# Entrepreneurial Wealth and Employment: Tracing Out the Effects of a Stock Market Crash

Marius A. K. Ring*

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**Abstract**

Exploiting the dispersion in stock market returns during 2008–09 as a source of exogenous variation in the wealth of Norwegian business owners, I show that adverse shocks to the entrepreneurs' wealth had large effects on the financing, employment, and investment of their privately-held firms. The real effects are driven by younger firms who see amplified financial effects through reduced bank borrowing. These findings provide a causal link between asset price shocks and the real economy; and document equity-financing frictions and the procyclicality of entrepreneurial wealth as being important channels through which economic shocks amplify.

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*University of Texas at Austin and Statistics Norway. E-mail: mariuskallebergring@gmail.com. This paper was first presented at the Kellogg Finance bag-lunch series at Northwestern University in the fall of 2017. I thank Scott Baker, Anthony DeFusco, Matthew Notowidigdo, Paola Sapienza, Dimitris Papanikolaou, David Matsa, and Mitchell Petersen for helpful comments and questions. This research has benefited from financial support from the Research Council of Norway (grant #283315).

# 1 Introduction

Recent research has shown that financial shocks have large effects on employment during economic crises. This literature has underlined the importance of securing bank financing to firms, which has had extensive policy implications. However, this literature is largely mute on the effects of adverse shocks to the financial health of business owners who serve as the primary source of funding for many small firms.[1] While economic crises see disruptions to bank lending, they also see large drops in the wealth and liquidity of business owners. In the presence of financial frictions, this procyclicality of entrepreneurial wealth may work to amplify the consequences of adverse economic shocks. This idea lies at the heart of the financial accelerator framework by Bernanke, Gertler, and Gilchrist (1999), an important underpinning of modern macroeconomics. Adverse shocks to entrepreneurial wealth are likely to come at the worst of times: when credit supply is weak, revenues are low, and business uncertainty is high. Yet evidence of how shocks to entrepreneurs' wealth affect the real economy, through the employment and investment of their firms, is lacking. This presents a limitation to our understanding of how economic shocks amplify and thereby which policies should be pursued to curtail unemployment during a crisis.

The scarcity of empirical research on this subject is likely caused by data limitations. First, data that links information on business owners' wealth with the characteristics of their firms is limited. To the extent that it is obtainable, we face the issue that the level of (or any changes to) the owners' wealth is likely highly correlated with, or even endogenous to, their firms' investment opportunities.[2] I overcome these challenges by using administrative tax data from Norway that contains detailed financial information for all Norwegian residents. This includes security-level data on ownership in listed stocks, which allows me to quantify idiosyncratic wealth shocks based on the exogenous forward returns of the stocks in the entrepreneur's pre-crisis portfolio. Linking these data to the entrepreneurs' private firms and employees through ownership and employment registers allows me to perform a detailed investigation of the real effects of shocks to entrepreneurial wealth. Using stock market losses as the identifying variation in wealth allows me to examine the real effects of stock market crashes, by tracing out the effect of the stock market crash of 2008–09 to investors, the private firms they own, and their employees.

I first examine how shocks to owners' financial health affect equity financing. I find that a financial wealth loss of 10% reduces the probability of increasing Paid-in Capital (PIC) by 1.37 percentage points. This is a sizable effect relative to the mean probability of 6.1 percent. The finding that idiosyn-

[1] Private business owners are important providers of both finance to small and medium-sized firms. The 2016 Small Business Credit Survey finds that the most common source of financing for the 61% of employer firms facing financial challenges was the personal funds of the owners.

[2] For example, entrepreneurs may save more to offset lower expected cash-flows in the future. They may also save more if their expected return on capital decreases and income effects dominate intertemporal substitution effects as in Ring (2020). This implies that (changes in) wealth may proxy for both financial frictions and future investment opportunities.

cratic shocks to the wealth of an existing owner substantially lowers the probability of equity injections is consistent with firms facing important frictions in establishing new equity-financing relationships. I find that these effects are significantly stronger for more levered firms. I then investigate the effects on dividend payments. While I find little effect for the average firm, there exists significant heterogeneity. Less shocked, more levered firms pay out less dividends. This suggests that wealthier entrepreneurs forego dividends from levered firms during the crisis. On the other spectrum, I find that more shocked, more liquid firms pay out substantially more dividends. I then proceed to investigate owner-provided loan financing. This is an important source of financing for Norwegian firms. At the mean, sample firms have approximately 2.5 times more short-term debt provided by owners than by banks. I find that illiquid firms with less shocked owners receive more investor loans. I find the opposite effect for more levered firms, who were found to be differentially more likely to receive equity injections. This is consistent with equity, rather than debt, being the preferred instrument to finance more levered firms in a recessionary environment.[3]

Using the employer-employee registers, I continue by exploring the real economic effects in terms of employment outcomes. I find that wealth shocks only affect employment if the ex-ante wealth of the owner is of a similar magnitude to the potential financing needs of firm. These are the cases where the owner would be a viable source of financing absent a wealth shock, but not necessarily resilient to sizable portfolio losses. In these cases, I find statistically significant and economically large effects: A loss of 10% of the owner's financial wealth reduces employment growth from 2007 to 2010 by almost 5 percentage points. These effects are almost entirely driven by younger firms, whose employment shows no sign of recovery even well after the crisis.

I provide a novel decomposition of this change in employment growth into firing and hiring, and find that the effect primarily works through a reduction in hiring. Adversely affected firms thus appear able to insure existing workers from extensive-margin income shocks. Conditional on hiring, I find that shocked younger firms hire differentially fewer college-educated workers. This is consistent with more educated workers being costlier to finance or more reluctant to work for firms in financial distress.

To obtain a richer picture of the real effects of entrepreneurial wealth shocks, I use detailed tax return data to explore the effects on capital expenditures. While investment responses are fairly muted for the average firm, this enshrouds strong responses among younger firms. A loss of 10% of financial wealth lowers the two-year investment to asset ratio of 4.2 percentage points, a vigorous 84% relative to the mean investment rate during 2008–09. I further find that adverse shocks lower the propensity to undertake major investments in plants or property, particularly for younger firms. These investment effects are consistent with comprehensively harshened financial frictions.

[3]This seems particularly reasonable in the European context where book leverage is publicly observable in business registries and may thus easily be used by suppliers or other creditors to argue for stricter payment schedules.

The finding that young firms are the most affected is consistent with Petersen and Rajan (1994) who suggest that firms may follow a pecking-order of borrowing over time with an initial high reliance on funding from the owners. Other financial multipliers, such as leverage, do not interact with wealth shocks with similar force. To explore this heterogeneity further, I examine the differential ability of young versus old firms to substitute towards other sources of financing. These analyses reveal that older firms are able to substitute towards bank-provided financing, while younger firms see a reduction in bank loans. This firm-age heterogeneity in the degree of substitution between bank and equity financing is consistent with the notion that younger firms face more expensive external financing due to having had less time to develop creditor relationships or a financial track record and are therefore more vulnerable to financing disruptions. I further find no evidence of shocked owners in either young or old firms reducing their ownership share, which would occur if adversely affected owners gave way to new investors. This finding is further evidence of frictions in equity-financing relationships.

My identification of the effects of wealth shocks on firm outcomes faces two broad sets of potential issues that are related to the selection of listed stocks. First, investors may select into listed stocks that operate in the same or related industries.[4] This may cause stock portfolios and private firms to be subject to common shocks. Second, unobservable traits, such as ability or risk aversion, of the investors may lead to correlated outcomes between the listed stocks in his or her portfolio and the private firm he or she owns. The richness of the data allows me to address these concerns in multiple ways. Firstly, I show that the results are robust to controlling for a wide range of firm and investor characteristics, such as past portfolio returns or even realized future profitability. I also show that my identifying variation in wealth is uncorrelated with pre-crisis observables. Second, I perform placebo tests by examining the correlation between portfolio losses and firm outcomes when the initial stock market exposure is too low for any meaningful financing effects to be expected. These tests reveal a precisely estimated correlation of zero. Beyond these tests, the absence of pre-trends, the effects on financing, and the observed heterogeneity in the treatment effects support the notion that the observed outcomes are causally driven by harshened financial frictions.

I find that my main results are specific to the Financial Crisis. I repeat the main analyses both before (2005–07) and after (2009–10), and do not find any significant employment responses to concurrent business owner wealth shocks during these periods. This suggests that wealth shocks largely work to amplify adverse economic shocks, such as reduced availability of credit, business uncertainty, and lower cash flows.

These analyses may be viewed as a comprehensive test of the null hypothesis that adverse shocks to business owner wealth do not affect real outcomes in firms. This strong null hypothesis can be decomposed into less trivial layers, which my empirical analyses shed new light on. (**i**) Business owners do not expose themselves to risk that can lead to adverse liquidity shocks occurring when their

[4] Døskeland and Hvide (2011) show that Norwegian stock market investors tend to invest in firms that are close both in terms of geography and industry of employment.

firms need financing. In the early 2000s, stock markets plummeted and unemployment rose following the burst of the IT bubble. The possibility that such an event could reoccur should certainly be salient among entrepreneurs prior to the Financial Crisis. (**ii**) To the extent that such events do occur, firms are able to substitute towards other sources of financing, e.g., by obtaining equity injections from other investors or individuals in the entrepreneur's network, leaving financing outcomes unaffected. (**iii**) To the extent that financing outcomes are affected, real outcomes are not, as firms can substitute toward bank financing. (**iv**) If they cannot, their investments and employment outcomes are not dependent on owner or bank-provided financing, for other reasons, such as the availability or trade credit or the willingness of workers to delay wage payments. While combinations of (iii) and (iv) have seen considerable empirical attention, the extent of equity-related financial frictions, their interaction with bank lending, and their real economic effects have not, and are particularly novel to this paper.

My paper contributes to multiple related literatures. By showing how shocks to business owners' wealth affect firm-level employment, through increasing the severity of financial frictions, I am adding to a growing literature on financial frictions and employment (see, e.g., Berton, Mocetti, Presbitero, and Richiardi 2018, Chodorow-Reich 2014, Benmelech, Frydman, and Papanikolaou 2019, Greenstone, Mas, and Nguyen 2020, Duygan-Bump, Levkov, and Montoriol-Garriga 2015). This literature presents a near consensus that adverse shocks to bank lending reduce employment growth. However, focusing on smaller firms, Greenstone, Mas, and Nguyen (2020) find statistically insignificant and economically small effects of bank-lending contractions on employment growth, even during the Financial Crisis. They argue that small firms may plausibly have access to other sources of credit when bank lending supply contracts. This would be consistent with the hypothesis that small firms do not face substantial pro-cyclical financing constraints—a hypothesis that I can reject in my empirical setting.

The core contribution of my paper is to focus on a different, highly pro-cyclical, and under-researched source of financial frictions that is particularly important for smaller firms. This contribution is facilitated by merging detailed financial data on both incorporated firms and their equity holders. I make additional contributions as well: First, I provide a detailed examination of employment outcomes through (a) distinguishing between the effects on firing and hiring and (b) considering the effect on the educational composition on workers. This exercise presents new evidence that it is the pool of potential new employees—rather than the existing ones—who are affected on the extensive margin. Second, I provide a more complete picture of the real effects of financial disruptions by also studying the effects on capital investments. Third, I provide evidence of a link between equity- and bank-financing frictions by showing that the ones most affected by owner wealth shocks (i.e., young firms) are also those who are less able to substitute towards bank-provided financing.

My results that highlight the importance of business owner wealth for the outcomes of young firms contributes to a large literature on financial frictions and entrepreneurship (see, e.g., Andersen and Nielsen 2012, Adelino, Schoar, and Severino 2015, Schmalz, Sraer, and Thesmar 2017, Hurst and Lusardi 2004, Kerr, Kerr, and Nanda 2015, Corradin and Popov 2015) that has largely focused on

entrepreneurial entry rather than the effects of shocks to existing firms. In the broader entrepreneurship literature, it complements research on angel financing (Lindsey and Stein 2019, Kerr, Lerner, and Schoar 2014, Denes, Howell, Mezzanotti, Wang, and Xu 2020) by highlighting the importance of the financial circumstances of investors on firm outcomes.[5] It is also consistent with the findings of Townsend (2015) that financial shocks may propagate through common ownership and the findings of Hanspal (2018) that the loss of wealth for sole-proprietors may inhibit business growth. My analyses of age-heterogeneity in the responses to economic shocks contribute to recent studies of differential effects of economic shocks on firm employment (see, e.g., Adelino, Ma, and Robinson 2017, Brown, Earle, and Morgulis 2015). By showing that firms largely insure *existing* workers against financial shocks on the extensive margin, I contribute to the literature on the pass through of firm shocks to workers (see, e.g., Guiso, Pistaferri, and Schivardi 2005, Ellul, Pagano, and Schivardi 2018, and Friedrich, Laun, Meghir, and Pistaferri 2019). This paper also contributes to a new literature establishing a causal link from stock market fluctuations to the real economy (Di Maggio, Kermani, and Majlesi 2020, Chodorow-Reich, Nenov, and Simsek 2019, Crane, Koch, and Lin 2019).[6]

Finally, this paper contributes to research on financial frictions and wealth inequality (Cagetti and De Nardi 2006 and Quadrini 2000). In frictionless financial markets, financing for profitable projects should be readily available, despite any adverse effects of wealth shocks on the liquidity or risk-tolerance of entrepreneurs. Whether firm financing and real outcomes materially depend on the personal wealth of owners therefore provides a test of the severity of financial frictions in equity markets. These frictions—rather than those in debt markets—are found by Peter (2020) to be key in determining of the level of wealth inequality. Furthermore, my findings indicate that less-wealthy entrepreneurs may be at a significant disadvantage in pursuing growth opportunities during a financial crisis. My findings thus highlight financial frictions as a channel through which economic crises may amplify wealth inequality.

The paper proceeds as follows: Section 2 describes the data. Section 3 provides a discussion of the empirical strategy. Section 4 considers owner-provided financing results. Section 5 considers firm-level employment outcomes. Section 6 investigates investment outcomes. Section 7 shows additional financing results, and Section 8 concludes.

[5] See also the concurrent paper by Berzins, Bøhren, and Stacescu (2020) who study the effect of wealth-tax-induced shareholder illiquidity on firm outcomes; Bahaj, Foulis, and Pinter (2020) who document important (collateral) effects of directors' home values on firms' financing and investment outcomes; and Bjørneby, Markussen, and Røed (2020) who find a positive effect of wealth taxes on firm employment growth.

[6] Hanspal (2018) makes a similar concurrent contribution by using stock holdings in failing banks as one of his main explanatory variables.

# 2 Data

## 2.1 Data sources

This paper uses Norwegian administrative data collected by Statistics Norway and the Norwegian Tax Authorities. The different data sources are linked by using (de-identified) person and firm identification numbers that are consistent across datasets. It covers the universe of Norwegian residents and incorporated domestic firms I provide an overview of my data sources below.

**Income Register** (1993–2012): These records contain detailed information about individuals' income, broken down into various sources such as wage income, capital income and government transfers. It includes data on individuals' wealth, broken down into different asset classes, such as bonds, mutual funds, listed stocks, non-listed stocks, primary and secondary real estate, debt and deposits. This data is primarily reported by third parties, such as firms, banks and other financial intermediaries.

**Stockholder Register** (2001–2013): This database contains yearly snapshots of ownership positions in all listed and non-listed limited liability companies, from 2004 and 2001, respectively. It contains security (share type and firm) and owner (firm or person) identifiers, and provides the number of shares held at the end of the year and the amount of dividends that were paid to the stockholder.

**Employer-Employee Register** (1995–2011): This register contains data on each employment relationship between individuals and firms. A record in this dataset is on the firm-plant-employee-year level. For each record, I observe firm, plant, and employee identifiers, the start and stop dates of the employment relationship, and total monetary compensation.

**Firm Tax Returns** (2004–2013): These records contain detailed data on firms' income and assets in the form of approximately 400 accounting variables. It also contains an array of additional variables especially collected for tax purposes. This database covers the universe of incorporated firms.

Supplementary data includes: Records of family links, addresses, gender and marital status from the **Central Population Register** (1993–2010); Educational attainment for all residents from the **National Education Database** (1993–2012).

I obtain industry identifiers for firms from the tax returns, employer-employee register and the stockholder register, in the form of NACE codes. NACE is the standard industry classification in the European Union and are based on the 4th revision of the U.S. ISIC classification system.

## 2.2 Sample construction

I describe the construction of my dataset below.

**Holdings of listed stocks.** I obtain data on stock portfolios and returns from the Stockholder Register. For listed stocks that are owned by firms, I iterate once on ownership links in order to

attribute these shares to private individuals.[7] I use this data to calculate the two-year forward return, $R_{v,t,t+2}$ of an owner's portfolio, based on the owner's portfolio composition at time $t$ (December 31st of that year). At the portfolio-year (equivalently, owner-year) level, I also compute portfolio HHI as the sum of squared portfolio weights within the portfolio and the average of the natural log of the total market cap of the stocks in the portfolio. I drop a rather small number of investors who own a large share ($\geq$0.5%) of a listed stock. Some securities have missing price data, I omit these and owners who on average hold more than 3 such stocks.

**Private firm ownership.** I start with the Stockholder Register for limited liability companies, which is on the owner-firm-year level. I exclude all firms that have been or become publicly listed. The owner can be a firm, thus I iterate once on the ownership links to uncover individuals who own firms indirectly. I exclude firms for which I cannot attribute ownership to at least 75% of the shares in a company after this procedure.

**Firm employment.** I link all employees to firms using the Employer-Employee register, which is on the firm-plant-employee-year level. I first aggregate all variables to the firm-employee-year-level. I then merge this data with the Central Population Register and the National Education database, both of which are on the individual level. I merge this data again, on the firm-individual-year level with the stockholder register to distinguish between regular employees and owner-employees. I then aggregate this data to the firm-year level. I create means of education and gender variables by weighting individuals by the duration of their within-year employment.

