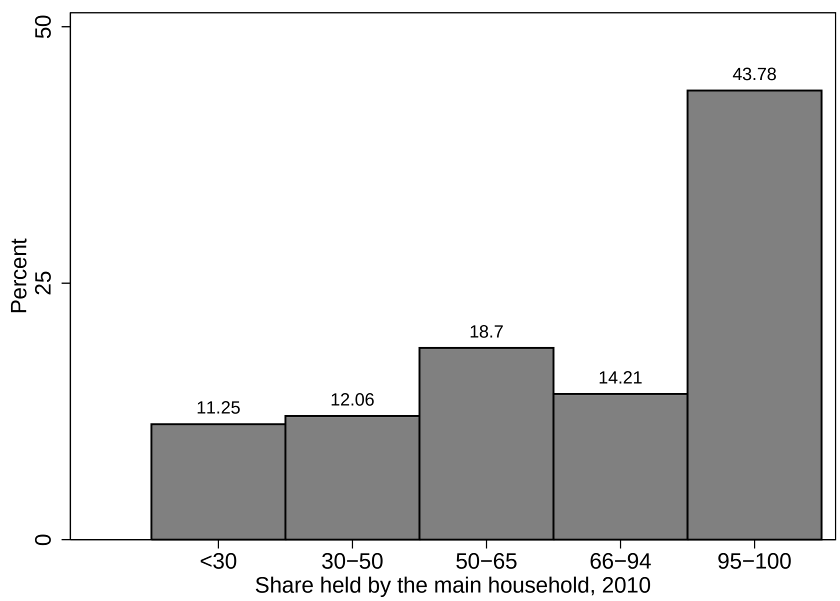
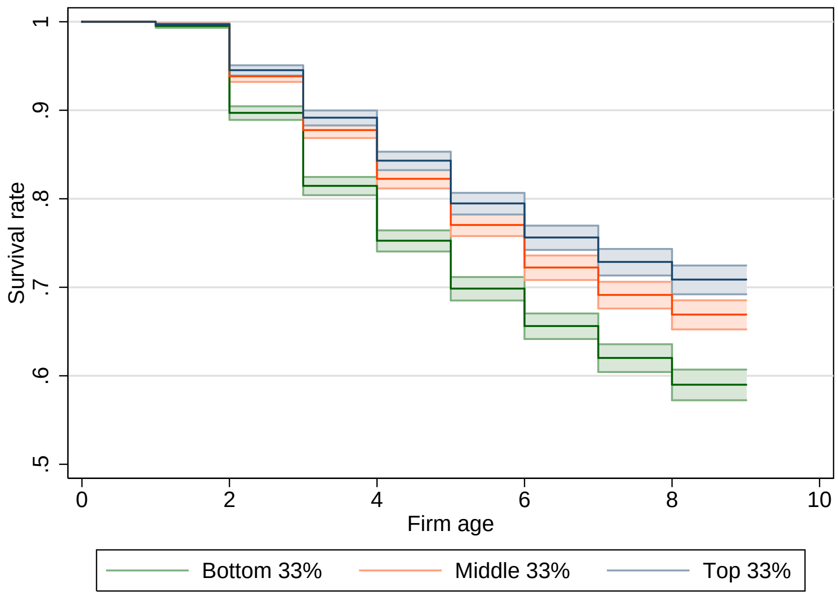
Figures

Figure 1: Share of the firm equity held by the main owner



The histogram shows the percentage of firms in different bins of shares owned by the main owner. For esample, the rightmost bar indicates that the main owner of 43.78 percent of the firms active in 2010 owns 95 to 100 percent of the firm's equity.

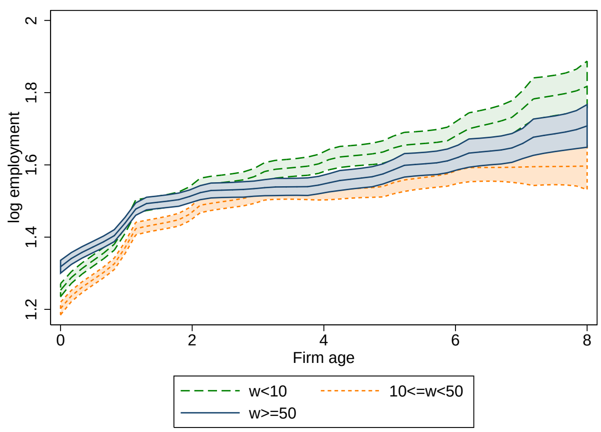
Figure 2: Survival Rate



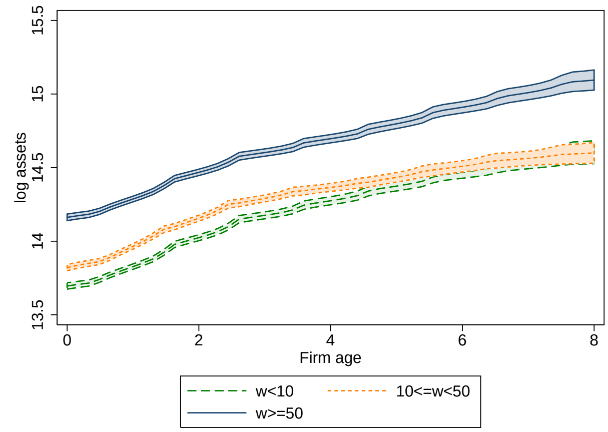
Note: The figure reports Kaplan-Meier estimates of the survival function of the three different groups of young firms, classified along the dimension of the owners personal wealth 5 years before the firm was founded. The three groups correspond to the three tertiles of the wealth distribution.

Figure 3: Age profiles, only firms observed from age 0 with owner

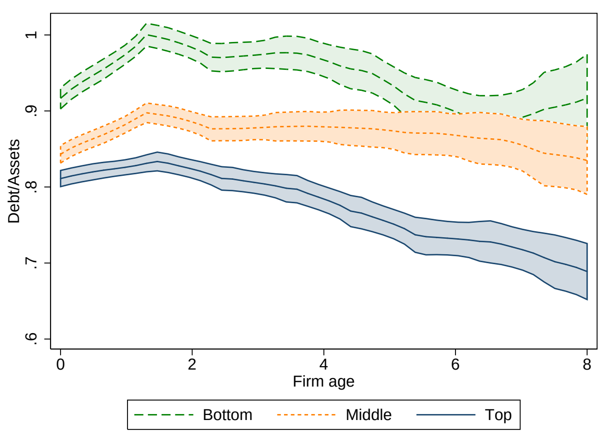
(a) Employment



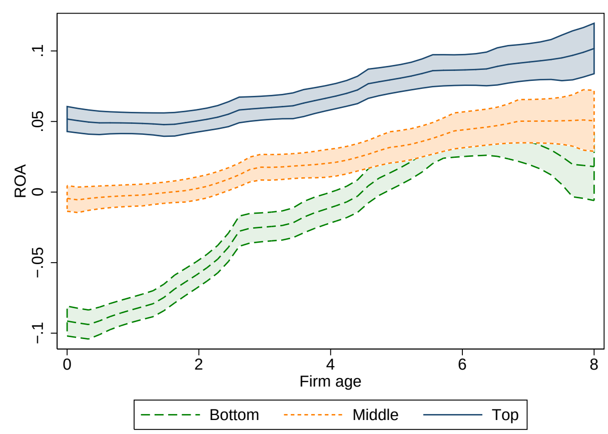
(b) Book Value of Assets



(c) Debt to Asset Ratio

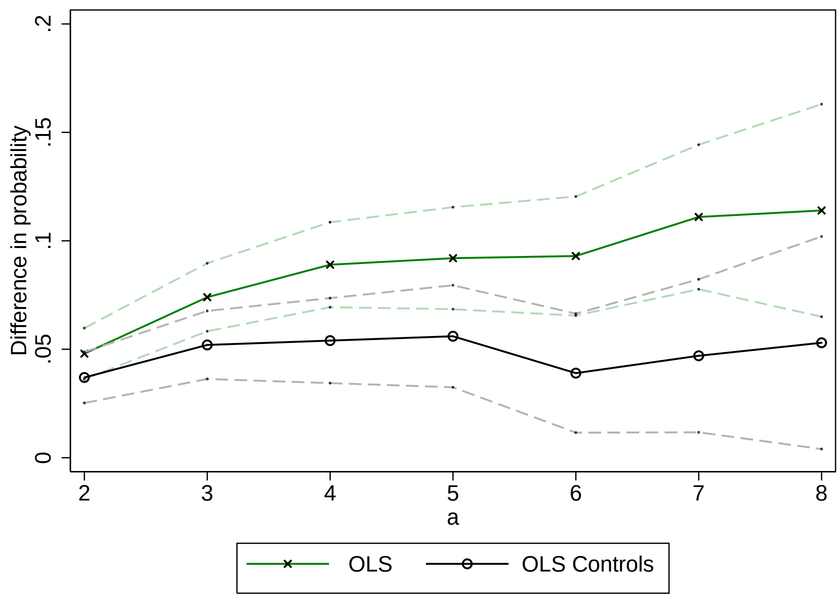


(d) Returns on Assets



Note: The figure reports unconditional nonparametric estimates of the age profiles of different young firm outcomes grouped by their initial the owner's personal wealth 5 years before the firm was founded. The estimates are obtained through local polynomial regressions. The three groups correspond to the three tertiles of the wealth distribution.

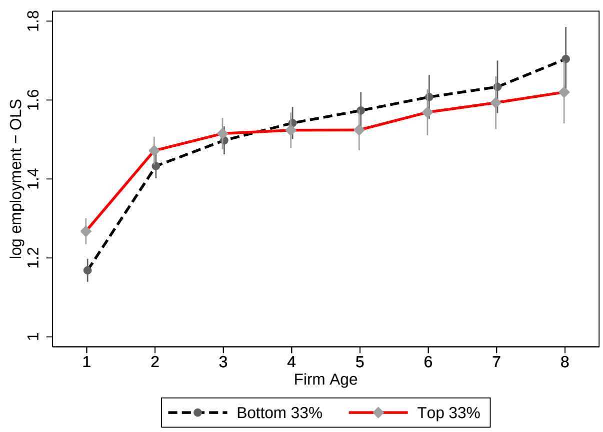
Figure 4: Differences in likelihood of survival; change when adding controls



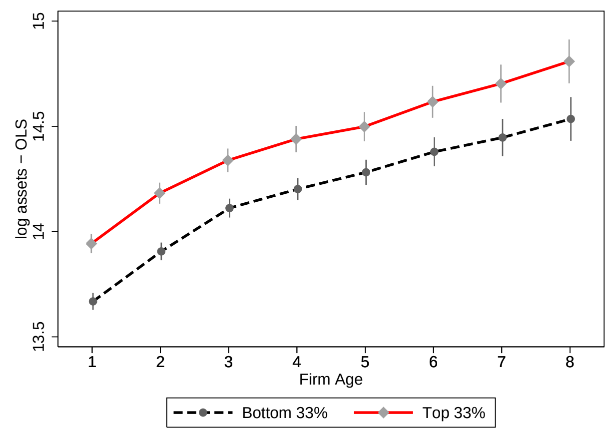
Note: The figure reports the coefficients $\beta_{3,a}, \forall a \in 2 \ldots 8$ in equation 2 estimated without controls and with controls. The coefficients represent the estimated different in probability of surviving a years or more between firms owned by entrepreneurs in the top tercile of the wealth distribution and entrepreneurs in the bottom tercile of the wealth distribution.

Figure 5: Age profiles, parametric version with controls - OLS

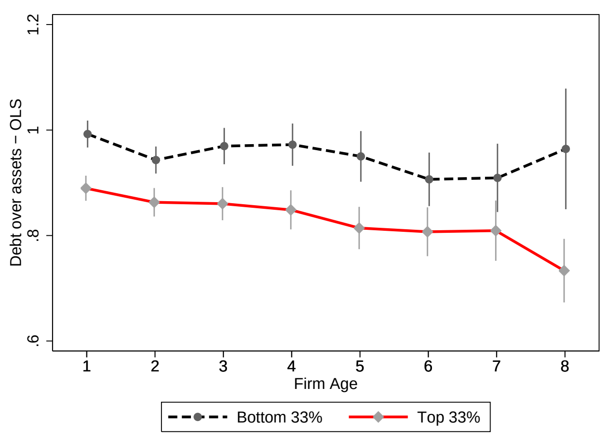
(a) Employment



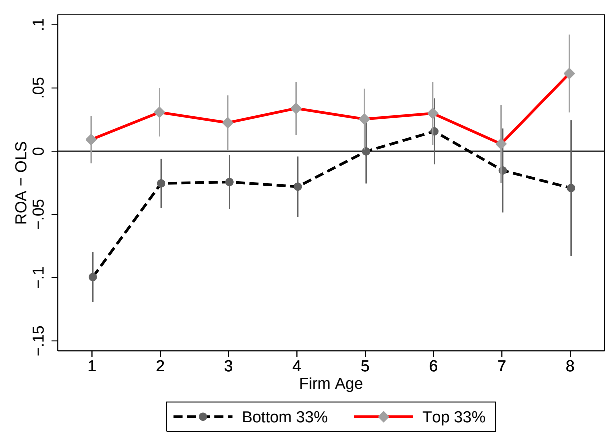
(b) Book Value of Assets



(c) Debt to Asset Ratio

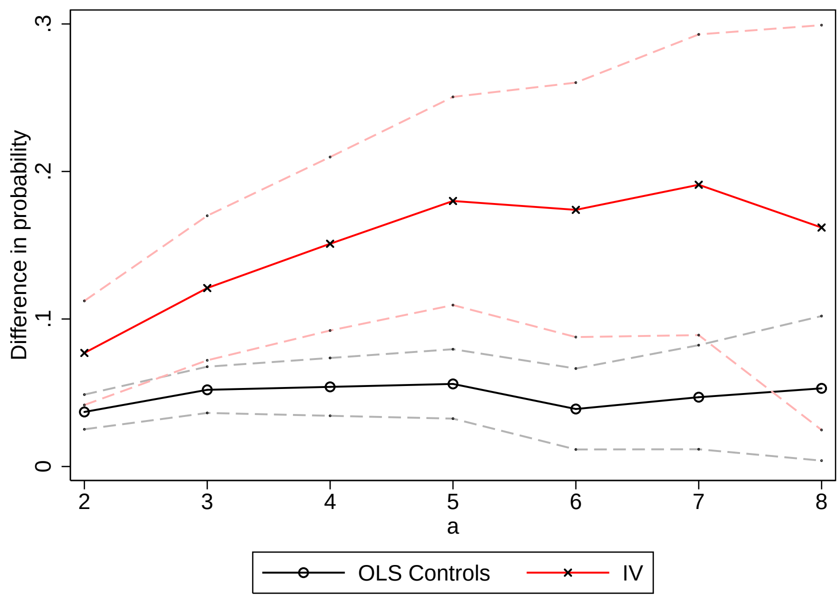


(d) Returns on Assets



Note: The figure reports the coefficients in equation 3, estimated with OLS, including the full set of controls. For readability, only the coefficients referring to the top and bottom tertiles of the owners (5 years lagged) wealth distribution are plotted. The coefficients should be interpreted as conditional averages, as we added to each estimate the average outcome of the baseline group excluded in the specification (Age 0 and second tertile).

