The Effect of Personal Financing Disruptions on Entrepreneurship[*]

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Abstract

This paper studies how disruptions to personal sources of financing, aside from commercial lending supply shocks, impair the survival and growth of small businesses. Entrepreneurs holding deposit accounts at retail banking institutions that defaulted following the financial crisis reduce personal borrowing and are consequently more likely to exit their firm. Exposure to the corresponding investment losses from delisted publicly traded bank stocks strongly reduces the rate of firm survival, particularly for early-stage ventures. At the intensive margin, owners who remain in business reduce employees after personal wealth losses. My results suggest that personal finance is an important component of firm financing.

1   Introduction

How access to finance affects the growth and survival of firms is a fundamental question of entrepreneurial finance. Although there is ample evidence suggesting that credit market disruptions affect commercial lending and the borrowing ability of firms, we know relatively little about how firms respond to financing shocks experienced directly by entrepreneurs themselves. If small businesses are reliant on financing supplied by principal owner equity through savings, and debt financing from retail loans, personal financing disruptions are likely to play an important role in the creation and dissolution of new businesses.

Previous literature has focused on how shocks to commercial lenders are transmitted to firms and affect real economic activity. Researchers have studied this by using variation in bank-branch consolidation and measuring aggregate local market outcomes,[1] with bank-firm matched data and detailed information on commercial lending,[2] and by examining larger firms with access to syndicated loan and capital markets.[3] By construction, the literature on credit market shocks largely excludes disruptions in personal finance in the outcomes of small business owners and entrepreneurial firms. Furthermore, the focus of existing research in entrepreneurship and personal finance has been on whether loosening financial constraints allows individuals from the general population to start a business, rather than how financing disruptions may affect established firms.

In this paper, I investigate how firms respond to idiosyncratic financing shocks experienced directly by small business owners. I use administrative data on firm owners which include detailed information on their personal assets and their retail banking relationships, merged to a comprehensive dataset on labor market activity. I identify bank-specific shocks by using variation in the solvency of retail banking institutions in Denmark following the 2007-2009 financial crisis. This period was characterized by extensive banking consolidation and bankruptcies, exposing entrepreneurs and small business owners to heterogeneous, and arguably exogenous, disruptions in retail financial markets. In the years preceding the financial crisis, Danish banking institutions increased their exposure to international capital markets and money markets in response to deposit deficits. As the financial crisis unfolded many financial institutions found themselves on the verge of bankruptcy. As a result of write-offs on domestic real estate investments, thirteen retail banks defaulted between 2008 and 2012, eight of which were publicly traded on the Copenhagen Stock Exchange. These banks were taken over by a state-owned financial

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[1]Berger and Udell (1998); Peek and Rosengren (2000); Ashcraft (2003); Greenstone et al. (2014); Nguyen (2014); Black and Strahan (2002); Adelino et al. (2014)

[2]Gan (2007); Khwaja and Mian (2008); Paravisini (2008); Degryse et al. (2011); Schnabl (2012); Iyer et al. (2014)

[3]Chodorow-Reich (2014)

supervisory authority. An additional twelve troubled banks resolved their liquidity needs in private merger and acquisition activity.

To understand how changes in personal wealth may affect entrepreneurial survival, I focus on a sample of small business owners who held retail bank stock investments outside of their own bank in the years leading up to the financial crisis. As an attempt to increase capital, many retail banks followed an expansionary policy consisting largely of selling stock to individual investors since the year 2000 (Danish Financial Supervisory Authority (2009)). These investments were relatively common among investors. Prior to the financial crisis, 60% of all Danish investors held an investment portfolio containing the stocks of a retail banking institution (Andersen et al. (2016)). The shareholders of these banks were exposed to sizable investment losses when the banks defaulted and their shares were eventually delisted from exchanges. Conditional on investment in the banking sector, portfolios of exposed and unexposed investors were highly similar in composition and risk, however exposed entrepreneurs lost liquid assets from investments equal to 343,800 DKK ($62,500 USD) at the mean and held approximately 30% less liquid wealth in the years after the financial crisis.[4]

Exposure to personal financial wealth losses for firm owners stemming from lost investments increases the rate of firm exit for entrepreneurs holding investment accounts by approximately 6 percentage points, an economically meaningful result given a baseline rate of exit of approximately 16 percent. This effect is accentuated for less experienced and more financially constrained entrepreneurs. For entrepreneurs who started a firm in the years prior to the financial crisis, a one-standard-deviation increase in the ratio of losses to pre-crisis liquidity increases the probability of firm exit by almost 7 percentage points, or a 41 percent increase. A complete loss of liquid wealth for a new small business owner translates into a near 40 percent chance of firm failure. Using a matched sample and a differences-in-differences research design, I show that prior to the financial crisis, investors of banks which became distressed compared to those that remained solvent, show similar rates of exit.

Consistent with the conjecture that firm owners may attempt to reduce costs prior to firm closure, I find that personal wealth losses of entrepreneurs result in significant intensive margin decisions. Conditional on remaining in business, firm owners reduce employment by approximately 0.15 full time workers after being exposed to financial losses, a meaningful decrease given the average firm in the sample consists of 5 employees. Wages and working time for full-time employees also decrease following personal wealth shocks, while part-time labor increases marginally.

I hypothesize that financial constraints, rather than alternative mechanisms such as

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[4]1 USD = 5.5 DKK.

changes in risk aversion, are the main driver of changes in firm survival after personal wealth shocks. Adjustments at the intensive margin, and heterogeneity across the sample support this argument. To further disentangle the mechanisms behind the results, I turn to a sample of entrepreneurs who were *deposit customers* of distressed banks rather than investors. These entrepreneurs were, by construction, unexposed to wealth losses, instead they held insured deposit accounts in distressed retail banks which were controlled by a state-owned institution created to unwind the bank prior to its resale. As such, customers were likely unable to access additional credit in the short run following the bank's default. I document the significance of this unexpected shock on debt accumulation for small business owners: the average exposed entrepreneur decreased his level of personal borrowing by approximately 20 percent, or 70,600 DKK ($12,800 USD) in the years following the default of his personal retail bank relative to comparable small business owners with accounts in solvent banks. These exposed depositors are consequently 3 percentage points more likely to close their firm following the default of their retail bank.

If investors or depositors that select distressed banks are potentially worse business owners compared to those who select banks which remain solvent, they may also start weaker firms, or demand less credit for smaller or worse performing businesses. To address this challenge of potential unobservable heterogeneity in credit demand, I rely on the observation that during the aftermath of the financial crisis a number of distressed banks were either acquired by, or merged with, more stable retail banks. In these cases, the continuing or acquiring bank directly took control of the distressed bank without responsibilities or assets being transfered to a third party. These bank mergers provide an ideal counterfactual group. Unobservable characteristics of firm owners correlated with selection into potentially weaker banks are unlikely to differ between deposit account holders at banks which defaulted compared to deposit account holders at banks which were acquired, as both sets of banks became distressed at the onset of the financial crisis. Exploiting this variation, I confirm a strong, negative effect on both debt accumulation and firm performance for affected entrepreneurs.

This paper departs from existing literature on entrepreneurial and small business finance by focusing on successful and established firm owners, rather than individuals from a broad population. Entrepreneurs which hold investments are wealthy. In fact the individuals in the sample hold above median net wealth positions and are in the top quartile of income, compared to all other firm owners in Denmark. Furthermore, the average entrepreneur in the sample has amassed a significant amount of business experience: the average firm owner started his or her first firm almost 20 years prior to the financial crisis. In this respect, my results suggest that even wealthy and experienced entrepreneurs may have firms which are vulnerable to unexpected personal shocks. I

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contribute to a vast literature on how personal financing constraints may affect potential entrants to entrepreneurship (Evans and Jovanovic (1989); Gentry and Hubbard (2004); Blanchflower and Oswald (1998) Holtz-Eakin et al. (1994); Hvide and Møen (2010); Andersen and Nielsen (2012); Nanda (2011)). A recent literature has suggested that loosening constraints may enable a lower quality marginal entrants into firm ownership (Andersen and Nielsen (2012); Jensen et al. (2015)). Surprisingly, there seems to be little evidence of how changes in owners' ability to provide financing may have effects that propagate ongoing firm dynamics and alter the survival or performance of established firms. Furthermore, the previous literature has focused almost exclusively on positive wealth shocks such as inheritances or gains in housing wealth while financial losses have yet to be studied.

These results expand upon the existing literature which question the importance of the credit supply channel by asking if financial institutions transmit bank-specific shocks to firms. Schnabl (2012) analyzes how credit availability effects business lending to borrowing firms in Peru using the 1998 Russian default as an exogenous shock to bank-to-bank international lending liquidity. Similarly, Khwaja and Mian (2008) use cross-bank changes in liquidity stemming from nuclear tests in Pakistan to show that firm borrowing of corporate loans is heavily reliant on bank liquidity. Iyer et al. (2014) uses the unexpected freeze of European interbank market to investigate the change of commercial and industrial loans to non-financial public firms in Portugal. Finally, Paravisini (2008) shows that an increase in government funding to local banks in Argentina increases total borrower debt without decreasing bank profitability. In addition, many researchers have used bank mergers as credit supply shocks to state-, county-, and even census track-level local markets and have considered the aggregate effects on rates of entrepreneurship and lending outcomes (Berger and Udell (1998); Peek and Rosengren (2000); Ashcraft (2003); Greenstone et al. (2014); Nguyen (2014), and Black and Strahan (2002)). Results generally show that bank consolidation in local markets and less banking competition reduce aggregate lending outcomes and firm activity.

Finally, my results are related to a literature on entrepreneurial performance. Studies on entrepreneurial performance and firm survival have focused on the initial start-up conditions of the firm and on inherent characteristics of the firm's owner. For example, human capital endowments and demographic characteristics (Cooper et al. (1994); Shane and Stuart (2002); Van Praag (2003)), and prior experience of the owner (Lafontaine and Shaw (2016); Bayus and Agarwal (2007)). Recent research has considered how macroeconomic events may affect firm performance, e.g., the Great Recession (Cowling et al. (2012); Cowling et al. (2015); Zarutskie and Yang (2015)), and entry conditions and the business cycle (Fairlie (2013); Moreira (2016)). A number of studies have considered

the capital structure of the firm at the onset of creation and its effect on performance or survival. Firms that self-finance and take on external debt seem to have higher rates of survival (Reid (1991)), initial outside debt seems to be correlated with higher firm revenues later in the firm's lifecycle (Robb and Robinson (2012)), early start-up loans have a strong impact on survival (Fracassi et al. (2013)), and firms supported by lending programs fare better with higher rates of growth (Brown et al. (2015)).

I contribute to the existing literature above by showing that personal financing disruptions, aside from shocks which affect commercial and business lending, can have large effects on the survival and growth of entrepreneurial firms. This channel may have been previously understudied for a number of reasons. Detailed information about the financial well-being of individual owners of a private firm is generally withheld from financial reporting. Datasets that link these firm owners to their personal financial market histories and experiences with information about the performance of their private firms are difficult to obtain. Finally, sources of personal financing are often correlated with characteristics of owners and potential determinants of firm performance, and a causal relationship is therefore difficult to identify. My analysis overcomes these issues by using high quality, administrative data from Denmark eliminating sources of measurement error and a natural experiment from the financial crisis. I look specifically at firm outcomes and performance rather than intensive margin changes in borrowing and lending. In addition, I focus on smaller, entrepreneurial firms and small business owners in an advanced European country.

The study proceeds as follows: In Section 2 I discuss the motivation and institutional background. The following section discusses in detail the sources of data and the sample. In Section 4, I discuss the identification strategy and empirical approach. Section 5 discusses the results and follows with additional specifications and robustness checks. The final section concludes.

2 Background

2.1 Related literature and hypothesis development

For most new firms the majority of capital financing comes from outside debt via personal loans made to the owner, commercial loans, and personal and business credit cards, as documented by Robb and Robinson (2012). The authors consider outside debt which is either a claim on the owner's personal assets or on the business's assets. Furthermore, their analysis suggests that personal debt is a significant component of early stage financing. More than 50 percent of the average firm's early financial capital stems from

personal debt. At the extensive margin approximately 26 percent of firms use business lending and business credit cards, while 20 and 31 percent use personal bank loans and personal credit cards.[5]

The Kauffman Firm Survey data further suggests that more than 75% of firms are financed by at least some degree of owner equity (Robb and Robinson (2012)). Of these firms, owners provide on average $40,500 of financing. Equity investments therefore make up a substantial fraction of household wealth for established small businesses, as pointed out by Moskowitz and Vissing-Jorgensen (2002), households with entrepreneurial equity on average invest more than 70% of their wealth in their own business. Berger and Udell (1998) show that smaller enterprises (less than 20 employees) finance their firms with a larger share of principal owner equity compared to larger firms (45% compared to 27%), and owner equity increases with the age of the firm while commercial and personal bank debt decrease.[6] Robb and Robinson (2012) find that for smaller businesses, owner equity constitutes approximately one-third of total financial capital in a firm's first year of business and a sizable fraction of initial and subsequent capital injections during operations.

This recent literature suggests that personal equity and formal credit are key elements of initial financing. If the performance and survival of firms is reliant on these sources of financing, shocks that affect these channels should have large detrimental effects on small businesses. I therefore hypothesize that unexpected changes in the owner's balance sheet should affect the owner's ability to supply the firm with ongoing capital. Similarly, if growth or survival of a small firm is reliant on personal debt financing, external credit shocks affecting the owner's ability to obtain personal bank loans are likely to affect the firm to a detriment as well.

2.2   Institutional background

In the years preceding the financial crisis, Danish banking institutions saw a fundamental shift in the way that they accessed financing to lend to their customer base.[7] As a result of widespread deposit deficits, the retail banking sector turned to international capital and money markets in order to raise liquidity through new channels of financing. This in turn increased their exposure to international financial market fluctuations (Rangvid et al. (2013)). Prior to the financial crisis, however there was little concern that market financing may 'dry up.'

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[5]These values can be computed from Table 4 of Robb and Robinson (2012).
[6]See Table 1 in Berger and Udell (1998) for more information.
[7]A feature of the banking environment in Denmark is an abundance of smaller, publicly held retail banks. In addition to the five largest retail banks (Danske Bank, Nykredit, Nordea Bank, Sydbank, and Jyske Bank), many smaller, local, retail banks are also publicly held and traded on the Copenhagen Stock Exchange.

With the default of Lehman Brothers in the fall of 2008 Danish retail banks were effectively cut off from these international capital markets they had grown accustomed to. At the same time, many Danish banking institutions held sizable investments in domestic real estate and farmland, and as the financial crisis unfolded in the United States, asset values in these markets crumbled. This triggered a flight to liquidity, where some banks experienced the contraction more severely than others.