**Firm-owner-year-level dataset.** My main analysis dataset is then created by merging the private firm ownership dataset (firm-owner-year) with the the employment data in order to know whether the owner is employed (on the firm-employee-year level); I then obtain firm-level employment characteristics by merging this with the firm-year level employment data (described above); I merge this with firm tax records (firm-year); owner tax returns (individual-year); owner education (individual); owner gender and other demographics (individual); and finally with the dataset on holdings of listed stocks (owner-year), which is described above.

I then only keep firm-investor observations that satisfy the following criteria in 2007: (1) Firm profitability (profits/revenue) must be between -75% and 75%; (2) The investor must own at least 1% of the firm; the firm must employ at least 1 non-owner. This leaves me with 67,000 firm-investor level observations in 2007, and approximately 32,000 firms employing around 300,000 non-owner employees.

For my analyses, I focus on the subset of firm-investor observations where I observe that the investor owns listed stocks. This reduces my sample to 20,000 firm-investor observations. This reduction is due to the fact that many investors primarily hold mutual funds, for which I do not observe the exact portfolio composition (and I am therefore unable to exploit cross-sectional variation in returns

[7] Investors may choose to own stocks and other financial assets through LLCs for tax smoothing reasons.

across funds). I make the additional restriction that the owner must have at least 1% of his or her Gross Financial Wealth (GFW) in listed stocks, and the stock market holdings make up at least 1% of the average of the past 2 years' operating expenditures of the firm he or she owns. This reduces the number of firm-investor observations in 2007 to approximately 4,700.

### 2.2.1 Key Variables

**Gross Financial Wealth (GFW).** This is the sum of all domestically held financial assets: deposits, bonds, mutual fund holdings, listed stocks, taxable value of private equity holdings, and outstanding claims. Deposits, bonds, mutual funds and listed stocks are third-party reported (e.g., banks or other financial intermediaries) and are marked to market. Private equity holdings are provided in the firm's tax returns to the tax authorities and is then pre-filled onto investors' tax returns. It is roughly computed as the owner's ownership share * (historical cost of firm assets + market value of financial assets - firm debt).

**Stock Market Exposure.** This is the fraction of the owner's Gross Financial Wealth that is invested in listed stocks.

$$\frac{Stocks_{v,t}}{GFW_{v,t}} \tag{1}$$

**Returns**. For brevity, I will refer to "intended returns" as just returns. (Intended) returns are the returns that an investor, $v$, would experience from time $t$ to $t+j$, assuming that the portfolio composition does not change after time $t$, i.e. the weight, $w_{v,s,t}$, of investor, $v$'s, holdings of stock, $s$, does not change between time $t$ and $t+j$. In subsection A.8 in the Appendix, I present evidence consistent with a strong relationship between intended and experienced returns.

$$R_{v,t,t+j} = \sum_s R_{v,s,t,t+j} \cdot w_{v,s,t} \tag{2}$$

**Stock Market Wealth Shock.** My main explanatory variable is the product of the owner's intended returns (equation 2) and the owner's stock market exposure (equation 1). This product gives us the fraction of the owner's wealth that he or she is "intended" to lose.[8]

$$\frac{Gains_{v,t+1,t+2}}{GFW_{v,t}} = R_{v,t,t+2} \cdot \frac{Stocks_{v,t}}{GFW_{v,t}} \tag{3}$$

## 2.3 Summary Statistics

The average firm in my sample has NOK 5.6 MNOK (USD 930,000) in assets, and employs 8.54 individuals, out of which 6.96 are regular employees and not owners in the firm. This dataset is thus

[8]Since I do not observe within-year transactions, I cannot use this as an instrument in a traditional IV setting. If, for example, I use this as an instrument for log-differenced GFW, the first stage could be (endogenously) biased downward if entrepreneurs reduce their consumption to offset losses. However, I discuss how one might want to scale the reduced-form estimates in subsection A.8.

well suited to analyze the behavior of smaller firms who make up a sizable fraction of employment in most countries.[9]

My sample is limited to incorporated firms. This is a necessary feature of studying the link between household and corporate finance, since unincorporated firms, i.e., sole proprietors, do not have balance sheets that are legally separated from their sole owner. It is also a necessary feature of studying employment effects as unincorporated Norwegian sole proprietors rarely have employees.[10]

In Table A.3 in the Appendix, I explore how firms whose owners own listed stocks differ from other firms. I find that they are generally somewhat older (13.8 versus 12.4 years), have higher profitability (10% versus 7%), and are less levered (50% versus 56%). The differences are not dramatic, but suggest that the firms that are in my sample were somewhat less financially constrained *prior to* the financial crisis. It would therefore be likely that the elasticities that I uncover would understate those found in a broader sample of firms, which would include firms that were more constrained ex-ante.

In Figure A.1 in the Appendix, I compare the industry composition of the firms in my analysis sample with a broader sample of Norwegian firms. The main sample restriction is that the firm must have one or more owners who own listed stocks. I observe that oil and gas companies do not have a sizable presence. This is connected to the fact that oil and gas companies tend to be very large and are often listed on the stock exchange or have more complicated ownership structures with a large presence of foreign ownership. Firms for whom I cannot link a majority of ownership shares to private, domestic individuals through at most one holding company are are excluded from my data. The largest industry group in my sample is professional services. This group consists mostly of accounting firms (30%), engineering consulting services (25%) and auditing firms (10%). Due to the sizable overrepresentation (by about 100%) of professional services (PS) in my analysis sample, caused by restricting the sample to owners with a meaningful listed stock portfolio, I (down-)weight these firms by a factor of 0.5 in my analyses on employment and investment effects. This is not critical. My main results on employment are highly robust to different weighting schemes, which include not (down-)weighting PS firms as well as completely omitting them. The results of these robustness tests are reported in Table A.12 in the Appendix.

[Table 1 about here.]

Table 2 provides summary statistics on the firm-owner level. On the firm-owner level, the mean ownership share, which includes spousal co-ownership, is 55%. I find that most owners were also present in previous years: Conditional on the firm existing in 2004, 92% of owners were present also in 2004. I find that 16% (11%) of owners have increased (decreased) the number of shares they own since 2004. I observe that 71% of owners live in the same city as their firm and 85% live in the same

[9] In 2017, 28% of U.S. private sector employees worked at firms employing less than 50 people. In Norway this fraction is closer to 50%.

[10] As of 2008, there were 146,903 sole proprietorships (enkeltpersonforetak) in Norway. Only 15% of these had any employees, and only 2% had more than four employees. Source: Statistics Norway (statistics series 09107)

county. There is also a large presence of family businesses. Conditional on not being a sole-owner, 21% of investors co-own with a sibling and 17% are parents of other owners. These (and additional) statistics can be found in Table A.2 in the Appendix.

Most (59%) of the owners are also employed in the firm. On average, they have worked in the firm for 11.71 years, and their labor earnings from the firm make up 96% of their total labor earnings, implying that few owner-employees are also employed elsewhere. 30% of the firms pay dividends, and on average (including those who do not pay dividends) these dividends are equal to 5% of the investors Gross Financial Wealth in 2007, and the sum of dividends in 2008 and 2009 made up, on average, 17% of their 2007 Gross Financial Wealth, implying that the ratio of dividends to financial wealth rose during the financial crisis.

[Table 2 about here.]

I provide summary statistics for the characteristics of owners in Table A.1 in the Appendix. They are are primarily men (85%) and are 52 years old on average. The median owner has MNOK 4.6 ($\approx$ USD 770,000) in GFW. The average number of firms owned by a given investor is 1.26. The dataset is therefore unlikely to include many professional investors. I further observe that 91% of owners have a high school degree and 45% have a college degree, which is considerably more than in Schmalz, Sraer, and Thesmar (2017), but similar to Levine and Rubinstein (2017).[11]

### 2.3.1 Owners' Stock Portfolios

Figure 1 keeps portfolios fixed at the (end-of-year) 2007 composition and provides the distribution of owners' stock returns during 2008 and 2008–09. I see that nearly all investors experienced negative returns from during 2008 and that there is only moderate dispersion in returns (sd=15%). During the two-year period of 2008–09, on the other hand, there is a large dispersion (sd=25%), with almost 5% of investors experiencing positive returns, and 5% of investors experiencing returns south of -74%.

[Figure 1 about here.]

Beyond providing more cross-sectional variation in wealth shocks, using two-year returns addresses the issue that one-year returns provide highly transitory wealth shocks: The correlation between 2008 and 2009 portfolio returns is approximately $-1$, which is driven by a similar autocorrelation in the underlying stocks on the Oslo Stock Exchange. Thus, the portfolios that performed the worst during 2008 performed fairly well during 2009, making wealth shocks based on 2008 returns alone very short lived. Using two-year returns addresses this issue.

[11] In the sample of French entrepreneurs in Schmalz, Sraer, and Thesmar (2017), only 23% have a college diploma. Levine and Rubinstein (2017) find that 46% of incorporated entrepreneurs in the Current Population Survey (1996-2012) have a college degree, and using the NLSY (1982-2012), they find that 36% of incorporated entrepreneurs have a college degree.

# 3 Empirical Strategy

## 3.1 Empirical Specification

My main regression specification to estimate the effect of owner wealth shocks on firm outcomes, $Y_{f,v}$, is the following:[12]

$$Y_{f,v,t} = \alpha_{r,t} + \alpha_{n,t} + \beta_t \frac{Gains_{v,08,09}}{GFW_{v,07}} + \Gamma_t \left( \frac{Stocks_{v,07}}{GFW_{v,07}} \right) + \rho_t' P_{v,07} + \eta_t' V_{v,07} + \zeta_t' F_{f,07} + \varepsilon_{f,v,t}, \quad (4)$$

where the $v$ subscript indicates the owner/investor and the $f$ subscript indicates the firm. Outcome variables, $Y$, are primarily measured at the firm level, but some outcomes, such as dividend flows, are measured at the firm-owner (f,v) level. Equation 4 is estimated separately for different $t$ whenever event-plots are provided. Similar to Chodorow-Reich (2014), I typically measure firm-level outcomes as (cumulative) growth rates relative to 2007, which removes firm-level fixed effects in the level of the variable of interest.[13] $\alpha_{r,t}$ and $\alpha_{n,t}$ are region and industry fixed effects, respectively. I use 3-digit NACE codes. Regions are the 19 Norwegian counties. The main coefficient of interest is $\beta$, which measures the effect of wealth shocks on $Y_{f,v}$. The shock variable $Gains_{v,08,09}/GFW_{v,07}$ is the fraction of the owner's financial wealth to be gained (or mostly lost) in the stock market during 2008 and 2009 when the portfolio composition is kept constant at its 2007 configuration. My main control variable is the fraction of wealth invested in the stock market per December 31st 2007, $Stocks_{v,07}/GFW_{v,07}$, and its square: $\Gamma_t(x) = \gamma_{1,t}x + \gamma_{2,t}x^2$.

$P$ is a vector of portfolio controls, including the portfolio HHI and the average log size, as defined by stock market capitalization, of the firms in the portfolio. It also includes a variable indicating the fraction of listed stocks held through a holding company (a separate LLC). I perform robustness tests where I also condition on past returns by including 1st through 4th order polynomials in demeaned portfolio returns between 2005 and 2007.[14]

$V$ is a vector of investor controls, including age bins (20-35; 36-45 ;46-55 ;55-67 ;67+), log(GFW), log(debt), log(labor earnings), dummies for educational attainment (compulsory, high-school, and college), and the share of financial wealth invested in mutual funds.

$F$ is a vector of firm controls including long-term (LT) and short-term (ST) leverage, log(Assets), log(OpEx), log(total payroll), Profitability (profits/revenue), and liquidity, as measured by Cash/OpEx, which is the sum of cash and bank deposits divided by the firm's average operating expenditures over

[12] $Y_{f,v}$ includes a subscript $v$, since for some outcomes the variable is measured on the firm-investor level, e.g., dividend flows.

[13] This is also the approach used by Benmelech, Frydman, and Papanikolaou (2019) who center event time around 1928, one year prior to the onset of the Great Depression.

[14] I do not do this in my main specifications as it reduces my sample size by about 12%. However, I find that my results are unaffected by including these controls.

the past two years. In specifications including both $F$ and $V$ controls, I also include the relative size of the investor, as measured by the ratio of the owner's GFW to the firm's OpEx.

In my regressions on firm-level outcomes, I apply weights to ensure that firms are equally weighted in the presence of multiple investors. While the average firm has 2.75 owners, most of these owners will not appear in the regression at the same time, since I only include owners with a stock market exposure (Stocks/GFW) exceeding 0.01. Only a handful of firms have multiple business-owners satisfying this requirement, and for those firms I weight the investors according to the size of their stock market portfolio. For my main results on employment, I also show the results of multiple robustness tests with different weighting schemes, such as only keeping the most exposed investor per firm.

In my baseline approach, I two-way cluster standard errors on the firm and investor level. I find that my estimated standard errors shrink slightly when instead two-way cluster on the level of the largest firm in the owner's stock portfolio and the firm's 3-digit NACE code.

### 3.2 Discussion of Internal Validity

A strong version of the identifying assumption is that portfolio-induced wealth shocks $\left(\frac{Gains_{v,08,09}}{GFW_{v,07}}\right)$ are orthogonal to changes in the firm's investment opportunity once controlling for over-all stock market exposure $\left(\frac{Stocks_{v,07}}{GFW_{v,07}}\right)$. This essentially says that the composition of the stocks in an entrepreneur's portfolio is uncorrelated with the economic outlooks of the firm. This assumption may seem overly strong, since investors may have a bias towards investing in firms that are close in both a geographic and industry sense (Døskeland and Hvide, 2011). A weaker version of the identifying assumption is that this orthogonality holds once I condition for geographic and industry fixed effects.

The strength of the identification is that—conditional on portfolio selection—the exact returns that the entrepreneur's portfolio will experience is fully exogenous to the entrepreneur. The question is to what extent the entrepreneur, before the crises, selected stocks whose *subsequent* returns during the crisis are correlated with other factors affecting firm performance during the crisis.

In the two subsections below, I discuss these potential selection problems and present some tests to address the potential severity of these issues. In addition, I will present several robustness exercises and results on heterogeneous responses that are inconsistent with sizable confounding due to selection.

#### 3.2.1 Correlation between Stock Market Returns and Firm Outcomes

If investors are biased towards selecting listed stocks that are geographically close or operate the same or related industries, correlations between stock market wealth shocks and firm outcomes may be confounded if my region and industry fixed effects do not fully capture this selection. For example, an investor may own an engineering consulting firm that specializes in the oil industry, but the industry code only specifies his or her firm as a structural engineering consultancy.

[Figure 2 about here.]

These shocks may confound my estimates both by affecting the cash flows and expectations about future business opportunities. To address this, I focus on a sample of business owners whose stock market exposure is low, and thus he effect of any wealth shocks is likely to be highly limited. More specifically, I restrict the sample to owners with stock market exposures between 0.25% and 10% of their total financial wealth. I require at least 0.25% exposure to limit the number of investors with trivially small portfolios, yielding a sample of 5,648 firm-owner pairs.[15] I report the results in Figure 2 and find no significant correlation between stock returns and either concurrent or future revenue growth. I perform the same exercise for changes in profitability and find no economically meaningful or statistically significant correlations. These results are presented in the Appendix in Figure A.2. While these tests do not allow me to reject the presence of any selection issues, they do suggest that the severity of these issues is modest in this empirical setting.

#### 3.2.2 Investor Characteristics and Stock Market Returns

Investors who lost more during the 2008–09 may have picked more procyclical listed stocks *and* private firms. However, I show in my results on employment that this does not seem to be the case. Wealth losses during 2008–09 predict lower employment growth during 2008–10, but not before. My results are also robust to controlling for past returns and their higher order moments. One may also worry that effects are confounded by ability. However, my analyses do not support this notion. For example, Table A.8 in the Appendix reveals finds no statistically significant correlation between profitability and future stock returns. This results still hold when I condition on the owner having been present in the firm for multiple years, thus giving the owner's ability time to materialize as higher profitability for the firm. My main results on employment are also robust to controlling for both past and future profitability. Finally, the heterogeneity of my results does not seem consistent with these confounders driving my results. Again, I cannot reject that there is, for example, some measure of ability that is correlated with both stock returns and the firm's performance during the crisis. However, my analyses suggest that the importance of this mechanism is limited relative to the effects that portfolio losses have on increasing the severity of financial frictions.

#### 3.2.3 Differences on Observables

I now investigate whether firms whose owners were more exposed to the stock market or experienced larger wealth losses were different on observable characteristics. I regress firm characteristics on the wealth shock and stock market wealth exposure variables as well as industry and region fixed effects. Taking out these fixed effects allow us to interpret the coefficients as indicators of how these

[15] In my analysis samples I only include investors with at least 1% exposure, here I include less exposed investors to increase the sample size and precision. Excluding the the investors with $< 1\%$ exposure yields the same results, but larger standard errors.

firms differ from other firms in the same region or area.

Reassuringly, I find that my shock variable is not predictive of pre-shock observable characteristics of the firm. However, I do find, perhaps unsurprisingly, that firms whose investors had allocated a larger share of their financial wealth to the stock market (Stocks/GFW) are different. I find that these differences are best characterized by a second order polynomial in Stocks/GFW. To ease readability, I provide the predicted differences in my Y-variables based on increasing Stocks/GFW by one standard deviation (0.22) from the mean (0.20).

[Table 3 about here.]