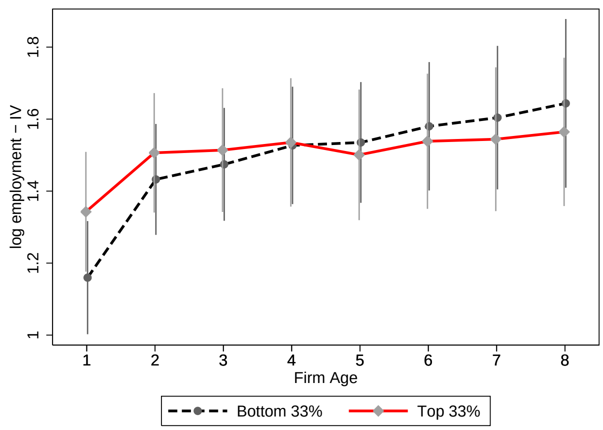
Figure 6: Differences in likelihood of survival; OLS vs IV



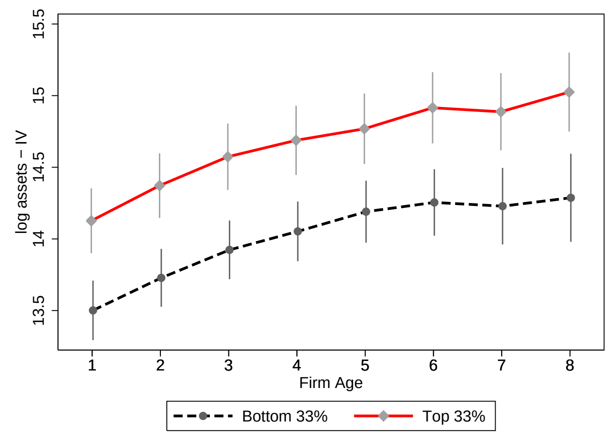
Note: The figure reports the coefficients $\beta_{3,a}, \forall a \in 2 \ldots 8$ in equation 2 estimated with OLS and all controls and with IV and allcontrols. The coefficients represent the estimated different in probability of surviving a years or more between firms owned by entrepreneurs in the top tercile of the wealth distribution and entrepreneurs in the bottom tercile of the wealth distribution.

Figure 7: Age profiles, parametric version with controls - IV

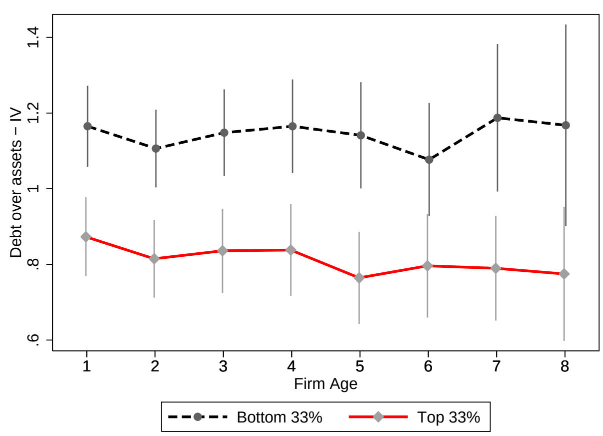
(a) Employment



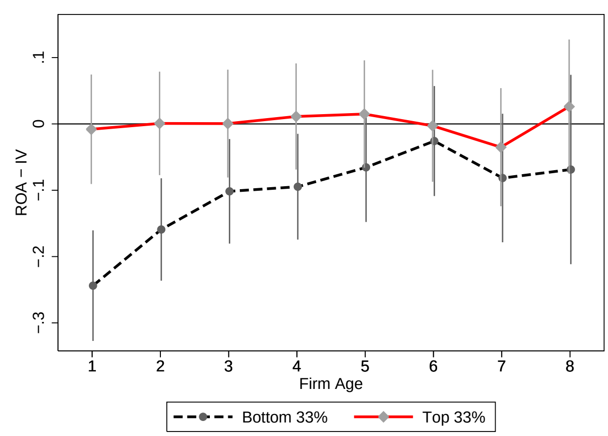
(b) Book Value of Assets



(c) Debt to Asset Ratio

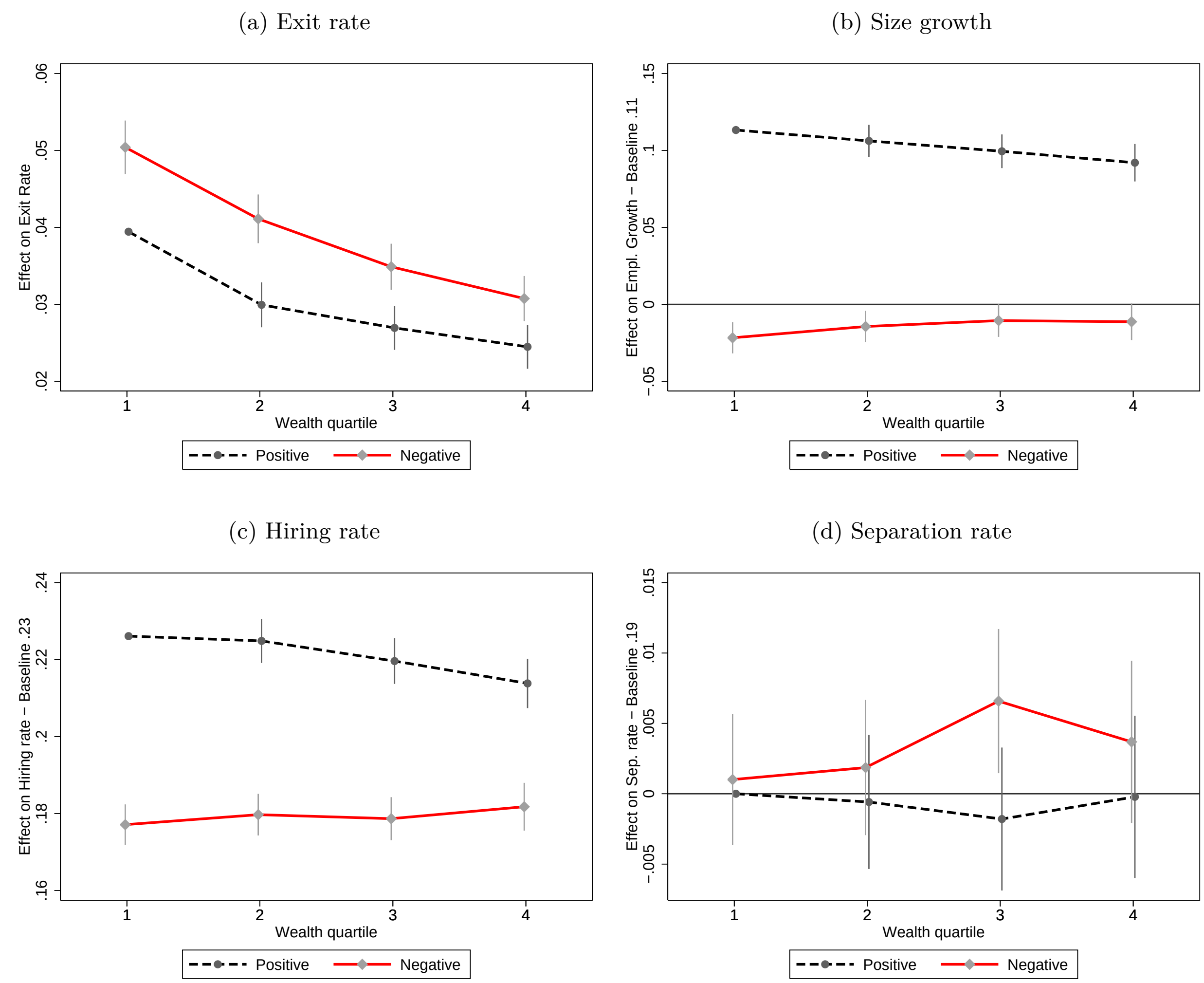


(d) Returns on Assets



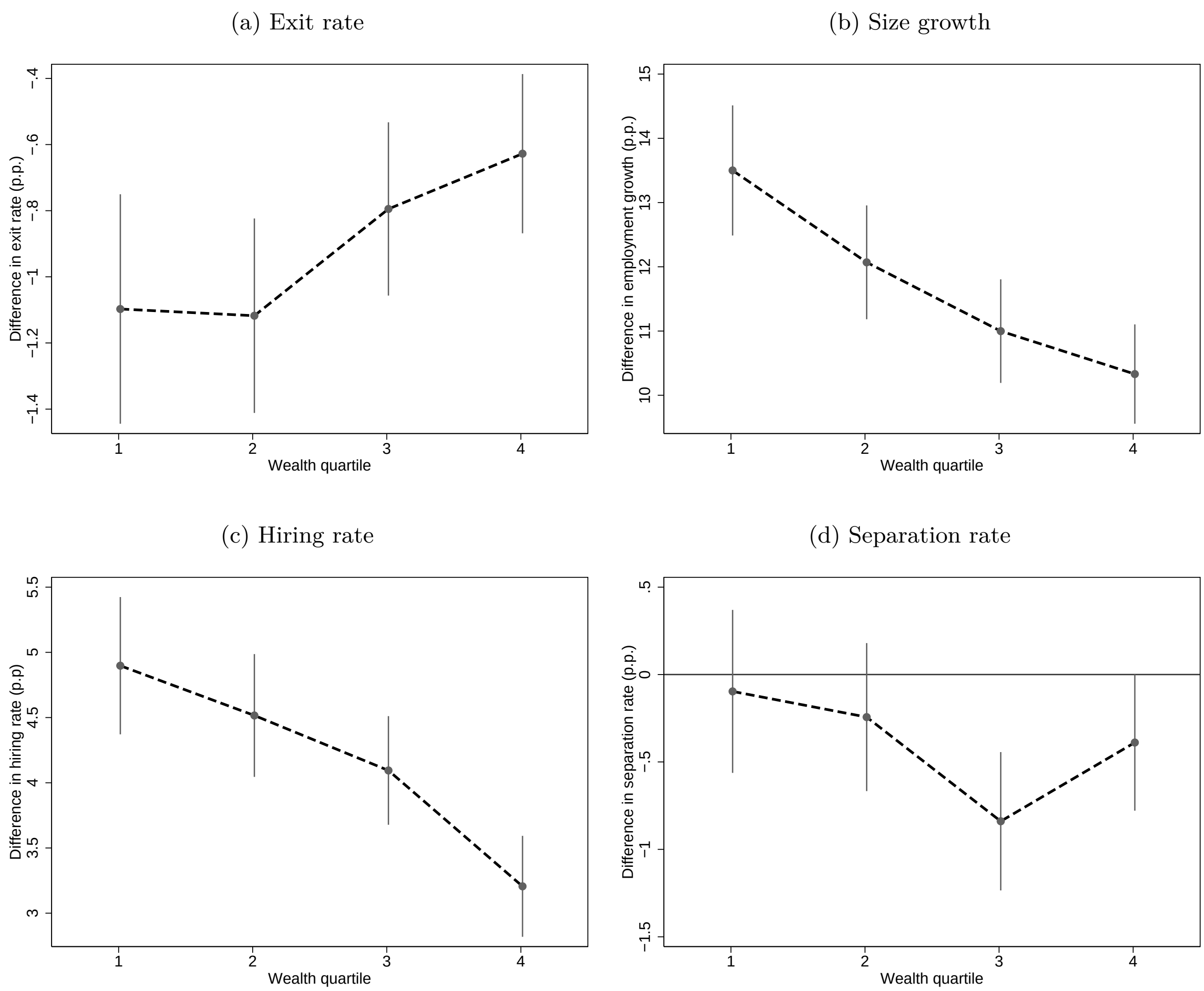
Note: The figure reports the coefficients in equation 3, estimated with IV, including the full set of controls. The instrument is described in equation 4. For readability, only the coefficients referring to the top and bottom tertiles of the owners (5 years lagged) wealth distribution are plotted. The coefficients should be interpreted as conditional averages, as we added to each estimate the average outcome of the baseline group excluded in the specification (Age 0 and second tertile).