A group of small and medium-sized financial institutions were hit particularly hard. Indeed, there was considerable variation in how severely banks were affected (Rangvid et al. (2013)), and many banks were on the verge of defaulting on their obligations. Between 2008 and 2012, as a result of write-offs on real estate investments, thirteen retail banks defaulted, eight of which were publicly held. These thirteen default banks were taken over by *Finansiel Stabilitet A/S* (FS)[8], a state-managed company established at the onset of the financial crisis to unwind distressed banks. An additional twelve distressed banks consolidated with existing banks in private merger and acquisition arrangements.[9] The municipalities where the troubled banks were headquartered were distributed throughout Denmark, as shown in Figure 1.

3 Data

I access administrative register data encompassing the universe of all legal Danish residents and assemble a dataset of individuals spanning 2002 to 2012. My dataset contains economic, financial, and personal information about all individuals. The dataset is constructed based on several different administrative registers made available from Statistics Denmark.

Individual-level data originate from the official Danish Civil Registration System. These data provide individual characteristics, such as age, gender, and marital status, and give unique identification across individuals and time. Educational records are from the Danish Ministry of Education. All completed (formal and informal) education levels are registered annually and made available through Statistics Denmark. Income, wealth, and employment status are from the official records at the Danish Tax and Customs Administration (SKAT). This dataset contains personal income and wealth information by individual social security number (CPR) for the Danish population. SKAT receives this information directly from the relevant sources; financial institutions supply information to SKAT on their customers' deposits and holdings of investments. Employers similarly

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[8]*Finansiel Stabilitet A/S* is an independent public corporation owned by the Danish government through the Ministry of Economic and Business Affairs. Not to be confused with the Danish Financial Supervisory Authority, *Finanstilsynet* (FSA).

[9]Refer to Appendix A.1 for additional information.

supply statements of wages paid to their employees.

I access data containing the 4-digit registration number of each individual's primary retail banking account at year-end, from 2005-2012. I map these registration numbers into retail banks across Denmark using a hand-collected database. In addition, I obtain access to ISIN-level stocks and mutual funds from 2006-2012 for all equity market participating Danish individuals. This data provides year-end information on the specific composition and the value of individual investment portfolios held outside of pension accounts. I supplement the portfolio level holdings with Datastream monthly returns information.

3.1 Entrepreneurship data

The above datasets are complemented with a matched employer-employee panel dataset drawn from the Integrated Database for Labor Market Research in Denmark (IDA). In this register database, entrepreneurship and self-employment are defined by *primær arbejdsstilling*, or primary occupation. For each individual, I observe the annual primary occupation as designated in the last week of November. The dataset allows me to identify entrepreneurs precisely, distinguishing between self-employment and part-time work. The administrative designation of employment removes measurement error typically contained in survey data.[10] I define *self-employed* individuals as individuals who have a primary occupation code of *individual tax payer* or *employer* who employ no other individuals in the firm. Most importantly, *entrepreneurs*, are defined as individuals with a primary occupation of *employer* and employ at least one other individual in the firm, similar to the definition used in Jensen et al. (2015), Nanda (2008), Nanda and Sørensen (2010), and Nanda (2011), among others. By definition these individuals are owners of ventures with unlimited liability (UL), which encompass approximately 63 percent of new Danish enterprises (Statistics Denmark (2016)).

The data do not allow me to identify firm owners with limited liability (LL). This however, is not problematic for the analysis as LL entrepreneurs are employees within their company, rather than employers employing others (Nanda and Sørensen (2010)). Throughout the analysis I therefore compare exposed UL firm owners with unexposed UL firm owners, rather than a sample consisting of various types of firm owners. This somewhat reduces external validity, as I cannot characterize personal financing and owners of firms with limited liability. To that end, I use firm owners, small business owners, and entrepreneurs interchangeably but the sample is likely more representative of small owner-managed businesses rather than technology start-ups. Finally, because I use the IDA database on UL firm owners, I do not observe the business assets or revenues of the

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[10]See Jensen et al. (2015) for a more in depth discussion of this dataset.

firm, only the individual assets of the firm owner him- or herself.[11]

3.2 Sample

To be included in the final dataset, individuals must have a full record for each year for inclusion, including a retail bank account. I then exclude any individuals with missing employment information during any year as well as individuals with incomplete education records. Finally, I limit the sample to individuals over the age of 25 and under the age of 60 in order to avoid entrepreneurs retiring from their businesses or withdrawing equity in pre-retirement years. This dataset results in 2,446,433 individuals in the year 2006, 28,653 (1.17 percent) of whom are entrepreneurs who employ other individuals. Appendix A.2 shows that these entrepreneurs have an average firm size of 5.4 employees.

Table 1 reports summary statistics for all individuals in the sample in the year 2006. The table divides individuals by their primary employment; Column 1 focuses on all individuals in the sample, Column 2 on self-employed individuals, Column 3 on entrepreneurs that employ at least one other individual, and Column 4 on individuals who are in traditionally salaried labor employment. Consistent with the existing literature, entrepreneurs are more likely to be male, married, and have more children than their salaried counterparts. Additionally, they have significantly higher income with a higher standard deviation, and have accumulated more net wealth – while holding significantly higher levels of debt in their mortgage and personal bank loans. In fact, entrepreneurs have approximately ten-fold the amount of personal bank debt as salaried employees. This highlights the relative importance of personal banking loans on the balance sheets of entrepreneurs.[12]

4 Empirical strategy

To analyze the effect personal financing disruptions may have on entrepreneurship I turn to a natural experiment in Denmark resulting from bank defaults following the financial crisis. The disruptions in the banking sector allows me to estimate the causal effect on firm survival using a multiple-treatment differences-in-differences specification, given by the following estimation:

$$y_{it} \quad = \boldsymbol{\alpha}_t + \boldsymbol{\rho}_i + \gamma exposed_{it} + \beta' \mathbf{X}_{it} + \epsilon_{it}, \tag{1}$$

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[11]A possible extension of this analysis would be to focus on LL firms where firm asset and revenue data is more widely available, however this is outside the scope of this current paper.

[12]Personal bank loans may include a top-up loan to facilitate initial mortgage down-payments. These are discussed in further detail in Jensen and Johannesen (2015), however they are not unique to entrepreneurs and are not what drives the differences between entrepreneurs and salaried individuals.

where $\boldsymbol{\alpha}_t$ and $\boldsymbol{\rho}_i$ are year and individual-entrepreneur fixed effects, respectively, which account for variation across the sample years and time-invariant differences between individuals. The vector $\mathbf{X}_{it}$ controls for individual time-varying control variables such as log. income, log. net wealth and if the entrepreneur purchases a home or has a child in year t. I identify unexpected personal wealth losses, unrelated to an entrepreneur's firm, with investment losses in the stock market. I define *investors* as entrepreneurs who held investments in publicly traded retail banks outside of the bank in which they have a deposit account. Investors who are *unexposed* and *exposed* are determined by whether the bank they hold investments in remained solvent or defaulted during the financial crisis. The sample is limited to bank investors, and as $exposed_{it}$ takes the value of one in post-default periods, γ provides the average treatment effect of exposure after the default occurs compared to unexposed entrepreneurs (i.e. the differences-in-differences estimate).[13]

Many retail banks in Denmark followed an expansionary policy consisting largely of selling stock to individual investors since the year 2000 (Danish Financial Supervisory Authority (2009)). These investments were common among investors, as described in Andersen et al. (2016); more than 60 percent of all investors held these assets in their portfolio. As these banks defaulted, the value of their traded shares rapidly declined until they held zero value and exposed investors to additional losses in a declining market.

To demonstrate, the top panel of Figure 2 plots a simple index of market returns in log terms of different types of investments held in the portfolios of market participants. The gray line, plots the average market returns of all equities outside of the Danish banking sector over time. The black solid line plots the returns of the equities of retail banking institutions which defaulted throughout the crisis, whose total value eventually diminishes to zero. These equities were eventually delisted from the Copenhagen Stock Exchange. Finally, the dashed black line plots the market returns for *unexposed* bank investors. These retail banking equities remained solvent throughout the crisis, and while their value decreased in comparison to all other equities, they retained a significant portion of their value compared to defaulting banks. Comparing the difference between the solid and dashed black lines serves as variation in personal wealth losses, while holding constant the investment style of the investor. In fact, as shown in the bottom panel of Figure 2, the ex-post returns for a market-capitalization weighted portfolio of retail bank stocks which remain solvent compared to a portfolio bank stocks which end up in default had near identical risk and market returns in the 36 months preceding the financial crisis.

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[13]In order to address potential serial correlation across time common in DD estimations with several pre- and post time periods as noted in Bertrand et al. (2004), I cluster all standard errors at the pre-crisis primary retail bank level.

The figure plots the distribution of monthly returns for the two portfolios containing retail banking stocks weighted by market capitalization from January 2005 to December 2007.[14] A Kolmogorov-Smirnov test suggests that the distributions of monthly returns are not statistically different from each other, not surprising considering the time-series correlation of monthly returns between the two portfolios is more than 90 percent.

For the average investor, these delisted investments led to sizable losses of liquid wealth. Appendix A.3 provides a tabulation of the distribution of losses for unexposed and exposed investors. The table states the mean, 25th, 50th, and 75th percentiles of total investment losses, total losses as a percentage of savings, as a percentage of liquid wealth, and as a percentage of net wealth. The table shows that on average, unexposed bank-investor entrepreneurs lost 49,700 DKK ($9,000 USD) in the declining market following the financial crisis, while exposed entrepreneurs lost on average 343,800 DKK ($62,500 USD), equal to 30 percent of pre-crisis savings, or 22 percent of financial wealth.

In general, this identification strategy has several strengths. Firstly, for small businesses, personal and business expenditures are likely to overlap considerably, but stock investments are generally a financial instrument held in personal accounts and separately from an entrepreneur's firm. Therefore a shock to personal investments serves as an ideal proxy for understanding the effect of changes in personal financial liquidity on firm performance. Secondly, because variation comes from the specific bank, and not in the type of investment, I compare investors with similar investment styles and portfolios with similar risk-return structures who are exposed to idiosyncratic variation from the delisted equities. Finally, these investments made up a significant fraction of the liquid wealth held by entrepreneurs in the sample. It should also be noted that the related literature has shown that individual investors are likely to be under-diversified, hold on to losing investments, invest in local assets, and are sluggish to update their portfolio or to realize returns.[15] This suggests that it is not surprising, per se, that individuals may have let their portfolios containing defaulting bank stocks diminish instead of actively rebalancing away from these assets.

4.1 Descriptive characteristics of small business owners

The validity of estimates obtained by Equation 1 rests on the assumption that entrepreneurs who are exposed to banking defaults are similar to unexposed entrepreneurs, and selection into these two groups is near random. Therefore I pay particular attention to testing for differences in observable characteristics between entrepreneurs, controlling

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[14]December 2007 is an accepted starting date for the Great Recession (NBER), however similar distributional plots for varying time periods show qualitatively the same result, as does using an equally weighted portfolio.

[15]Please see Barberis and Thaler (2003), Kaustia (2010), and Andersen et al. (2016) for related literature reviews.

for fixed and time-varying demographic and financial characteristics, and examining the common pre-crisis trend in outcomes.

In Table 2, I focus on the main sample of entrepreneurs who invest in retail bank stocks outside of their own bank prior to the financial crisis. Columns 3 and 4 show that demographic, financial, and portfolio characteristics of *unexposed* and *exposed* investors are similar, with the differences and significance of the two groups displayed in Column 5. Column 5 suggests that the differences between the two groups is economically and statistically insignificant. This includes important indicators of background consumption such as housing assets, mortgage loan-to-value, non-mortgage retail bank debt.

Of particular importance is the investment and portfolio characteristics of investors in the sample. If exposed investors held less diversified portfolios or invested with dramatically different risk, this would challenge the near random assumptions of the identification strategy. Table 3 compares exposed and unexposed entrepreneur-investors in terms of their portfolio characteristics in 2006, prior to the financial crisis. Exposed investors hold slightly less non-mutual fund risky assets, however this value is not statistically different from unexposed investors. This is highlighted by the observation that exposed investors hold a qualitatively similar measure of risky assets relative to financial wealth, where financial wealth measures the sum of year-end market value of stocks, bonds, and bank deposits. Furthermore, the two groups of investors hold an indistinguishable number of assets in their portfolio, approximately 2.6 at the mean. I use monthly returns from 10 years of data (1997-2006) and the MSCI World All-Market index as a benchmark to investigate the risk and return trade off of investors portfolios. Exposed investors, on average have a slightly less volatile portfolio indicated by a small but statistically significantly smaller beta-coefficient, and tend to have a slightly higher Sharpe ratio. However, both exposed and unexposed investors on average hold portfolios with low and statistically similar levels of idiosyncratic risk.[16]

Perhaps unsurprisingly, these entrepreneurs also own similar firms. Exposed and unexposed investors have similar levels of entrepreneurial experience and employ approximately 5 employees in their firms. In general, entrepreneurs who held investments in banks which defaulted are highly similar to other entrepreneurs with similar investors in observable characteristics. It seems likely that the balance sheets of retail banks may not have necessarily been an important selection criteria among retail bank customers and investors prior to the financial crisis in Denmark.

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[16]These results are highly similar when using alternative benchmark indexes such as the the Copenhagen OMX, or the MSCI Euro Stock index.

5 Results

5.1 The effect of personal financing disruptions on firm survival

The first stage of the analysis is to examine how changes in financial wealth affect firm survival. In Table 4 each column represents a different dependent variable which explores survival outcomes of the entrepreneur's firm. Column 1, first analyzes the probability that the entrepreneur exits from the firm for any reason. Column 2 then specifies that the firm was closed down by the owner. Column 3 specifies that the firm was closed due to the result of a merger. Column 4 specifies that the firm remained open, however was downsized to a single owner-employee. Finally Column 5 specifies that the entrepreneur closed down the firm and moved to an established firm as an employee. The main variable of interest, *exposed investor*, indicates whether the entrepreneur held stock investments in a default bank and incurred *above median* financial losses. The variable takes the value of one if year t is after the bank default year and zero if otherwise.

Entrepreneurs who were exposed to significant financial wealth losses are approximately 6 percentage points more likely to exit from entrepreneurship compared to other bank-investor entrepreneurs unaffected by wealth losses. Columns 2 and 3 suggest that this result is predominantly driven by the fact that these firm owners actually close down their business, rather than sell their business or merge with another firm. Exposed investors are 3 percentage points more likely to close their firm. This is an economically meaningful result, given a mean pre-crisis rate of exit of 16 percent. A 3.1 percentage point increase therefore corresponds to a marginal effect of almost a 20 percent increase in the hazard of failure for entrepreneurs experiencing additional wealth losses.