Firms with more exposed owners (one standard deviation from the mean) are less profitable (2 percentage points or 21%), smaller (0.11 log points), more levered (4.4 percentage points, or 10%), less liquid (5.1 percentage points or 22%), and slightly younger (0.06 log points). I do not find that that these firms differ on the fraction of workers with a college degree. I note that this is conditional on a sample of firms whose owners had a stock market exposure $\geq 1\%$. These differences serve to reduce the gap between the firms in my analysis sample who hold a non-trivial amount of listed stocks and the superset of firms whose owners may or may not hold listed stocks. This can be seen in Table A.3 in the Appendix. Here, I also show that more exposed firms had higher past employment growth than less exposed firms, but in the fourth quartile of exposure past employment growth is identical as to the over-all population of firms. Conclusions are similar for leverage and profitability.

## 4 Results on Owner-provided Financing

I now examine whether and how wealth shocks affect the owner-provided financing of firms. This offers a test of a two-layered hypothesis. Firstly, we may expect that entrepreneurs do not allocate a significant portion of their liquid financial wealth to risky assets outside of the firm if it is conceivable that such assets may be vital for the firm in the near future. Less than ten years prior to the Financial Crisis, the IT bubble burst, stock markets crashed and Norway experienced unemployment levels exceeding that of the Financial Crisis.[16] That such an event might reoccur should thus have been a salient potential outcome for Norwegian entrepreneurs. Therefore, we might expect that adverse shocks to business owner wealth to realize only when there is no need for financing. The second layer of the hypothesis is that if there is a financing demand, then financing will still not be affected, as firms can substitute towards other equity investors. Thus, an idiosyncratic shock to the wealth of an existing owner would not affect, e.g., the probability of the firm receiving an equity injection. Relatedly, we would also not expect to find an effect on dividend payments, as owners could forego these by, e.g., selling an equity stake in the firm to salvage personal liquidity.

I report the results on the related analyses in Table 4. I focus on three outcome variables. Columns

[16] See https://fred.stlouisfed.org/series/LMUNRRTTNOM156S.

(1)-(2) consider the effects on Paid-in-Capital. The outcome variable is a dummy variable for whether the firm saw an increase in PIC (i.e., an equity injection) during 2008–09. Since many firms are close to the regulatory minimum PIC, there are very few events where PIC decreases. The unconditional probability of a PIC increase is 6.1%, there is therefore little room to statistically uncover intensive margin effects. Columns (3)-(4) consider the effects on the retained earnings portion of equity through dividend payments. Columns (5-6) consider the effects on owner-provided loans. This type of owner-provided financing is similar to equity in that it has very low seniority, but may be a preferable method of liquidity injection since it does not require changing the ownership structure of the firm.

In these analyses on firm financing, I limit the sample to firms that do not own any listed stocks. For tax smoothing reasons, business-owners may choose to invest in the stock market and attribute the ownership of these stocks to the firm. Thus, from a tax accounting perspective, the financial shock would appear within the firm, without any effect on the flow of financing from the owner's outside wealth and the firm. Approximately 14% of firms in my sample are recorded owning listed stocks.

In column (1), I find that a wealth shock of -10% reduces the probability of an equity injection by 1.37 percentage points, or 22% relative to the mean. This variable is measured at the firm level. This implies that if there are no frictions to raising equity from other (unshocked) investors, and the firm's liquidity needs are unaffected, we should not see any effect. This finding is thus indicative of stickiness in equity-financing relationships. This line of reasoning is employed in the literature on the transmission of bank shocks: If an adverse shock to a bank translates into reduced borrowing for firms with which the bank has a relationship, then this implies frictions in bank-lending relationships (see, e.g., Chodorow-Reich 2014).

In column (2), I show that the effect on PIC is stronger for more levered firms. This is consistent with more levered firms having a higher demand for equity-financing during the crisis. In columns (3)-(4), I report results on how wealth shocks affect dividend payments at the firm-investor level. I scale dividend payments by the owner's GFW, which facilitates a NOK-for-NOK interpretation. While wealth shocks do not affect dividend payments on average, there is sizable heterogeneity along the dimensions of leverage and liquidity. A wealth loss of NOK 1 increases dividend payments by NOK 0.156 (NOK 0.325) for firms whose leverage (liquidity) is one standard deviation above the mean. The heterogeneity along leverage is consistent with the hypothesis that more-levered firms have a stronger need to retain equity and investors who lost less are more able to allow for equity retention through foregoing dividends. The heterogeneity along liquidity suggests that stock market losers are more likely to offset losses in the stock market by increasing dividend payments when the firm has ample liquidity.

[Table 4 about here.]

In columns (5)-(6), I report the results on investor loans. The dependent variable that I examine is

the change in investor loans on the firm's balance sheet from 2007 to 2009, scaled by the owner's GFW, which also facilitates a NOK-for-NOK interpretation. While I find no effects on average (Column 5), this masks significant heterogeneity with respect to liquidity and leverage. A wealth loss of NOK 1 is associated with a 0.33 NOK decrease in investor loans for a firm with $Cash/OpEx$ one standard deviation below the mean. However, this effect is cancelled out if I also increase leverage by one standard deviation. This lowered sensitivity of funding for more levered firms suggests that loans may be an undesirable source of financing for more levered firms. This may be caused by a preference for lower *observable* leverage among distressed firms. In Norway, and most other European countries, private firm accounting data is public information. Increasing leverage might thus send an observable, and potentially negative, signal about firm bankruptcy risk to suppliers and customers.

My analysis covers the core, observable sources of owner-provided financing. However, there may be other ways owners for owners to finance their firms. For example, through delaying the payment of their own wages. Unfortunately, this is hard to distinguish from other loans, as it may appear as both (or either) investor loans or liabilities to employees on the firms balance sheet.

To examine the presence of pre-trends in financing outcomes, I repeat my analysis while considering outcome variables during 2005–06 (and keeping all the right-hand-side variables the same). Reassuringly, this does not reveal any statistically significant correlations. These results are provided in Table A.6 in the Appendix.

# 5 Results on Employment Growth

## 5.1 Definition of Employment Growth

My sample primarily consists of businesses with fewer than 20 employees. Since many employees are also owners, I omit them when measuring differences in employment levels. This addresses the concern that the employment situation of owners may be affected through other channels, such as the owner responding to adverse wealth shocks by increasing labor supply.

My main measure of employment growth is defined as follows:

$$EG^{D}_{f,t,t+j} \equiv \frac{\#\text{Non-owner Employment Days}_{f,t+j} - \#\text{Non-owner Employment Days}_{f,t}}{\#\text{Employment Days}_{f,t}}, \quad (5)$$

where firms that exit at time $t$ are defined to have zero employment days at time $t$.

This measure is based on days of employment rather than number of employees during the year. This addresses an important potential issue related to using growth rates in end-of-year employment levels. Many firms, such as retailers, may have highly seasonal employment, with peak seasons falling during Christmas. This may lead to a downward bias in the effect of financial shocks on employment if peak-season employment is less sensitive to financial frictions due to, e.g., high cash flow.

The measure I use further offers potential advantages relative to using changes in the total of number of employees employed in the course of a given year (which would address the previous issue). If we use the change in the number of employees, we risk counting turnover as growth. By effectively weighting the number of employees by their days of employment, I avoid this issue. It further avoids the issue of overweighting high-income workers, which would be the result of weighting employees by their salaries. Of course, salary-weighted employment could be the relevant variable in some settings. I explore this as an outcome in Subsection 5.8 by considering total (non-owner) pay as the outcome variable. In Table A.11 in the Appendix, I show how my main results are affected when using these different measures of employment growth.

I choose to use the standard formula for percentage change, rather than the symmetric growth rate or log differences for two main reasons. First, using symmetric-growth rates for very small firms that move between 0,1 and 2 employees can vigorously overstate employment decline. In Table 5, I find that the average employment growth rate from 2007 to 2010 in my sample increases in magnitude from -2.8% to -16.1% when using the symmetric growth rate.[17] Measuring growth rate using log differences has similar issues. Log differences are beneficial to reduce the impact of outliers in the presence of positive growth. However, when there is a *decline* in employment growth, it will increase magnitudes. In my sample there are very few firms experiencing sizable positive employment growth, however, to minimize their impact, I bind employment growth to be $\leq 200\%$.

[Table 5 about here.]

### 5.2 When Do Wealth Shocks Matter for Firm Employment?

If the firm owner has substantial private wealth relative to the financing needs of the firm, he or she would be able to provide financing even after suffering a large negative wealth shock. Consider a firm that has financing needs of \$100 and the owner holds \$300 in wealth. Even after suffering a 50% wealth loss, the owner still has \$150 > \$100 to cover the firm's financing needs. On the other hand, consider an owner who only has \$10 in private wealth. Regardless of whether he or she experiences a 50% wealth loss, he or she would only be able to cover a small fraction of the firm's financing needs.

[Figure 3 about here.]

If an owner of a firm has little wealth relative to the potential financing needs of the firm ex-ante, any shocks to his or her wealth is unlikely to have impact on the financing available to the firm, ex-post. Similarly, if the owner has substantial wealth relative to the firm, any shocks to the ability, or perhaps willingness, to provide financing may not be large enough to affect the flow of funds to the

[17] Other studies using the symmetric growth rate (e.g., Chodorow-Reich 2014) or log differences in employment (e.g., Benmelech, Frydman, and Papanikolaou 2019) are likely much less affected by these issues due to mostly having large firms in their samples.

firm. Thus, I only expect meaningful effects when the owner's status as a viable financier changes. This is exactly what I uncover: I create bins for different ratios of owner financial wealth to firm operating expenditures, and estimate the effect on wealth shocks, as a fraction of the owner's financial wealth, separately within these bins. These results are reported in Figure 3 below, which are based on estimating equation 6. I find that wealth shocks have no effect on firm employment growth when the ratio is less than 25% or above 175%. While a 100% loss for owners with large wealth relative to the firms financing needs would likely constrain them, the owners in my sample rarely experience stock market losses exceeding 50% of financial wealth.

This heterogeneity is similar to that reported by Bahaj, Foulis, and Pinter (2020). They find that housing wealth shocks experienced by a firm's directors only affect investments when housing wealth accounts for a meaningful share of the firm's potential financing needs.[18]

$$\frac{E_{f,2010} - E_{f,2007}}{E_{f,2007}} = \alpha_n + \alpha_r + \alpha_g + \beta_g \frac{Gains_{v,08,09}}{GFW_{v,07}} + \Gamma_t \left( \frac{Stocks_{v,07}}{GFW_{v,07}} \right) + \rho' P_{v,07} + \eta' V_{v,07} + \zeta' F_{f,07} + \varepsilon_{f,v}. \tag{6}$$

In the remainder of my analysis, where I consider the effects on employment and investment outcomes, I restrict my sample to firm-owner pairs where the financial wealth of the owner is between 25% and 175% (100% ± 75%) of the firm's average operating expenditures in 2006 and 2007.

### 5.3 Main Employment Regressions

In Table 6, I report the main results on the employment effects of owner wealth shocks. The results of the preferred empirical specification are presented in column (6). It demonstrates a substantial elasticity of employment growth during 2008–10 to the owner's Gross Financial Wealth (GFW) of 0.49. I find that the estimated coefficient, $\hat{\beta}$, is fairly robust to changes in the set of controls. In column (7), I find that that standard errors shrink when I two-way cluster on firm's 3 digit industry (114 clusters) code and the largest firm in the owner's portfolio (88 clusters), as opposed to on the firm (F) and investor (V) level in columns (1) through (6). My regression sample consists of approximately 2,500 firm-owner observations, including approximately 2,250 firms and 2,320 owners.

Some important take-aways from traveling from column (1) to column (8) is that my estimated coefficient grows consistently, albeit only slightly, when adding more fine-grained industry and geographic controls. If my results were confounded by industry, regional or industry-region shocks, I would expect to see a noticeable *decrease*, not increase, in my estimated coefficient, when adding fixed effects to account for these confounders. The largest change is observed when I initially introduce 2-digit industry fixed effects in column (3), which suggests that correlations between stock returns and industry shocks are negative rather than positive.

[18] Bahaj, Foulis, and Pinter (2020) employ the cut off that home values must exceed 15% of the firm's assets.

[Table 6 about here.]

In Table A.10 in the Appendix, I also provide results when controlling for *future* Profitability (measured in 2010), and find that my results are robust: The coefficient is reduced from 0.488 to 0.412, or by approximately 1/7th, and remains significant on the 5% level. However, this result should be interpreted with caution since profitability may be endogenous to the wealth shock. However, the fact that the coefficient remains large and significant is reassuring. It also indicates that wealth shocks reduce employment growth through channels not closely linked to profitability. I also control for past, demeaned, returns from 2005 to 2007, including 2nd through 4th order polynomials, and find that the estimated coefficient on the wealth shock variable is unaffected.

### 5.4 Pre-trends and Cumulative Effects

A potential concern is that investors who lost a large amount of their wealth during the crisis had taken on significant risks, both in public and private equity. This might suggest that these investors expanded more rapidly during the crisis, and thus had to reduce their employment growth more following the onset of the crisis. An additional, but related, concern is that these investors had invested in both private and listed firms that were highly pro-cyclical. Both of these concerns would suggest that more shocked firms had higher employment growth prior to experiencing wealth losses during 2008–09. I do not find this to be the case. In Figure 4 below, I do not find that more shocked firms experienced higher cumulative growth rates between 2003 and 2007. Importantly, as I will show in the next subsections, younger shocked firms, who produce most of the effect on employment, do not display any pre-trends in employment growth.

[Figure 4 about here.]

### 5.5 Heterogeneity

In order to better understand the mechanisms at work, I estimate the heterogeneous effects of wealth shocks along the dimensions of profitability, liquidity (as measured by Cash/OpEx), and leverage. In these analyses on real outcomes, I also consider heterogeneity with respect to firm age. The motivation for this is that a given owner-financing shock may have stronger effects on younger firms, since they may find it harder or costlier to substitute towards other sources of financing. This suggests that a given owner-provided financing shock has a larger over-all financing shock for younger firms, which may lead to stronger effects on employment growth and investment.

In order to estimate the heterogeneous effects, I run the following regressions, interacting my shock and exposure measure with one or multiple variables $x$:[19]

[19] $\Gamma_x(a)x \equiv \gamma_{1,x}a \cdot x + \gamma_{2,x}a^2 \cdot x$. I thus estimate the slopes on the interaction between each $x$ and stock market exposure and squared stock market exposure.

$$
\begin{aligned}
EG^{D}_{07,10} &= \alpha_n + \alpha_r + \beta \frac{Gains_{v,08,09}}{GFW_{v,07}} + \Gamma \left( \frac{Stocks_{v,07}}{GFW_{v,07}} \right) \\
&+ \sum_x \left( \xi_x \cdot x + \beta_x \cdot x \cdot \frac{Gains_{v,08,09}}{GFW_{v,07}} + \Gamma_x \left( \frac{Stocks_{v,07}}{GFW_{v,07}} \right) x \right) \\
&+ \rho' P_{v,07} + \eta' V_{v,07} + \zeta' F_{f,07} + \varepsilon_{f,v}. \qquad (7)
\end{aligned}
$$

I report the results of these regressions in Table 7. I find no statistically significant differences when considering profitability, liquidity, or leverage. I employ dummy variables that indicate whether these characteristics are below or above some rounded cutoff near the sample median. While profitability may imply higher ability to self-finance out of retained earnings, profitability may also proxy for investment opportunities and thus make it more sensitive to changes in the supply of finance from owners. The same may apply to liquidity if the firm is storing cash in expectation of upcoming investment opportunities. More levered firms would likely be more adversely affected by a contraction in credit supply if lenders discriminate against more levered borrowers—however, more levered firms may also have superior creditor relationships, thus endogenously acquiring more leverage. The theoretical predictions on how wealth shocks interact with firm age are less ambiguous. Younger firms have had less time to signal their quality and less time to develop relationships with external financiers. Consistent with this, I find that the effect of wealth shocks interacts strongly with firm age, and that the average effect on employment growth is almost entirely driven by firms $< 10$ years old.[20]

[Table 7 about here.]

I proceed to examine the cumulative effects on employment growth for younger firms. To evaluate this, I repeat the graphical exercise in Figure 4, but now report the coefficients on the interaction between *Gains/GFW* and *Firm Age* $< 10$. Interestingly, Figure 5 reveals rather persistent effects. The point estimates for cumulative employment growth from 2007 to 2010 are the same as those for 2007 to 2012, with the latter remaining statistically significant at the 5% level. This may be indicative of two things. First, firms may be unable to substitute towards other sources of financing even over the course of multiple years. Second, firms may have lost out on certain investment (or employment) opportunities that do not reappear.

Finding that the (differentially) adverse effects on employment growth last at least 5 years is consistent with Schmalz, Sraer, and Thesmar (2017) who find persistent (8-year) intensive margin effects of housing wealth on employment outcomes for newly created French firms. In the literature on credit market contractions and employment growth, there are varying results on the duration of bank-lending induced financial shocks on employment. Popov and Rocholl (2018) find effects that dissipate within 3 years among German firms connected to less healthy banks during the Financial

[20] 10 years is the same threshold as used by Rajan and Zingales (1998) to distinguish the external financing needs of young and mature firms. In their context 10 years is the cutoff for time since IPO.

Crisis. Chodorow-Reich (2014) find that 3-year effects are similar to 2-year effects among mostly larger U.S. firms whose previous lenders reduced credit supply during the Financial Crisis.

[Figure 5 about here.]

### 5.6 Decomposing Employment Growth into Firing and Hiring

In this subsection, I exploit the detailed nature of the Employer-Employee register to decompose employment growth into separations and new hires. To my knowledge, the literature on financial frictions and employment has provided little evidence on how financial frictions may affect these two components of employment growth differently.[21] While separating workers from the firm may mitigate financing short-falls by reducing payroll costs, and have longer-term positive effects on average productivity, it may have significant short-term costs due to potential legal costs and notice periods.[22] It is therefore unclear how attractive job separations are for financially constrained firms. A more attractive option is likely to curtail the hiring of new workers, which is typically associated with an initial training period and little immediate value added. This further allows firms to offer extensive margin income insurance for their existing employees.