Figure 8: Shocks to Revenues and Firm Outcomes



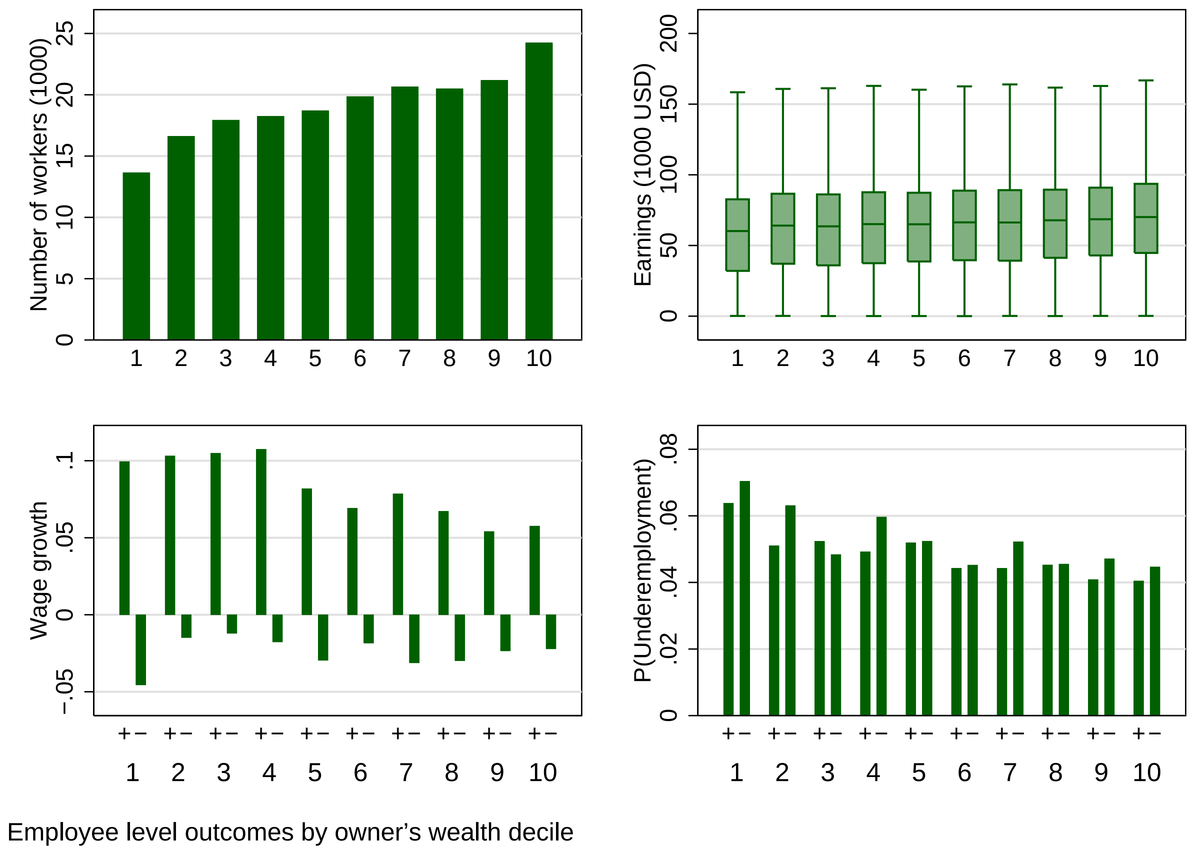
The graph plots the estimated β_d and δ_d coefficients in equation (6) in the main text. They represent changes in exit rate, size growth, hiring and separation rate (quits + layoffs) in response to shocks of different sign, across the quartiles of the owner's wealth. The shocks are computed from the log revenues at the firm level, using the change in residuals from equation (5) in the main text. Wealth is computed excluding the value of the share of the firm directly held by the owner's household. The sample only includes firms whose main owner also seats in the board and has a managerial position.

Figure 9: Shocks to Revenues and Firm Outcomes - Differences



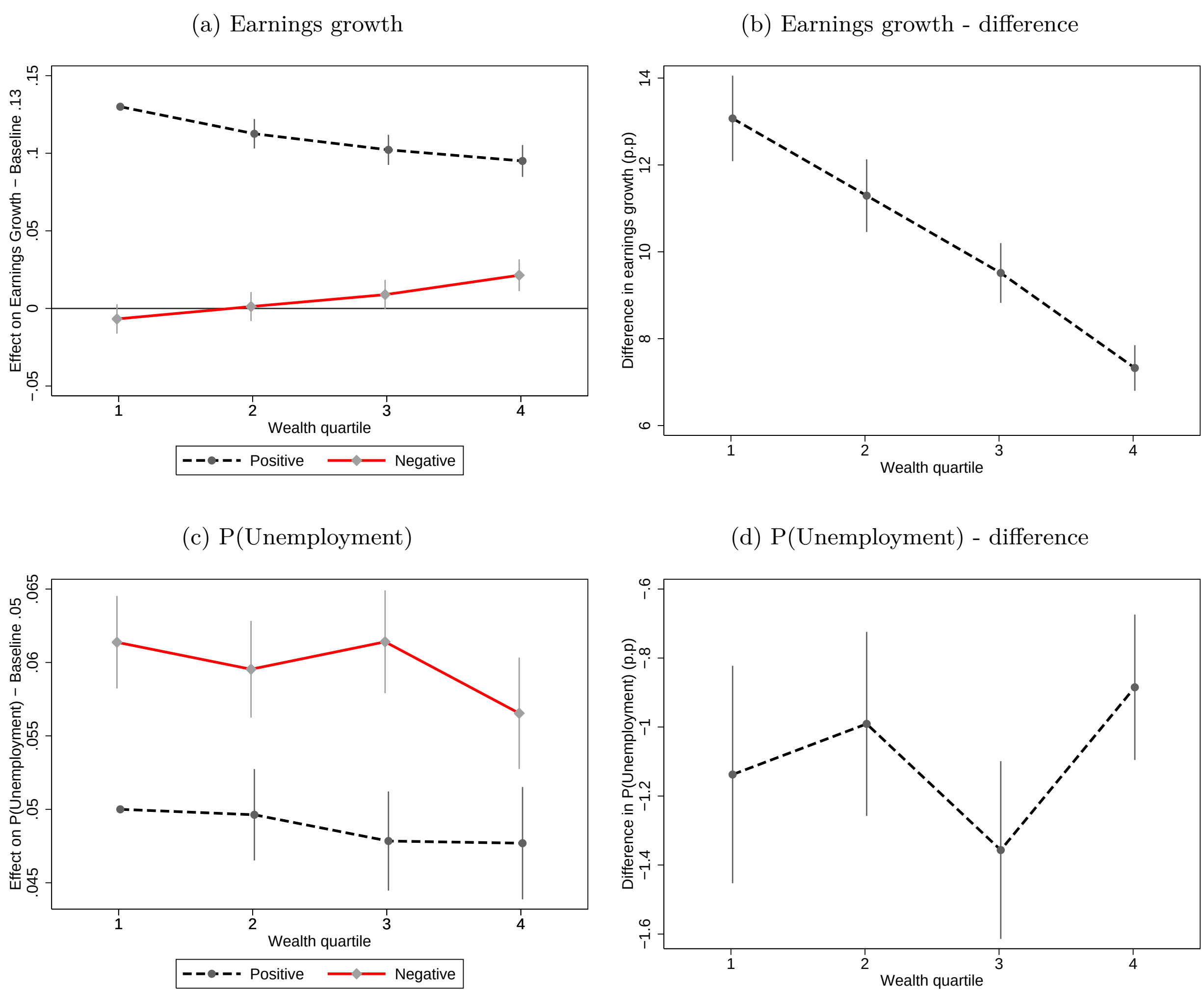
The graph plots the estimated differences $\delta_d - \beta_d,\ \forall d \in \{1 \dots 4\}$ coefficients in equation (6) in the main text. They represent the differences in changes in exit rate, size growth, hiring and separation rate (quits + layoffs) in response to shocks of different sign, across the quartiles of the owner's wealth. The shocks are computed from the log revenues at the firm level, using the change in residuals from equation (5) in the main text. Wealth is computed excluding the value of the share of the firm directly held by the owner's household. The sample only includes firms whose main owner also seats in the board and has a managerial position.

Figure 10: Employees Characteristics



The graph shows how different employee characteristics change across the main owner's wealth distribution in 2012. Wealth is computed excluding the value of the share of the firm directly held by the owner's household.

Figure 11: Employees outcomes and shocks to the firm revenues



The graph plots the estimated β_d and δ_d (panels a and c) coefficients and their differences $\delta_d - \beta_d$ (panels b and d) in equation (8) in the main text. They represent changes in individual earnings growth, and probability of experiencing unemployment in response to firm level shocks of different sign, across the quartile of the owner's wealth. Shocks are computed from the log revenues at the firm level, using the change in residuals from equation (5) in the main text. Wealth is computed excluding the value of the share of the firm directly held by the owner's household. The sample only includes firms whose main owner also seats in the board and has a managerial position. Only workers who received payments from the firm in year t and year $t-1$ are included (where t is the year of the shock).

Tables

Table 1: Descriptive Statistics – New Entrepreneurs

Panel A

	Mean	Std. dev	P10	Median	P90
Age	41.8	10.4	29	41	56
H.S. or less	0.71	0.45	0	1	1
Econ/Business education	0.15	0.36	0	0	1
Business income	14.7	31.4	0	1	47
Labor income	57.2	36.1	22	53	93
Avg. share risky assets	0.16	0.17	0	0	0
Entrep. parents	0.33	0.47	0	0	1
New entrepreneur	0.37	0.48	0	0	1
Observations	18278				

Panel B

	Bottom 1/3	Top 1/3	Diff
Age	37.1	47.5	-10.5^{***}
			(0.17)
H.S. or less	0.75	0.67	0.081^{***}
			(0.0082)
Econ/Business education	0.12	0.17	-0.051^{***}
			(0.0065)
Business income	4.96	29.5	-24.5^{***}
			(0.62)
Labor income	42.8	75.1	-32.3^{***}
			(0.68)
Avg. share risky assets	0.10	0.23	-0.13^{***}
			(0.0031)
Entrep. parents	0.31	0.33	-0.024^{**}
			(0.0085)
New entrepreneur	0.49	0.21	0.28^{***}
			(0.0083)

The summary statistics in Panel A refer to the sample of entrepreneurs who opened a firm after 2006 and had an open firm in year 2010. Panel B highlights the differences across wealth groups: wealth is computed five years before the firm's start up year. Specifically, we compare the means of the summarized variables across entrepreneurs in the bottom third and in the top third of the wealth distributions. The wealth measure does not include stocks in private firms and is computed 5 years before the firm is started.

Table 2: Descriptive Statistics – New Firms

Panel A

	Mean	Std. dev	P10	Median	P90
Low cap.int. sector	0.35	0.48	0	0	1
High cap.int. sector	0.57	0.49	0	1	1
Professional sector	0.078	0.27	0	0	0
Assets (1000)	439.2	2938.5	49.8	177.3	741.8
Assets (log)	12.1	1.14	10.8	12.1	13.5
Equity/assets	0.17	0.49	-0.11	0.20	0.54
Employees	4.88	5.36	1	3	10
Observations	18278				

Panel B

	Bottom 1/3	Top 1/3	Diff
Low cap.int. sector	0.39	0.30	0.093^{***}
			(0.0086)
High cap.int. sector	0.55	0.61	-0.057^{***}
			(0.0090)
Professional sector	0.057	0.093	-0.036^{***}
			(0.0048)
Assets (1000)	302.9	667.6	-364.7^{***}
			(62.4)
Assets (log)	11.9	12.4	-0.46^{***}
			(0.021)
Equity/assets	0.13	0.21	-0.080^{***}
			(0.0092)
Employees	4.84	5.22	-0.38^{***}
			(0.10)

The summary statistics in Panel A refer to firms whose main owner is a household in some year between 2005 and 2013, holds at least 10% of the firm' equity and has a managerial role in the board of the firm. Panel B highlights the differences across wealth groups: wealth is computed five years before the firm's start up year. Specifically, we compare the means of the summarized variables across entrepreneurs in the bottom third and in the top third of the wealth distributions

Table 3: Cox proportional hazard rate estimates

	(1)	(2)	(3)	(4)	(5)
Middle 33%	0.731***	0.736***	0.738***	0.756***	0.805***
	(0.024)	(0.023)	(0.023)	(0.023)	(0.030)
Top 33%	0.636***	0.644***	0.645***	0.672***	0.789***
	(0.031)	(0.030)	(0.030)	(0.031)	(0.037)
Test 2 vs 3	0.002	0.003	0.003	0.007	0.647
Year FE		✓	✓	✓	✓
County FE			✓	✓	✓
Sector FE				✓	✓
Individual controls					✓
Observations	18,278	18,278	18,278	18,278	18,278

Exponentiated coefficients

The table reports the estimates from a proportional hazard rate model. Individual level controls include dummies for education type and length, a quadratic in age, aquadratic in nonbusiness income, a quadratic in business income, the average share of risky assets in portfolio, and a dummy for previous entrepreneurial experience. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4: Age profile: assets and employment

	(1) Employees	(2) Employees	(3) Employees	(4) Assets	(5) Assets	(6) Assets
Age Firm 1, Tertile 1	0.307***	0.270***	0.270***	0.113***	0.174***	-0.003
	(0.015)	(0.016)	(0.079)	(0.021)	(0.021)	(0.103)
Age Firm 1, Tertile 2	0.244***	0.244***	0.278***	0.263***	0.262***	0.284***
	(0.007)	(0.008)	(0.031)	(0.011)	(0.012)	(0.048)
Age Firm 1, Tertile 3	0.313***	0.309***	0.344***	0.581***	0.451***	0.640***
	(0.015)	(0.018)	(0.085)	(0.022)	(0.026)	(0.115)
Age Firm 8, Tertile 1	0.677***	0.592***	0.518***	0.914***	0.874***	0.663***
	(0.050)	(0.055)	(0.157)	(0.074)	(0.078)	(0.220)
Age Firm 8, Tertile 2	0.435***	0.389***	0.641***	0.906***	0.852***	0.981***
	(0.046)	(0.053)	(0.186)	(0.061)	(0.069)	(0.238)
Age Firm 8, Tertile 3	0.572***	0.527***	0.459***	1.436***	1.228***	1.474***
	(0.046)	(0.054)	(0.126)	(0.061)	(0.069)	(0.164)
Ever Entrepreneur		-0.060***	-0.063***		-0.009	-0.044*
		(0.018)	(0.019)		(0.023)	(0.024)
Average Dep. Var. Baseline	1.16	1.16	1.16	13.73	13.73	13.73
Estimation Method	OLS	OLS	IV	OLS	OLS	IV
Controls		✓	✓		✓	✓
R-squared	0.027	0.096	0.093	0.077	0.165	0.150
Observations	83,456	83,456	80,871	84,336	84,336	81,718