Because entrepreneurs in the sample are defined by the fact that they employee other individuals, a potential driver of firm changes at the extensive margin may simply be that firm owners downsize to firms with a single entrepreneur-employee. Column 4, therefore analyzes the effect of financial wealth losses on the probability of this outcome. I note that individuals with personal financing disruptions are no more likely to exit due to downsizing compared to unaffected entrepreneurs. Finally, Column 5 shows that exposed investor-entrepreneurs are approximately 1 percentage point more likely to exit their firm and move to a salaried employment position in the labor market. While this effect is statistically significant, the economic magnitude of the finding is relatively small.[17]

In total, Table 4 shows that personal wealth shocks seem to have a strong positive effect

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[17]The results presented thus far are also robust to alternative definitions of entrepreneurship. In an unreported analysis I create a dataset consisting of entrepreneurs *and* self-employed individuals and find qualitatively similar results. If the sample consists of *only* self-employed individuals, the effect of bank defaults and investments losses decreases in magnitude. This can potentially be explained if self-employed individuals are more likely to be consultants and/or work in less capital intensive businesses.

on firm-closure. One potential criticism however, is that the results may be confounded by demographic or financial factors which are correlated with investors who were exposed to financial losses. In addition, investors who experienced high, or above median losses, may have taken higher risk than less exposed investors, which may also be correlated with firm-level decisions. Finally, as the analysis is a differences-in-differences estimation, it would be natural to investigate if there are any pre-bank default differences in firm outcomes between exposed and unexposed entrepreneurs.

To address these items I turn to a similar analysis using an exact-matched sample. For each exposed investor entrepreneur in the sample I match up to 5 nearest-neighbor unexposed investors in year t_{-1} from the bank default. The matching is based on five-year age cohorts, twenty-vigintiles of net wealth, five-percentage point bins of the share of wealth in risky assets, gender, marital status, and municipality of residence. Matching methods allow analysis relative to time υ, years from bank default, rather than solely calender-year, t. The regression therefore takes the form,

$$y_{it} = \boldsymbol{\alpha}_t + \boldsymbol{\rho}_i + \boldsymbol{t}_\upsilon + \gamma(exposed_i \times \boldsymbol{t}_\upsilon) + \beta'\mathbf{X}_{it} + \epsilon_{it}, \tag{2}$$

where $\boldsymbol{t}_\upsilon$ is a vector of indicator variables for each year since the bank default and year of exact-match. The results from this analysis are shown graphically in Figure 3. Panel B includes all matching elements listed above, while in Panel A I allow the pre-default risk share to vary between investors, this increases the sample size and adds further power to the analysis. Each point on the figures state the difference in the probability of firm closure between exposed and unexposed investors. Both panels reveal that prior to the bank default exposure the probability of firm closure for the unexposed and exposed entrepreneur does not significantly deviate from zero. However in the years following, exposed investors are approximately 3-4 percentage points more likely to close their firm. Furthermore, this analysis defines exposed investors as investors who were exposed to *any degree* of losses from the delisted bank stocks, rather than losses above the median.[18] In general, Figure 3 provides satisfactory evidence of parallel pre-trends prior to the financial crisis. The regression results from these analysis are also stated in Appendix A.5.

5.2 Intensive margin decisions

As shown, changes in personal wealth affect the extensive margin of firm operations. However, it is logical to assume that if disruptions affect the ability to supply capital to the firm rather than via some other channel, firm owners may attempt to reduce the

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[18]Using the previous defintition of above median losses are unreported and produce a similar result with a larger post-period effect, however the presented estimation provides a more conservative approach.

variable costs associated with labor inputs prior to ceasing operations. In Table 5 I focus on changes at the intensive margin for small business owners. I ask if employers reduce employee headcount when facing an unexpected decrease in their personal financial wealth.

Conditional on a firm owner remaining in business, Columns 1-3 analyze various outcomes for full-time employees, while Columns 4-6 focus on part-time employees. Beginning with Column 1, Table 5 states that investor-entrepreneurs exposed to wealth losses from delisted stock investments, decrease their number of full-time employees by approximately 0.15 employee in the years after experiencing wealth losses. This effect is statistically significant at the 5% level. The median firm in the sample has just 3 employees, therefore this corresponds to a 5% marginal effect. Perhaps more interesting Columns 2 and Columns 3 reveal that exposed investors reduce the number of working days for the average full-time employees and their relative wages by 9.6 working days per year and a 10% reduction in wages conditional on having full time employees. Investors exposed to financial wealth losses, on the other hand, seem to increase part-time labor both in the number of overall employees and in their working days. However, as shown in Columns 4 and 5, this effect is statistically insignificant.

The results from this table suggests that wealth losses drive changes at the intensive margin of operations for firm owners. This finding complements a recent literature examining the effect of credit market disruptions on employment (Chodorow-Reich (2014). While Greenstone et al. (2014)) finds a limited effect of credit market disruptions on employment in smaller businesses perhaps more comparable to this analysis, Table 5 suggests that personal wealth shocks, aside from credit market disruptions may also contribute to the real effects on employment. Firm owners who lose a significant source of personal liquidity operate smaller firms after they experience personal losses.[19] On average, exposed employers reduce their number of full-time employees by approximately 0.15 employees after experiencing financial wealth losses.

5.3 Heterogeneity in entrepreneurs

The results thus far suggest that an unexpected decrease in personal financial wealth plays an important role in determining exit from entrepreneurship. In order to quantify this effect across the distribution of losses, I turn to a DD specification with a continuous treatment variable.

$$\text{pr}(y_{it} = 1 | exposed_{it}, \mathbf{X}) = \Lambda(\boldsymbol{\alpha}_t + \boldsymbol{\sigma}_c + \gamma(exposed_{it} \times \phi_{i,2006}) + \beta' \mathbf{X}_{it} + \epsilon_{it}) \quad (3)$$

[19]This effect could be driven by employers actively reducing staff, by employers simply choosing not to renew employment contracts, or alternatively by employees selecting out of certain ventures.

where $\boldsymbol{\alpha}_t$ and $\boldsymbol{\sigma}_c$ are year and bank-treatment cohort fixed effects. Note that in specifications without individual-entrepreneur fixed effects the bank-treatment fixed effect is necessary to identify γ. As previous, $exposed_{it}$ indicates entrepreneurs with exposure to investment losses stemming from retail bank investments and $\phi_{i,2006}$ is the share of liquid wealth (i.e. the year-end market value sum of bank savings, bond holdings, and stock investments) invested in retail bank stocks prior to the financial crisis. γ provides the average treatment effect of exit from entrepreneurship for exposed entrepreneurs after the default of their bank investment at varying levels of pre-crisis investment in stocks which go on to default. The results from this specification are presented graphically in Figure 4, showing the effect of the size of lost investment on the probability of $y_{it} = 1$. The figure shows the marginal effect on *any exit* from entrepreneurship (in diamonds), *firm closure* (dots), and *exit to the labor market* (square). The x-axis plots the fraction of liquid wealth lost from an investment in a default bank for exposed entrepreneurs after the banking defaults. The results suggest that the probability to exit is an increasing function of the size of lost wealth; when entrepreneurs experience a complete loss of their liquid wealth the probability that they exit from their firm increases by nearly 20 percentage points greater than the baseline hazard of exit.

In order to examine the heterogeneous effects of personal wealth losses on entrepreneurship, in Table 6 I split the sample by the length of time the firm owner has operated the current firm. Columns 1 and 3 focus on the a sample of established entrepreneurs with a high level of experience. Established entrepreneurs began their firm at any time prior to 2002, while in Columns 2 and 4 the sample consists of new entrepreneurs who started their first venture in the years prior to the financial crisis, 2002-2007. Beginning with Columns 1 and 2, I note that for *any exit* from entrepreneurship, exposed entrepreneurs with less experience are approximately 7.8 percentage points more likely to exit compared to entrepreneurs with more experience (5.7 percentage points). However, the general finding from Columns 1 and 2 is that high and low experience entrepreneurs are both significantly affected.

In Columns 3 and 4, I focus specifically on *firm closure*. Here I note that entrepreneur investors with high levels of experience are only 1.9 percentage points more likely to exit, with marginal statistical significance. While exposed entrepreneurs with limited experience appear to be driving the large effect on firm closure. These results confirm existing cross-sectional evidence such as Berger and Udell (1995) and Robb and Robinson (2012), suggesting that owner provided equity may be more crucial for younger firms in the earlier stages of their life-cycle.

Similarly, in Table 7, the sample is divided into terciles such that Column 1 (2) (3) includes the bottom (middle) (top) third of the distribution. Panel A separates this for

net wealth while Panel B separates *debt to asset ratio*. For investors, the results from Panel A suggest that entrepreneurs outside of the top third of the distribution of wealth are more impacted by personal wealth losses. Panel B shows that investors with high debt as a function of the total assets are almost 5 percentage points more likely to exit from their firm after exposure to personal wealth losses from lost investments. These results suggest that, perhaps unsurprisingly, more financially constrained small business owners are more affected by personal wealth losses.

6 Investigating the mechanism

6.1 Alternative channels

To understand the mechanism which may cause small business owners to exit or close their firm after experiencing financial wealth losses I briefly discuss the findings thus far, then turn to an alternative test which helps disentangle the effects of financial disruptions on firm outcomes.

The main channel that has been discussed so far suggests that exit is driven by limited financing, or credit supply contractions, as a barrier to firm survival. However, a financial wealth shock may also cause changes in risk taking behavior which in turn could affect the desire of an individual to continue with an entrepreneurial firm. A large literature examining how households react to changes in wealth finds individual portfolio risk aversion to be either constant or slightly decreasing.[20] In general, individuals seem to keep their portfolio risky asset share constant around changes in wealth. However, Andersen et al. (2016) find that negative experiences in the stock market made individually do indeed reduce future financial risk taking. On the other hand, the literature suggests that entrepreneurs may perceive risk differently from salaried individuals.[21] Regardless, when analyzing wealth changes on labor market decisions, changes in willingness to take risk becomes difficult to disentangle empirically.

A number of the findings presented thus far lean in favor of financial constraints, rather than changes in risk aversion, as the mechanism which drives the results. Firstly, the previous section on heterogeneity shows that the results are driven by entrepreneurs in younger firms, i.e., with less experience. On one hand, its likely that these entrepreneurs are more financially constrained in the formative years of their business (Berger and Udell (1998); Fracassi et al. (2013)). On the other hand, it would be difficult to argue that

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[20]See Calvet et al. (2007), Brunnermeier and Nagel (2008), and Chiappori and Paiella (2011).

[21]See Åstebro et al. (2014) and Koudstaal et al. (2015) for recent discussions. In addition, recent evidence suggests that these differences may be attributable to entrepreneurs' willingness to risk losses (Koudstaal et al. (2015)).

entrepreneurs in the initial years of their business would be more willing, relative to more experienced entrepreneurs, to close their business and exit their firm due to alternative mechanisms such as changes in risk appetite. If the findings ran in the opposite direction, and more established firm owners were more likely to shut down their firm, the effect could be due potentially to early retirement or exit from a riskier stream of income.

Firm owners most likely to exit from their business following wealth shocks are more likely to be financially constrained in terms of net wealth and their relative debt position. The effect of financial losses at the intensive margin of employment decisions also contributes a powerful test, as it focuses on firm owners who remain in business. Those who experience larger losses, reduce costs associated with employees relative to those who remain less affected.

Finally, in Table 8, I analyze the effect of a change in personal financial wealth on alternative individual outcomes of the entrepreneur. Column 1 first documents the change in the logarithm of financial wealth. The variable *exposed investor* indicates whether the entrepreneur held stock investments in a default bank and incurred (any degree of) financial losses. The coefficient is statistically significant at the 5% level and indicates that exposure to investment losses has a strong, and likely mechanical, negative effect on individual financial wealth. Entrepreneurs exposed to portfolio losses experience a near 40 percent decrease in liquid asset holdings. This finding is shown graphically in Figure 5 with a matched sample of unexposed investors.[22]

Columns 2 through 6 show the effect of portfolio losses on alternative outcomes. Column 2 is the change in the logarithm of net wealth, while Column 3 is the change in the logarithm of total income. Column 4 investigates the change in the share of wealth in risky assets, conditional on holding risky investments. Column 5 focuses on total debt while Column 6 focuses on personal retail banking loans. Across all of these outcomes, I note that the effect of personal financing disruptions via investment losses is statistically indistinguishable from zero. This table highlights the finding that losses particularly affect financial wealth holdings, and not alternative outcomes which may be driving the changes of the firm. I observe no change in risky asset holdings, total sources of income, or personal debt.

6.2 Evidence from deposit holders

To further disentangle between financing constraints and alternative mechanisms which could be associated with wealth shocks, I turn to a related feature of the retail banking disuriptions following the financial crisis. I focus on a subsample of entrepreneurs who

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[22]The matching specification is identical to that discussed in the previous section.

were *deposit customers* of affected banks rather than investors. Customers of exposed retail banks held a personal deposit account at a bank which was unlikely to be able to supply additional credit to its client base in the short run following the onset of the crisis.

The activities of retail banks which defaulted in Denmark were immediately transferred to FS.[23] These transfers were part of the unwinding process for distressed banks as part of 'Bank Rescue' Packages I-IV spanning 2008-2012. In many cases, after FS held responsibility of the banks, their assets (customer accounts, bank branches, etc.) were later sold in full or partial sales to competing retail banks. Previously, FS maintained a passive role in advising banks on their borrowing and lending arrangements. Once the affected banks began default discussions, FS took an active role in all activities of the exposed banks in an effort to provide security to depositors.

Deposits of exposed bank customers were guaranteed by the state, and therefore the bank defaults had a limited effect on personal deposit holdings.[24] However, the default of an entrepreneur's bank may directly affect the entrepreneur's ability to access capital in the form of personal bank loans.

There are a number of reasons why deposit holders could be affected in their ability to borrow. Defaulted banks were likely to be more distressed than others which would directly affect their lending ability. After the default, the bank was controlled by FS, and it is unlikely that they would issue new loans or negotiate existing loans in the immediate term. As the assets were eventually sold to other banks, it seems likely that there may have been a time lag before operations resumed to normal. Finally, a large fraction of customers actively switched to an alternative bank, following their bank's default. In the short term, this could be detrimental to their borrowing ability, as it is well documented that borrower-lender relationships affect credit availability, term rates, and collateral requirements (Petersen and Rajan (1994); Berger and Udell (1998)).

Unfortunately the data do not contain objective measures of borrower-lender relationships in the data. However, I can make inferences about exposure to retail banking defaults by observing the change in retail bank loans held by affected entrepreneurs. To investigate the relationships between disruptions to retail banking and personal borrowing, I define *exposed depositors* as entrepreneurs with a personal deposit account at a retail bank which went on to default following the financial crisis. *Unexposed depositors* are similar entrepreneurs however held an account at a bank which remained solvent. While,

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[23]In the case of the very first bank default of the 2007-9 financial crisis, the assets and responsibilities were actually first transferred to the Danish Nationalbank, and then shortly after transferred to the newly created Finansiel Stabilitet in October 2008.

[24]Depositor insurance in Denmark is provided by The Guarantee Fund for Depositors and Investors and guarantees 100% deposits up to 750,000 DKK (100,000 EUR). Notably relevant for this study, the Danish government decided to provide unlimited guarantees to depositors from October 5, 2008 to September 30, 2010.

demographic and financial characteristics between the two groups are observantly similar, I construct a sample of unexposed entrepreneurs matched to exposed depositors.[25] The nearest neighbor exact matching specification is identical to that of investors, discussed in a previous section. The qualitative difference being that the risk share matching criteria may include a zero-value of wealth invested in risky assets.