My results are consistent with this intuition. I find that approximately three-quarters of the effect on employment growth is through hiring, and that I cannot reject the null of no effect on job separations. I decompose the numerator in the employment growth variable ($\Delta$# Non-owner Employment Days) into new hires ($\Delta$# Non-owner Employment Days for workers not present at time $t$) and existing workers ($\Delta$# Non-owner Employment Days for workers present at time $t$). I keep the denominator the same as before, containing the total number of employment days. Columns (1)-(2) show the baseline (reference) results that have employment growth variable as the dependent variable. Columns (3)-(4) focus on new hires and columns (5)-(6) consider existing workers.

Comparing columns (1), (3) and (4), I find that most of the effect is driven by new hires. The coefficient on growth attributable to new hires makes up 74% of the coefficient on over-all employment growth. While I cannot rule out an economically meaningful effect on job separations in younger firms in column (6), the results in column (4) indicate that the reduction in hiring among younger firms is the primary driver of the average elasticity uncovered in column (1).

[Table 8 about here.]

These findings suggest that the adverse effects of shocks to business owner wealth do not pass through to pre-existing workers along the extensive margin. The employment summary statistics in Table 5 show that while the average employment growth is -2.8% from 2007 to 2010, this is (essentially) the sum of considerable hiring (26%) and separations (-29%). This high degree of turnover presents

[21] A concurrent paper by Barbosa, Bilan, and Célérier (2019) also uses this decomposition to look at the effects of credit supply on human capital retention and acquisition.

[22] Notice periods are 1 to 3 months in Norway.

an opportunity for firms to reduce the strain of employment costs by curtailing hiring and thereby insure existing workers on the extensive margin. These findings are consistent with Risch (2019) who finds that adverse shocks to business owners, operating through their personal income taxes, lead to intensive but not extensive margin effects on existing workers' compensation.

### 5.7 Educational Composition of Workers

I now explore how wealth shocks affect the composition of the firm's work force in terms of educational attainment. A recent empirical literature documents that workers, especially highly-educated ones, are less willing to work for financially distressed firms. Brown and Matsa (2016) finds that workers from higher-educated ZIP codes are differentially less likely to apply to financially distressed firms. Baghai, Silva, Thell, and Vig (forthcoming) find that higher-ability workers are more likely to leave firms in financial distress. These findings of meaningful effects on the educational composition among both existing and incoming workers motivate use of the hiring versus firing decomposition when considering the effects of the educational composition of workers.

I report the results in Table 9, where column (1) reveals that there is no effect on average. However, when considering differential effects for young firms in column (2), I find that adversely affected small firms reduce the fraction of college-educated workers in their firm. Comparing columns (2), (4), and (6) show that the effect is driven by differences in educational attainment among new hires. A potential explanation for this is that more educated workers demand higher wages and offer delayed returns in terms of their contribution to firms' revenues and profits. This may be an investment constrained younger firms are unwilling to make. Also, perhaps surprisingly, I find that adversely affected mature firms *increase* the education level of new hires. This essentially serves to limit (or reverse) the educational gap between young and old firms, as young firms, on average, had 24% college educated workers, while older firms had 19%.

The finding of a reduction in the educational attainment among new hires is consistent with Barbosa, Bilan, and Célérier (2019). However, they also find that financial constraints also lead to an exit of more skilled workers, which does not appear to be the case in my setting.

[Table 9 about here.]

### 5.8 Total Pay and Subcontracting

In this section, I briefly present results on changes in firm-level total (non-owner) pay and subcontracting expenditures. In column (1), I find that a 10% wealth shock reduces payroll expenditures by 3 percentage points ($t$-stat = 1.63). Heterogeneity in column (2) with respect to firm age, shows that this masks forceful effects on younger firms, which is consistent with the previous analyses using employment days as the outcome variable. The negative point estimate of -0.134 ($t$-stat=-0.72)for older firms, although statistically insignificant, is consistent with the finding that older firms increase their

hiring of college-educated—and likely more expensive—workers. Relatedly, the point estimate for the young-firm interaction effect of 1.158 is larger than (although statistically similar to) the point estimate on employment growth, consistent with the result of a negative effect on the hiring of college-educated workers for younger firms.

[Table 10 about here.]

In columns (2)-(3), I report the effect of wealth shocks on subcontracting. In column (3), I see that for the average firm, decreases in payroll are almost entirely offset by increases in subcontracting expenditures. Column (4) reveals that this is not the case for younger firms. While they too appear to increase subcontracting, it only offsets payroll decreases by approximately 23%=(0.266-0.031)/(-0.134+1.158).

### 5.9 Different Time Periods

I repeat my analysis in different time periods. In more sound economic periods, adverse shocks to business owner wealth may have less of an impact on firms' outcomes. In particular, absent adverse shocks to firm cash flows, the ability to self finance may be higher. Beyond this, the ability to substitute towards other sources of financing are likely higher as well. There may be more willingness to provide equity or loans among outside investors and banks, and suppliers may be more flexible in their payment schedules.

The main results are reported in Table 11. Columns (1)-(2), (3)-(4) and (5)-(6) consider the effects of wealth shocks during 2006–07, 2008–09 (my main time period), and 2010–11, respectively, on employment growth during these periods and the subsequent year. I find no statistically significant effects outside of the financial crisis. This can either be due to differences in the economic environment or differences in the distribution of wealth shocks across these periods, as 05–07 stock returns were largely positive, 07–09 mostly negative, while 09–11 were mixed. To examine potential asymmetric effects, I estimate a third order polynomial in the wealth shock variable, Gains/GFW, for the analysis covering 09–11. This reveals no evidence of any particular asymmetries.[23]

Since security-level data on listed stocks is only available starting in 2004, I am unable to consider other economic crises, such as that following the burst of the IT bubble in the early 2000s.

[Table 11 about here.]

[23] The estimated coefficients (standard errors) on the first through third-order polynomial in $Gains/GFW$ are 0.1359 (0.2404), 0.1064 (0.2566), and -0.2422 (0.3598), respectively. Plotting the treatment effects for different values of $Gains/GFW$ does not reveal any significant asymmetries.

# 6 Results on Investment Effects

In this section, I analyze the effects of wealth shocks on firm investment. While Section 5 documents sizable real effects in terms of employment, the economic effects of wealth-shock induced financial constraints may go well beyond labor demand. If firms are severely constrained, we would also expect an adverse effect on capital expenditures. However, documenting this effect is interesting because it sheds light on the hypothesis that financial frictions may be more severe for labor. There are at least two reasons why this is plausible. First, capital—as opposed to labor—may serve as collateral. Second, capital—as opposed to labor—may not decide to leave or refuse to join the firm (Baghai, Silva, Thell, and Vig forthcoming, Brown and Matsa 2016). The literature on credit market contractions and employment focuses almost exclusively on employment outcomes. This literature therefore does not shed much light on whether both labor and capital expenditures are materially affected in the same sample of firms, which is necessary to evaluate the above hypothesis.

An empirical challenge has been that data on capital expenditures is not always readily available in contexts where employment outcomes are. This challenge may be overcome in Norwegian register data as all incorporated firms must report each year the transaction value of all investments and disinvestments in fixed assets, broken down by asset class. The purpose of these reporting requirements is to facilitate the calculation of tax deductions based on asset depreciation. A positive cash flow inducing sale of a fully depreciated asset triggers taxes, and future depreciation allowances depend on the historical (transaction) cost of the asset. Up until 2011 these yearly figures were reported in the firm's main tax return form.[24] This allows me to analyze the effects on firm-level investments with likely minimal measurement error. In Table 12, I provide summary statistics for the firms' net investment in 2008 and 2009 scaled by assets in 2007.

[Table 12 about here.]

[Table 13 about here.]

I first examine the effect on the over-all investment ratio. I report my estimates in Table 13. Results are based on estimating equation 7, using investment outcomes as left-hand-side variables. In column (1), I find that the effect of a wealth shock on the average firm's overall investment ratio is statistically insignificant. However, this masks statistically significant heterogeneity with respect to firm age, which is apparent in column (2): A one standard deviation wealth shock (10%) reduces the 2-year investment ratio by 10%*(-0.027+0.447) = 4.2 percentage points or 32% of its standard deviation (0.042/0.13).

I also consider the effect on major capital expenditures events, such as investments in plants or new property.[25] In column (4), I find that a wealth loss of 10% lowers the probability of investments

[24] After 2011 these numbers enter a separate form that is filed an appendix to the firm's tax return. This appendix is not part of my dataset.

[25] There are fairly few such events, with very large variation in the expenditures. This causes me to restrict my focus

in Plant and Property by 2.5 percentage points, or by 35.7% relative to the mean probability of 0.07. In column (3), I find that this effect is again largely driven by younger firms.

# 7 Additional Financing Outcomes

## 7.1 Bank Financing

My results show that effects are driven by younger firms. A potential explanation for this is that younger firms have had less time to develop relationships with potential external financiers, e.g., banks, and are thus less able to substitute to external sources of financing. In this section, I present results consistent with this intuition. For affected mature firms, bank loans appear to be a partial substitute for owner-provided financing, while for affected young firms, they appear to be complementary.

I report my results in Table 14. I examine whether affected firms were (1)-(2) more likely to experience a nominal increase in long-term bank debt, (3)-(4) experience an increase in long-term bank loans from 2007 to 2009 relative to 2007 assets, and (5)-(6) experience an increase in over-all bank loans relative to 2007 assets.

A mature firm whose owner loses 10% of his or her wealth sees an increase in the bank loan to asset ratio of 0.02, or approximately 40% relative to the the mean (conditional on a non-negative change) of 0.051.[26] Young firms, on the other hand, decrease this ratio by approximately 52%.[27] Relative to the unconditional means these effects are much larger, but arguably not very informative, since the means are close to zero due to a large presence of firms paying down their bank loans.

[Table 14 about here.]

## 7.2 Investor Exit and Ownership Share

In this subsection, I first examine whether shocked owners liquidate their holdings in the stock market. This is useful to inform the possible extent of alternative mechanisms, such as a diminished willingness to grow the stock of labor or capital in response to negatively affected beliefs about the future. These results are reported in columns (1)-(2) of Table 15. Interestingly, there is no evidence of wealth shocks inducing a stock market exit. In column (3)-(4), I examine whether they exit their equity position in the private firm they own. I find no evidence of this either.

In column (5)-(6), I examine the effect on the ownership share in the private firm, conditional on still being an owner. Being unable to find an effect here is consistent with an inability of these firms to substitute towards equity financing from other investors, which would reduce their ownership

to investments on the extensive rather than intensive margin.

[26] Conditional on having a non-negative change in over-all loans from 2007 to 2009, the mean change, scaled by 2007 assets is 0.051. Conditional on being strictly positive, the mean is 0.234.

[27] -(0.203-0.468)*0.1/0.051

share. I also find no heterogeneity with respect to firm age. Young firms are meaningfully affected by owner wealth shocks and are unable to substitute toward bank financing. The finding that they do not (or are unable to) substitute towards equity financing from other investors indicate that equity relationships are quite sticky: The previous finding that wealth shocks do affect the probability that the firm receives equity financing only implied an absence of full substitutability; the findings in this section point toward zero substitutability.

[Table 15 about here.]

# 8 Conclusion

Entrepreneurs and equity investors' wealth are subject to a wide range of cash-flow and asset-price shocks that can inhibit their ability to provide financing. Such shocks include the value and cash-flows of their investments in (other) firms, the stock market, real estate, and other financial instruments, as well as taxation. Many of these shocks will be tightly correlated to the investment opportunities of their private firms. In this paper, I use variation in stock market wealth in an attempt to keep firms' investment opportunities constant while still obtaining meaningful variation in wealth and liquidity. This allows me to present new evidence on how small, and especially young, firms are affected by shocks to their owners' wealth. I show that these shocks have economically large effects on employment and investment. A multitude of tests are inconsistent with these effects being driven by confounding due to, e.g., selection on investor characteristics or common shocks.

The fact that wealth shocks affect firms' financing and that the effects on employment and investment are primarily driven by younger firms suggest that the main mechanism through which the owner's wealth affects the firm is by increasing financial constraints. There are at least three alternative stories. First, wealth losses could affect the owner's consumption demand. For example, lowered wealth may induce lower consumption of leisure. The owner may therefore wish to work more himself which can crowd out the firm's demand for labor. Second, updated beliefs about the future may limit the owner's willingness to grow the stock of capital or labor. If either of these two mechanisms were dominating, I would not expect to uncover the heterogeneous results with respect to firm age or the wealth of the owner relative to the potential financing needs of the firm. A potential third mechanism is that wealth losses may induce owner-managers to take less risk due to a wealth effect. This is hard to distinguish from a "pure" liquidity effect. Any reduction in liquidity provision from the owners, either because they have no liquid assets or because they're unwilling to move their liquidity into the firm, contributes to harsher financial constraints from the perspective of the firm. It is therefore unclear how one could distinguish this channel from a pure liquidity effect and in which scenarios this distinction matters.

My findings underline the importance of owners in financing investment and employment in small firms in a recessionary economic environment. Greenstone et al. (2020) find that small firms are largely

unaffected by contractions in small business lending, suggesting that small firms may have access to other sources of credit when bank lending contracts. This may be consistent with an absence of pro-cyclical financial constraints for smaller firms; a hypothesis which my findings reject. My analyses further reveal sizable effects that are rather persistent for younger firms. This suggests that younger firms who lose out on investment or employment opportunities due to financial frictions do not catch up in the short to medium term. Given the importance of small businesses in most economies and the fact that they often rely heavily on owners (rather than banks) for financing, these findings stress that policymakers should consider policy responses to adverse economic shocks that go beyond securing bank credit. Examples include policies that lead to (i) increased provision of loans to small, young businesses or to their owners, or (ii) increased incentives for investors to provide equity financing to these firms.

The fundings further stress that, to the extent that financial shocks pass through to workers, those affected may primarily be potential new employees. The provision of standard unemployment insurance, which typically requires pre-existing employment, may therefore not be the right medicine.

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## List of Figures

## Figure 1: Stock Market Portfolio Returns

The graphs below provide histograms of 2008 and 2008–09 returns. These are defined as in equation 2, using $t = 2008$ and $j = 1, 2$.

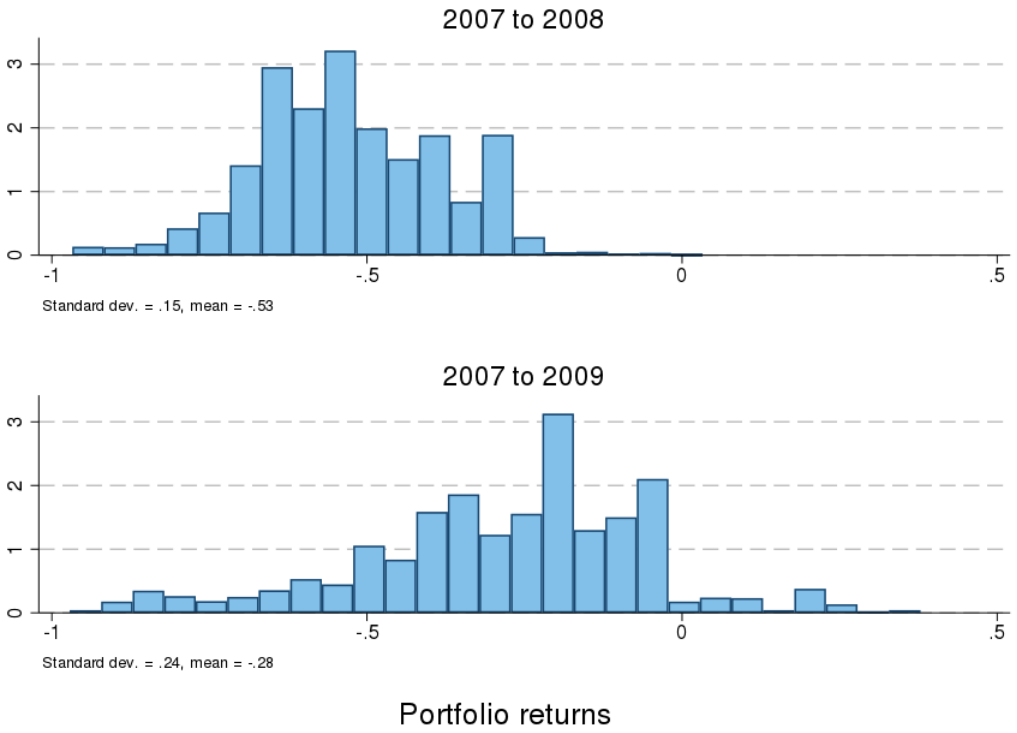


Figure 2: Placebo Test: Correlation Between Portfolio Returns And Revenue Growth when Stock Market Exposure is Low

Results are obtained by estimating the following equation for each year $t$: $(Revenue_{f,t} - Revenue_{f,t-1})/(0.5 \cdot Revenue_{f,t} + 0.5 \cdot Revenue_{f,t-1}) = \alpha_{n,t} + \alpha_{r,t} + \alpha_{n,t} + \beta_t R_{v,07,09} + \rho_t' P_{v,07} + \eta_t' V_{v,07} + \zeta_t' F_{f,07} + \varepsilon_{f,v,t}$. The plot shows the coefficient on the portfolio return from 2007 to 2009. The analysis is limited to investors with a stock market exposure between 0.25% and 10% in 2007.