The table reports the estimates from equation 3. The dependent variables are (log) employment and (log) book value of assets. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5: Age profile: leverage and profitability

	(1) D/A	(2) D/A	(3) D/A	(4) Roa	(5) Roa	(6) Roa
Age Firm 1, Tertile 1	0.180***	0.175***	0.347***	-0.112***	-0.108***	-0.253***
	(0.013)	(0.013)	(0.055)	(0.010)	(0.010)	(0.043)
Age Firm 1, Tertile 2	0.084***	0.092***	0.009	-0.034***	-0.039***	-0.012
	(0.008)	(0.009)	(0.038)	(0.008)	(0.008)	(0.034)
Age Firm 1, Tertile 3	0.029***	0.072***	0.055	0.021**	0.000	-0.017
	(0.011)	(0.012)	(0.053)	(0.009)	(0.010)	(0.042)
Age Firm 8, Tertile 1	0.081	0.146**	0.350**	-0.000	-0.038	-0.078
	(0.057)	(0.058)	(0.136)	(0.027)	(0.027)	(0.073)
Age Firm 8, Tertile 2	-0.035	0.034	-0.181	0.029	-0.011	-0.044
	(0.036)	(0.039)	(0.151)	(0.023)	(0.024)	(0.084)
Age Firm 8, Tertile 3	-0.186***	-0.084***	-0.043	0.108***	0.053***	0.017
	(0.028)	(0.031)	(0.090)	(0.014)	(0.016)	(0.052)
Ever Entrepreneur		-0.077***	-0.059***		0.035***	0.024***
		(0.013)	(0.014)		(0.007)	(0.007)
Average Dep. Var. Baseline	0.82	0.82	0.82	0.01	0.01	0.01
Estimation Method	OLS	OLS	IV	OLS	OLS	IV
Controls		✓	✓		✓	✓
R-squared	0.028	0.035	0.015	0.027	0.036	0.026
Observations	84,336	84,336	81,718	84,336	84,336	81,718

The table reports the estimates from equation 3. The dependent variables debt to asset ratio (D/A) and returns on assets (Roa). The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6: Exit rates and employment growth

	(1) Exit r.	(2) Exit r.	(3) Size g.	(4) Size g.
Rev. shock (+) × Quartile 2	-0.010***	-0.009***	-0.009**	-0.007
	(0.001)	(0.001)	(0.004)	(0.005)
Rev. shock (+) × Quartile 3	-0.013***	-0.012***	-0.029***	-0.014**
	(0.001)	(0.001)	(0.004)	(0.006)
Rev. shock (+) × Quartile 4	-0.016***	-0.015***	-0.049***	-0.021***
	(0.001)	(0.001)	(0.004)	(0.006)
Rev. shock (-) × Quartile 1	0.011***	0.011***	-0.138***	-0.134***
	(0.002)	(0.002)	(0.004)	(0.005)
Rev. shock (-) × Quartile 2	0.001	0.002	-0.133***	-0.127***
	(0.002)	(0.002)	(0.004)	(0.005)
Rev. shock (-) × Quartile 3	-0.005***	-0.005***	-0.137***	-0.123***
	(0.002)	(0.002)	(0.004)	(0.005)
Rev. shock (-) × Quartile 4	-0.010***	-0.009***	-0.146***	-0.124***
	(0.001)	(0.001)	(0.004)	(0.006)
Cash/Assets		-0.083***		0.158***
		(0.009)		(0.056)
Average Dep. Var. Baseline	0.04	0.04	0.11	0.11
Controls	✓	✓	✓	✓
Firm FE				✓
R-squared	0.006	0.007	0.042	0.252
Observations	234,453	234,453	230,989	230,989

The dependent variables are a dummy that takes value one if the firm that received a shock in year t does not exist in year $t+1$ (Exit r.) and the percentage change in employment between year t and $t+1$ (Size g.). The shocks are computed from log revenues at the firm level, using the change in residuals from equation (5) in the main text. Higher quartiles refer to richer owners. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 7: Separation and hiring rates

	(1) Sep. r.	(2) Sep. r.	(3) Hir. r.	(4) Hir. r.
Rev. shock (+) × Quartile 2	-0.013***	-0.001	-0.013***	-0.001
	(0.002)	(0.002)	(0.002)	(0.003)
Rev. shock (+) × Quartile 3	-0.021***	-0.002	-0.031***	-0.006**
	(0.002)	(0.003)	(0.002)	(0.003)
Rev. shock (+) × Quartile 4	-0.025***	-0.000	-0.050***	-0.012***
	(0.002)	(0.003)	(0.002)	(0.003)
Rev. shock (-) × Quartile 1	0.009***	0.000	-0.058***	-0.049***
	(0.002)	(0.002)	(0.002)	(0.003)
Rev. shock (-) × Quartile 2	-0.003	0.001	-0.067***	-0.046***
	(0.002)	(0.002)	(0.002)	(0.003)
Rev. shock (-) × Quartile 3	-0.003	0.006**	-0.075***	-0.047***
	(0.002)	(0.003)	(0.002)	(0.003)
Rev. shock (-) × Quartile 4	-0.010***	0.003	-0.084***	-0.044***
	(0.002)	(0.003)	(0.002)	(0.003)
Cash/Assets		-0.126***		0.084***
		(0.023)		(0.025)
Average Dep. Var. Baseline	0.19	0.19	0.23	0.23
Controls	✓	✓	✓	✓
Firm FE		✓		✓
R-squared	0.054	0.390	0.110	0.366
Observations	225,105	225,105	225,105	225,105

The dependent variables are the separation rate computed as the number of separations during year t over the average employment between year t and $t-1$ (Sep r.) and the hiring rate computed as the number of workers who join the firm in year t over the average employment between year t and $t-1$ (Hir r.). The shocks are computed from log revenues at the firm level, using the change in residuals from equation (5) in the main text. Higher quartiles refer to richer owners. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 8: Worker level results

	(1) Eran. g.	(2) Eran. g.	(3) Eran. g.	(4) P(UI)	(5) P(UI)	(6) P(UI)
Rev. shock (+) × Quartile 2	-0.024***	-0.021***	-0.017***	-0.006***	-0.005***	-0.000
	(0.004)	(0.004)	(0.005)	(0.002)	(0.002)	(0.002)
Rev. shock (+) × Quartile 3	-0.049***	-0.039***	-0.028***	-0.009***	-0.007***	-0.002
	(0.004)	(0.004)	(0.005)	(0.001)	(0.002)	(0.002)
Rev. shock (+) × Quartile 4	-0.064***	-0.046***	-0.035***	-0.012***	-0.009***	-0.002
	(0.004)	(0.004)	(0.005)	(0.002)	(0.002)	(0.002)
Rev. shock (-) × Quartile 1	-0.171***	-0.166***	-0.137***	0.013***	0.013***	0.011***
	(0.004)	(0.004)	(0.005)	(0.002)	(0.002)	(0.002)
Rev. shock (-) × Quartile 2	-0.165***	-0.159***	-0.129***	0.008***	0.009***	0.010***
	(0.004)	(0.004)	(0.005)	(0.002)	(0.002)	(0.002)
Rev. shock (-) × Quartile 3	-0.160***	-0.149***	-0.121***	0.007***	0.008***	0.011***
	(0.004)	(0.004)	(0.005)	(0.002)	(0.002)	(0.002)
Rev. shock (-) × Quartile 4	-0.148***	-0.129***	-0.109***	0.000	0.003	0.007***
	(0.004)	(0.004)	(0.005)	(0.002)	(0.002)	(0.002)
Cash/Assets			0.179***			0.001
			(0.042)			(0.016)
Average Dep. Var. Baseline	0.13	0.13	0.13	0.05	0.05	0.05
Demographic/Year FE	✓	✓	✓	✓	✓	✓
Firm Controls		✓	✓		✓	✓
Firm FE			✓			✓
R-squared	0.027	0.029	0.108	0.015	0.015	0.202
Observations	864,794	864,794	864,726	865,130	865,130	865,062

The dependent variables are (1) earnings growth (Earn. g.) computed as percentage change in earnings between year t and $t+1$ and (2) underemployment measured by a dummy that takes value one if the worker received any underemployment related benefit in year $t+1$. The regressions include only stayers, i.e. workers who received their highest share of earnings by the firm both in year t and in year $t-1$. Demographic controls include marital status, gender dummies, type and length of education. firm controls include polynomials in firm age and size, sector and county fixed effects. The shocks are computed from log revenues at the firm level, using the change in residuals from equation (5) in the main text. Higher quartiles refer to richer owners. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 9: Wealth as a buffer: summary results

Panel A

	Age	OLS No controls	OLS Controls	IV Estimate	IV LB
Debt/Assets	1	**-15**	**-10**	**-29**	-8
	8	**-26**	**-23**	-23	0
ROA	1	**13**	**11**	**23**	7
	8	**11**	**9**	9	0

Panel B

	(1)	(2)	(3)	(4)
	Δ at the top ($\hat{\delta}_4 - \hat{\beta}_4$)	Δ at the bottom ($\hat{\delta}_1 - 0$)	Buffer diff-in-diff	Ratio (3)/(2)
Survival	**0.006**	**0.011**	**-0.005**	-0.45
Salary p.w. growth	**0.235**	**0.371**	**-0.137**	-0.37
Size growth	**0.103**	**0.135**	**-0.032**	-0.27
Separation rate	**-0.004**	**-0.001**	-0.003	3
Hiring rate	**0.032**	**0.048**	**-0.017**	-0.33
Earnings growth	**0.074**	**0.137**	**-0.063**	-0.43
Underemployment	-0.009	**-0.011**	0.003	-0.27

Panel A summarize the results from specification 3 estimated with OLS including only year and sector fixed effects (column No controls), including the full set of controls (column Controls) and IV. The numbers in the first three column are the differences in the relevant outcome between firms owned by entrepreneurs in the bottom third of the distribution, against firms owned by entrepreneurs in the top third. The last column report the minimum difference that can be rejected with a level of confidence of 5 percent. Panel B summarizes the results from the most controlled specification in Tables 6 to 8 . The differences in the first column refers to shocks of different sign for firms owned by a houshold ion the highest quartile of the wealth distribution, those in the second column to firms owned by a houshold in the lowest quartile. The fourth column report the difference of the two differences. The last column reports the ratio between column (3) and column (4). Coefficients in **bold** are significant, with $p < 0.05$, with standard errors clustered at the firm level.

APPENDICES

A Algebra baseline model

- If we assume quadratic ϕ (so that $\phi''' = 0$), then sign $\left[\frac{\partial^2 k}{\partial\theta\partial a}\right]$ = sign $\left[-\phi''\left(\frac{k-a}{k}\right)\right] = -1$, i.e., $\frac{\partial^2 k}{\partial\theta\partial a} < 0$

- If we assume $\phi'''\left(\frac{k-a}{k}\right) < 0$ same as before

- If we assume $\phi'''\left(\frac{k-a}{k}\right) > 0$ then $\frac{\partial^2 k}{\partial\theta\partial a} < 0$ if and only if

$$2\phi''\left(\frac{k-a}{k}\right) - \phi'''\left(\frac{k-a}{k}\right)\frac{a}{k} > 0 \Leftrightarrow \frac{a}{k} < \frac{2\phi''}{\phi'''}.$$

Although the last condition seems not very informative, note that

- $a/k \leq 1$ in the model

- which implies that whenever $\phi'' > \phi'''$ the condition is satisfied.

B Full model

[TBA]

C Data Sources

[TBA]

D Appendix tables and figures

Table A.1: Descriptive Statistics – All Norwegian

	Mean	Std. dev	P10	Median	P90
Age	47.45	18.34	24	46	74
Male	0.49	0.50	0	0	1
Less than High School	0.25	0.44	0	0	1
High School	0.43	0.49	0	0	1
University	0.31	0.46	0	0	1
Educ. Not Given	0.01	0.11	0	0	0
Years of education	13.30	3.46	10	13	17
Econ/Business education	0.12	0.32	0	0	1
Observations	356113				

The summary statistics refer to a 10 percent random sample of all Norwegian older than 17.

Table A.2: Descriptive Statistics – Firms

Panel A

	Mean	Std. dev	P10	Median	P90
Year of start up	2008.64	2.44	2005	2009	2012
Debt to asset ratio	0.83	0.49	0	1	1
Services	0.31	0.46	0	0	1
Manufacturing and energy	0.10	0.30	0	0	1
Construction and real estate	0.25	0.43	0	0	1
Retail and food	0.32	0.47	0	0	1
Maximum age in sample	3.63	2.33	1	3	7
Alive in 2013	0.77	0.42	0	1	1
Maximum number of employees	9.60	20.77	2	5	19
Lagged owner's wealth	179544.98	3901424.90	1648	24034	227780
Lagged owner's synthetic wealth	65812.71	677264.75	47	9837	108743
Observations	18278				

Panel B

	Mean	Std. dev	P10	Median	P90
Year of start up	1995.12	10.78	1984.00	1997.00	2005.00
Debt to asset ratio	0.72	0.32	0.37	0.71	0.97
Survival	0.97	0.18	1.00	1.00	1.00
Employees	8.52	9.76	2.00	6.00	18.00
Separation rate	0.17	0.23	0.00	0.11	0.45
Hiring rate	0.17	0.25	0.00	0.00	0.49
Size growth	0.01	0.31	-0.29	0.00	0.39
Wage per worker growth	-0.00	0.42	-0.39	0.01	0.38
Services	0.24	0.43	0.00	0.00	1.00
Manufacturing and energy	0.15	0.36	0.00	0.00	1.00
Construction and real estate	0.21	0.41	0.00	0.00	1.00
Retail and food	0.37	0.48	0.00	0.00	1.00
Lagged owner's wealth	444523.22	10313304.54	7490.69	99450.54	708224.62
Observations	225105				

The summary statistics refer to firms whose main owner is a household in some year between 2005 and 2013, holds at least 10% of the firm' equity and has a managerial role in the board of the firm. Panel A refers to the subsample of firms started after 2006 while Panel B includes all firms respecting the aforementioned criteria.