Panel B of Figure 5 displays the effect of retail banking disruptions on personal bank loans. Prior to the default exposed and exposed deposit holding entrepreneurs held the same amount of personal loans. As the exposed group experiencing the default, they significantly reduce their consumption of personal loans by approximately 20 percent. This corresponds to approximately 70,600 DKK ($12,800 USD).

If a mechanism other than financing constraints were to drive the results presented thus far, for example a change in risk taking behavior, it would be unlikely that deposit experiences should affect firm closure. Entrepreneurs affected via this channel are, by construction, not exposed to additional financial losses but significantly decrease their borrowing ability.. Figure 6 presents the results of this test. Both Panels A and B show that following the bank defaults, exposed depositors are approximately 1 to 2.5 percentage points more likely to close their firm, compared to a matched sample of entrepreneurs holding deposit accounts at banks which remained solved following the financial crisis. Prior to the bank defaults, the groups of entrepreneurs had indistinguishable rates of firm closure.[26]

6.3 Accounting for differences in credit demand

The analysis thus far has emphasized the effect of changes in credit supply and its affect on firm survival with the implicit assumption that demand for credit remains constant across exposed and unexposed investors and depositors. If investors or depositors that select banks which default are for any reason somehow less financially sophisticated or potentially worse business owners compared to those who select banks which remain solvent, they may also start weaker firms, or demand less credit for smaller or worse performing businesses.

To address this challenge of potential unobservable heterogeneity in credit demand, I rely on the observation that during the aftermath of the financial crisis a number of distressed banks were either acquired by, or merged with, more stable retail banks. The

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[25]Appendix A.6 focuses on the depositor sample of entrepreneurs in 2006 and compares entrepreneurs whose primary retail bank goes on to default during the financial crisis with entrepreneurs whose retail bank remains solvent. Column 4 presents the differences between *exposed* and *unexposed* depositors and the results of an unpaired *t*-test. In terms of observable demographic and financial characteristics exposed and unexposed entrepreneurs appear to be similar.

[26]The full table of regressions are shown in Appendix A.5

banks which were acquired were generally local banking institutions, comparable to the banks which defaulted. In these cases, the continuing or acquiring bank directly took control of the distressed bank without responsibilities or assets being transfered to the FS as part of an unwinding or oversight process. In fact, throughout the aftermath of the financial crisis, the FS enacted measures via its Bank Rescue packages to 'supplement market solutions and private transfers,' to help remove barriers for mergers between banks, so long as at least one of the merging banks remained under increased FS supervision (Rangvid et al. (2013)).

The benefit of this variation is that if unobservable characteristics of firm owners are somehow correlated with selection into potentially weaker banks or into institutions which took ex-ante more risk than banks which remained solvent, it is unlikely that these characteristics differ between deposit account holders at distressed banks which default compared to deposit account holders at distressed banks which were acquired.[27] Distressed banks that resulted in mergers therefore provide an ideal counterfactual group compared to banks which defaulted. The main difference being that merging banks potentially more quickly migrated their customers and assets to a liquid and more stable retail bank. Banks that defaulted, were first transferred to FS for further bank unwinding and supervision. It is likely that these additional frictions may impact available credit supply to small business owners borrowing directly via their personal retail accounts. At the same time, because both groups of banks became distressed at the onset of the financial crisis, deposit customers should be similar in their demand for credit and other unobservable dimensions.

As in previous analyses, I match exposed depositors with up to 5 nearest-neighbor deposit holders whose retail bank is acquired by another bank following the financial crisis. The groups of depositors are matched based on year t_{-1} from the bank default or merger. Again, the matching is based on age, net wealth, gender, marital status, the risky asset share, and municipality of residence. Figure 7 documents the effects of retail bank defaults for deposit holders, relative to the matched sample of entrepreneurs whose bank is acquired once distressed. I note first in Panel B that the effect on debt accumulation is large and significant. Entrepreneurs whose bank defaults relative to one whose bank is acquired, reduce personal credit products by almost 50% over the next four

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[27]An existing literature uses bank merger and acquisition activity following banking law liberalization in the United States as a similar identification strategy. Results suggest that bank-branch closures reduce small business lending (Berger et al. (1998); Nguyen (2014)) and decrease employment (Greenstone et al. (2014)). However, Black and Strahan (2002) find a positive effect of banking consolidation on entrepreneurial activity, arguing that larger bank's diversification strengths may outweigh smaller bank's relationships strengths. Consistent with the results in this study, Strahan and Weston (1998) find that mergers have little effect on small business lending, and if anything the relationship may be positive. Sapienza (2002) uses individual loan contract data on small businesses in Italy and finds that borrowing and lending rates increase after small mergers but decrease after large mergers.

years. In Panel A, I examine the extensive margin. Entrepreneurs whose bank defaults are approximately 3 percentage points more likely to close their firm relative to those whose bank is acquired.

The results of this test show, while controlling for potential differences in credit demand, that personal financing disruptions have a strong effect on firm outcomes for small business owners. Furthermore, by focusing on a subset of the population unexposed to wealth losses, the findings suggest that the main mechanism is via constraints in retail credit supply.

7   Alternative specifications

There are several dimensions of the data that warrant additional analysis prior to making conclusions regarding the effects of financing disruptions on firm survival. In previous linear specifications I estimated the probability of firm closure at calendar-year t, while controlling for the year that the entrepreneur started-up the firm. It may be more reasonable to estimate the survival or hazard rate of entrepreneurial-firm i, conditional on the length of time in years τ that the firm has survived. In this case, the Cox proportional hazard model is a reasonable choice as it allows estimation of the baseline hazard without making any assumptions about it's shape over time.[28] In addition, the hazard class of models are particularly well suited to handle the right-censored nature of entrepreneurial firm survival.

While the identification strategy remains similar, the econometric model changes to the form,

$$\lambda_i(\tau|exposed_i, \mathbf{X}) = \lambda_{i,0}(\tau)\exp\{\boldsymbol{\alpha}_t + \boldsymbol{\rho}_i + \boldsymbol{t}_v + \gamma(exposed_i \times t_{\geq 0}) + \beta'\mathbf{X}_{it} + \epsilon_{it}\}$$

where τ is the length in years entrepreneur i has been the owner of the current firm. The coefficient γ, represents a shift in the baseline hazard, $\lambda_{i,0}(\tau)$, due to bank default exposure affecting the entrepreneur via a change in personal wealth. As in Equation 2, t_v measures the years relative to the bank's default, and the interaction term with $exposed_i$ captures time periods in the post-bank default period. Again, $\mathbf{X}_{it}$ is a vector of control covariates.[29]

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[28] In an unreported table, I estimate the model using a Weibull distribution which allows for duration dependence in the shape parameter ρ, i.e., whether the probability of firm exit is increasing or decreasing as τ increases. The results from the Weibull model suggest a slight positive duration dependence, and the hazard rates and standard errors are comparable to the results using a Cox proportional hazard.

[29] As demonstrated by Ai and Norton (2003) the coefficients of interaction terms in non-linear models do not translate directly to differences-in-differences estimates as in linear models. Instead, in non-linear estimations, differences-in-differences should be evaluated using the full underlying model. To account for this, I compute each coefficient as described based on the conditional probability including all covariates held at their mean

There are two sources of left-censoring that need to be addressed. The first is that I exclude entrepreneurs who began their firm after 1990 and shut down prior to the study period beginning in 2002. This is a trivial exclusion as it occurs by construction. The second is more serious and pertains to entrepreneurs who started their firm prior to 1990 and remain entrepreneurs after 2002 such that they are included in the study period. Because of data limitations if entrepreneurs started their firm before 1990, I will only capture the start year as 1990. To address this source of data censoring I also confirm that the results hold in a subsample limited to entrepreneurs who began their firm after 1990.

I estimate the above empirical model with the sample of exact-matched data on bank investors. The results are presented graphically in Figure 8. The y-axis states the cumulative hazard of firm closure, while the x-axis is the time since the firm was established in years. The lines plot the cumulative hazard for various groups in the sample: the solid line is unexposed investors prior to the matched banking default, while the dashed line is exposed investors during that same time period. I note that these cumulative hazard plots are similar in appearance and are not statistically different. The dotted line is unexposed investors at time $t_{\geq 0}$, i.e., after the banking default, the long-dashed line is exposed investors during the post-default period. From the figure, it is apparent that exposed entrepreneurs in the post-period have significantly higher rates of firm closure. These results from the hazard model specification confirm previous findings using a linear probability model.

8   Conclusion

Much of the previous literature on financing for small businesses has focused on the initial starting conditions of entrepreneurs, liquidity constraints, and the capital structure of the firm. The previous research on how credit market disruptions affect firms focus on larger firms and shocks to commercial and business lending. In contrast, this paper studies how personal financing disruptions experienced directly by the individual entrepreneur can have large causal effects on the survival rate of their businesses during operations. I use detailed administrative data on individual entrepreneurs matched with data on their banking relationships and personal assets to estimate the effects of changes personal financial wealth on firm performance and survival rates. The wave of banking defaults that occurred throughout the Great Recession in Denmark serves as variation between small business owners and their borrowing ability, as well as changes in personal liquid asset positions.

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values as a robustness exercise (unreported) and verify that coefficients and standard errors appear similar.

My results suggest that for established entrepreneurs, shocks to the personal wealth of a small business owner substantially increases the hazard of firm exit, even for wealthy and experienced small business owners. Losses of individual wealth affect intensive margin decisions as well, affected firm owners are more likely to employ fewer individuals after losses in personal wealth. Particularly in times of economic crisis, personal wealth and personal borrowing play a key role in entrepreneurial decision making. In the future, it will be interesting to examine how entrepreneurs are affected by changes in access to *informal* lending, and if changes in assets within the household, or social-networks of entrepreneurs affect their firm's outcomes.

References

Adelino, M., S. Ma, and D. T. Robinson (2014). Firm age, investment opportunities, and job creation. Technical report, National Bureau of Economic Research.

Ai, C. and E. C. Norton (2003). Interaction terms in logit and probit models. *Economics letters 80*(1), 123–129.

Andersen, S., T. Hanspal, and K. M. Nielsen (2016). Once bitten, twice shy: The role of inertia and personal experiences in risk taking. *Working Paper*.

Andersen, S. and K. M. Nielsen (2012). Ability or finances as constraints on entrepreneurship? evidence from survival rates in a natural experiment. *Review of Financial Studies 25*(12), 3684–3710.

Ashcraft, A. B. (2003). Are banks really special? new evidence from the fdic-induced failure of healthy banks. *New Evidence from the FDIC-induced Failure of Healthy Banks (December 2003). FRB of New York Staff Report* (176).

Åstebro, T., H. Herz, R. Nanda, and R. A. Weber (2014). Seeking the roots of entrepreneurship: Insights from behavioral economics. *The Journal of Economic Perspectives 28*(3), 49–69.

Barberis, N. and R. Thaler (2003). A survey of behavioral finance. *Handbook of the Economics of Finance 1*, 1053–1128.

Bayus, B. L. and R. Agarwal (2007). The role of pre-entry experience, entry timing, and product technology strategies in explaining firm survival. *Management Science 53*(12), 1887–1902.

Berger, A. N., A. Saunders, J. M. Scalise, and G. F. Udell (1998). The effects of bank mergers and acquisitions on small business lending. *Journal of financial Economics 50*(2), 187–229.

Berger, A. N. and G. F. Udell (1995). Relationship lending and lines of credit in small firm finance. *Journal of Business*, 351–381.

Berger, A. N. and G. F. Udell (1998). The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle. *Journal of Banking & Finance 22*(6), 613–673.

Bertrand, M., E. Duflo, and S. Mullainathan (2004). How much should we trust differences-in-differences estimates? *The Quarterly Journal of Economics 119*(1), 249–275.

Black, S. E. and P. E. Strahan (2002). Entrepreneurship and bank credit availability. *The Journal of Finance 57*(6), pp. 2807–2833.

Blanchflower, D. G. and A. J. Oswald (1998). What makes an entrepreneur? *To appear in Journal of Labor Economics 16*(1), 26–60.

Brown, J. R., G. Martinsson, and C. J. Thomann (2015). What if firms could borrow more? evidence from a natural experiment.

Brunnermeier, M. K. and S. Nagel (2008). Do wealth fluctuations generate time-varying risk aversion? micro-evidence on individuals. *American Economic Review 98*(3), 713–36.

Buchholst, B. V. and J. Rangvid (2013). Leading indicators of distress in danish banks in the period 2008-12. *Danmarks Nationalbank Working Papers* (85).

Calvet, L. E., J. Y. Campbell, and P. Sodini (2007). Down or out: Assessing the welfare costs of household investment mistakes. *Journal of Political Economy 115*(5), 707–747.

Chiappori, P.-A. and M. Paiella (2011). Relative risk aversion is constant: Evidence from panel data. *Journal of the European Economic Association 9*(6), 1021–1052.

Chodorow-Reich, G. (2014). The employment effects of credit market disruptions: Firm-level evidence from the 2008–9 financial crisis. *The Quarterly Journal of Economics 129*(1), 1–59.

Cooper, A. C., F. J. Gimeno-Gascon, and C. Y. Woo (1994). Initial human and financial capital as predictors of new venture performance. *Journal of business venturing 9*(5), 371–395.

Cowling, M., W. Liu, and A. Ledger (2012). Small business financing in the uk before and during the current financial crisis. *International Small Business Journal 30*(7), 778–800.

Cowling, M., W. Liu, A. Ledger, and N. Zhang (2015). What really happens to small and medium-sized enterprises in a global economic recession? uk evidence on sales and job dynamics. *International Small Business Journal 33*(5), 488–513.

Danish Financial Supervisory Authority (2009). *Rapport om salg af egne aktier, 2009. Report, Copenhagen Denmark.*.

Degryse, H., N. Masschelein, and J. Mitchell (2011). Staying, dropping, or switching: the impacts of bank mergers on small firms. *Review of Financial Studies 24*(4), 1102–1140.

Evans, D. S. and B. Jovanovic (1989, August). An Estimated Model of Entrepreneurial Choice under Liquidity Constraints. *Journal of Political Economy 97*(4), 808–27.

Fairlie, R. W. (2013). Entrepreneurship, economic conditions, and the great recession. *Journal of Economics & Management Strategy 22*(2), 207–231.

Fracassi, C., M. Garmaise, S. Kogan, and G. Natividad (2013). How much does credit matter for entrepreneurial success in the united states? *Working Paper*.

Gan, J. (2007). The real effects of asset market bubbles: Loan-and firm-level evidence of a lending channel. *Review of Financial Studies 20*(6), 1941–1973.

Gentry, W. M. and R. G. Hubbard (2004). Entrepreneurship and household saving. *Advances in Economic Analysis & Policy 4*(1).