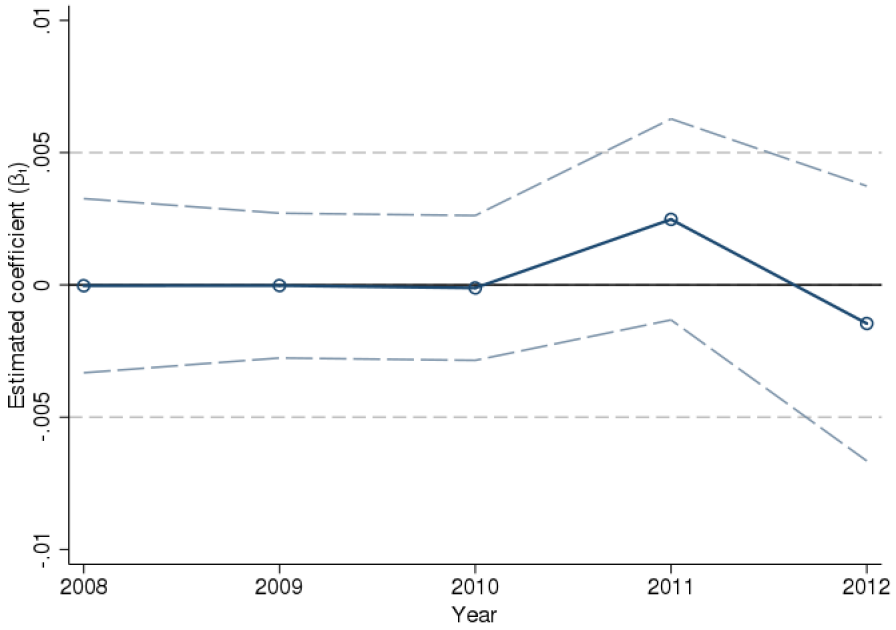


Figure 3: Differential Effects of Wealth Shocks on Employment Growth Based on Relative Investor/Firm Size

This figure shows the differential effects of wealth shocks on firm employment growth for different bins of the ratio of an owner's GFW to the firm's operating expenditures (OpEx). Point estimates come from estimating equation 6. Dashed lines provide 95% confidence intervals.

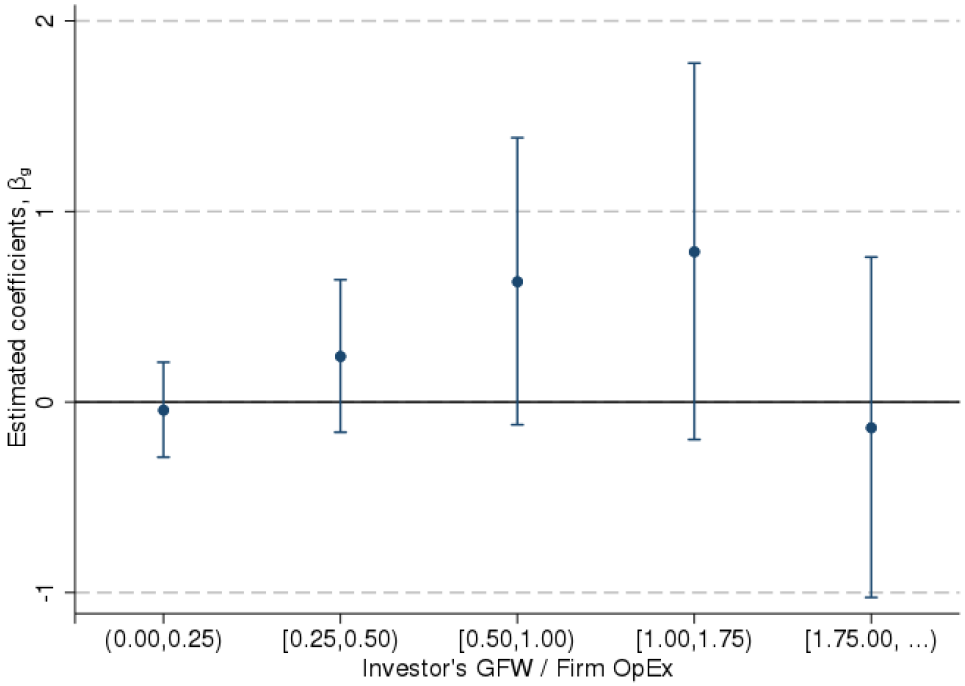


Figure 4: The Effects of Wealth Shocks during 2008–09 on Cumulative Employment Growth

Circles indicate point-estimates for $\beta_t$, estimated separately for each $t$ using equation 4. The outcome variable is cumulative employment growth relative to 2007, $EG^{D}_{f,07,t}$. Dashed blue lines provide 95% confidence intervals.

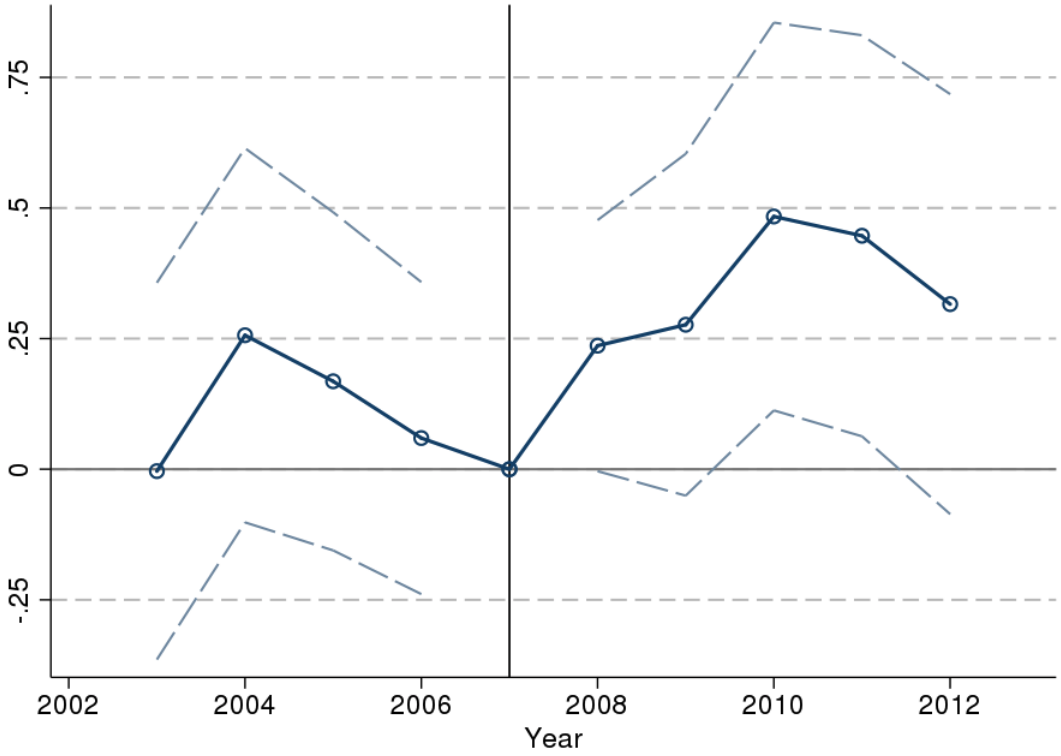
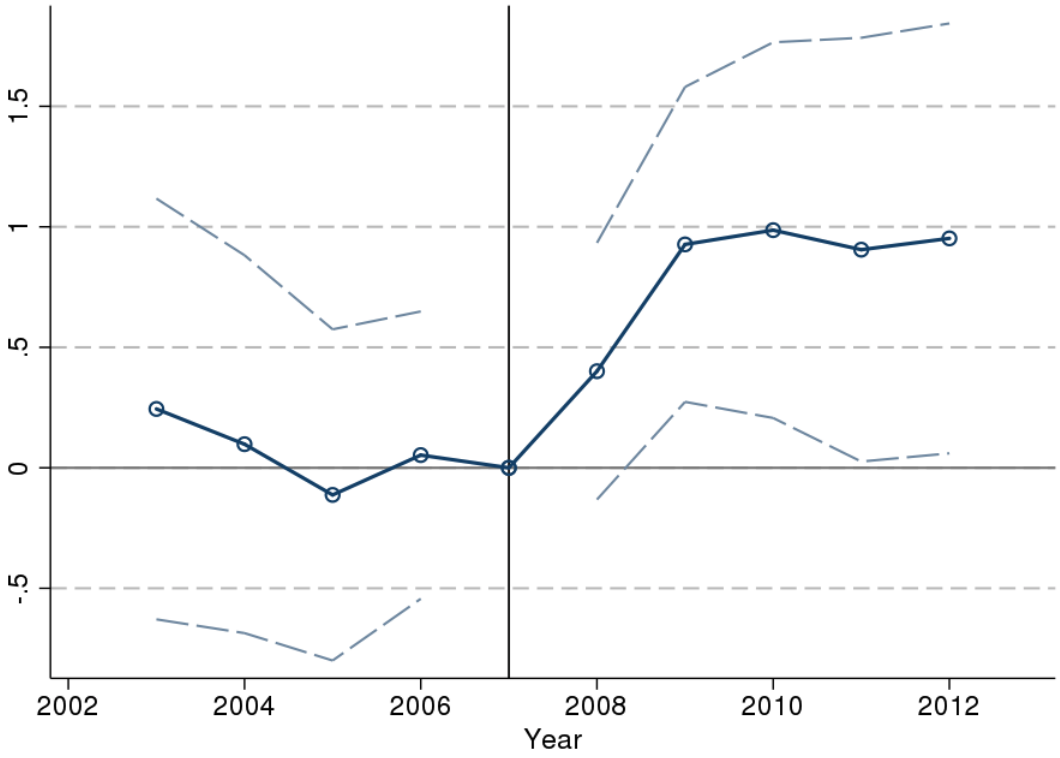


Figure 5: Additional Effect of Wealth Shocks on Employment Growth for Young versus Old Firms

This figure shows the differential effects of wealth shocks on firm employment growth for young (<10 years) firms. Point estimates come from the same specification as in column (2), Table 7. This specification is given by equation 7, with (the only) x being a dummy for firm age < 10. Dashed blue lines provide 95% confidence intervals.



## List of Tables

Table 1: Firm characteristics

| | N | mean | sd | p10 | p25 | p50 | p75 | p90 |
|---|---|---|---|---|---|---|---|---|
| log(Assets) | 4051 | 14.89 | 1.14 | 13.54 | 14.12 | 14.84 | 15.57 | 16.38 |
| Firm Age | 4051 | 13.77 | 11.56 | 2.00 | 6.00 | 11.00 | 19.00 | 26.00 |
| Leverage (LT) | 4026 | 0.09 | 0.17 | 0.00 | 0.00 | 0.00 | 0.10 | 0.34 |
| Leverage (ST) | 4026 | 0.41 | 0.21 | 0.15 | 0.25 | 0.39 | 0.54 | 0.70 |
| Profitability | 4026 | 0.10 | 0.15 | -0.02 | 0.02 | 0.08 | 0.17 | 0.28 |
| Cash/OpEx | 4026 | 0.24 | 0.26 | 0.02 | 0.06 | 0.15 | 0.31 | 0.61 |
| # Owners | 4026 | 2.76 | 1.81 | 1.00 | 1.00 | 2.00 | 4.00 | 5.00 |

All variables are measured in December 2007. LT refers to long-term, and ST refers to short-term. Cash/OpEx is the sum of bank deposits and cash divided by the average of the firm's past two years operating expenditures. # Owners counts the number of owners in the firm, including owners that are not in my analysis sample.

Table 2: Firm-Owner Pair Statistics

| | N | mean | sd | p10 | p25 | p50 | p75 | p90 |
|---|---|---|---|---|---|---|---|---|
| Ownership (Share) | 4783 | 0.55 | 0.34 | 0.10 | 0.25 | 0.50 | 1.00 | 1.00 |
| Employed | 4783 | 0.60 | | | | | | |
| Employment Tenure (Years) | 2669 | 11.75 | 8.47 | 2.00 | 5.00 | 10.00 | 18.00 | 24.00 |
| GFW/OpEx | 4783 | 0.75 | 0.77 | 0.08 | 0.18 | 0.44 | 1.05 | 2.45 |
| Stocks/GFW | 4783 | 0.20 | 0.22 | 0.02 | 0.05 | 0.11 | 0.27 | 0.53 |
| $\text{Gains}_{08-09}$/GFW | 4783 | -0.06 | 0.11 | -0.16 | -0.07 | -0.02 | -0.01 | -0.00 |

All variables are measured as of end-of-year 2007, except $\text{Gains}_{08-09}$, which uses data on stock returns from 2007 to 2009. The unit of observation is the firm-investor level, and each observation is weighted by the owner's stock market exposure such that the weights sum to 1 for each firm.

Table 3: Differences on Observables. How Wealth Shocks Predict Lagged Observables

| | (1) Profitability | (2) log(Assets) | (3) Leverage | (4) Cash/OpEx | (5) log(Firm Age) | (6) Frac. College |
|---|---|---|---|---|---|---|
| $\text{Gains}_{08-09}/\text{GFW}_{07}$ | -0.032 | -0.339 | -0.049 | 0.016 | 0.121 | 0.044 |
| | (0.024) | (0.218) | (0.049) | (0.041) | (0.157) | (0.060) |
| $\text{Stocks}_{07}/\text{GFW}_{07}$ | -0.143*** | -0.850*** | 0.351*** | -0.418*** | -0.455** | 0.042 |
| | (0.031) | (0.261) | (0.053) | (0.050) | (0.181) | (0.060) |
| $(\text{Stocks}_{07}/\text{GFW}_{07})^2$ | 0.090** | 0.595** | -0.240*** | 0.304*** | 0.310 | -0.006 |
| | (0.036) | (0.300) | (0.061) | (0.057) | (0.212) | (0.070) |
| $\text{E}[\Delta Y \mid \Delta Stocks/GFW = 1 \text{ sdev}]$ | -.02 | -.107 | .044 | -.051 | -.059 | .008 |
| mean(Y) | .096 | 14.927 | .498 | .228 | 2.424 | .195 |
| sdev(Y) | .146 | 1.15 | .234 | .252 | .777 | .304 |
| FE | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R |
| R2 | 0.154 | 0.200 | 0.124 | 0.192 | 0.114 | 0.272 |
| N | 4750 | 4750 | 4750 | 4750 | 4750 | 4750 |

Standard errors are two-way clustered at the firm and investor level and are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. $Gains_{08-09}/GFW_{07}$ is amount of stock market gains the investor experienced during 2008 and 2009, fixing portfolio weights in 2007, scaled by 2007 Gross Financial Wealth. The difference in Y based on changing $Stocks/GFW$ by one standard deviation evaluates $Stocks/GFW$ at the mean. Frac. College refers to the fraction of employees with a college degree.

Table 4: The Effect of Wealth Shocks on Firm Financing: Equity-Injections, Dividend flows and Owner-Provided Loans

| | Financing Outcomes During 2008–09 | | | | | |
|---|---|---|---|---|---|---|
| | ΔPaid-in-Capital > 0 | | Dividends/GFW | | ΔInvestor Loans/GFW | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $\text{Gains}_{08-09}/\text{GFW}_{07}$ | 0.137* | 0.103* | -0.071 | -0.125 | -0.055 | -0.054 |
| | (0.070) | (0.058) | (0.098) | (0.104) | (0.108) | (0.096) |
| $\text{Gains}_{08-09}/\text{GFW}_{07}$ * Leverage | | 0.146** | | -0.156* | | -0.341*** |
| | | (0.074) | | (0.086) | | (0.126) |
| $\text{Gains}_{08-09}/\text{GFW}_{07}$ * Cash/OpEx | | 0.023 | | -0.325** | | -0.331** |
| | | (0.073) | | (0.141) | | (0.129) |
| $\text{Gains}_{08-09}/\text{GFW}_{07}$ * Profitability | | -0.141 | | -0.043 | | 0.168 |
| | | (0.089) | | (0.136) | | (0.145) |
| mean(Y) | .061 | .061 | .148 | .148 | -.001 | -.001 |
| P, F, V controls | Y | Y | Y | Y | Y | Y |
| FE | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R |
| R2 | 0.1303 | 0.1376 | 0.4721 | 0.4860 | 0.1976 | 0.2080 |
| N | 3722 | 3722 | 3408 | 3408 | 3722 | 3722 |

Standard errors are two-way clustered at the firm and investor level and are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. $Gains_{08-09}/GFW_{07}$ is amount of stock market gains the investor experienced during 2008 and 2009, fixing portfolio weights in 2007, scaled by 2007 Gross Financial Wealth. Interaction variables are normalized to have a zero mean and a standard deviation of one, and are included as controls, as well as interactions with $Stocks/GFW$. Controls include $Dividends_t/GFW_t$, a $Dividends_t > 0$ dummy, an $InvestorLoans_t > 0$ dummy, $InvestorLoans_t/GFW_t$. ΔPaid-in-Capital > 0 is equal to one if $\text{PIC}_{09}$ >$\text{PIC}_{07}$. Dividends refer to dividends paid during 08 and 09. ΔInvestorLoans = $\text{InvestorLoans}_{09}$-$\text{InvestorLoans}_{07}$. Paid-in-Capital and Investor loans are measured at the firm level (from firms' tax returns), while dividends are on the firm-investor level (from the Stockholder Register).