Table A.3: Age profile: log employment

	(1)	(2)	(3)	(4)
Age Firm 0, Tertile 1	0.043***	-0.005	0.102	-0.035
	(0.015)	(0.015)	(0.075)	(0.080)
Age Firm 0, Tertile 3	0.110***	0.124***	0.203***	0.222***
	(0.015)	(0.016)	(0.071)	(0.079)
Age Firm 2, Tertile 1	0.370***	0.337***	0.412***	0.295***
	(0.017)	(0.018)	(0.075)	(0.079)
Age Firm 2, Tertile 2	0.313***	0.318***	0.414***	0.414***
	(0.010)	(0.011)	(0.046)	(0.046)
Age Firm 2, Tertile 3	0.362***	0.384***	0.370***	0.402***
	(0.017)	(0.019)	(0.071)	(0.081)
Age Firm 5, Tertile 1	0.483***	0.456***	0.516***	0.421***
	(0.025)	(0.027)	(0.086)	(0.091)
Age Firm 5, Tertile 2	0.383***	0.386***	0.510***	0.512***
	(0.019)	(0.023)	(0.077)	(0.076)
Age Firm 5, Tertile 3	0.426***	0.446***	0.419***	0.437***
	(0.024)	(0.027)	(0.076)	(0.088)
Age Firm 8, Tertile 1	0.677***	0.629***	0.642***	0.539***
	(0.050)	(0.054)	(0.157)	(0.159)
Age Firm 8, Tertile 2	0.435***	0.429***	0.711***	0.689***
	(0.046)	(0.051)	(0.188)	(0.186)
Age Firm 8, Tertile 3	0.572***	0.583***	0.503***	0.523***
	(0.046)	(0.051)	(0.110)	(0.118)
Ever Entrepreneur		0.041**		0.032
		(0.021)		(0.030)
Average Dep. Var. Baseline	1.16	1.16	1.16	1.16
Estimation Method	OLS	OLS	IV	IV
Controls		✓		✓
R-squared	0.027	0.086	0.024	0.083
Observations	83,456	83,456	80,871	80,871

The table reports the estimates from equation 3. The dependent variable is log-employment. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.4: Age profile: log assets

	(1)	(2)	(3)	(4)
Age Firm 0, Tertile 1	-0.125***	-0.099***	-0.213**	-0.310***
	(0.020)	(0.021)	(0.099)	(0.107)
Age Firm 0, Tertile 3	0.342***	0.288***	0.468***	0.533***
	(0.020)	(0.022)	(0.095)	(0.108)
Age Firm 2, Tertile 1	0.359***	0.398***	0.250**	0.162
	(0.022)	(0.023)	(0.098)	(0.105)
Age Firm 2, Tertile 2	0.464***	0.476***	0.435***	0.467***
	(0.016)	(0.017)	(0.064)	(0.064)
Age Firm 2, Tertile 3	0.782***	0.733***	0.946***	1.018***
	(0.024)	(0.026)	(0.094)	(0.109)
Age Firm 5, Tertile 1	0.669***	0.746***	0.601***	0.574***
	(0.031)	(0.034)	(0.112)	(0.119)
Age Firm 5, Tertile 2	0.714***	0.770***	0.597***	0.668***
	(0.027)	(0.031)	(0.101)	(0.100)
Age Firm 5, Tertile 3	1.096***	1.075***	1.305***	1.401***
	(0.030)	(0.034)	(0.100)	(0.116)
Age Firm 8, Tertile 1	0.914***	1.058***	0.686***	0.770***
	(0.074)	(0.079)	(0.222)	(0.225)
Age Firm 8, Tertile 2	0.906***	1.049***	1.025***	1.151***
	(0.061)	(0.067)	(0.249)	(0.243)
Age Firm 8, Tertile 3	1.436***	1.484***	1.525***	1.716***
	(0.061)	(0.065)	(0.146)	(0.157)
Ever Entrepreneur		0.123***		-0.056
		(0.028)		(0.040)
Average Dep. Var. Baseline	13.73	13.73	13.73	13.73
Estimation Method	OLS	OLS	IV	IV
Controls		✓		✓
R-squared	0.077	0.131	0.066	0.109
Observations	84,336	84,336	81,718	81,718

The table reports the estimates from equation 3. The dependent variable is log-book value of assets. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.5: Age profile: debt to asset ratio

	(1)	(2)	(3)	(4)
Age Firm 0, Tertile 1	0.055***	0.038***	0.046	0.109**
	(0.009)	(0.010)	(0.045)	(0.050)
Age Firm 0, Tertile 3	-0.025***	-0.021**	-0.073*	-0.067
	(0.008)	(0.009)	(0.041)	(0.047)
Age Firm 2, Tertile 1	0.144***	0.121***	0.222***	0.276***
	(0.013)	(0.013)	(0.047)	(0.052)
Age Firm 2, Tertile 2	0.058***	0.049***	0.018	0.007
	(0.010)	(0.011)	(0.045)	(0.045)
Age Firm 2, Tertile 3	-0.003	-0.008	-0.089**	-0.092*
	(0.012)	(0.013)	(0.041)	(0.049)
Age Firm 5, Tertile 1	0.115***	0.090***	0.244***	0.285***
	(0.022)	(0.023)	(0.065)	(0.071)
Age Firm 5, Tertile 2	0.054***	0.036*	-0.047	-0.052
	(0.019)	(0.020)	(0.070)	(0.070)
Age Firm 5, Tertile 3	-0.078***	-0.087***	-0.142***	-0.160***
	(0.016)	(0.018)	(0.048)	(0.057)
Age Firm 8, Tertile 1	0.126**	0.085	0.258**	0.298**
	(0.055)	(0.057)	(0.130)	(0.135)
Age Firm 8, Tertile 2	0.002	-0.034	-0.177	-0.230
	(0.034)	(0.036)	(0.150)	(0.150)
Age Firm 8, Tertile 3	-0.169***	-0.187***	-0.145*	-0.162*
	(0.025)	(0.028)	(0.078)	(0.085)
Ever Entrepreneur		0.026**		0.078***
		(0.013)		(0.019)
Average Dep. Var. Baseline	0.82	0.82	0.82	0.82
Estimation Method	OLS	OLS	IV	IV
Controls		✓		✓
R-squared	0.011	0.031	.	0.011
Observations	84,336	84,336	81,718	81,718

The table reports the estimates from equation 3. The dependent variable is book value of debt over book value of assets. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.6: Age profile: returns on assets

	(1)	(2)	(3)	(4)
Age Firm 0, Tertile 1	-0.089***	-0.081***	-0.153***	-0.187***
	(0.009)	(0.009)	(0.045)	(0.047)
Age Firm 0, Tertile 3	0.052***	0.057***	0.051	0.058
	(0.009)	(0.009)	(0.042)	(0.045)
Age Firm 2, Tertile 1	-0.038***	-0.033***	-0.131***	-0.162***
	(0.010)	(0.010)	(0.037)	(0.039)
Age Firm 2, Tertile 2	0.014*	0.012	0.045	0.037
	(0.008)	(0.008)	(0.037)	(0.036)
Age Firm 2, Tertile 3	0.052***	0.056***	0.046	0.055
	(0.009)	(0.009)	(0.035)	(0.038)
Age Firm 5, Tertile 1	0.017	0.013	-0.014	-0.052
	(0.012)	(0.012)	(0.040)	(0.042)
Age Firm 5, Tertile 2	0.026**	0.019	-0.010	-0.026
	(0.011)	(0.012)	(0.044)	(0.045)
Age Firm 5, Tertile 3	0.070***	0.068***	0.073**	0.081**
	(0.010)	(0.011)	(0.035)	(0.039)
Age Firm 8, Tertile 1	-0.002	-0.004	0.002	-0.047
	(0.026)	(0.027)	(0.071)	(0.073)
Age Firm 8, Tertile 2	0.029	0.028	-0.029	-0.014
	(0.022)	(0.023)	(0.085)	(0.084)
Age Firm 8, Tertile 3	0.123***	0.116***	0.108**	0.099**
	(0.013)	(0.015)	(0.046)	(0.049)
Ever Entrepreneur		-0.019***		-0.046***
		(0.007)		(0.010)
Average Dep. Var. Baseline	0.01	0.01	0.01	0.01
Estimation Method	OLS	OLS	IV	IV
Controls		✓		✓
R-squared	0.012	0.030	0.006	0.020
Observations	84,336	84,336	81,718	81,718

The table reports the estimates from equation 3. The dependent variable is returns on assets (profits over assets). The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.7: Survival Rate - Value added growth

	(1)	(2)	(3)	(4)
VA shock (+) × Quartile 2	0.009***	0.008***	0.008***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)
VA shock (+) × Quartile 3	0.014***	0.012***	0.012***	0.012***
	(0.002)	(0.002)	(0.002)	(0.002)
VA shock (+) × Quartile 4	0.018***	0.015***	0.015***	0.014***
	(0.002)	(0.002)	(0.002)	(0.002)
VA shock (-) × Quartile 1	-0.010***	-0.009***	-0.008***	-0.008***
	(0.002)	(0.002)	(0.002)	(0.002)
VA shock (-) × Quartile 2	0.001	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)
VA shock (-) × Quartile 3	0.009***	0.008***	0.007***	0.007***
	(0.002)	(0.002)	(0.002)	(0.002)
VA shock (-) × Quartile 4	0.014***	0.012***	0.012***	0.011***
	(0.002)	(0.002)	(0.002)	(0.002)
Cash/Assets				0.058***
				(0.011)
Average Dep. Var. Baseline	0.96	0.96	0.96	0.96
Year FE	✓	✓	✓	✓
Firm Controls		✓	✓	✓
Sector and County FE			✓	✓
R-squared	0.005	0.005	0.006	0.006
Observations	222,140	219,878	219,878	219,878

The dependent variable is a dummy that takes value one if the firm that received a shock in year t still exists in year $t+1$. The shocks are computed from the value added per worker, using the change in residuals from equation (5) in the main text. Higher quartiles refer to richer owners. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.8: Size Growth - Value added growth

	(1)	(2)	(3)	(4)	(5)
VA shock (+) × Quartile 2	-0.003	0.001	-0.000	-0.001	-0.001
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
VA shock (+) × Quartile 3	-0.019***	-0.012***	-0.013***	-0.012***	-0.012***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
VA shock (+) × Quartile 4	-0.034***	-0.034***	-0.036***	-0.020***	-0.020***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)
VA shock (-) × Quartile 1	-0.107***	-0.105***	-0.105***	-0.123***	-0.123***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
VA shock (-) × Quartile 2	-0.098***	-0.093***	-0.094***	-0.114***	-0.114***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
VA shock (-) × Quartile 3	-0.104***	-0.096***	-0.098***	-0.111***	-0.111***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
VA shock (-) × Quartile 4	-0.105***	-0.106***	-0.108***	-0.105***	-0.105***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)
Cash/Assets					-0.007
					(0.040)
Average Dep. Var. Baseline	0.05	0.05	0.05	0.05	0.05
Year FE	✓	✓	✓	✓	✓
Firm Controls		✓	✓	✓	✓
Sector and County FE			✓	✓	✓
R-squared	0.017	0.056	0.059	0.345	0.345
Observations	219,878	219,878	219,878	219,878	219,878

The dependent variable size growth, i.e. the log change in employment between year t and year $t+1$. The shocks are computed from the value added per worker, using the change in residuals from equation (5) in the main text. Higher quartiles refer to richer owners. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.9: Hiring Rate - Value added growth

	(1)	(2)	(3)	(4)	(5)
VA shock (+) × Quartile 2	-0.022***	-0.015***	-0.013***	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
VA shock (+) × Quartile 3	-0.047***	-0.032***	-0.030***	-0.011***	-0.011***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
VA shock (+) × Quartile 4	-0.063***	-0.049***	-0.047***	-0.015***	-0.015***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
VA shock (-) × Quartile 1	-0.055***	-0.052***	-0.052***	-0.064***	-0.064***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
VA shock (-) × Quartile 2	-0.068***	-0.060***	-0.058***	-0.058***	-0.058***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
VA shock (-) × Quartile 3	-0.087***	-0.071***	-0.069***	-0.058***	-0.058***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
VA shock (-) × Quartile 4	-0.093***	-0.080***	-0.078***	-0.053***	-0.053***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Cash/Assets					-0.087***
					(0.022)
Average Dep. Var. Baseline	0.22	0.22	0.22	0.22	0.22
Year FE	✓	✓	✓	✓	✓
Firm Controls		✓	✓	✓	✓
Sector and County FE			✓	✓	✓
R-squared	0.018	0.106	0.112	0.373	0.373
Observations	218,057	218,057	218,057	218,057	218,057

The table reports the estimated β_d and δ_d coefficients in equation (6) in the main text. The dependent variable is hiring rate, i.e. new employees in year $t+1$ over average size in t and $t+1$. The shocks are computed from the value added per worker at the firm level, using the change in residuals from equation (5) in the main text. Higher quartiles refer to richer owners. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.10: Separation Rate - Firm Level