Greenstone, M., A. Mas, and H.-L. Nguyen (2014). Do credit market shocks affect the real economy? quasi-experimental evidence from the great recession and'normal'economic times. *NBER Working Paper Series*, 20704.

Holtz-Eakin, D., D. Joulfaian, and H. S. Rosen (1994). Sticking it out: Entrepreneurial survival and liquidity constraints. *Journal of Political Economy*, 53–75.

Hvide, H. K. and J. Møen (2010). Lean and hungry or fat and content? entrepreneurs' wealth and start-up performance. *Management Science 56*(8), 1242–1258.

Iyer, R., J.-L. Peydró, S. da Rocha-Lopes, and A. Schoar (2014). Interbank liquidity crunch and the firm credit crunch: Evidence from the 2007–2009 crisis. *Review of Financial studies*, hht056.

Jensen, T. L. and N. Johannesen (2015). The consumption effects of the 2007-2008 financial crisis: Evidence from household-level data.

Jensen, T. L., S. Leth-Petersen, and R. Nanda (2015). Home equity finance and entrepreneurial performance-evidence from a mortgage reform.

Kaustia, M. (2010). Disposition effect. *Behavioral Finance: Investors, Corporations, and Markets 6*(171), 791–812.

Khwaja, A. I. and A. Mian (2008). Tracing the impact of bank liquidity shocks: Evidence from an emerging market. *The American Economic Review*, 1413–1442.

Koudstaal, M., R. Sloof, and M. Van Praag (2015). Risk, uncertainty, and entrepreneurship: Evidence from a lab-in-the-field experiment. *Management Science*.

Lafontaine, F. and K. Shaw (2016). Serial entrepreneurship: Learning by doing? *Journal of Labor Economics 34*(S2), S217–S254.

Moreira, S. (2016). Firm dynamics, persistent effects of entry conditions, and business cycles. *Mimeo*.

Moskowitz, T. J. and A. Vissing-Jorgensen (2002). The returns to entrepreneurial investment: A private equity premium puzzle? *American Economic Review 92*(4), 745–778.

Nanda, R. (2008, January). Cost of external finance and selection into entrepreneurship. Harvard Business School Working Papers 08-047, Harvard Business School.

Nanda, R. (2011). Entrepreneurship and the discipline of external finance. *Harvard Business School Entrepreneurial Management Working Paper* (11-098).

Nanda, R. and J. B. Sørensen (2010, July). Workplace peers and entrepreneurship. *Management Science 56*(7), 1116–1126.

Nguyen, H.-L. (2014). Do bank branches still matter? the effect of closings on local economic outcomes. Working Paper.

Paravisini, D. (2008). Local bank financial constraints and firm access to external finance. *The Journal of Finance 63*(5), 2161–2193.

Peek, J. and E. S. Rosengren (2000). Collateral damage: Effects of the japanese bank crisis on real activity in the united states. *American Economic Review*, 30–45.

Petersen, M. A. and R. G. Rajan (1994). The benefits of lending relationships: Evidence from small business data. *The journal of finance 49*(1), 3–37.

Rangvid, J., F. Østrup, and P. Møgelvang-Hansen (2013). Den finansielle krise i danmark: Årsager, konsekvenser og læring. Technical report, Erhvervs-og Vækstministeriet.

Reid, G. C. (1991). Staying in business. *International Journal of Industrial Organization 9*(4), 545–556.

Robb, A. M. and D. T. Robinson (2012). The capital structure decisions of new firms. *Review of Financial Studies*, hhs072.

Sapienza, P. (2002). The effects of banking mergers on loan contracts. *The Journal of finance 57*(1), 329–367.

Schnabl, P. (2012). The international transmission of bank liquidity shocks: Evidence from an emerging market. *The Journal of Finance 67*(3), 897–932.

Shane, S. and T. Stuart (2002). Organizational endowments and the performance of university start-ups. *Management science 48*(1), 154–170.

Statistics Denmark (2016). Statbank denmark, business demography. http://statistikbanken.dk/. (july 2016).

Strahan, P. E. and J. P. Weston (1998). Small business lending and the changing structure of the banking industry. *Journal of Banking & Finance 22*(6), 821–845.

Van Praag, M. C. (2003). Business survival and success of young small business owners. *Small Business Economics 21*(1), 1–17.

Zarutskie, R. and T. Yang (2015). How did young firms fare during the great recession? evidence from the kauffman firm survey. In *Measuring Entrepreneurial Businesses: Current Knowledge and Challenges*. University of Chicago Press.

Table 1: Employment choice and descriptive statistics

The following table reports summary statistics for all individuals in the sample in the year 2006. Column 1 includes all individuals, Column 2 includes *self-employed* individuals, Column 3 focuses on *entrepreneurs* who employ at least one other individual, and Column 4 focuses on individuals who are in traditional salaried labor employment or temporarily outside of the labor market. The last column states the differences between salaried individuals and entrepreneurs. *Age* is measured in years for each individual in 2006. *Married* indicates if the individual is married in the year 2006. *Number of children* is the total number of children of any age currently living in the same household. *College education* is an indicator variable taking the value of one if an individual has a high school and university education. *Total income* measures the income received by the individual from all sources, while *financial wealth* is the sum of bank deposits, stocks, and bonds at year-end 2006 market values, and *bank deposits* is year-end personal bank savings. *Positive housing assets* indicates if an individual owns real estate (market value greater than 500,000 DKK). *Total value of property* is the sum of current value debt and equity of all housing investments and *Mortgage value* is the year-end value of outstanding mortgage debt. *Mortgage loan to value* is the ratio of outstanding mortgage debt to total housing assets. *Value of debt* is the total outstanding value of debts. *Bank loans* is the value of retail banking loans. All amounts are in thousands at the year-end 2006 and deflated to year-2010 DKK. All variables are presented at the individual level unless otherwise indicated. Standard deviations are in parentheses and t-statistics are reported in brackets. ***, **, and * indicate significant at the 1, 5, and 10 percent levels, respectively.

| | Full sample | | | | |
	All (1)	Self-employ (2)	Entrepreneurs (3)	Salaried (4)	Differences (3) - (4)
Age	42.08	42.48	45.03	41.94	3.09***
	(10.04)	(10.77)	(8.86)	(9.88)	[52.35]
Male	0.51	0.48	0.78	0.52	0.26***
	(0.50)	(0.50)	(0.41)	(0.50)	[88.25]
Married	0.58	0.54	0.72	0.58	0.13***
	(0.49)	(0.50)	(0.45)	(0.49)	[45.00]
Number of children	0.86	0.81	1.10	0.87	0.23***
	(1.06)	(1.11)	(1.18)	(1.04)	[37.29]
College education	0.23	0.17	0.09	0.25	-0.16***
	(0.42)	(0.38)	(0.29)	(0.43)	[-61.91]
Total income	355.88	276.64	695.83	368.74	327.09***
	(611.21)	(1253.18)	(1752.79)	(249.31)	[168.51]
Financial wealth	149.31	156.47	434.84	143.55	291.29***
	(331.88)	(416.40)	(770.14)	(296.10)	[158.07]
Value of bank deposits	87.19	88.82	253.90	84.40	169.50***
	(171.05)	(212.04)	(413.88)	(152.48)	[177.90]
Positive housing assets	0.52	0.39	0.79	0.54	0.25***
	(0.50)	(0.49)	(0.41)	(0.50)	[82.89]
Total value of property	777.44	776.34	3233.45	741.97	2491.48***
	(1253.33)	(1860.75)	(4502.98)	(885.87)	[403.79]
Mortgage value	459.85	445.54	2058.75	439.81	1618.94***
	(786.69)	(1166.76)	(3049.70)	(536.81)	[418.97]
Mortgage loan to value	0.65	0.63	0.73	0.66	0.07***
	(1.11)	(0.76)	(0.81)	(1.16)	[9.63]
Total value of debt	644.41	666.80	3199.55	602.21	2597.34***
	(1008.86)	(1536.87)	(4044.71)	(629.13)	[549.45]
Bank loans	169.61	198.03	996.85	151.19	845.66***
	(318.66)	(445.62)	(1173.64)	(225.19)	[535.43]
Observations	2,416,433	438,143	28,359	1,949,931	-

Table 2: Descriptive statistics of entrepreneurs

The following table reports summary statistics for all individuals in the sample in the year 2006. Column 1 presents all *entrepreneurs* in the sample, Column 2 focuses on all entrepreneurs who hold a positive amount of retail banking investments in 2006. Column 3 focuses on *unexposed entrepreneurs* who hold investments in retail banks in 2006 which did not default in the following financial crisis. Column 4 is comprised of *exposed entrepreneurs* who hold investments in retail banking institutions in 2006 which goes on to subsequently default in 2008-2012. The last column presents the differences between exposed and unexposed entrepreneurs. *Age* is measured in years for each individual in 2006. *Married* indicates if the individual is married in the year 2006. *Number of children* is the total number of children of any age currently living in the same household. *College education* is an indicator variable taking the value of one if an individual has a high school and university education. *Total income* measures the income received by the individual from all sources, while *financial wealth* is the sum of bank deposits, stocks, and bonds at year-end 2006 market values, and *bank deposits* is year-end personal bank savings. *Positive housing assets* indicates if an individual owns real estate (market value greater than 500,000 DKK). *Total value of property* is the sum of current value debt and equity of all housing investments and *Mortgage value* is the year-end value of outstanding mortgage debt. *Mortgage loan to value* is the ratio of outstanding mortgage debt to total housing assets. *Value of debt* is the total outstanding value of debts. *Bank loans* is the value of retail banking loans. Bank loans and Total debt are winsorized at the 99th percentile. All amounts are in thousands at the year-end 2006 and deflated to year-2010 DKK. All variables are presented at the individual level unless otherwise indicated. Standard deviations are in parentheses and t-statistics are reported in brackets. ***, **, and * indicate significant at the 1, 5, and 10 percent levels, respectively.

| | Entrepreneurs | | | | |
	All (1)	Bank investors (2)	Unexposed (3)	Exposed (4)	Differences (3) - (4)
Age	45.03	46.97	46.95	47.08	0.13
	(8.86)	(8.61)	(8.59)	(8.73)	[0.44]
Male	0.78	0.83	0.83	0.85	0.02*
	(0.41)	(0.37)	(0.37)	(0.36)	[1.69]
Married	0.72	0.75	0.75	0.73	-0.02
	(0.45)	(0.43)	(0.43)	(0.44)	[-1.05]
Number of children	1.10	1.05	1.06	0.96	-0.11***
	(1.18)	(1.19)	(1.20)	(1.14)	[-2.79]
College education	0.09	0.09	0.09	0.10	0.01
	(0.29)	(0.29)	(0.29)	(0.30)	[0.70]
Total income	695.83	902.91	877.82	1049.39	171.56
	(1752.79)	(3223.54)	(1448.59)	(7670.08)	[0.73]
Financial wealth	434.84	742.02	749.08	700.80	-48.28
	(770.14)	(1001.04)	(1007.25)	(963.40)	[-1.50]
Value of bank deposits	253.90	339.38	342.21	322.81	-19.40
	(413.88)	(489.02)	(492.14)	(470.27)	[-1.23]
Positive housing assets	0.79	0.86	0.86	0.86	-0.00
	(0.41)	(0.35)	(0.35)	(0.35)	[-0.05]
Total value of property	3233.45	4838.92	4858.65	4723.73	-134.91
	(4502.98)	(5467.39)	(5485.19)	(5363.38)	[-0.76]
Mortgage value	2058.75	2970.01	2986.48	2873.86	-112.63
	(3049.70)	(3720.66)	(3737.89)	(3618.65)	[-0.93]
Mortgage loan to value	0.73	0.68	0.69	0.66	-0.03
	(0.81)	(1.00)	(1.06)	(0.50)	[-1.17]
Total value of debt	3199.55	4441.29	4465.57	4299.55	-166.02
	(4044.71)	(4888.31)	(4911.93)	(4747.80)	[-1.05]
Bank loans	996.85	1268.98	1275.31	1232.01	-43.30
	(1173.64)	(1371.76)	(1374.88)	(1353.47)	[-0.96]
Observations	28,359	7,276	6,212	1,064	-

Table 3: Portfolio characteristics of entrepreneurs

The following table reports portfolio characteristics for entrepreneurs in the sample in the year 2006. In Panel A, Column 1 focuses on *unexposed entrepreneurs* who hold investments in retail banks in 2006 which did not default in the following financial crisis. Column 2 is comprised of *exposed entrepreneurs* who hold investments in retail banking institutions in 2006 which goes on to subsequently default in 2008-2012. The last column presents the differences between exposed and unexposed entrepreneurs. *Value of stock holdings* is the market value of year-end stock holdings outside of pension contributions. *Risk share* is the fraction of liquid assets held in stock investments and *Unique stocks in portfolio* is the number of unique assets in the stock market portfolio including mutual funds. *Beta* is the beta coefficient of the entrepreneur's portfolio from a single factor capital asset pricing model (CAPM) using monthly returns from 10 years of data (1997-2006) and the MSCI World All-Market index as a benchmark. The *Sharpe ratio* is the portfolio's return relative to its standard deviation. The *idiosyncratic risk* of the portfolio is the measured risk of the portfolio aside from the market component. Standard deviations are in parentheses and t-statistics are reported in brackets. ***, **, and * indicate significant at the 1, 5, and 10 percent levels, respectively.

| | Entrepreneurs | | |
	Unexposed (1)	Exposed (2)	Differences (2) - (1)
Value of stocks	609.27	467.37	-141.90
	(7319.73)	(1904.85)	[-1.29]
Risk share	0.42	0.45	0.03***
	(0.34)	(0.35)	[2.64]
Unique stocks in portfolio	2.66	2.59	-0.06
	(3.73)	(3.72)	[-0.51]
Beta	0.74	0.63	-0.11***
	(0.70)	(0.69)	[-4.70]
Sharpe ratio	0.80	0.88	0.08***
	(0.28)	(0.35)	[6.81]
Idiosyncratic risk	7.94	8.21	0.27
	(11.35)	(10.39)	[0.77]
Observations	6,212	1,064	-

Table 4: The effect of personal financing disruptions on entrepreneurship

The following table analyzes the effect of a change in personal financial wealth on the propensity to exit entrepreneurship stemming from Equation (1). Each column of the table represents the various reasons for the exit from the firm. Column 1 includes any observed departure from the entrepreneurship from the previous period. Column 2 specifies that the firm was closed down by the owner. Column 3 specifies that the firm was closed due to the result of a merger. Column 4 specifies that the firm remained open, however was downsized to a single owner-employee. Finally Column 5 specifies that the entrepreneur closed down the firm and moved to an established firm as an employee. The variable *exposed investor* indicates whether the entrepreneur held stock investments in a default bank and incurred *above median* financial losses. The variable takes the value of one if year t is after the bank default year and zero if otherwise. In all columns the specifications include individual-entrepreneur fixed effects and the following time-varying demographic controls: *log wealth, log income,* and if the entrepreneur has a *child* or purchases a *house* at time t. Regression coefficients are estimated with OLS. ***, **, and * indicate significant at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at the pre-crisis primary bank level are in parenthesis.