Table 5: Employment Summary Statistics

| | N | mean | sd | p10 | p25 | p50 | p75 | p90 |
|---|---|---|---|---|---|---|---|---|
| 2007 Employment | | | | | | | | |
| # Owner-employees | 4051 | 1.58 | 1.30 | 0.00 | 1.00 | 1.00 | 2.00 | 3.00 |
| # Reg. employees | 4051 | 6.96 | 11.99 | 1.00 | 1.00 | 3.00 | 7.00 | 15.00 |
| Avg. Age | 4051 | 40.53 | 10.71 | 27.00 | 33.00 | 40.00 | 47.40 | 55.50 |
| Avg. Years of Edu. | 4051 | 13.11 | 2.06 | 11.00 | 11.86 | 12.75 | 14.00 | 16.75 |
| Employment Growth | | | | | | | | |
| $EG^D$ 05-07 | 3713 | 0.116 | 0.481 | -0.314 | -0.117 | 0.000 | 0.208 | 0.610 |
| $EG^D$ 07–08 | 4051 | 0.015 | 0.369 | -0.332 | -0.100 | 0.001 | 0.106 | 0.335 |
| $EG^D$ 07–09 | 4051 | 0.001 | 0.458 | -0.500 | -0.199 | 0.000 | 0.154 | 0.457 |
| $EG^D$ 07–10 | 4051 | -0.028 | 0.498 | -0.643 | -0.281 | -0.002 | 0.167 | 0.499 |
| $EG^D$ 07–10, Symmetric | 4051 | -0.161 | 0.593 | -0.947 | -0.328 | -0.002 | 0.154 | 0.399 |
| Decomposing $EG^D$ 07–10 | | | | | | | | |
| New hires | 4051 | 0.260 | 0.388 | 0.000 | 0.000 | 0.086 | 0.392 | 0.723 |
| Separations | 4051 | -0.291 | 0.321 | -0.750 | -0.500 | -0.250 | -0.020 | 0.000 |

Table 6: Main Employment Regressions.
The Effects of Wealth Shocks on Employment Growth From 2007 to 2010

| $EG^{D}_{07,10}$ | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| $\text{Gains}_{08-09}$/GFW | 0.323* | 0.332* | 0.435** | 0.452** | 0.458** | 0.488** | 0.488*** | 0.522*** |
| | (0.188) | (0.181) | (0.182) | (0.184) | (0.187) | (0.192) | (0.179) | (0.200) |
| Stocks/GFW | 0.027 | -0.015 | 0.049 | 0.048 | 0.012 | -0.075 | -0.075 | 0.042 |
| | (0.086) | (0.185) | (0.181) | (0.180) | (0.181) | (0.189) | (0.210) | (0.250) |
| $(\text{Stocks/GFW})^2$ | | 0.064 | 0.042 | 0.037 | 0.102 | 0.229 | 0.229 | 0.070 |
| | | (0.232) | (0.221) | (0.221) | (0.217) | (0.223) | (0.314) | (0.305) |
| Profitability | | | | | | 0.311*** | 0.311*** | 0.210 |
| | | | | | | (0.118) | (0.107) | (0.150) |
| Leverage (ST) | | | | | | 0.183** | 0.183** | 0.177* |
| | | | | | | (0.083) | (0.085) | (0.101) |
| Leverage (LT) | | | | | | -0.080 | -0.080 | -0.070 |
| | | | | | | (0.089) | (0.077) | (0.112) |
| log(Assets) | | | | | | 0.075*** | 0.075** | 0.069** |
| | | | | | | (0.028) | (0.031) | (0.035) |
| Cash/OpEx | | | | | | -0.176*** | -0.176** | -0.078 |
| | | | | | | (0.064) | (0.078) | (0.079) |
| Lagged 1-Yr E.G. | | | | | | -0.099** | -0.099** | -0.105** |
| | | | | | | (0.041) | (0.038) | (0.047) |
| GFW/OpEx | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] |
| P, F, V controls | Y | Y | Y | Y | Y | Y | Y | Y |
| FE | - | - | NACE2 | NACE2,R | NACE3,R | NACE3,R | NACE3,R | NACE3×R |
| Cluster | F,V | F,V | F,V | F,V | F,V | F,V | NACE3,LS | F,V |
| R2 | 0.0023 | 0.0023 | 0.0376 | 0.0490 | 0.0852 | 0.1340 | 0.1340 | 0.3118 |
| N | 2521 | 2521 | 2520 | 2520 | 2496 | 2496 | 2496 | 2099 |

The main coefficient of interest is that on $Gains_{08-09}/GFW_{07}$, which is amount of stock market gains the investor experienced during 2008 and 2009, fixing portfolio weights in 2007, scaled by 2007 Gross Financial Wealth. Stocks/GFW is over-all stock market exposure. Columns (1) through (6) and (8) gradually introduce more control variables and fixed effects. ST and LT refer to short-term and long-term liabilities, respectively. Cash/OpEx is the sum of bank deposits and cash scaled by the average of the firm's past 2-year operating expenditures. Standard errors in all columns except (7) are two-way clustered at the firm and investor level. In column (7), standard errors are two-way clustered at the firm's 3 digit industry (114 clusters) and the largest firm in the owner's portfolio (88 clusters). Standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 7: Heterogeneous effects of wealth shocks on employment growth

| $EG^{D}_{f,07,10}$ | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| $\text{Gains}_{08-09}$/GFW | 0.488** | 0.131 | 0.567* | 0.238 | 0.472 | 0.076 |
| | (0.192) | (0.192) | (0.333) | (0.279) | (0.325) | (0.402) |
| * Firm Age < 10 | | 0.990** | | | | 0.808** |
| | | (0.398) | | | | (0.412) |
| * Profitability < 10% | | | -0.103 | | | -0.371 |
| | | | (0.396) | | | (0.460) |
| * Cash/OpEx < 10% | | | | 0.496 | | 0.669 |
| | | | | (0.366) | | (0.451) |
| * Leverage > 50% | | | | | 0.035 | 0.102 |
| | | | | | (0.399) | (0.419) |
| P, V, and F | Y | Y | Y | Y | Y | Y |
| FE | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R |
| R2 | 0.1340 | 0.1368 | 0.1345 | 0.1432 | 0.1343 | 0.1471 |
| N | 2496 | 2496 | 2496 | 2496 | 2496 | 2496 |

Coefficients estimated using equation 7. These specifications also include a (dummy) control variable for whether the firm had any bank loans/financing in 2007. Standard errors are two-way clustered at the firm and investor level and are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 8: The Effect of Wealth Shocks on Employment Growth during 2008–10 Decomposed into Changes Among Existing and New Workers

| | $EG^{D}_{07,10}$ | | Change in denominator limited to New Hires | | Change in denominator limited to Existing Workers | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $\text{Gains}_{08-09}$/GFW | 0.488** | 0.131 | 0.359*** | 0.113 | 0.107 | 0.010 |
| | (0.192) | (0.192) | (0.133) | (0.128) | (0.127) | (0.164) |
| * Firm Age < 10 | | 0.990** | | 0.720*** | | 0.226 |
| | | (0.398) | | (0.254) | | (0.258) |
| GFW/OpEx | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] |
| P, F, and V controls | Y | Y | Y | Y | Y | Y |
| FE | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R |
| R2 | 0.1340 | 0.1368 | 0.1856 | 0.1896 | 0.2029 | 0.2053 |
| N | 2496 | 2496 | 2496 | 2496 | 2496 | 2496 |

Standard errors are two-way clustered at the firm and investor level and are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Columns (1)-(2) correspond to my main employment specification and are provided as a reference. In columns (3)-(4) I only use the change in employment arising from new hires, i.e. employees that were not present at time $t = 2007$. In columns (5)-6) I only consider changes in employment arising from workers who were present at time $t = 2007$. The dependent variables in columns (3)-(4) and (5)-(6) sum up to the dependent variable in columns (1)-(2) for approximately 99% of the observations, some deviations occurs due to separate winsorization.

Table 9: The Effects of Wealth Shocks on the Educational Composition of All, New, and Existing Workers.

| | All workers 2010 | | New Hires | | Existing Workers | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $Gains_{08-09}$/GFW | 0.058 | -0.030 | 0.022 | -0.462*** | -0.068 | -0.024 |
| | (0.069) | (0.070) | (0.184) | (0.149) | (0.072) | (0.067) |
| * Firm Age < 10 | | 0.252* | | 1.163*** | | -0.164 |
| | | (0.132) | | (0.236) | | (0.171) |
| GFW/OpEx | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] |
| P, F, V controls | Y | Y | Y | Y | Y | Y |
| FE | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R |
| N | 2036 | 2036 | 1274 | 1274 | 2036 | 2036 |

The dependent variable is the share of workers with a college degree. This is measured using the 2010 employee pool; considering all workers, workers who were present in 2007, and workers who were not present in 2007, in columns (1)-(2), (3)-(4), and (5)-(6), respectively. I include the 2007-valued fraction of workers with a college degree as a control. Standard errors are two-way clustered at the firm and investor level and are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 10: The Effects of Wealth Shocks on Total Payroll and Subcontracting Expenditures

| | ΔTotalPay | | ΔSubContracting | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $Gains_{08-09}$/GFW | 0.298 | -0.134 | -0.261** | -0.266* |
| | (0.183) | (0.186) | (0.122) | (0.149) |
| * Firm Age < 10 | | 1.158*** | | 0.031 |
| | | (0.387) | | (0.246) |
| GFW/OpEx | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] |
| P, F, V controls | Y | Y | Y | Y |
| FE | NACE3,R | NACE3,R | NACE3,R | NACE3,R |
| R2 | 0.1435 | 0.1478 | 0.1517 | 0.1525 |
| N | 2496 | 2496 | 2271 | 2271 |

Total pay excludes salary or wage earnings for owners. ΔTotalPay and ΔSubContracting are scaled by 2007 total payroll. In column (3)-(4), I control for payroll-scaled subcontracting as of 2007. Standard errors are two-way clustered at the firm and investor level and are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 11: The Effects of Wealth Shocks on Subsequent Employment Growth during Different Time Periods

| | $EG^{D}_{05,08}$ | | $EG^{D}_{07,10}$ | | $EG^{D}_{09,12}$ | |
|---|---|---|---|---|---|---|
| | t=2005 | | t = 2007 (baseline) | | t=2009 | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $Gains_{t+1-t+2}/GFW_t$ | -0.014 | -0.042 | 0.488** | 0.131 | 0.076 | -0.004 |
| | (0.106) | (0.135) | (0.192) | (0.192) | (0.156) | (0.185) |
| * Firm Age < 10 | | 0.072 | | 0.990** | | 0.186 |
| | | (0.232) | | (0.398) | | (0.327) |
| GFW/OpEx | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] |
| P, F, V controls | Y | Y | Y | Y | Y | Y |
| FE | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R |
| R2 | 0.1432 | 0.1449 | 0.1340 | 0.1368 | 0.1136 | 0.1139 |
| N | 2212 | 2212 | 2496 | 2496 | 2721 | 2721 |

Coefficients are estimated using equation 4. $Gains_{t+1-t+2}/GFW_t$ is amount of stock market gains the investor experienced during t+1 and t+2, fixing portfolio weights at the end of year t, scaled by year t GFW. In columns (1)-(2) $t = 2005$, in columns (3)-(4) $t = 2007$, and in columns (5)-(6) $t = 2009$. Firm age, and all other controls measured at time $t$. Standard errors are two-way clustered at the firm and investor level and are reported in parentheses. * , ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Table 12: Firm Investments during 2008–09

| | N | mean | sd | p1 | p5 | p10 | p25 | p50 | p75 | p90 | p95 | p99 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Plant /Assets | 3671 | 0.01 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.23 |
| Property /Assets | 3671 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 |
| Total Investments /Assets | 3671 | 0.05 | 0.13 | -0.28 | -0.04 | 0.00 | 0.00 | 0.01 | 0.07 | 0.18 | 0.27 | 0.57 |

Total investments include net investments in R&D (e.g., acquisitions of intangibles), vehicles (cars, planes, ships, etc.), inventory and machinery, plant, and property. Only firms remaining in the sample until 2009 are included. Investment ratios are defined as the sum of net investments during 2008 and 2009, scaled by 2007 assets. These ratios are censored to be between -1 and 1.

Table 13: The Effects of Wealth Shocks on Firm Investments during 2008–09

| | Total Inv/Assets | | | Plant&Prop > 0 | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $Gains_{08-09}$/GFW | 0.121 | -0.027 | -0.124 | 0.250** | 0.140 | 0.247 |
| | (0.096) | (0.094) | (0.183) | (0.116) | (0.098) | (0.191) |
| * Firm Age < 10 | | 0.447** | 0.422* | | 0.388* | 0.251 |
| | | (0.200) | (0.221) | | (0.216) | (0.206) |
| * Profitability < 10% | | | 0.605*** | | | 0.041 |
| | | | (0.222) | | | (0.269) |
| * Leverage > 50% | | | -0.389* | | | -0.335 |
| | | | (0.216) | | | (0.209) |
| * Cash/OpEx < 10% | | | -0.207 | | | 0.210 |
| | | | (0.237) | | | (0.231) |
| GFW/OpEx | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] |
| P, F, V controls | Y | Y | Y | Y | Y | Y |
| Lagged Outcome | Y | Y | Y | Y | Y | Y |
| FE | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R |
| R2 | 0.1655 | 0.1706 | 0.1791 | 0.3385 | 0.3428 | 0.3458 |
| N | 2129 | 2129 | 2129 | 2129 | 2129 | 2129 |

Columns (1) through (3) consider the effect on total investments during 2008 and 2009 scaled by 2007 assets. Columns (3) through (6) use a dummy variable for whether there were net positive investments in plant or property during 2008 or 2009. Coefficients are estimated using equation 7, using investment outcomes as left-hand-side variables. Standard errors are two-way clustered at the firm and investor level and are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 14: The Effects of Wealth Shocks on Bank-provided Financing during 2008–09
Extensive and Intensive Margin Effects

| | Δ LT Bank Loans > 0 | | ΔLT Bank Loans/$Assets_{07}$ | | ΔAll Bank Loans/$Assets_{07}$ | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $Gains_{08-09}$/GFW | -0.249** | -0.255* | -0.101 | -0.206* | -0.061 | -0.203* |
| | (0.115) | (0.130) | (0.095) | (0.117) | (0.100) | (0.116) |
| * Firm Age < 10 | | 0.122 | | 0.368 | | 0.468* |
| | | (0.268) | | (0.249) | | (0.261) |
| mean(Y) | .116 | .116 | .004 | .004 | .008 | .008 |
| GFW/OpEx | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] |
| P, F, V controls | Y | Y | Y | Y | Y | Y |
| FE | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R |
| R2 | 0.1544 | 0.1583 | 0.1362 | 0.1432 | 0.1473 | 0.1534 |
| N | 2349 | 2349 | 2349 | 2349 | 2349 | 2349 |

Standard errors are two-way clustered at the firm and investor level and are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. LT refers to long-term liabilities. The differences refer to changes in bank loans over the two-year period between Dec 2007 and Dec 2009. Controls include stock market exposure (linear and squared), the FirmAge < 10 dummy, their interactions, A dummy for having no bank loans, and bank loans divided by assets, all measured in 2007. Only firms who have non-missing accounting data during both 2007 and 2009 are present. For columns (5)-(6): Conditional on having a non-negative change in over-all loans from 2007 to 2009, the mean change, scaled by 2007 assets is 0.051. Conditional on being strictly positive, the mean is 0.234.

Table 15: Investor Exit

| | Portfolio Stocks$_{2010} > 0$ | | Firm Ownership Share$_{2010} > 0$ | | Firm Ownership Share$_{2010}$ | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Gains$_{08-09}$/GFW | -0.104 | -0.080 | -0.101 | -0.003 | 0.014 | 0.008 |
| | (0.121) | (0.139) | (0.161) | (0.150) | (0.051) | (0.065) |
| * Firm Age $< 10$ | | 0.042 | | -0.300 | | 0.018 |
| | | (0.279) | | (0.344) | | (0.107) |
| GFW/OpEx | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] |
| P, F, V controls | Y | Y | Y | Y | Y | Y |
| FE | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R |
| R2 | 0.1247 | 0.1285 | 0.1410 | 0.1445 | 0.9032 | 0.9032 |
| N | 2496 | 2496 | 2285 | 2285 | 1970 | 1970 |

Standard errors are two-way clustered at the firm and investor level and are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. $Gains_{08-09}/GFW_{07}$ is amount of stock market gains the investor experienced during 2008 and 2009, fixing portfolio weights in 2007, scaled by 2007 Gross Financial Wealth. Columns (4)-(5) show results on firm ownership share, conditional on still being an owner.