	(1)	(2)	(3)	(4)	(5)
VA shock (+) × Quartile 2	-0.018***	-0.014***	-0.011***	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
VA shock (+) × Quartile 3	-0.028***	-0.020***	-0.017***	0.002	0.002
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
VA shock (+) × Quartile 4	-0.028***	-0.022***	-0.020***	0.004	0.004
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
VA shock (-) × Quartile 1	0.015***	0.017***	0.017***	0.011***	0.011***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
VA shock (-) × Quartile 2	-0.002	0.003	0.005***	0.011***	0.011***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
VA shock (-) × Quartile 3	-0.011***	-0.002	0.002	0.014***	0.014***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
VA shock (-) × Quartile 4	-0.015***	-0.009***	-0.007***	0.011***	0.011***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Cash/Assets					0.044
					(0.031)
Average Dep. Var. Baseline	0.18	0.18	0.18	0.18	0.18
Year FE	✓	✓	✓	✓	✓
Firm Controls		✓	✓	✓	✓
Sector and County FE			✓	✓	✓
R-squared	0.004	0.045	0.057	0.397	0.397
Observations	218,057	218,057	218,057	218,057	218,057

The dependent variable is separation rate, i.e. employees who left the firm in year $t+1$ over average size in t and $t+1$. The shocks are computed from the value added per worker at the firm level, using the change in residuals from equation (5) in the main text. Higher quartiles refer to richer owners. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.11: Salaries per Worker Growth - Firm Level

	(1)	(2)	(3)	(4)	(5)
VA shock (+) × Quartile 2	-0.045***	-0.040***	-0.039***	-0.026***	-0.026***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)
VA shock (+) × Quartile 3	-0.083***	-0.070***	-0.069***	-0.053***	-0.053***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)
VA shock (+) × Quartile 4	-0.125***	-0.097***	-0.096***	-0.089***	-0.089***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)
VA shock (-) × Quartile 1	-0.478***	-0.474***	-0.474***	-0.457***	-0.458***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
VA shock (-) × Quartile 2	-0.465***	-0.458***	-0.457***	-0.432***	-0.433***
	(0.004)	(0.003)	(0.003)	(0.005)	(0.005)
VA shock (-) × Quartile 3	-0.446***	-0.431***	-0.429***	-0.404***	-0.405***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)
VA shock (-) × Quartile 4	-0.419***	-0.390***	-0.389***	-0.373***	-0.373***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)
Cash/Assets					-0.191***
					(0.048)
Average Dep. Var. Baseline	0.27	0.27	0.27	0.27	0.27
Year FE	✓	✓	✓	✓	✓
Firm Controls		✓	✓	✓	✓
Sector and County FE			✓	✓	✓
R-squared	0.233	0.240	0.240	0.393	0.393
Observations	236,070	236,070	236,070	236,070	236,070

The dependent variable is percentage growth in salary per worker between year t and $t-1$. The shocks are computed from the value added per worker at the firm level, using the change in residuals from equation (5) in the main text. Higher quartiles refer to richer owners. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.12: Earnings Growth - Value added shocks

	(1)	(2)	(3)	(4)	(5)
VA shock (+) × Quartile 2	-0.022***	-0.019***	-0.019***	-0.016***	-0.016***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
VA shock (+) × Quartile 3	-0.048***	-0.040***	-0.040***	-0.028***	-0.028***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
VA shock (+) × Quartile 4	-0.063***	-0.046***	-0.046***	-0.036***	-0.036***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
VA shock (-) × Quartile 1	-0.160***	-0.156***	-0.156***	-0.130***	-0.129***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
VA shock (-) × Quartile 2	-0.159***	-0.153***	-0.153***	-0.124***	-0.124***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
VA shock (-) × Quartile 3	-0.151***	-0.140***	-0.140***	-0.113***	-0.113***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
VA shock (-) × Quartile 4	-0.141***	-0.123***	-0.123***	-0.102***	-0.102***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Cash/Assets					0.086**
					(0.042)
Average Dep. Var. Baseline	0.13	0.13	0.13	0.13	0.13
Demographic/Year FE	✓	✓	✓	✓	✓
Firm Controls		✓	✓	✓	✓
Sector and County FE			✓	✓	✓
Firm FE				✓	✓
R-squared	0.026	0.028	0.028	0.105	0.105
Observations	860,783	860,783	860,783	860,783	860,756

The dependent variable is percentage growth in earnings between year t and $t+1$. The regressions include only stayers, i.e. workers who received their highest share of earnings by the firm both in year t and in year $t-1$. Demographic controls include marital status, gender dummies, type and length of education. The shocks are computed from the value added per worker at the firm level, using the change in residuals from equation (5) in the main text. Higher quartiles refer to richer owners. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.13: Employment Risk - Worker Level

	(1)	(2)	(3)	(4)	(5)
VA shock (+) × Quartile 2	-0.005***	-0.005***	-0.005***	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
VA shock (+) × Quartile 3	-0.007***	-0.006***	-0.006***	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
VA shock (+) × Quartile 4	-0.010***	-0.008***	-0.008***	-0.003	-0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
VA shock (-) × Quartile 1	0.014***	0.015***	0.015***	0.009***	0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
VA shock (-) × Quartile 2	0.008***	0.009***	0.009***	0.007***	0.007***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
VA shock (-) × Quartile 3	0.006***	0.007***	0.007***	0.008***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
VA shock (-) × Quartile 4	-0.000	0.003	0.003	0.004**	0.004**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Cash/Assets					0.004
					(0.016)
Average Dep. Var. Baseline	0.05	0.05	0.05	0.05	0.05
Demographic/Year FE	✓	✓	✓	✓	✓
Firm Controls		✓	✓	✓	✓
Sector and County FE			✓	✓	✓
Firm FE				✓	✓
R-squared	0.015	0.023	0.023	0.202	0.202
Observations	861,109	861,109	861,109	861,109	861,082

The dependent variable is a dummy that takes value one if the worker received any underemployment related benefits in $t+1$. The regressions include only stayers, i.e. workers who received their highest share of earnings by the firm both in year t and in year $t-1$. Demographic controls include marital status, gender dummies, type and length of education. The standard errors are clustered at the firm level The shocks are computed from the value added per worker, using the change in residuals from equation (5) in the main text. Higher quartiles refer to richer owners. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.14: Survival Rate

	(1)	(2)	(3)	(4)
Rev. shock (+) × Quartile 2	0.010***	0.010***	0.010***	0.010***
	(0.002)	(0.001)	(0.001)	(0.001)
Rev. shock (+) × Quartile 3	0.015***	0.013***	0.013***	0.012***
	(0.001)	(0.001)	(0.001)	(0.001)
Rev. shock (+) × Quartile 4	0.019***	0.016***	0.016***	0.015***
	(0.001)	(0.001)	(0.001)	(0.001)
Rev. shock (-) × Quartile 1	-0.014***	-0.011***	-0.011***	-0.011***
	(0.002)	(0.002)	(0.002)	(0.002)
Rev. shock (-) × Quartile 2	-0.002	-0.001	-0.001	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)
Rev. shock (-) × Quartile 3	0.005***	0.005***	0.005***	0.005***
	(0.002)	(0.002)	(0.002)	(0.002)
Rev. shock (-) × Quartile 4	0.011***	0.009***	0.010***	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)
Cash/Assets				0.065***
				(0.011)
Average Dep. Var. Baseline	0.96	0.96	0.96	0.96
Year FE	✓	✓	✓	✓
Firm Controls		✓	✓	✓
Sector and County FE			✓	✓
R-squared	0.005	0.005	0.006	0.006
Observations	237,103	234,453	234,453	234,453

The dependent variable is a dummy that takes value one if the firm that received a shock in year t still exists in year $t+1$. The shocks are computed from log revenues at the firm level, using the change in residuals from equation (5) in the main text. Higher quartiles refer to richer owners. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.15: Size Growth

	(1)	(2)	(3)	(4)	(5)
Rev. shock (+) × Quartile 2	-0.012***	-0.008*	-0.009**	-0.007	-0.007
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Rev. shock (+) × Quartile 3	-0.037***	-0.028***	-0.029***	-0.014**	-0.014**
	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)
Rev. shock (+) × Quartile 4	-0.055***	-0.046***	-0.049***	-0.021***	-0.021***
	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)
Rev. shock (-) × Quartile 1	-0.141***	-0.139***	-0.138***	-0.135***	-0.135***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Rev. shock (-) × Quartile 2	-0.139***	-0.133***	-0.133***	-0.128***	-0.128***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Rev. shock (-) × Quartile 3	-0.148***	-0.137***	-0.137***	-0.124***	-0.124***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Rev. shock (-) × Quartile 4	-0.152***	-0.144***	-0.146***	-0.125***	-0.125***
	(0.003)	(0.004)	(0.004)	(0.006)	(0.006)
Cash/Assets					-0.011
					(0.050)
Average Dep. Var. Baseline	0.11	0.11	0.11	0.11	0.11
Year FE	✓	✓	✓	✓	✓
Firm Controls		✓	✓	✓	✓
Sector and County FE			✓	✓	✓
R-squared	0.020	0.040	0.042	0.252	0.252
Observations	230,989	230,989	230,989	230,989	230,989

The dependent variable size growth, i.e. the log change in employment between year t and year $t+1$. The shocks are computed from log revenues at the firm level, using the change in residuals from equation (5) in the main text. Higher quartiles refer to richer owners. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.16: Hiring Rate

	(1)	(2)	(3)	(4)	(5)
Rev. shock (+) × Quartile 2	-0.021***	-0.014***	-0.013***	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Rev. shock (+) × Quartile 3	-0.047***	-0.033***	-0.031***	-0.006**	-0.006**
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Rev. shock (+) × Quartile 4	-0.066***	-0.051***	-0.050***	-0.012***	-0.012***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Rev. shock (-) × Quartile 1	-0.061***	-0.058***	-0.058***	-0.049***	-0.049***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Rev. shock (-) × Quartile 2	-0.077***	-0.068***	-0.067***	-0.046***	-0.046***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Rev. shock (-) × Quartile 3	-0.093***	-0.077***	-0.075***	-0.047***	-0.047***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Rev. shock (-) × Quartile 4	-0.099***	-0.085***	-0.084***	-0.044***	-0.044***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Cash/Assets					-0.073***
					(0.022)
Average Dep. Var. Baseline	0.23	0.23	0.23	0.23	0.23
Year FE	✓	✓	✓	✓	✓
Firm Controls		✓	✓	✓	✓
Sector and County FE			✓	✓	✓
R-squared	0.020	0.104	0.110	0.366	0.366
Observations	225,105	225,105	225,105	225,105	225,105

The table reports the estimated β_d and δ_d coefficients in equation (6) in the main text. The dependent variable is hiring rate, i.e. new employees in year $t+1$ over average size in t and $t+1$. The shocks are computed from log revenues at the firm level, using the change in residuals from equation (5) in the main text. Higher quartiles refer to richer owners. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.17: Separation Rate

	(1)	(2)	(3)	(4)	(5)
Rev. shock (+) × Quartile 2	-0.019***	-0.015***	-0.013***	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Rev. shock (+) × Quartile 3	-0.032***	-0.025***	-0.021***	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Rev. shock (+) × Quartile 4	-0.033***	-0.027***	-0.025***	-0.000	-0.000
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Rev. shock (-) × Quartile 1	0.009***	0.011***	0.009***	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Rev. shock (-) × Quartile 2	-0.009***	-0.004*	-0.003	0.002	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Rev. shock (-) × Quartile 3	-0.015***	-0.005**	-0.003	0.007**	0.007**
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Rev. shock (-) × Quartile 4	-0.018***	-0.012***	-0.010***	0.004	0.004
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Cash/Assets					0.035
					(0.031)
Average Dep. Var. Baseline	0.19	0.19	0.19	0.19	0.19
Year FE	✓	✓	✓	✓	✓
Firm Controls		✓	✓	✓	✓
Sector and County FE			✓	✓	✓
R-squared	0.004	0.042	0.054	0.389	0.389
Observations	225,105	225,105	225,105	225,105	225,105

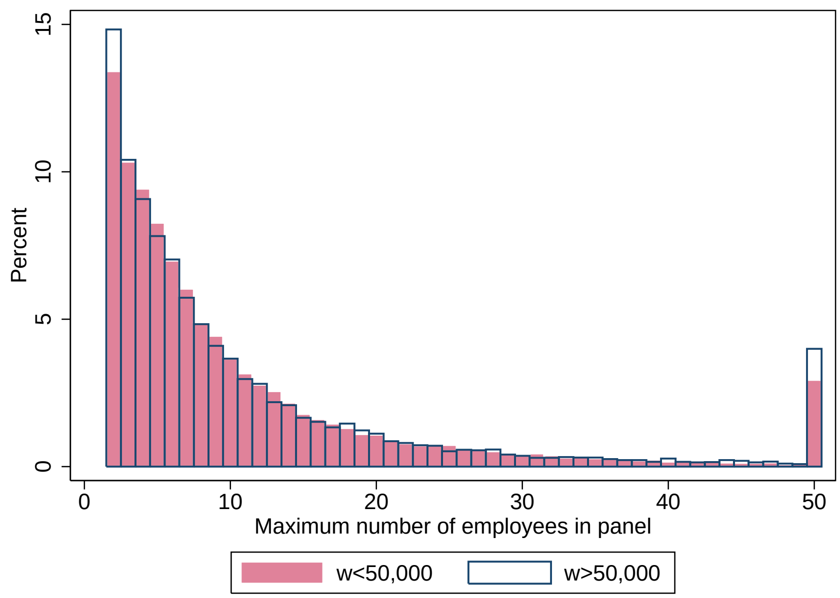
The dependent variable is separation rate, i.e. employees who left the firm in year $t+1$ over average size in t and $t+1$. The shocks are computed from log revenues at the firm level, using the change in residuals from equation (5) in the main text. Higher quartiles refer to richer owners. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.18: Salaries per Worker Growth