	Any exit	Firm closure	Merger	Downsize	Labor market
Outcome	(1)	(2)	(3)	(4)	(5)
Exposed investor	0.061**	0.031***	-0.000	-0.003	0.010**
	(0.024)	(0.009)	(0.002)	(0.004)	(0.005)
Control variables	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes	Yes
R^2	0.43	0.49	0.46	0.46	0.40
Observations	64,111	64,111	64,111	64,111	64,111

Table 5: The effect of personal financing disruptions on employment decisions

The following table analyzes the effect of a change in personal financial wealth on employment decisions of the entrepreneur's firm. Conditional on a firm owner remaining in business, Columns 1-3 analyze various outcomes for full-time employees, while Columns 4-6 focus on part-time employees. Columns 1 and 4 specify the number of employees, Columns 2 and 5 specify the average number of working days per year, and Columns 3 and 6 specify the average log. of wages for employees. The variable *exposed investor* indicates whether the entrepreneur held stock investments in a default bank and incurred *above median* financial losses. The variable takes the value of one if year t is after the bank default year and zero if otherwise. In all columns the specifications include individual-entrepreneur fixed effects and the following time-varying demographic controls: *log wealth, log income,* and if the entrepreneur has a *child* or purchases a *house* at time t. Regression coefficients are estimated with OLS. ***, **, and * indicate significant at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at the pre-crisis primary bank level are in parenthesis.

s	Full-time employees			Part-time employees		
	Employees	Working days	Log. wages	Employees	Working days	Log. wages
	(1)	(2)	(3)	(4)	(5)	(6)
Exposed investor	-0.15**	-9.66**	-0.10***	0.30	10.78	0.00
	(0.06)	(4.75)	(0.03)	(0.37)	(12.49)	(0.06)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.85	0.56	0.79	0.68	0.65	0.50
Observations	63,422	59,920	62,304	48,212	42,057	45,187

Table 6: Personal financing disruptions and heterogeneity in experience

The following table analyzes the effect of a change in personal financial wealth on the propensity to exit entrepreneurship stemming from Equation (1). Columns 1 and 2 includes any observed departure from the entrepreneurship from the previous period, while Columns 3 and 4 specifies that the firm was closed down by the owner. The variable *exposed investor* indicates whether the entrepreneur held stock investments in a default bank and incurred *above median* financial losses. The variable takes the value of one if year t is after the bank default year and zero if otherwise. Columns 1 and 3 focus on the a sample of established entrepreneurs with a high level of experience. Established entrepreneurs began their firm at any time prior to 2002, while in Columns 2 and 4 the sample consists of new entrepreneurs who started their first venture in the years prior to the financial crisis, 2002-2007. All specifications include individual-entrepreneur fixed effects and the following time-varying demographic controls: *log wealth, log income,* and if the entrepreneur has a *child* or purchases a *house* at time t. Regression coefficients are estimated with OLS. ***, **, and * indicate significant at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at the pre-crisis primary bank level are in parenthesis.

	Any exit		Firm closure	
Experience	High	Low	High	Low
	(1)	(2)	(3)	(4)
Exposed investor	0.057*	0.078**	0.019*	0.076***
	(0.032)	(0.030)	(0.011)	(0.018)
Control variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes
R^2	0.40	0.47	0.41	0.60
Observations	50,740	12,122	50,740	12,122

Table 7: Personal financing disruptions and heterogeneity in wealth and debt

The following table analyzes the effect of a change in personal financial wealth on the propensity to exit entrepreneurship stemming from Equation (1). All columns specify that the firm was closed down by the owner. The variable *exposed investor* indicates whether the entrepreneur held stock investments in a default bank and incurred *above median* financial losses. The variable takes the value of one if year t is after the bank default year and zero if otherwise. The sample is divided into terciles such that Column 1 (2) (3) includes the bottom (middle) (top) third of the distribution. Panel A specifies this for *net wealth* while Panel B specifies this for *debt to assets ratio*. All specifications include individual-entrepreneur fixed effects and the following time-varying demographic controls: *log wealth, log income,* and if the entrepreneur has a *child* or purchases a *house* at time t. Regression coefficients are estimated with OLS. ***, **, and * indicate significant at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at the pre-crisis primary bank level are in parenthesis.

	Firm closure		
Net wealth	Low	Med	High
	(1)	(2)	(3)
Exposed investor	0.039***	0.049**	-0.009***
	(0.009)	(0.022)	(0.002)
Controls, Year FE, Individual FE	Yes	Yes	Yes
R^2	0.38	0.38	0.40
Observations	18,864	18,495	18,867

Debt to assets ratio	Low	Med	High
	(1)	(2)	(3)
Exposed investor	-0.012***	0.040**	0.046***
	(0.002)	(0.018)	(0.010)
Controls, Year FE, Individual FE	Yes	Yes	Yes
R^2	0.43	0.36	0.37
Observations	18,223	19,210	18,791

Table 8: Understanding the mechanism between disruptions and firm closure

The following table analyzes the effect of a change in personal financial wealth on various financial outcomes of the entrepreneur stemming from Equation (1). Column 1 investigates the change in the logarithm of financial wealth, Column 2 is the change in the logarithm of net wealth, while Column 3 is the change in the logarithm of total income. Column 4 investigates the change in the share of wealth in risky assets, conditional on holding risky investments. Column 5 focuses on total debt while Column 6 focuses on personal retail banking loans. The variable *exposed investor* indicates whether the entrepreneur held stock investments in a default bank and incurred *above median* financial losses. The variable takes the value of one if year t is after the bank default year and zero if otherwise. In all columns the specifications include individual-entrepreneur fixed effects and the following time-varying demographic controls: *log wealth, log income,* and if the entrepreneur has a *child* or purchases a *house* at time t. Regression coefficients are estimated with OLS. ***, **, and * indicate significant at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at the pre-crisis primary bank level are in parenthesis.

Outcome	Financial wealth (1)	Net wealth (2)	Income (3)	Risk share (4)	Debt (5)	Bank loans (6)
Exposed investor	-0.388**	0.057	-0.068	-0.024	297.608	-58.554
	(0.159)	(0.156)	(0.063)	(0.020)	(547.038)	(90.211)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.71	0.76	0.46	0.58	0.90	0.77
Observations	91,106	91,106	91,106	84,412	91,106	91,106

Figure 1: Locations of local banks and incidence of bank defaults in Denmark

This map shows the location of publicly trading retail banks and incidences of bank defaults across municipalities in Denmark from 2006 to 2013 based on bank headquarters. Municipalities with a surviving publicly listed bank are displayed in dark gray. Municipalities in which a troubled bank was involved in a merger or acquisition after the financial crisis are shown in light red. Municipalities in which a publicly traded retail bank defaulted between 2008 and 2012 are displayed in dark red. The two municipalities in which a bank defaulted that was not publicly traded are shown in maroon. Finally, municipalities without a publicly listed retail bank are shown in light gray.
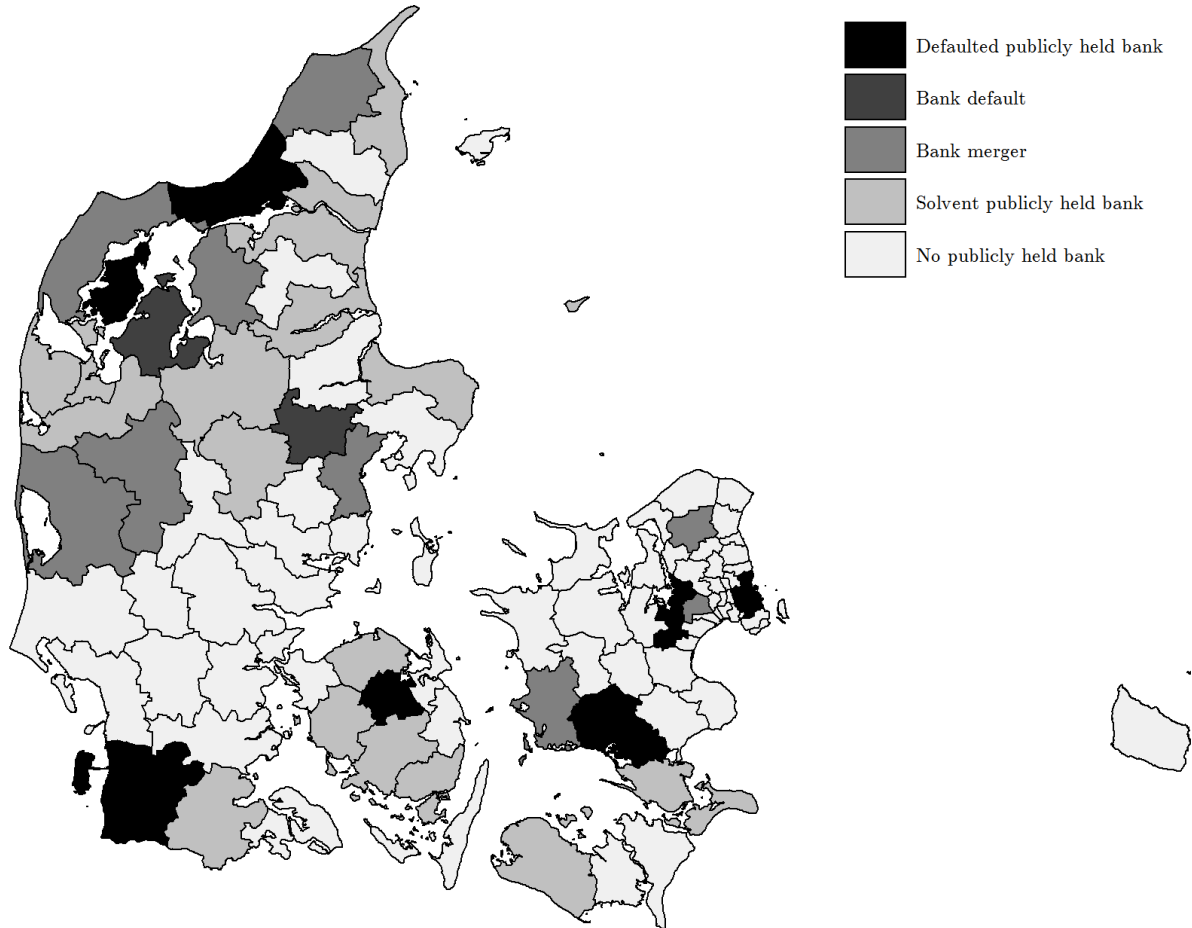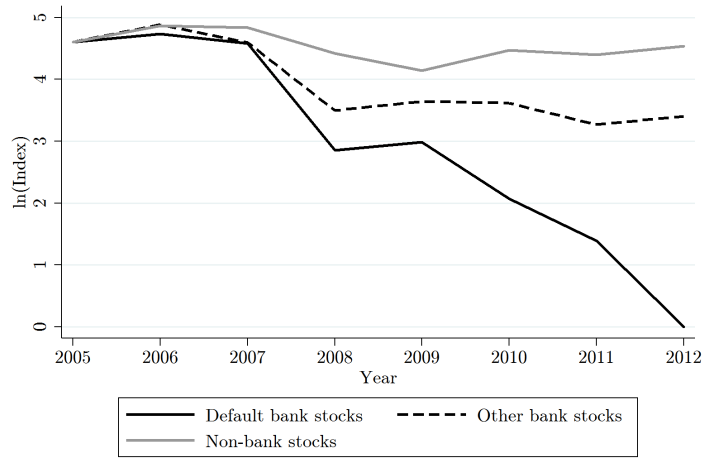
Figure 2: Investment returns

The figure in Panel A plots an index of market returns for investors in the sample using micro-data on year-end portfolio holdings at the individual asset level. The solid dark line plots of an index of returns for retail bank stocks which go on to default throughout the financial crisis. The dashed line plots the index for bank stocks which remain solvent and do not default during the crisis, the solid gray line plots a portfolio of all other stocks. The portfolio is indexed to year 2006. In Panel B, the figure plots the distribution of monthly returns for Danish retail bank stocks between January 1st, 2005 and December 1st, 2007. The dashed line plots the the distribution for monthly returns for a market capitalization-weighted portfolio of retail bank stocks which remain solvent following the financial crisis while the solid line plots a portfolio of retail bank stocks which default between 2008-2012. The vertical lines provide the mean return for each distribution. A Kolmogorov-Smirnov test (at right) is performed to test if the two distributions statistically differ

Panel A:

Panel B:

Solid line: Solvent mean return = .017 (σ = .076,σ^2 = .006)
Dashed line: Default mean return = .02 (σ = .079,σ^2 = .006)
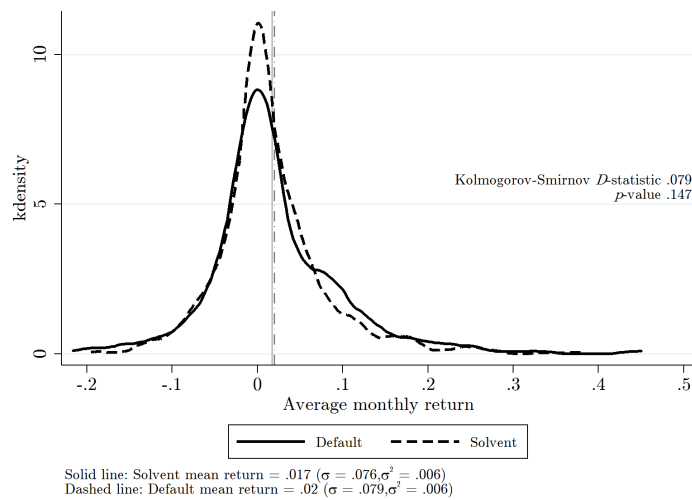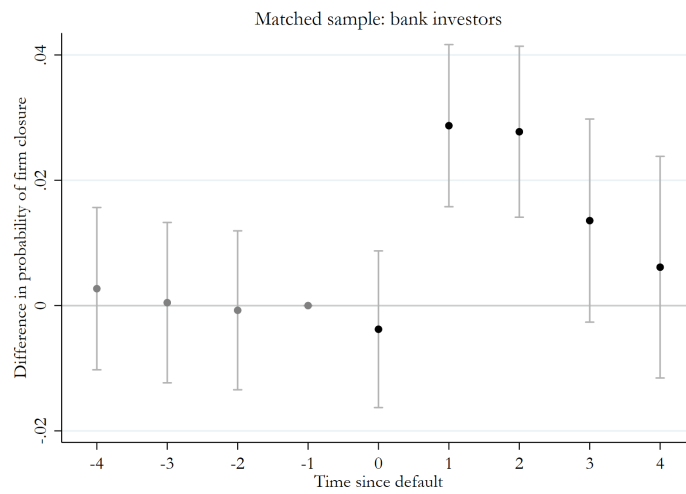
39

Figure 3: Probability of firm closure around personal financing disruptions

The following figures present event study plots of the effect of personal financing disruptions on firm closure using an exact-matched sample. Up to 5 nearest-neighbor unexposed investors in year t_{-1} from the bank default are matched to each exposed investor. The matching is based on five-year age cohorts, twenty-vigintiles of net wealth, five-percentage point bins of the share of wealth in risky assets, gender, marital status, and municipality of residence. Panel B includes all of these matching characteristics, while Panel A omits the risky asset share. The model is specified in Equation (2). The scatter points display coefficient of the interaction term between *exposed investor* entrepreneurs and year from bank default-indicators, therefore providing differences-in-differences estimates. The y-axis states the difference in probability of firm closure in percentage points. The x-axis is the time since default in years. 90% Confidence intervals are shown.