# A Appendix

## A.1 Business Owner Summary Statistics

Table A.1: Business owner characteristics

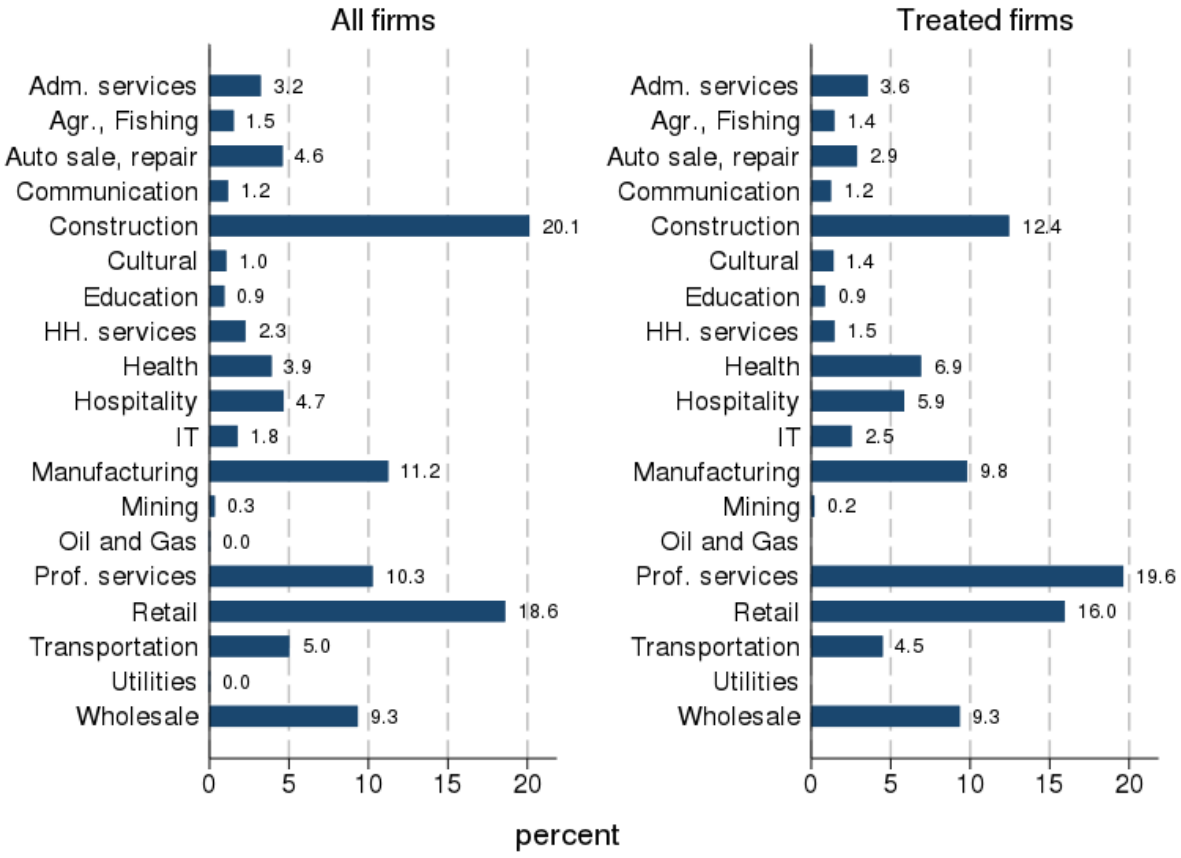
| | count | mean | sd | p10 | p25 | p50 | p75 | p90 |
|---|---|---|---|---|---|---|---|---|
| log(GFW) | 4150 | 14.42 | 1.36 | 12.69 | 13.56 | 14.41 | 15.30 | 16.11 |
| log(Earnings) | 4150 | 12.88 | 1.00 | 11.86 | 12.73 | 13.04 | 13.37 | 13.70 |
| Age | 4150 | 52.38 | 10.94 | 37.00 | 45.00 | 53.00 | 60.00 | 65.00 |
| Male | 4150 | 0.85 | 0.36 | | | | | |
| HighSchool | 4150 | 0.91 | 0.28 | | | | | |
| College | 4150 | 0.45 | 0.50 | | | | | |
| Owns $>$ 50% of a firm | 4150 | 0.49 | 0.50 | | | | | |
| # Firms owned | 4150 | 1.26 | 0.70 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 |

All variables are measured as of end-of-year 2007. The unit of observation is the investor level. # Firms owned counts the number of firms where the owner owns $\geq$ 1% of the shares, including firms that may not be in the analysis sample. College indicates completed higher education. Earnings consist of wage and salary earnings plus any self-employment income.

## A.2 Industry composition of firms

Figure A.1: Industry Composition of Firms

The left hand side chart shows the distribution of firms in my data prior to implementing the restriction of a non-trivial stock market exposure. The right-hand-side chart (Treated firms) shows the distribution of firms in my analysis sample. All of these firms are "treated" to a varying extent, depending on their subsequent portfolio returns.



## A.3 Firm-Owner Pair Statistics, Long version

Table A.2: Firm-Owner Pair Statistics, long version

| | N | mean | sd | p10 | p25 | p50 | p75 | p90 |
|---|---|---|---|---|---|---|---|---|
| Ownership(%) | 4747 | 0.55 | 0.34 | 0.10 | 0.25 | 0.50 | 1.00 | 1.00 |
| Ownership(%), excl. spouse | 4747 | 0.51 | 0.33 | 0.10 | 0.25 | 0.50 | 0.90 | 1.00 |
| WasOwner2004 | 4306 | 0.92 | | | | | | |
| WasOwner2006 | 4783 | 0.97 | | | | | | |
| OwnViaHolding | 4747 | 0.35 | | | | | | |
| IncrOwnershipSince2004 | 3946 | 0.16 | | | | | | |
| DecrOwnershipSince2004 | 3946 | 0.11 | | | | | | |
| SameCity | 4783 | 0.71 | | | | | | |
| SameCounty | 4783 | 0.85 | | | | | | |
| SiblingOwners | 3393 | 0.21 | | | | | | |
| ParentOwner | 3393 | 0.17 | | | | | | |
| ChildOwner | 3393 | 0.12 | | | | | | |
| Employed | 4783 | 0.60 | | | | | | |
| EmploymentTenure | 2669 | 11.75 | 8.47 | 2.00 | 5.00 | 10.00 | 18.00 | 24.00 |
| Owner's pay (NOK) | 2848 | 462214 | 256918 | 138860 | 304723 | 435033 | 596156 | 781988 |
| % of Owner's Earnings | 2848 | 0.96 | 0.16 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| $\text{Dividends}_t > 0$ | 4783 | 0.29 | | | | | | |
| $\text{Dividends}_t/\text{GFW}_t$ | 4162 | 0.05 | 0.12 | 0.00 | 0.00 | 0.00 | 0.02 | 0.15 |
| $\text{Dividends}_{t+1,t+2}/\text{GFW}_t$ | 4162 | 0.17 | 0.47 | 0.00 | 0.00 | 0.00 | 0.14 | 0.47 |

OwnViaHolding is a dummy for whether any of the owner's shares were held through another LLC. Dummies for increases and decreases in ownership share are only defined for those who were owners in both 2004 and 2007. For non-100% owners, ParentOwner=1 if the owner is the parent of another shareholder. ChildOwner is for children of another owner. SiblingOwner is similarly defined if one of your siblings is present as an owner. Dividends are recorded as they appear on the owner's tax records. The USD/NOK exchange rate was approximately 6 in 2007.

### A.3.1 Firm Characteristics and Investor Stock Market Exposure

Most of the identifying variation in my analyses will come from firms whose investors have larger stock market exposures. In order to inform my later discussion of external validity, I provide summary statistics of all the firms in my sample (first column), all treated firms (second column), and by quartiles of exposure for the treated firms (4 last columns) in Table A.3.

I find that treated firms do not differ dramatically from the other firms in my data. Most notably, treated firms tend to be slightly older, have a larger number of owners, fewer employees, and lower past employment growth. These differences in employment growth, however, are decreasing in the

owner's stock market exposure.

The lower part of Table A.3 provides the distribution of my continuous treatment variable, $\frac{Gains_{t+1,t+2}}{GFW_t}$ for my entire treated sample, as well as by quartiles of stock market exposure.

Table A.3: Stock Market Exposure and Firm Characteristics

| | All firms | Exposed | By Exposure (Stocks/GFW) Quartile | | | |
|---|---|---|---|---|---|---|
| Means | | | 1 | 2 | 3 | 4 |
| log(Assets) | 14.96 | 14.89 | 14.98 | 14.89 | 14.89 | 14.81 |
| Leverage (ST) | 0.45 | 0.41 | 0.37 | 0.39 | 0.41 | 0.45 |
| Leverage (LT) | 0.11 | 0.09 | 0.07 | 0.08 | 0.09 | 0.11 |
| Profitability | 0.07 | 0.10 | 0.12 | 0.11 | 0.10 | 0.08 |
| Firm Age | 12.38 | 13.75 | 14.68 | 14.35 | 13.34 | 12.60 |
| # Owners | 2.22 | 2.76 | 2.57 | 2.71 | 2.84 | 2.90 |
| # Owner-Employees | 1.59 | 1.57 | 1.29 | 1.55 | 1.76 | 1.71 |
| # Regular Employees | 9.29 | 6.93 | 7.09 | 6.55 | 6.36 | 7.74 |
| Empl. Growth$_{05,07}$ | 0.17 | 0.11 | 0.07 | 0.10 | 0.12 | 0.17 |
| Investments$_{06-07}$/Assets$_{05}$ | 0.11 | 0.09 | 0.08 | 0.09 | 0.09 | 0.10 |

*Employment Growth is measured as growth in number of days of within-year employment at the firm. I discuss this measure in greater detail in the Employment section of the paper. Investments include investments in vehicles, plant, property, and other fixed assets. Summary statistics are based on one observation per firm, and stock market exposure is assigned based on the owner with the largest ownership share.*

### A.3.2 Stock Market Exposure and Investor Characteristics

The main identifying variation in wealth comes from investors with greater exposure to the stock market. While I control for this exposure in my regression specifications, knowledge of how these investors differ from the less exposed may guide the interpretation of the results.

I find that business owners with positive stock market exposure are wealthier, older, more educated and have lower personal leverage. Once conditioning on positive exposure, I find that these differences are decreasing, except for education, which does not vary with stock market exposure. The observation that stock market investors are wealthier and less leveraged points in the direction that these investors, and likely also their firms, are less ex-ante financially constrained than the over-all population of firms.

Table A.4: Stock Market Exposure and Investor Characteristics

| | All owners | Exposed | By Exposure (Stocks/GFW) Quartile | | | |
|---|---|---|---|---|---|---|
| Means | | | 1 | 2 | 3 | 4 |
| Stocks/GFW | 0.02 | 0.21 | 0.03 | 0.08 | 0.18 | 0.53 |
| GFW_log | 13.01 | 14.42 | 15.17 | 14.61 | 14.28 | 13.60 |
| PersonalLeverage | 0.44 | 0.29 | 0.20 | 0.26 | 0.30 | 0.41 |
| Earnings_log | 12.89 | 12.88 | 12.84 | 12.91 | 12.89 | 12.87 |
| Age | 46.90 | 52.38 | 54.87 | 52.86 | 51.58 | 50.21 |
| Norwayborn | 0.96 | 0.96 | 0.96 | 0.97 | 0.95 | 0.96 |
| Male | 0.77 | 0.85 | 0.87 | 0.86 | 0.84 | 0.84 |
| HighSchool | 0.86 | 0.91 | 0.92 | 0.93 | 0.91 | 0.89 |
| College | 0.29 | 0.45 | 0.46 | 0.45 | 0.43 | 0.45 |
| st.dev($R_{t,t+2}$) | | 0.24 | 0.25 | 0.24 | 0.24 | 0.24 |
| $Gains_{t,t+2}/GFW_t$ | | | | | | |
| sd | | 0.11 | 0.01 | 0.02 | 0.05 | 0.17 |
| p1 | | -0.50 | -0.04 | -0.08 | -0.19 | -0.76 |
| p5 | | -0.28 | -0.02 | -0.06 | -0.14 | -0.49 |
| p10 | | -0.17 | -0.02 | -0.05 | -0.12 | -0.40 |
| p25 | | -0.07 | -0.01 | -0.03 | -0.07 | -0.24 |
| p50 | | -0.02 | -0.01 | -0.02 | -0.04 | -0.13 |
| p75 | | -0.01 | -0.00 | -0.01 | -0.02 | -0.06 |
| p90 | | -0.00 | -0.00 | -0.00 | -0.01 | -0.02 |
| p95 | | 0.01 | 0.00 | 0.01 | 0.01 | 0.04 |
| p99 | | 0.08 | 0.01 | 0.03 | 0.06 | 0.15 |

## A.4 Breakdown of firm liabilities

Table A.5: Breakdown of firm liabilities

| | Firm Age $\geq 10$ | | Firm Age $< 10$ | |
|---|---|---|---|---|
| % of Assets | mean | median | mean | median |
| *Equity* | | | | |
| PIC | 14.24 | 8.86 | 14.09 | 8.46 |
| RetainedEarnings | 3.09 | 3.84 | 3.57 | 4.22 |
| *Long-term liabilities* | | | | |
| BankDebt | 10.40 | 0.00 | 9.98 | 0.00 |
| Owners | 4.08 | 0.00 | 4.35 | 0.00 |
| Other | 3.61 | 0.00 | 4.71 | 0.00 |
| *Short-term liabilities* | | | | |
| BankDebt | 2.64 | 0.00 | 2.48 | 0.00 |
| Owners | 7.01 | 0.00 | 6.42 | 0.00 |
| Suppliers | 13.55 | 7.71 | 11.99 | 6.11 |
| Wages | 8.15 | 6.31 | 7.66 | 6.20 |
| Other | 33.21 | 25.89 | 34.74 | 29.07 |

All variables measured in 2007. Sample is the superset of the analysis sample: It also includes firms with owner who do not hold listed stocks. PIC is Paid-in Capital. Other short-term debt includes payroll and value-added taxes.

## A.5 Financing, Placebo Regressions

I repeat the analysis on financing outcomes, keeping all the right-hand-side variables the same, but considering lagged financing outcomes (2005–06).

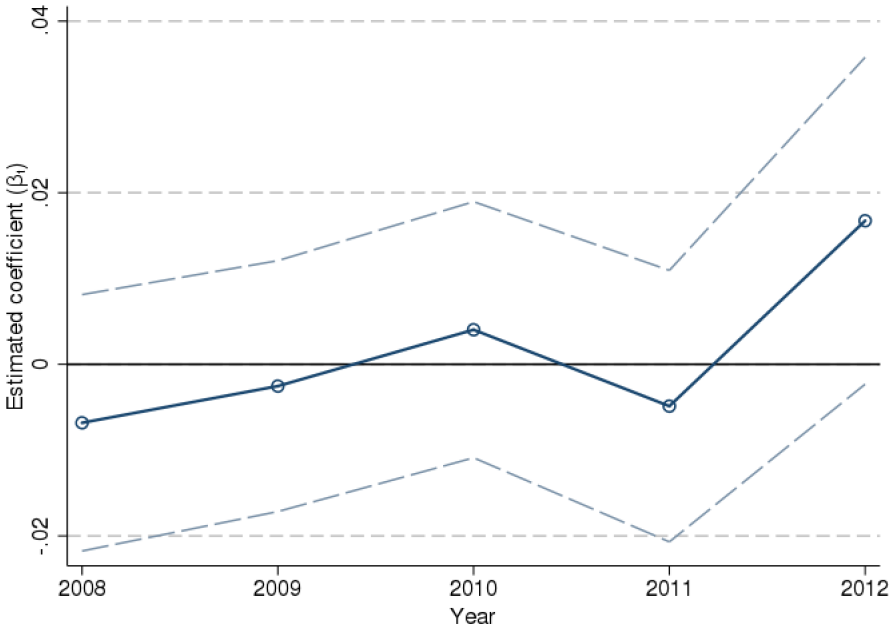
Table A.6: Financing, Placebo Regressions

| | Financing Outcomes During 2005–06 | | | | | |
|---|---|---|---|---|---|---|
| | ΔPaid-in-Capital > 0 | | Dividends/GFW | | ΔInvestor Loans/GFW | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $Gains_{08–09}/GFW_{07}$ | -0.044 | -0.074 | 0.099 | 0.089 | 0.184 | 0.197 |
| | (0.099) | (0.097) | (0.098) | (0.122) | (0.136) | (0.174) |
| $Gains_{08–09}/GFW_{07}$ * Leverage | | 0.143 | | -0.072 | | -0.247 |
| | | (0.105) | | (0.091) | | (0.156) |
| $Gains_{08–09}/GFW_{07}$ * Cash/OpEx | | -0.047 | | -0.037 | | -0.094 |
| | | (0.120) | | (0.198) | | (0.290) |
| $Gains_{08–09}/GFW_{07}$ * Profitability | | 0.110 | | -0.034 | | -0.137 |
| | | (0.118) | | (0.188) | | (0.187) |
| mean(Y) | .13 | .13 | .156 | .156 | .005 | .005 |
| P, V, F controls | Y | Y | Y | Y | Y | Y |
| FE | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R |
| R2 | 0.1400 | 0.1423 | 0.2021 | 0.2085 | 0.1442 | 0.1479 |
| N | 2956 | 2956 | 3557 | 3557 | 2953 | 2953 |

Standard errors are two-way clustered at the firm and investor level and are reported in parentheses. *, * and *** indicate significance at the 10%, 5% and 1% levels, respectively. $Gains_{08–09}/GFW_{07}$ is amount of stock market gains the investor experienced during 2008 and 2009, fixing portfolio weights in 2007, scaled by 2007 Gross Financial Wealth. Interaction variables are scaled by their standard deviation, and are included as controls, as well as interactions with $Stocks/GFW$. Controls for lagged $Dividend/GFW$ ratio, and a dividend dummy, are included.

## A.6 Placebo Test: Returns and Profitability

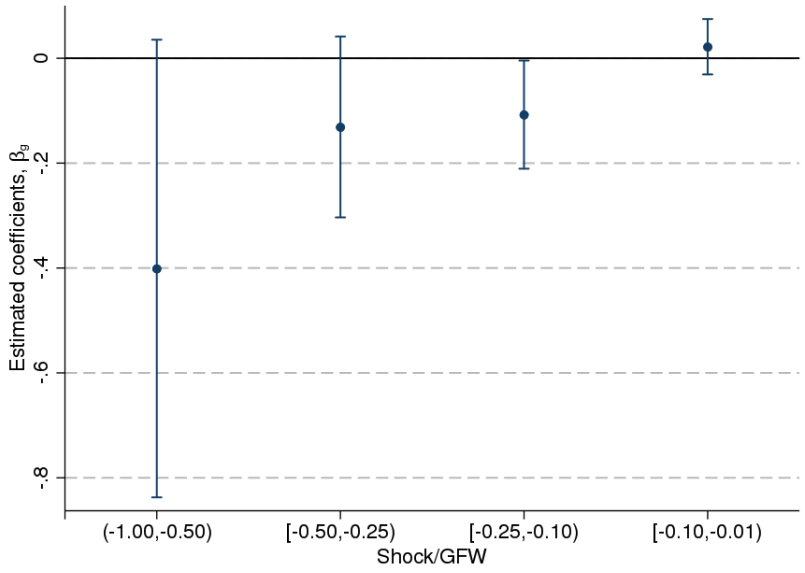
Figure A.2: Placebo Test: Correlation Between Portfolio Returns and Changes to Profitability for Owners with Low Stock Market Exposure




Results are obtained by estimating the following equation for each year $t$: $\Delta Profitability_{f,t} = \alpha_{n,t} + \alpha_{r,t} + \alpha_{n,t} + \beta_t R_{v,07,09} + \rho_t' P_{v,07} + \eta_t' V_{v,07} + \zeta_t' F_{f,07} + \varepsilon_{f,v,t}$. The plot shows the coefficient on the portfolio return from 2007 to 2009. The analysis is limited to investors with a stock market exposure between 0.25% and 10%.