	(1)	(2)	(3)	(4)	(5)
Rev. shock (+) × Quartile 2	-0.046***	-0.041***	-0.039***	-0.031***	-0.031***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Rev. shock (+) × Quartile 3	-0.078***	-0.064***	-0.062***	-0.050***	-0.050***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)
Rev. shock (+) × Quartile 4	-0.104***	-0.076***	-0.075***	-0.070***	-0.070***
	(0.003)	(0.003)	(0.003)	(0.006)	(0.006)
Rev. shock (-) × Quartile 1	-0.394***	-0.387***	-0.388***	-0.371***	-0.371***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Rev. shock (-) × Quartile 2	-0.375***	-0.366***	-0.365***	-0.341***	-0.341***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Rev. shock (-) × Quartile 3	-0.365***	-0.349***	-0.348***	-0.325***	-0.325***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Rev. shock (-) × Quartile 4	-0.352***	-0.323***	-0.322***	-0.305***	-0.305***
	(0.003)	(0.003)	(0.004)	(0.006)	(0.006)
Cash/Assets					0.069
					(0.061)
Average Dep. Var. Baseline	0.23	0.23	0.23	0.23	0.23
Year FE	✓	✓	✓	✓	✓
Firm Controls		✓	✓	✓	✓
Sector and County FE			✓	✓	✓
R-squared	0.146	0.151	0.152	0.313	0.313
Observations	239,802	239,802	239,802	239,802	239,802

The dependent variable is percentage growth in salary per worker between year t and $t-1$. The shocks are computed from log revenues at the firm level, using the change in residuals from equation (5) in the main text. Higher quartiles refer to richer owners. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

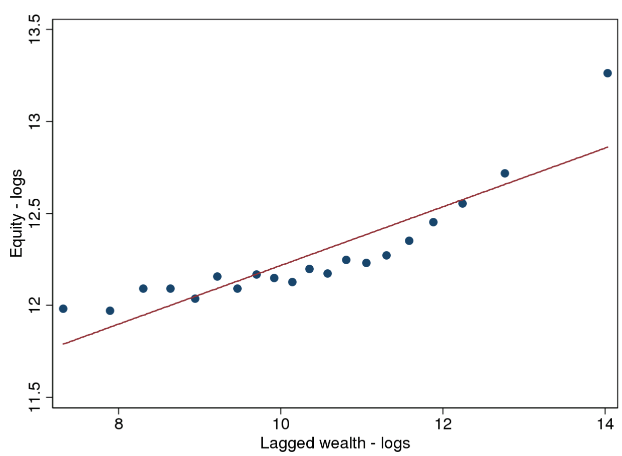
Figure A.1: Maximum number of employees



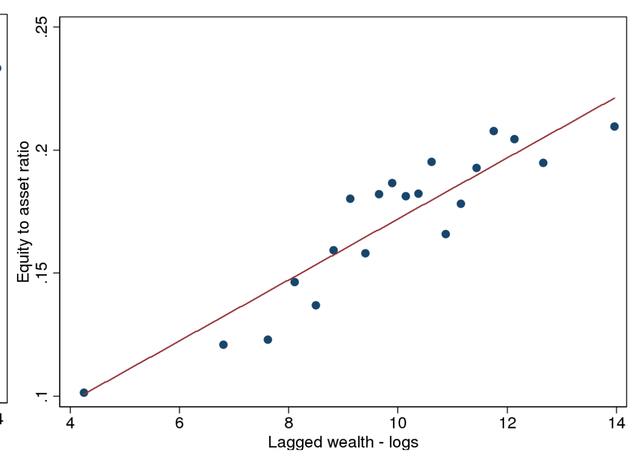
Note: In the figure we report the maximum number of employees reached in the first 9 years of life of the firm in the sample of young firms, along the dimension of the owners personal wealth 5 years before the firm was founded. The two groups correspond to the bottom two thirds of the wealth distribution ($w < 50,000$) and to the top third ($w > 50,000$)

Figure A.2: Share of the firm equity held by the main owner

(a) Initial equity



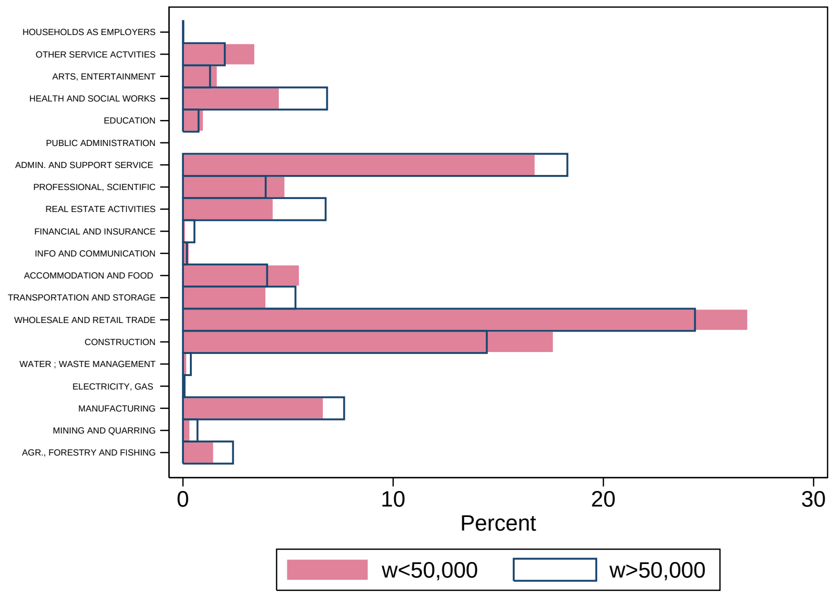
(b) initial equity over assets



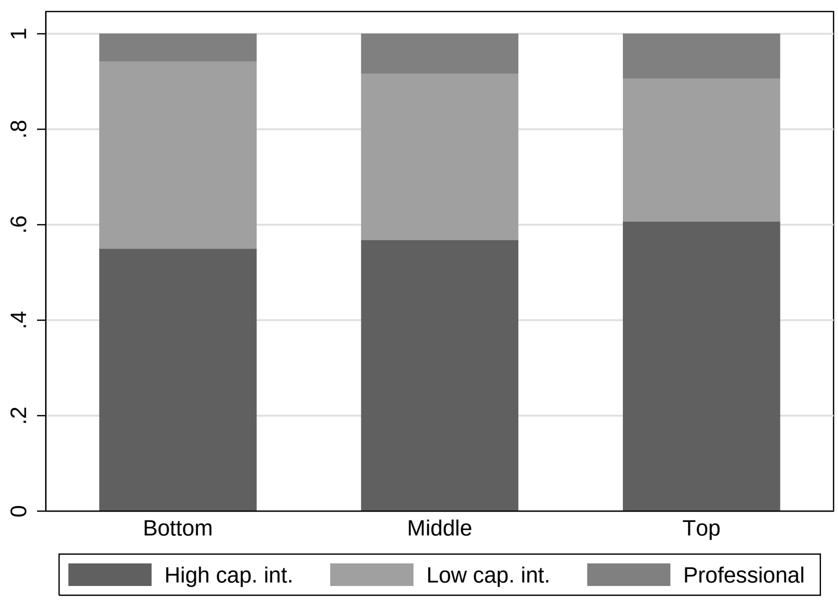
Wealthier households firms display more volatile employment. Wealth measured 5 years before start up year.

Figure A.3: Sectors ar entry

(a) Sector by wealth

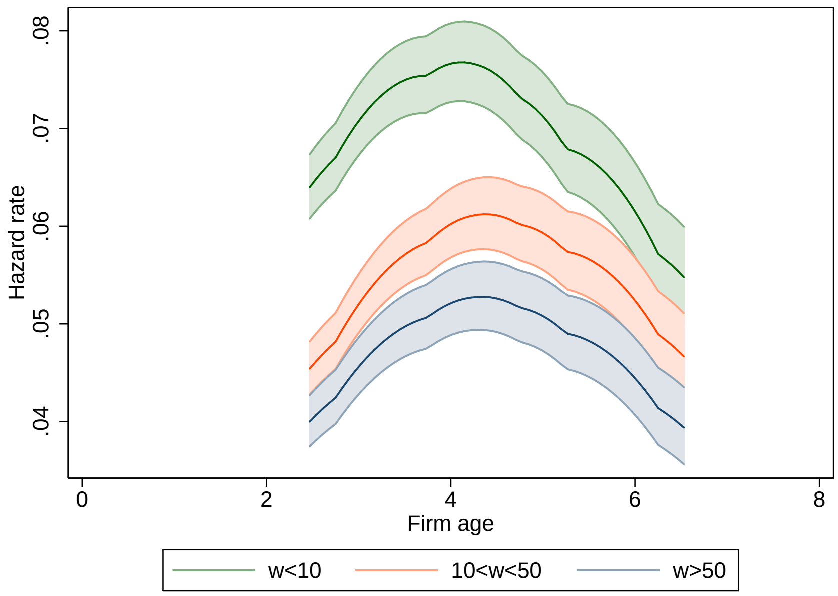


(b) Sector by capital intensity



Note: In the figure we report differences in sectors for the firm in the sample of young firms, along the dimension of the owners personal wealth 5 years before the firm was founded. The two groups correspond to the bottom two thirds of the wealth distribution ($w < 50,000$) and to the top third ($w > 50,000$)

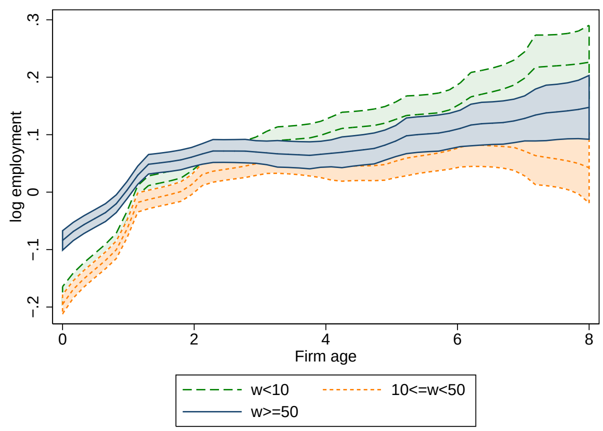
Figure A.4: Hazard Rate



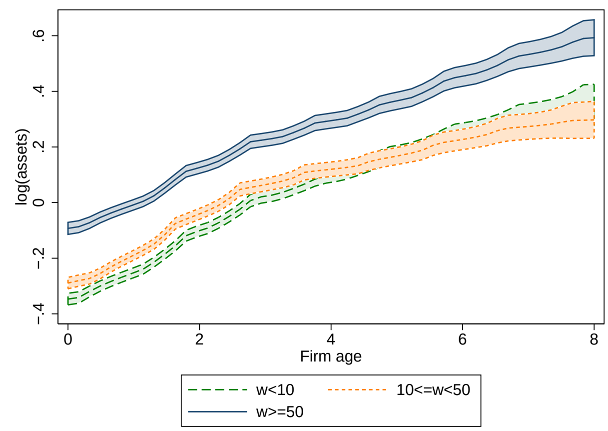
Note: The figure reports nonparametric hazard function estimates of the three different groups of young firms, classified along the dimension of the owners personal wealth 5 years before the firm was founded. The three groups correspond to the three tertiles of the wealth distribution.

Figure A.5: Age profiles,only firms observed from age 0 with owner - residualized variables