Panel A:

Panel B:

Figure 4: Heterogeneity in financial wealth losses

The following figures plots Equation 3. The y-axis states the probability of various types of firm closure in percentage points and the x-axis plots the fraction of liquid wealth lost from an investment in a default bank for *exposed* entrepreneurs after the banking defaults. *Any exit* from entrepreneurship is shown in diamonds, *firm closure* (dots), and *exit to the labor market* (square). 90% confidence intervals are shown.

Figure 5: Understanding the mechanism

The following figures present event study plots of the effect of personal financing disruptions on other financial outcomes using an exact-matched sample. In Panel A the sample features bank investors while in Panel B the sample consists of bank depositors. The outcome variable in Panel A is the log. of financial wealth, while in Panel B it is the log. of personal bank loans. Up to 5 nearest-neighbor unexposed investors (depositors) in year t_{-1} from the bank default are matched to each exposed investor (depositor). The matching is based on five-year age cohorts, twenty-vigintiles of net wealth, five-percentage point bins of the share of wealth in risky assets, gender, marital status, and municipality of residence. The model is specified in Equation (2). The scatter points display coefficient of the interaction term between *exposed investor (depositor)* entrepreneurs and year from bank default-indicators, therefore providing differences-in-differences estimates. The y-axis states the difference in the log. of financial wealth and the log. of personal bank loans in Panel A and B, respectively. The x-axis is the time since default in years. 90% Confidence intervals are shown.

Panel A:

Panel B:
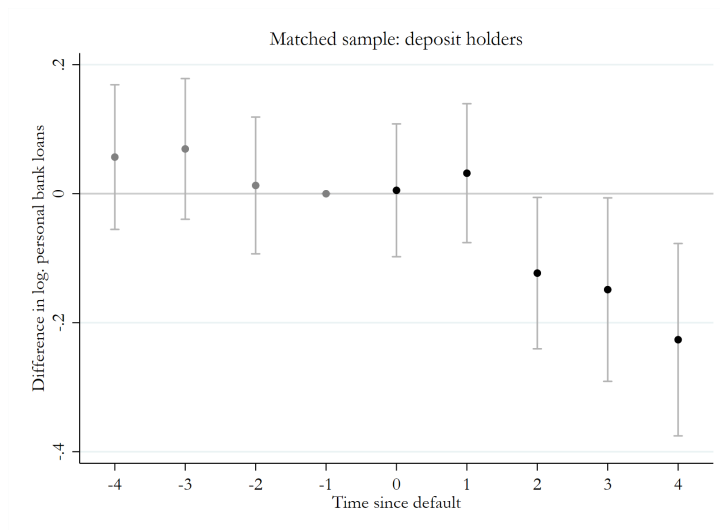
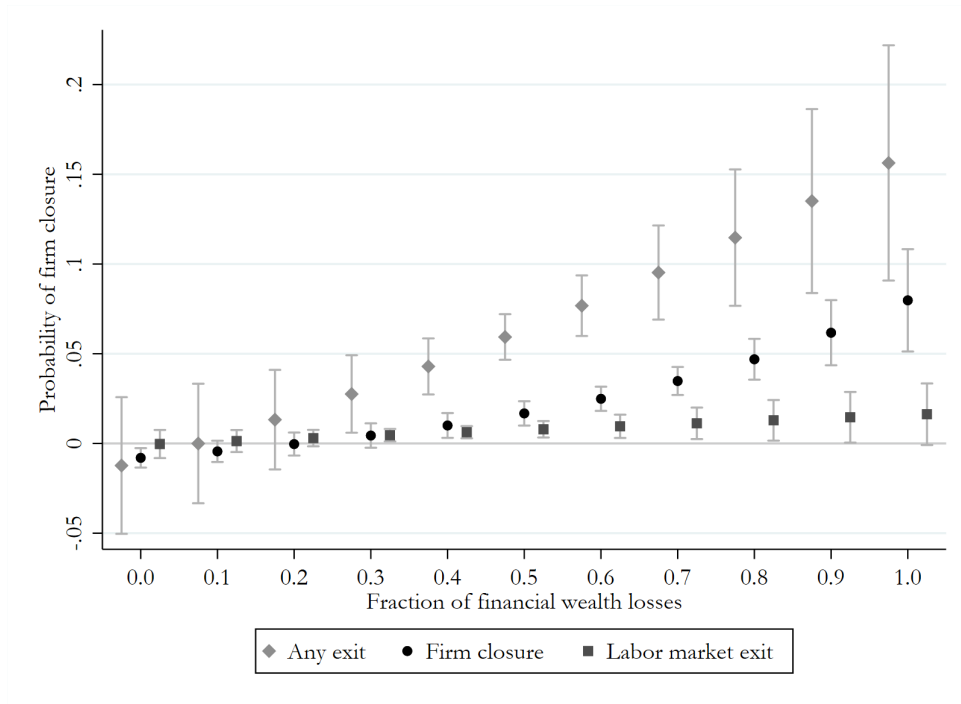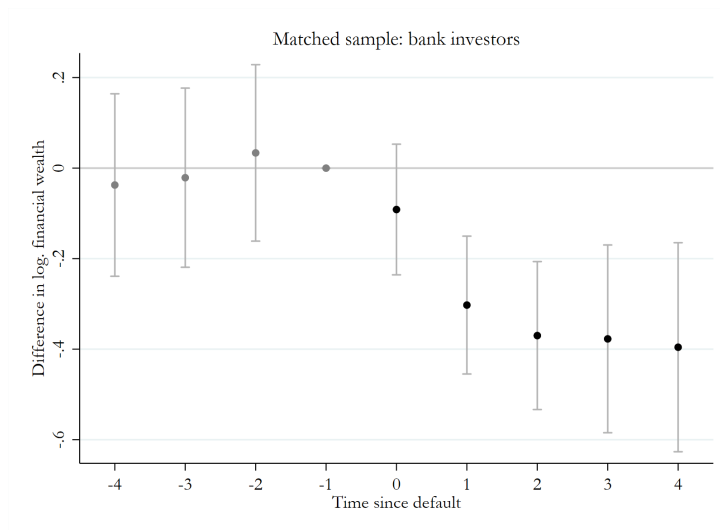**Figure 6: Probability of firm closure around personal financing disruptions for deposit holders**

The following figures present event study plots of the effect of personal financing disruptions on firm closure using an exact-matched sample. Up to 5 nearest-neighbor unexposed depositors in year t_{-1} from the bank default are matched to each exposed depositor. The matching is based on five-year age cohorts, twenty-vigintiles of net wealth, five-percentage point bins of the share of wealth in risky assets, gender, marital status, and municipality of residence. Panel B includes all of these matching characteristics, while Panel A omits the risky asset share. The model is specified in Equation (2). The scatter points display coefficient of the interaction term between *exposed depositor* entrepreneurs and year from bank default-indicators, therefore providing differences-in-differences estimates. The y-axis states the difference in probability of firm closure in percentage points. The x-axis is the time since default in years. 90% Confidence intervals are shown.

Panel A:

Panel B:

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Figure 7: The effect of personal financing disruptions: Evidence from mergers

The following figures present event study plots of the effect of personal financing disruptions on firm closure and financial outcomes using an exact-matched sample. Up to 5 nearest-neighbor depositors exposed to their own retail bank merging with another retail bank are matched to each exposed depositor in year t_{-1} from the bank default. The matching is based on five-year age cohorts, twenty-vigintiles of net wealth, five-percentage point bins of the share of wealth in risky assets, gender, marital status, and municipality of residence. The dependent variable in Panel A is firm closure, while Panel B it is the log. of personal bank loans. The model is specified in Equation (2). The scatter points display coefficient of the interaction term between *exposed depositor* entrepreneurs and year from bank default-indicators, therefore providing differences-in-differences estimates. The y-axis states the difference in probability of firm closure in percentage points and the log. of personal bank loans in Panels A and B, respectively. The x-axis is the time since default in years. 90% Confidence intervals are shown.
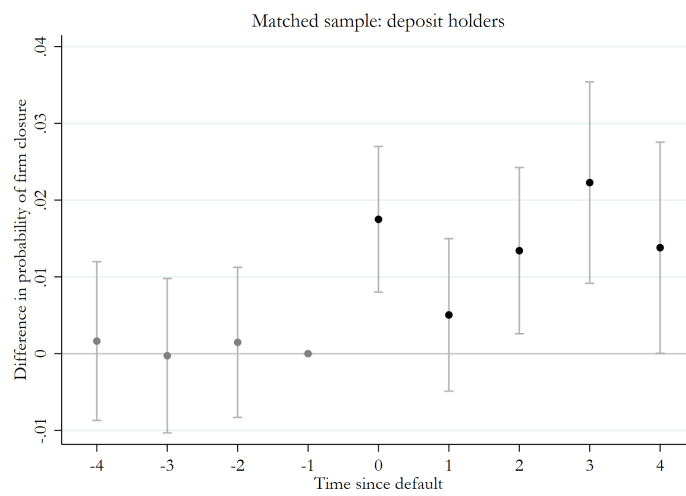
Panel A:

Panel B:

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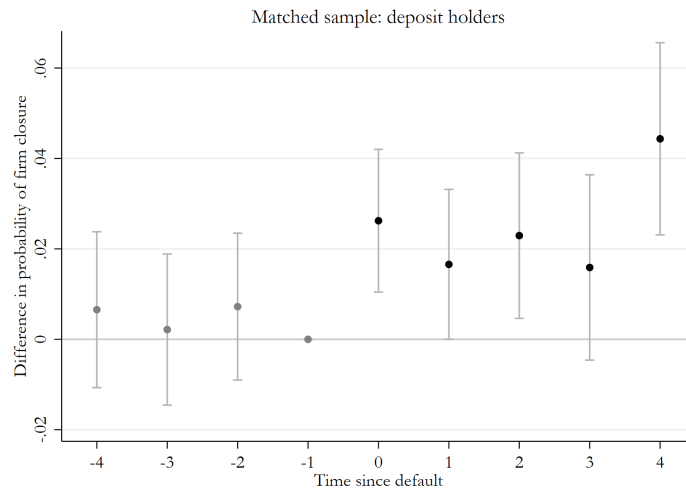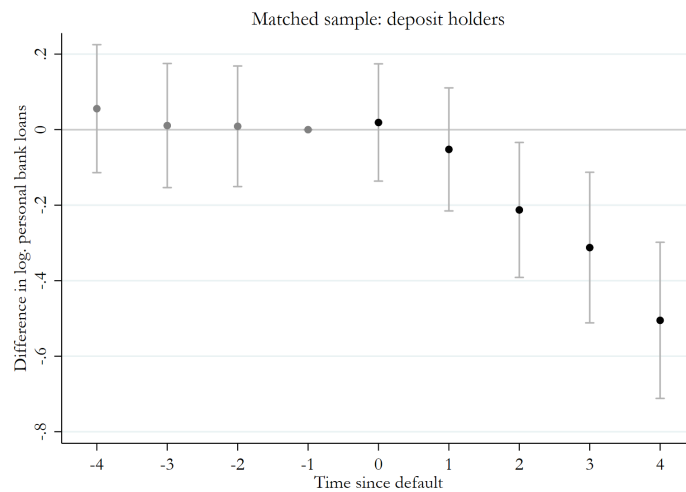
Figure 8: Hazard model specification

The figure below presents the effect of personal financing disruptions on firm closure using an exact-matched sample and Cox proportional hazard model. Up to 5 nearest-neighbor depositors exposed to their own retail bank merging with another retail bank are matched to each exposed depositor in year t_{-1} from the bank default. The matching is based on five-year age cohorts, twenty-vigintiles of net wealth, five-percentage point bins of the share of wealth in risky assets, gender, marital status, and municipality of residence. The dependent variable is firm closure. The model is specified in Equation (4). The y-axis states the cumulative hazard of firm closure. The x-axis is the time since the firm was established in years. The lines plot the cumulative hazard for various groups in the sample: The solid line is unexposed investors prior to the matched banking default, while the dashed line is exposed investors during that same time period. The dotted line is unexposed investors at time $t_{\geq 0}$, i.e., after the banking default, the long-dashed line is exposed investors during the post-default period.