## A.7 Effects on Employment Growth by Wealth Shock Bins

Figure A.3: Estimating effects of wealth shocks by bins




Results are obtained by performing the following regression for shock bin, $g \in G = \{(-1.00,-0.50),[-0.50,-0.25),[-0.25,-0.10),[-0.10,-0.01)\}$ : $EG^{D}_{07,10} = \alpha_n + \alpha_r + \sum_g \beta_g \mathbb{1}\left[\frac{Gains_{v,08,09}}{GFW_{v,07}} \in g\right] + \gamma_1 \frac{Stocks_{v,07}}{GFW_{v,07}} + \gamma_2 \left(\frac{Stocks_{v,07}}{GFW_{v,07}}\right)^2 + \rho' P_{v,07} + \eta' V_{v,07} + \zeta' F_{f,07} + \varepsilon_{f,v}$, where the excluded category consists of firm-investor observation where the owner lost less than 1% of GFW.

## A.8 Quasi First Stage: Portfolio stickiness

The strength of my shock variable depends on some degree stickiness in the investors' portfolios, since I am assuming that investors experience returns from $t$ to $t+j$ depending on their portfolio composition at time $t$. Thus, ifinvestors immediately sold off, or reshuffled, their portfolios right after time $t$, the investors would not be affected by the predicted/intended returns. Since I do not observe within-year transactions of securities, only the yearly portfolio compositions, I construct the following test.

I regress $R_{v,08,09}$, which is the owner's portfolio returns from 2008 to 2009, based on her 2008 portfolio composition, on $\tilde{R}_{v,08,09}$, which are the returns based on her 2007 portfolio composition.

$$R_{v,08,09} = \pi_0 + \pi_1 \tilde{R}_{v,08,09} + \varepsilon_v \tag{8}$$

The "worst case scenario" would be if investors randomly reshuffle their portfolios with frequent intervals. This would imply that $\hat{\pi}_1 = 0$. If there were no transactions, I would find that $\hat{\pi}_1 = 1$. In Table A.7 below I report these estimates. In columns (1)-(3), I omit observations where $R_{v,08,09}$

is missing. These would be missing if the investors had exited the stock market. In columns (5)-(6), I replace missing portfolio returns with zeros. In order to inform us of whether portfolio stickiness varies with the experienced returns from 2007 to 2008, I also estimate $\hat{\pi}_1$ separately for investors who lost more than 60% or less than 40%. These returns are close to the 25th and 75th percentiles, respectively.

Table A.7: Testing Portfolio Stickiness

| | Only non-missing $R_{08,09}$ | | | Missing $R_{08,09} \equiv 0$ | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $\tilde{R}_{08,09}$ | 0.649*** | 0.600*** | 0.648*** | 0.584*** | 0.532*** | 0.586*** |
| | (0.011) | (0.020) | (0.040) | (0.011) | (0.020) | (0.040) |
| Intercept | 0.226*** | 0.291*** | 0.193*** | 0.231*** | 0.301*** | 0.188*** |
| | (0.009) | (0.023) | (0.016) | (0.009) | (0.023) | (0.016) |
| $R_{07,08}$ | All | <-60% | >-40% | All | <-60% | >-40% |
| F | 3306.39 | 905.20 | 260.17 | 2590.61 | 700.84 | 218.08 |
| R2 | 0.4572 | 0.3986 | 0.2272 | 0.3844 | 0.3263 | 0.1873 |
| N | 3928 | 1368 | 887 | 4150 | 1449 | 948 |

Standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. $\tilde{R}_{v,08,09}$ is the return of the portfolio based on the owner's 2007 portfolio composition.

How do I interpret the coefficients? A coefficient of $\pi_1$ would suggest that the investor had reshuffled a fraction $1-\pi_1$ of her portfolio sometime during the year, and on average (assuming the average trade occurs July 1st) would not have experienced $0.5 \cdot (1-\pi_1)$ of the predicted returns during that period. If I extend this to a two-year horizon, as in my empirical setting, I would expect the "non-compliance" to be approximately $2 \cdot 0.5 \cdot (1-\pi_1) = 1-\pi_1$. Alternatively phrased, I would expect a 2-year compliance of approximately $\pi_1$. Table A.7 suggests that this would be approximately 60%. I find a strongly positive intercept, $\hat{\pi}_0 > 0$, due to the fact that stock markets rose dramatically from 2008 and 2009. Thus, any investors who bought new stocks that were positively correlated with the market, but not perfectly correlated with her existing portfolio, would contribute to the estimated positive intercept.

### A.8.1 Investor Characteristics and Future Portfolio Returns

In order to understand whether risk-tolerance or ability may confound my results I estimate how observable investor characteristics (in 2007) predicts portfolio returns (from 2007 to 2009). I report these results in Table A.8 and find that investors who held larger stocks in their portfolio enjoyed larger returns during the crisis. These large firms may likely have been perceived as safer ex-ante. I also see that investors who had a larger stock market exposure had lower returns. This is consistent with a

correlation between risk-tolerance and stock market returns. However, if this were to materialize as realized private firm outcomes, I would expect to see a correlation between stock returns and firm-level revenue, which I do not find to be the case in Figure 2. I also consider other potential proxies for risk-tolerance, namely portfolio HHI, the fraction of wealth invested in mutual funds and personal leverage, and find no predictive power.

A potential other concern is that an owner's stock market returns is correlated with his or her ability. This may be problematic if investors' who are able to pick superior stocks are also super managers or superior private equity investors. However, more than 90% of my owners only own one firm, the average investor owns 1.08 firms, and most investors are employed in the firms they own, and have been so for a long time, and are thus unlikely to be professional private equity investors.

I find that firm profitability does not predict stock market returns, either measured in 2007 or in 2009. If there is some individual fixed effect that affects both ability and firm performance, I would expect that stock returns correlated with ability, especially if the investor has been invested in the firm for a longer time period. In column (6), I limit to firm-owner pairs where the investor had already entered the firm during or before 2004, and still find that firm profitability as of 2007 does not predict superior stock market performance. Finally, if stock market returns are correlated with ability in my sample, I would expect a positive relationship between the owner's individual earnings or wealth level, and their stock market returns. However, I do not find any evidence of this.

Table A.8: Predictability of Investors' Stock Portfolio Returns

| $R_{v,2007,2009}$ | Owner's first year in firm $\leq$ 2007 | | | | | $\leq$ 2004 |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $\text{Stocks}_{07}/\text{GFW}_{07}$ | -0.0648*** | -0.0662*** | -0.0614*** | -0.0769*** | -0.0762*** | -0.0827*** |
| | (0.0166) | (0.0167) | (0.0171) | (0.0191) | (0.0195) | (0.0216) |
| Avg. $\log(\text{mcap})_{07}$ | 0.0302*** | 0.0302*** | 0.0309*** | 0.0307*** | 0.0305*** | 0.0277*** |
| | (0.0019) | (0.0019) | (0.0020) | (0.0020) | (0.0020) | (0.0022) |
| Portfolio $\text{HHI}_{07}$ | -0.0007 | -0.0009 | -0.0067 | -0.0125 | -0.0112 | 0.0017 |
| | (0.0120) | (0.0120) | (0.0123) | (0.0128) | (0.0129) | (0.0140) |
| Fraction Holding | 0.0167* | 0.0170* | 0.0145 | 0.0171* | 0.0184* | 0.0208* |
| | (0.0095) | (0.0095) | (0.0097) | (0.0098) | (0.0099) | (0.0107) |
| Mutualfund share | 0.0260 | 0.0257 | 0.0309 | 0.0215 | 0.0224 | 0.0102 |
| | (0.0282) | (0.0282) | (0.0291) | (0.0296) | (0.0297) | (0.0312) |
| $\text{Profitability}_{07}$ | | -0.0161 | | -0.0262 | -0.0258 | 0.0151 |
| | | (0.0248) | | (0.0293) | (0.0304) | (0.0297) |
| $\text{Profitability}_{09}$ | | | 0.0006 | 0.0092 | 0.0240 | |
| | | | (0.0173) | (0.0191) | (0.0196) | |
| $\log(\text{GFW})_{07}$ | | | | -0.0052 | -0.0073** | -0.0088** |
| | | | | (0.0032) | (0.0037) | (0.0040) |
| $\log(\text{Earnings})_{07}$ | | | | -0.0025 | -0.0005 | -0.0026 |
| | | | | (0.0038) | (0.0039) | (0.0041) |
| $\text{Personal Leverage}_{07}$ | | | | | -0.0246 | -0.0260 |
| | | | | | (0.0151) | (0.0166) |
| Male | | | | | -0.0010 | 0.0006 |
| | | | | | (0.0112) | (0.0121) |
| Industry FE | - | - | - | - | Yes | Yes |
| Region FE | - | - | - | - | Yes | Yes |
| R2 | 0.0639 | 0.0640 | 0.0680 | 0.0690 | 0.1046 | 0.0903 |
| N | 4150 | 4150 | 3866 | 3866 | 3862 | 3476 |

Standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. If a business-owner owns multiple firms, the Profitability variable is associated with the firm in which he or she has the highest ownership share. All RHS variables, except $\text{Profitability}_{09}$, are measured in 2007.

## A.9 Other outsourcing measures

To proxy for the use of temporary workers, I use the accounting post "Other Personnel costs", which includes expenses related to the use of temporary labor from staffing services. However, this aggregated account also contains posts such as gifts to employees. Thus, this proxy has significant measurement error that is likely affected shock variable.[28] To account for other types of outsourcing,

[28]The measurement error could be costs related to, e.g., gifts to employees or payment of gym memberships, which is likely affected by my wealth shock variable, thus this measurement error would bias my estimates towards not rejecting a null of no effect of adverse wealth shocks on using temporary workers.

including the use of external administrative services (incl. book-keeping and legal services), I use the accounting post called "External services (accounting, auditing, consulting, etc.)." This variable likely has similar measurement error issues as other personnel costs.[29]

Table A.9: Temporary Workers, and External Services

| | Δ Other Personnel Costs | | Δ External Services | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $Gains_{08-09}$/GFW | -0.055 | -0.055 | 0.067 | 0.025 |
| | (0.053) | (0.060) | (0.091) | (0.097) |
| * Firm Age < 10 | | -0.052 | | 0.112 |
| | | (0.132) | | (0.213) |
| $OtherPersonnelCosts/TotalPay_{07}$ | -0.284*** | -0.283*** | | |
| | (0.092) | (0.092) | | |
| $ExternalServices/TotalPay_{07}$ | | | -0.142** | -0.142** |
| | | | (0.060) | (0.060) |
| GFW/OpEx | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] |
| Lagged 1-Year $EG^D$ | Y | Y | Y | Y |
| Pcontrols | Y | Y | Y | Y |
| Fcontrols | Y | Y | Y | Y |
| Vcontrols | Y | Y | Y | Y |
| FE | NACE3,R | NACE3,R | NACE3,R | NACE3,R |
| R2 | 0.1570 | 0.1589 | 0.1378 | 0.1388 |
| N | 2052 | 2052 | 2279 | 2279 |

Standard errors are two-way clustered at the firm and investor level and are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Dependent variables are scaled by $TotalPay_{2007}$.

[29] While constrained firms may wish to outsource more of their administrative work, this may reduce over-all economic activity in the firm, thus reducing the need for outside services.

## A.10 Robustness

## A.11 Additional controls for main employment growth regressions

Table A.10: Additional Controls for Main Employment Growth Regressions

| $EG^D_{07,10}$ | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| $\text{Gains}_{08-09}$/GFW | 0.486** | 0.412** | 0.481** | 0.498** |
| | (0.192) | (0.186) | (0.206) | (0.210) |
| Profitability | 0.312*** | 0.073 | 0.323** | 0.324** |
| | (0.118) | (0.142) | (0.129) | (0.130) |
| $\text{Profitability}_{10}$ | | 0.191** | | |
| | | (0.080) | | |
| $r_{v,05,07} - \bar{r}_{05,07}$ | | | -0.038* | -0.046 |
| | | | (0.022) | (0.049) |
| $(r_{v,05,07} - \bar{r}_{05,07})^2$ | | | | 0.082 |
| | | | | (0.129) |
| $(r_{v,05,07} - \bar{r}_{05,07})^3$ | | | | 0.018 |
| | | | | (0.110) |
| $(r_{v,05,07} - \bar{r}_{05,07})^4$ | | | | -0.073 |
| | | | | (0.157) |
| GFW/OpEx | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] |
| P, F, V controls | Y | Y | Y | Y |
| FE | NACE3,R | NACE3,R | NACE3,R | NACE3,R |
| Cluster | F,V | F,V | F,V | F,V |
| r2 | 0.1341 | 0.1333 | 0.1459 | 0.1461 |
| N | 2496 | 2254 | 2187 | 2187 |

Standard errors are two-way clustered at the firm and investor level and are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. $Gains_{08-09}/GFW_{07}$ is amount of stock market gains the investor experienced during 2008 and 2009, fixing portfolio weights in 2007, scaled by 2007 Gross Financial Wealth. $\bar{r}_{05,07}$ is the mean portfolio returns from 2005 to 2007 for investors in the sample.

### A.11.1 Different measures of employment growth

I now explore whether my results are robust to changing the definition of employment growth. $EG^N$ is defined similarly as $EG^D$, but does not account for the duration of employment within the year. $EG^Y$ is year-on-year employment growth, considering the changes in the number of employees from December to December. In Table A.11 I find that my preferred measure of employment growth is the measure most sensitive to wealth shocks. Disregarding the employment duration ($EG^N$) lowers my coefficient by 24%, but reveals very similar heterogeneity with respect to firm age. Year-on-year employment growth is the measure least sensitive to wealth shocks.

Table A.11: Different Measures of Employment Growth

| | $EG^D 07,10$ | | $EG^N 07,10$ | | $EG^Y 07,10$ | | Total Pay Growth 07-10 | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| $Gains_{08-09}$/GFW | 0.488** | 0.131 | 0.371* | 0.054 | 0.170 | -0.072 | 0.298 | -0.136 |
| | (0.192) | (0.192) | (0.210) | (0.199) | (0.198) | (0.193) | (0.183) | (0.187) |
| * Firm Age < 10 | | 0.990** | | 0.952** | | 0.751* | | 1.161*** |
| | | (0.398) | | (0.381) | | (0.447) | | (0.386) |
| GFW/OpEx | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] |
| P, F, V controls | Y | Y | Y | Y | | | | |
| FE | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R |
| r2 | 0.1340 | 0.1368 | 0.1398 | 0.1432 | 0.1331 | 0.1351 | 0.1424 | 0.1467 |
| N | 2496 | 2496 | 2496 | 2496 | 2496 | 2496 | 2496 | 2496 |

Standard errors in parentheses. GFW/OpEx $\in [0.25, 1.75]$ .

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Columns (1)-(2) uses the preferred employment growth measure, $EG^D$. These results are provided as a reference point. $EG^N$ is defined similarly as my main employment growth measure, $EG^D$, but does not account for the duration of employment within the year. $EG^Y$ is year-on-year employment growth, which considers growth from Dec-to-Dec in the number of employees.

### A.11.2 Weighting

This section explores whether my results are robust to my weighting scheme. I report my results in Table A.12. Column (1) is my main specification. Column (2) weights by ownership share, excluding the spouse's share. If a firm only appears in the sample with one investor owning $< 100\%$, then this firm will be down-weighted relative to other firms. Column (3) does not downweight professional services. Column (4) excludes professional services. Columns (5)-(6) do not use weighting: Instead I select only one investor per firm. The selection criteria is that this weight, when not downweighting professional services, was $> 50\%$. Columns (5) and (6) differ in that column (6) excludes professional services.

Table A.12: Robustness to Weighting Scheme

| $EG^{D}_{07,10}$ | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| $\text{Gains}_{08-09}$/GFW | 0.488** | 0.436** | 0.430** | 0.561*** | 0.458** | 0.603*** |
| | (0.192) | (0.195) | (0.186) | (0.213) | (0.193) | (0.225) |
| Weighting | Stocks | Own % | Stocks | Stocks | - | - |
| DownweightPS | Y | - | - | - | - | - |
| OnlyOneInv | - | - | - | - | Y | Y |
| IncludePS | Y | Y | Y | - | Y | - |
| GFW/OpEx | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] | [0.25,1.75] |
| Pcontrols | Y | Y | Y | Y | Y | Y |
| Fcontrols | Y | Y | Y | Y | Y | Y |
| Vcontrols | Y | Y | Y | Y | Y | Y |
| FE | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R | NACE3,R |
| r2 | 0.1340 | 0.1446 | 0.1285 | 0.1434 | 0.1303 | 0.1468 |
| N | 2496 | 2479 | 2496 | 1981 | 2085 | 1655 |

Standard errors are two-way clustered at the firm and investor level and are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. $Gains_{08-09}/GFW_{07}$ is amount of stock market gains the investor experienced during 2008 and 2009, fixing portfolio weights in 2007, scaled by 2007 Gross Financial Wealth. Column (1) represents the main specification and is provided as a reference. Here, I weight by stocks which implies weighting by the amount of stock wealth the investor has relative to the total stock wealth of all investors who also own shares in the firm and are in the regression sample. In column (2), I instead weight by ownership share. In column (3), I again weight by owners by their stock holdings, but omit the down weighting of Professional Services (PS) firms. In column (4), I still weight owners by stock holdings, but completely drop PS firms. In column (5), I include PS firms, do not down weight them, but only keep one investor per firm. OnlyOneInv implies that per firm I only select investors whose non-downweighted weight was $> 50\%$, leaving me with one observation per firm. IncludePS indicates whether I included Professional Services firms (NACE2 codes 69-75).