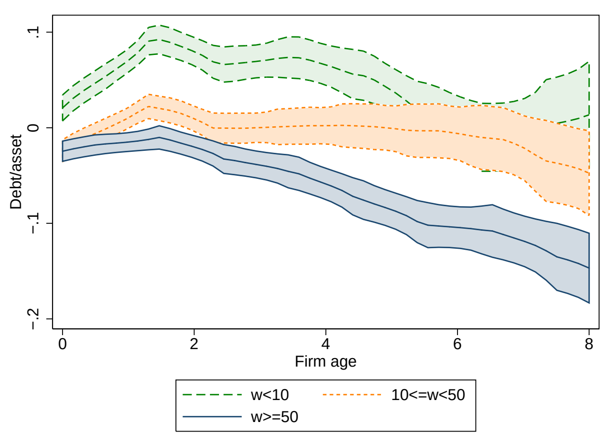
(a) Employment



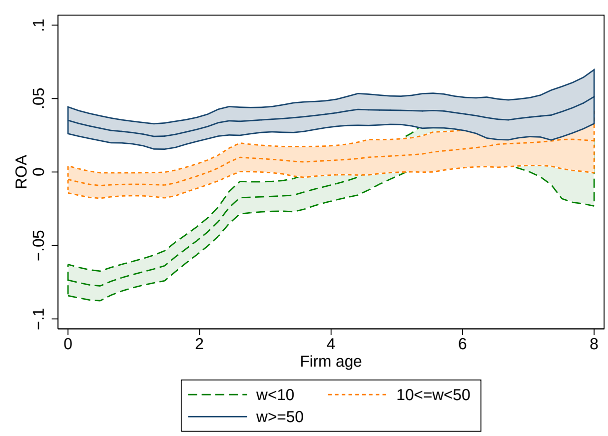
(b) Book Value of Assets



(c) Debt to Asset Ratio

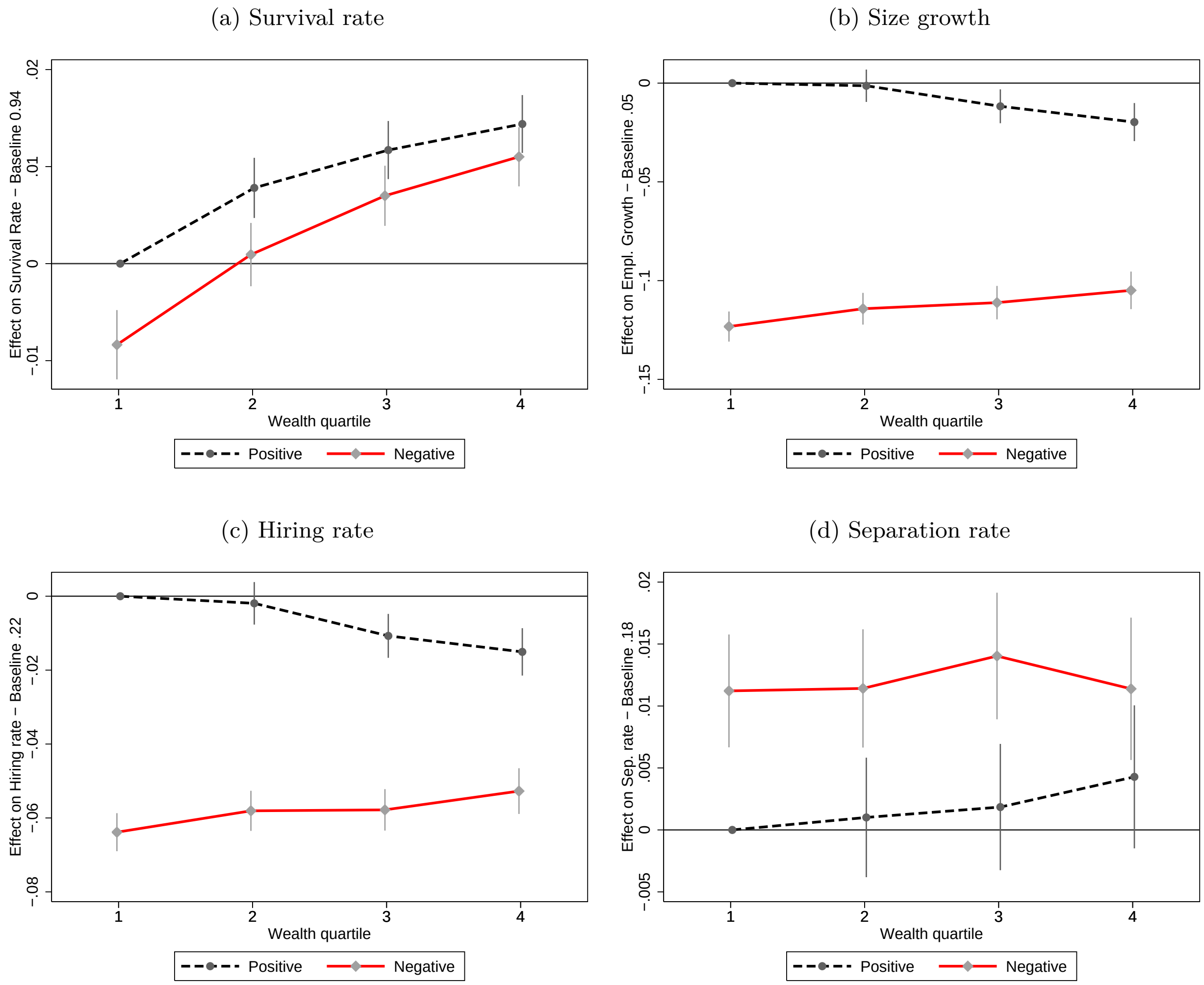


(d) Returns on Assets



Note: The figure reports nonparametric estimates of the age profiles of different young firm outcomes grouped by their initial the owner's personal wealth 5 years before the firm was founded. The estimates are obtained through local polynomial regressions, after controlling for year of entry fixed effects, sector fixed effects and entrepreneur's level controls. The three groups correspond to the three tertiles of the wealth distribution.

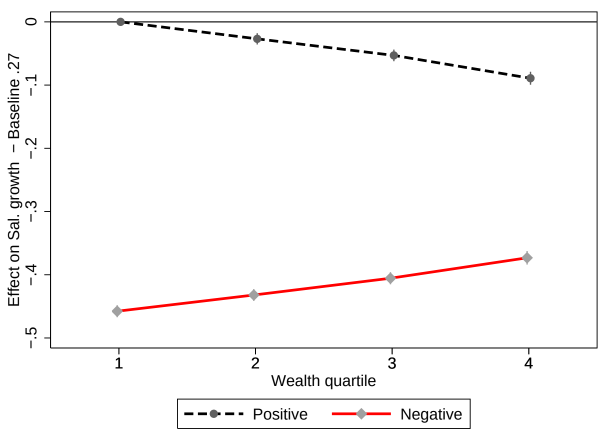
Figure A.6: Shocks to Value Added and Firm Outcomes



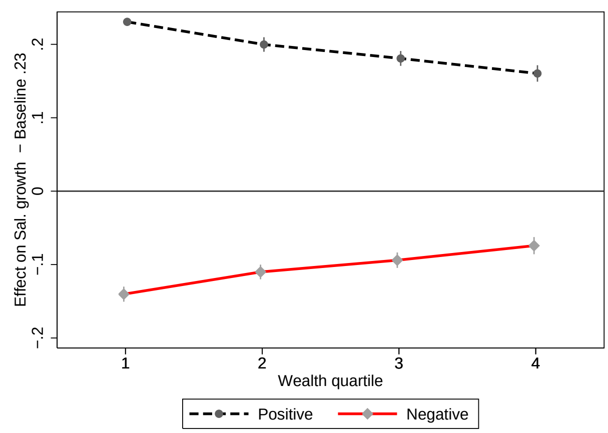
The graph plots the estimated β_d and δ_d coefficients in equation (6) in the main text. They represent changes in survival rate, size growth, hiring and separation rate (quits + layoffs) in response to shocks of different sign, across the quartiles of the owner's wealth. The shocks are computed from the value added per worker at the firm level, using the change in residuals from equation (5) in the main text. Wealth is computed excluding the value of the share of the firm directly held by the owner's household. The sample only includes firms whose main owner also seats in the board and has a managerial position.

Figure A.7: Salaries per Worker

(a) Shocks to Value Added



(b) Shocks to Revenues



The graph plots the estimated β_d and δ_d coefficients in equation (6) in the main text. They represent changes in salaries per worker growth in response to shocks of different sign, across the quartiles of the owner's wealth. In the left panel, shocks are computed from the value added per worker at the firm level, using the change in residuals from equation (5) in the main text. In the right panel, the shocks are computed from the log revenues at the firm level, using the change in residuals from equation (5) in the main text. Wealth is computed excluding the value of the share of the firm directly held by the owner's household. The sample only includes firms whose main owner also seats in the board and has a managerial position.

Table A.19: Earnings Growth - Worker Level

	(1)	(2)	(3)	(4)	(5)
Rev. shock (+) × Quartile 2	-0.024***	-0.021***	-0.021***	-0.018***	-0.017***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Rev. shock (+) × Quartile 3	-0.049***	-0.039***	-0.039***	-0.028***	-0.028***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Rev. shock (+) × Quartile 4	-0.064***	-0.046***	-0.046***	-0.035***	-0.035***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Rev. shock (-) × Quartile 1	-0.171***	-0.166***	-0.166***	-0.137***	-0.137***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Rev. shock (-) × Quartile 2	-0.165***	-0.159***	-0.159***	-0.129***	-0.129***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Rev. shock (-) × Quartile 3	-0.160***	-0.149***	-0.149***	-0.122***	-0.121***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Rev. shock (-) × Quartile 4	-0.148***	-0.129***	-0.129***	-0.109***	-0.109***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Cash/Assets					0.179***
					(0.042)
Average Dep. Var. Baseline	0.13	0.13	0.13	0.13	0.13
Demographic/Year FE	✓	✓	✓	✓	✓
Firm Controls		✓	✓	✓	✓
Sector and County FE			✓	✓	✓
Firm FE				✓	✓
R-squared	0.027	0.029	0.029	0.108	0.108
Observations	864,794	864,794	864,794	864,794	864,726

The dependent variable is percentage growth in earnings between year t and $t+1$. The regressions include only stayers, i.e. workers who received their highest share of earnings by the firm both in year t and in year $t-1$. Demographic controls include marital status, gender dummies, type and length of education. The shocks are computed from log revenues at the firm level, using the change in residuals from equation (5) in the main text. Higher quartiles refer to richer owners. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.20: Employment Risk - Worker Level

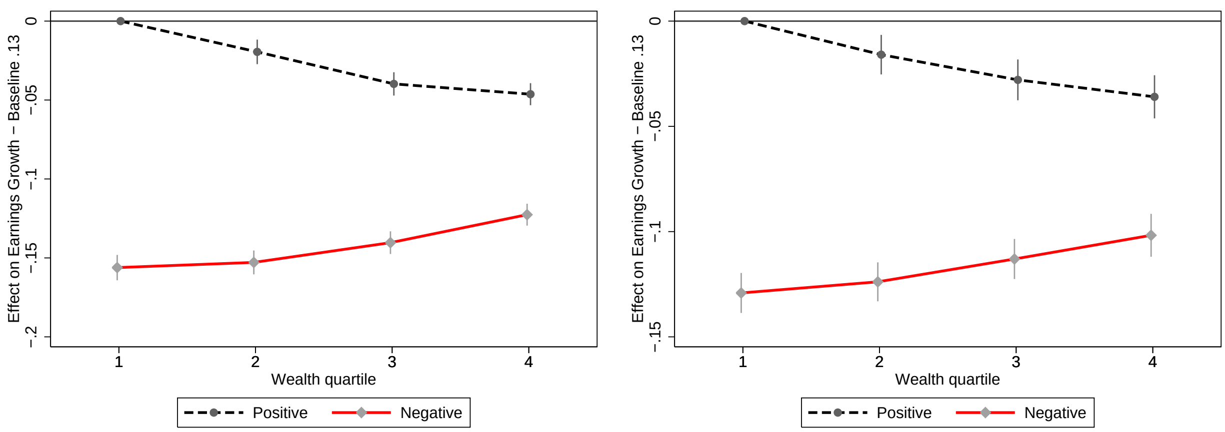
	(1)	(2)	(3)	(4)	(5)
Rev. shock (+) × Quartile 2	-0.006***	-0.006***	-0.006***	-0.000	-0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Rev. shock (+) × Quartile 3	-0.009***	-0.008***	-0.008***	-0.002	-0.002
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Rev. shock (+) × Quartile 4	-0.012***	-0.010***	-0.010***	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Rev. shock (-) × Quartile 1	0.013***	0.014***	0.014***	0.011***	0.011***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Rev. shock (-) × Quartile 2	0.008***	0.009***	0.009***	0.010***	0.010***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Rev. shock (-) × Quartile 3	0.007***	0.008***	0.008***	0.011***	0.011***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Rev. shock (-) × Quartile 4	0.000	0.004**	0.004**	0.007***	0.007***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Cash/Assets					0.001
					(0.016)
Average Dep. Var. Baseline	0.05	0.05	0.05	0.05	0.05
Demographic/Year FE	✓	✓	✓	✓	✓
Firm Controls		✓	✓	✓	✓
Sector and County FE			✓	✓	✓
Firm FE				✓	✓
R-squared	0.015	0.023	0.023	0.202	0.202
Observations	865,130	865,130	865,130	865,130	865,062

The dependent variable is a dummy that takes value one if the worker received any underemployment related benefits in $t+1$. The regressions include only stayers, i.e. workers who received their highest share of earnings by the firm both in year t and in year $t-1$. Demographic controls include marital status, gender dummies, type and length of education. The standard errors are clustered at the firm level The shocks are computed from log revenues at the firm level, using the change in residuals from equation (5) in the main text. Higher quartiles refer to richer owners. The standard errors are clustered at the firm level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure A.8: Employees Earnings Growth and Shocks to the Firm Value Added

(a) Firm fixed effects excluded

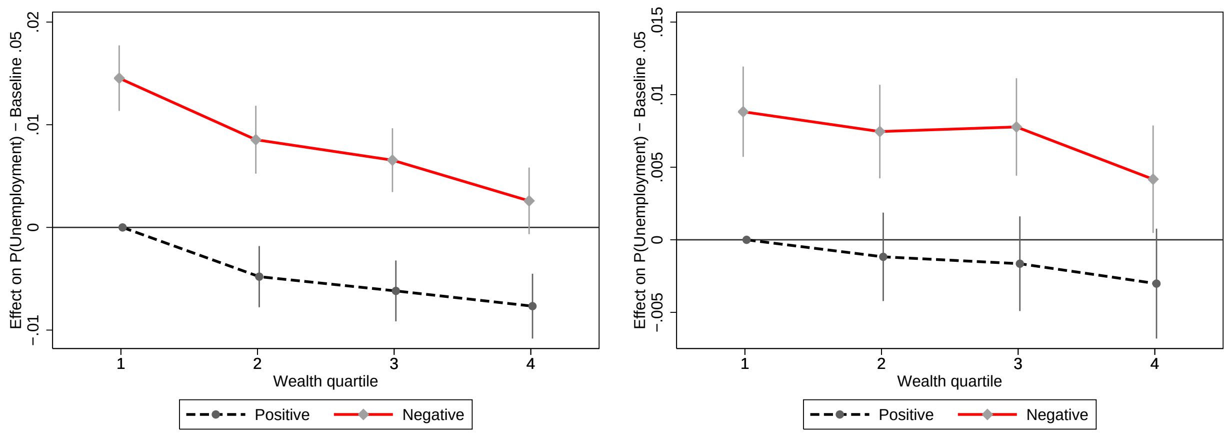
(b) Firm fixed effects included



The graph plots the estimated β_d and δ_d coefficients in equation (8) in the main text. They represent changes in individual earnings growth in response to firm level shocks of different sign, across the quartiles of the owner's wealth. Shocks are computed from the value added per worker at the firm level, using the change in residuals from equation (5) in the main text. Wealth is computed excluding the value of the share of the firm directly held by the owner's household. The sample only includes firms whose main owner also seats in the board and has a managerial position. Only workers who received payments from the firm in year t and year $t-1$ are included (where t is the year of the shock).

Figure A.9: Risk of Underemployment and Shocks to the Firm Value Added

(a) Firm fixed effects excluded (b) Firm fixed effects included



The graph plots the estimated β_d and δ_d coefficients in equation (8) in the main text. They represent changes in the probability of experiencing underemployment (i.e. of receiving some unemployment insurance benefits) in response to firm level shocks of different sign, across the quartiles of the owner's wealth. Shocks are computed from the value added per worker at the firm level, using the change in residuals from equation (5) in the main text. Wealth is computed excluding the value of the share of the firm directly held by the owner's household. The sample only includes firms whose main owner also seats in the board and has a managerial position. Only workers who received payments from the firm in year t and year $t-1$ are included (where t is the year of the shock).