Matched sample: bank investors

Legend:
— Unexposed * $t_{\leq 0}$
- - - Exposed * $t_{\leq 0}$
.... Unexposed * $t_{> 0}$
— · — · Exposed * $t_{> 0}$

Table A.1: Retail bank defaults and mergers throughout the Great Recession

The following table outlines the Danish retail banks that faced liquidity challenges after the onset of the 2007-2009 financial crisis. Each of the following troubled banks either defaulted and were taken over by the state-owned *Finansiel Stabilitet*, or found a private solution (e.g. merger or acquisition). If the bank merged or was acquired the table states the overtaking or surviving retail bank. The municipality and whether the bank was publicly held by investors is also indicated below. Data comes Buchholst and Rangvid (2013) as well as the author's own research.
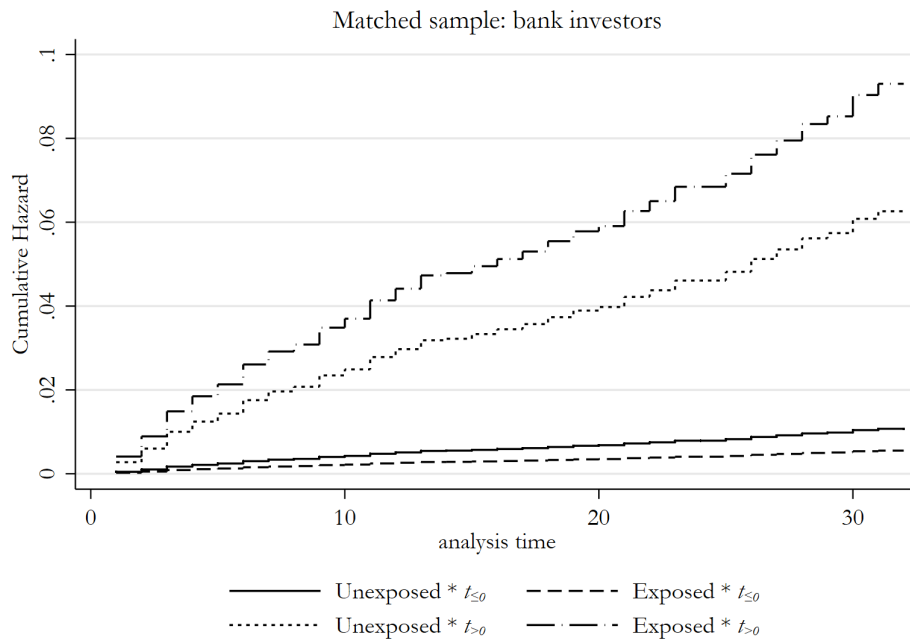
Year	Troubled bank	Outcome	Publicly held	Municipality	Surviving bank
2008	BankTrelleborg	Merged	No	Slagelse	Sydbank
2008	Roskilde	Defaulted	Yes	Roskilde	NA
2008	Bonusbanken	Merged	No	Herning	Vestjysk Bank
2008	Sparekassen Spar Mors	Merged	No	Morso	Morso Bank
2008	EBH Bank	Defaulted	Yes	Jammerbugt	NA
2008	Localbanken I Nordsaelland	Merged	No	Hillerd	Handelsbanken
2008	Forstaedernes Bank	Merged	No	Taastrup	Nykredit
2008	Ringkjobing Bank	Merged	No	Skjern	Vestjysk Bank
2009	Lokken Sparekasse	Defaulted	No	Hjrring	NA
2009	Gudme Raachou	Defaulted	No	Kobenhavn	NA
2009	Fionia Bank	Defaulted	Yes	Odensee	NA
2010	Capinordic	Defaulted	Yes	Gentofte	NA
2010	Finansbank	Merged	No	NA	Sparekassen Lolland
2010	EIK Banki	Defaulted	No	Farroe Islands	NA
2010	Skaelsor Bank	Merged	No	Slagelse	Max Bank
2011	Amagaerbanken	Defaulted	Yes	Kobenhavn S	NA
2011	Sparekassen Midtfjord	Merged	No	Vesthimmerland	Sparekassen Himmerland
2011	Fjordbank Mors	Defaulted	Yes	Morso	NA
2011	Max Bank	Defaulted	Yes	Naestved	NA
2011	Sparekassen Limfjorden	Merged	No	Thisted	Sparekassen Vendsyssel
2012	Sparekassen Farso	Merged	No	Vesthimmerland	Den Jyske Sparekassen
2012	Sparekassen Ostjylland	Defaulted	No	Favrskov	NA
2012	Aarhus Lokalbank	Merged	No	Aarhus	Vestjysk Bank
2012	Spar Salling Sparekasse	Defaulted	No	Skive	NA
2012	Tonder Bank	Defaulted	Yes	Tonder	NA

Table A.2: Entrepreneurship and small business owners

Panel A presents the rates of entrepreneurship across the years in the sample. Panel B provides statistics on the number of employees employed by entrepreneurs across the years in the sample. Percentiles are composed of the 5 closest observations due to regulations about data security.

Panel A: Number of entrepreneurs

	2005	2006	2007	2008	2009	2010	2011	2012	Total
All individuals	2,408,796	2,416,433	2,414,443	2,408,374	2,400,904	2,391,936	2383184	2,368,949	19,193,019
Entrepreneurs	29,553	28,653	27,568	27,012	24,545	23,488	23,381	22,626	206,826
Entrepreneur bank investors	7,962	7,361	6,840	6,394	5,720	5,448	5,279	4,976	49,980

Panel B: Number of employees

	2005	2006	2007	2008	2009	2010	2011	2012	Total
Mean	5.4	5.4	5.5	5.3	5.2	5.1	5.2	5.2	5.3
p10	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
p50	4.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0	3.5
p90	11.0	11.0	11.0	10.0	10.0	10.0	10.0	10.0	10.4

Table A.3: Investments and losses from banking defaults

The following table provides a tabulation of the distribution of losses for *exposed* and *unexposed* bank investors. All investors included held investments in publicly traded retail banks. *exposed* investors held stocks of retail banks which defaulted, while *unexposed* investors held stocks which remained solvent. I present the mean, 10th, 50th, and 90th percentiles of total losses, losses as a percentage of savings in 2006, as a percentage of liquid wealth in 2006, and as a percentage of net wealth. Columns 1-4 compare the values of exposed investors to columns 5-8 of unexposed investors. Percentiles are composed of the 5 closest observations due to regulations about data security.

Size of liquidity shock	Exposed				Unexposed			
	Mean	p25	p50	p75	Mean	p25	p50	p75
Losses (1,000 DKK)	-343.85	-78.68	-25.76	-11.45	-49.73	-43.91	-18.16	-6.44
Percentage of savings (%)	-30.27	-50.69	-12.50	-3.19	-20.10	-22.95	-6.09	-1.56
Percentage of liquid wealth (%)	-21.40	-30.72	-9.14	-2.73	-13.19	-15.85	-4.70	-1.25
Percentage of net wealth (%)	-30.92	-100.00	-5.26	-1.01	-24.40	-22.87	-2.35	-0.49

Table A.4: Bank characteristics

The following table provides bank-level information about deposit customers by different segments of retail banks in Denmark. The columns of Panel A divide all retail banks in the sample by the large, local, and default designation used in Table **??**. In Panel B banks are distinguished by the size classification introduced by the National Bank of Denmark and *Finansiel Stabilitet*. Group 1 (Column 1) includes banks which hold over 50 billion Danish krone in assets (Column 1), Group 2 (Column 2) includes banks which hold between 10 and 50 billion Danish krone in assets, Group 3 (Column 3) includes banks which hold between 250 million and 49 billion Danish krone in assets, and Column 4 includes all Danish banks with assets less than 250 million Danish krone. The rows contain information on the *average number of depositors*, the *share of entrepreneurs* and *self-employed* individuals in each bank. The *average deposit balance* and *average loan balance* (all sources of personal bank debt, excluding mortgages) in 1000 DKK of depositors per bank, as well as the *market share of depositors* captured by the classification type of the bank. In Panel B the *number of default banks* simply tallies up the number of banks that defaulted by group classification.

Panel A: Bank type

| | Bank type | | |
	Large bank (1)	Local bank (2)	Default bank (3)
Average number of depositors	200,581	4,009	6,093
Share of entrepreneurs (%)	1.85	2.36	2.58
Share of self-employed (%)	3.71	4.10	4.53
Average deposit balance	100.21	87.55	95.81
Average loan balance	219.46	201.60	252.89
Market share of depositors (%)	61.02	26.34	4.08
Observations	5	108	12

Panel B: FS grouping

| | Bank type | | | |
	FS Group 1 (1)	FS Group 2 (2)	FS Group 3 (3)	FS Group >3 (4)
Average number of depositors	238,180	24,665	4,209	916
Share of entrepreneurs (%)	1.79	1.99	2.72	1.76
Share of self-employed (%)	3.81	4.01	4.27	3.86
Average deposit balance	102.90	99.42	91.93	78.23
Average loan balance	217.00	206.98	220.28	177.43
Market share of depositors (%)	57.97	12.01	19.46	2.01
Number of default banks	0	3	9	0
Observations	4	9	76	36

Table A.5: Exposed entrepreneurs and firm closure: Matched sample

The following table presents event study regressions of the effect of personal financing disruptions on firm closure using an exact-matched sample. Columns 1 and 2 include bank investors while Columns 3 and 4 focus on bank deposit holders. Up to 5 nearest-neighbor unexposed investors (depositors) in year t_{-1} from the bank default are matched to each exposed investor (depositor). The matching is based on five-year age cohorts, twenty-vigintiles of net wealth, five-percentage point bins of the share of wealth in risky assets, gender, marital status, and municipality of residence. Columns 2 and 4 include all of these matching characteristics, while Columns 1 and 3 omit the risky asset share. The model is specified in Equation (2). The variables of interest, $t_t \times exposure_i$, are interaction terms of time since default year-dummies and an indicator for exposure (investment or deposits) in a bank which goes on to default. All specifications include individual-entrepreneur fixed effects and the following time-varying demographic controls: *log wealth, log income,* and if the entrepreneur has a *child* or purchases a *house* at time t. The specifications also include time since default-year effects, and calendar-year fixed effects. Regression coefficients are estimated with OLS. ***, **, and * indicate significant at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at the pre-crisis primary bank level are in parenthesis.

	Bank investors		Bank depositor	
	Firm closure			
	(1)	(2)	(3)	(4)
$t_{-9} \times exposure_i$	0.012	0.001	-0.003	-0.007
	(0.040)	(0.064)	(0.016)	(0.016)
$t_{-8} \times exposure_i$	0.008	-0.001	-0.005	-0.004
	(0.012)	(0.021)	(0.010)	(0.010)
$t_{-7} \times exposure_i$	-0.002	0.001	-0.001	-0.002
	(0.011)	(0.019)	(0.009)	(0.009)
$t_{-6} \times exposure_i$	-0.002	-0.002	0.007	0.009
	(0.009)	(0.016)	(0.008)	(0.008)
$t_{-5} \times exposure_i$	0.003	-0.002	-0.004	-0.004
	(0.008)	(0.015)	(0.007)	(0.007)
$t_{-4} \times exposure_i$	0.003	-0.005	0.002	-0.000
	(0.008)	(0.015)	(0.006)	(0.006)
$t_{-3} \times exposure_i$	0.000	-0.005	-0.000	-0.001
	(0.008)	(0.015)	(0.006)	(0.006)
$t_{-2} \times exposure_i$	-0.001	-0.013	0.002	-0.000
	(0.008)	(0.015)	(0.006)	(0.006)
$t_{-1} \times exposure_i$	-	-	-	-
$t_0 \times exposure_i$	-0.004	0.004	0.018***	0.017***
	(0.008)	(0.014)	(0.006)	(0.006)
$t_{+1} \times exposure_i$	0.028***	0.019	0.005	0.003
	(0.008)	(0.015)	(0.006)	(0.006)
$t_{+2} \times exposure_i$	0.028***	0.037**	0.013**	0.008
	(0.008)	(0.016)	(0.007)	(0.007)
$t_{+3} \times exposure_i$	0.013	0.011	0.022***	0.022***
	(0.010)	(0.019)	(0.008)	(0.008)
$t_{+4} \times exposure_i$	0.006	0.003	0.014*	0.023***
	(0.011)	(0.021)	(0.008)	(0.008)
$t_{+5} \times exposure_i$	-0.007	0.003	0.004	0.004
	(0.018)	(0.035)	(0.010)	(0.010)
Control variables	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes
Calendar-year fixed effects	Yes	Yes	Yes	Yes
Time since default fixed effects	Yes	Yes	Yes	Yes
R^2	0.34	0.33	0.33	0.34
Observations	13,967	2,951	46,548	45,620

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Table A.6: Descriptive statistics of bank depositors

The following table reports summary statistics for entrepreneurs in the sample in the year 2006. Column 1 presents all *entrepreneurs* in the sample, Column 2 focuses on *unexposed entrepreneurs* who have a retail banking institution in 2006 which did not default in the following financial crisis. Column 3 is comprised of *exposed entrepreneurs* who have a retail banking institution in 2006 which goes on to subsequently default in 2008-2012. The last column presents the differences between exposed and unexposed entrepreneurs. *Age* is measured in years for each individual in 2006. *Married* indicates if the individual is married in the year 2006. *Number of children* is the total number of children of any age currently living in the same household. *University education* is an indicator variable taking the value of one if an individual has a high school and university education. *Total income* measures the income received by the individual from all sources, while *liquid wealth* is the sum of bank deposits, stocks, and bonds at year-end 2006 market values, and *bank deposits* is year-end personal bank savings. *Positive housing assets* indicates if an individual owns real estate (market value greater than 500,000 DKK). *Total value of property* is the sum of current value debt and equity of all housing investments and *Mortgage value* is the year-end value of outstanding mortgage debt. *Mortgage LTV* is the ratio of outstanding mortgage debt to total housing assets. *Value of debt* is the total outstanding value of debts. *Bank loans* is the value of retail banking loans. All amounts are in thousands at the year-end 2006 and deflated to year-2010 DKK. All variables are presented at the individual level unless otherwise indicated. Standard deviations are in parentheses and t-statistics are reported in brackets. ***, **, and * indicate significant at the 1, 5, and 10 percent levels, respectively.

| | Entrepreneurs | | | |
	All (1)	Unexposed (2)	Exposed (3)	Differences (2) - (3)
Age	42.70	42.71	42.60	-0.11
	(6.84)	(6.85)	(6.76)	[-0.59]
Male	0.75	0.75	0.77	0.02
	(0.43)	(0.43)	(0.42)	[1.43]
Married	0.72	0.71	0.74	0.03**
	(0.45)	(0.45)	(0.44)	[2.53]
Number of children	1.36	1.36	1.36	-0.00
	(1.18)	(1.18)	(1.18)	[-0.14]
University education	0.16	0.16	0.17	0.01
	(0.37)	(0.37)	(0.37)	[0.51]
Total income	743.11	746.66	673.95	-72.71
	(1750.47)	(1788.51)	(662.88)	[-1.55]
Liquid wealth	451.80	450.98	467.87	16.90
	(927.53)	(926.87)	(940.43)	[0.68]
Value of bank deposits	264.72	265.52	249.22	-16.29
	(497.06)	(498.24)	(473.53)	[-1.23]
Positive housing assets	0.80	0.80	0.81	0.01
	(0.40)	(0.40)	(0.39)	[1.29]
Total value of property	3660.93	3652.32	3828.49	176.17
	(5963.21)	(5959.63)	(6032.07)	[1.10]
Mortgage value	2508.57	2499.39	2687.31	187.92
	(4333.27)	(4329.74)	(4399.12)	[1.62]
Mortgage loan to value	0.76	0.76	0.77	0.01
	(1.09)	(1.11)	(0.66)	[0.16]
Total value of debt	4559.31	4544.37	4850.14	305.77
	(18565.95)	(18911.39)	(9627.86)	[0.62]
Bank loans	1491.75	1483.03	1661.48	178.45
	(10046.86)	(10249.03)	(4589.20)	[0.66]
Observations	30,082	28,612	1,470	-

Table A.7: Exposed entrepreneurs, financial outcomes, and merger cases: Matched sample

The following table presents event study regressions of the effect of personal financing disruptions on firm closure and financial outcomes using an exact-matched sample. The sample consists of bank deposit account holders. In Columns 1 and 2, up to 5 nearest-neighbor unexposed depositors in year t_{-1} from the bank default are matched to each exposed depositor. In Columns 3 and 4 depositors with default experience are matched to depositor holders of banks which merge or are acquired by other banks. The matching is based on five-year age cohorts, twenty-vigintiles of net wealth, five-percentage point bins of the share of wealth in risky assets, gender, marital status, and municipality of residence. The dependent variable in Column 1 is the log. of financial wealth, in Columns 2 and 4 it is the log. of personal retail bank loans. In Column 3 the dependent variable is equal to one if the entrepreneur closes down his firm. The model is specified in Equation (2). The variables of interest, $t_t \times exposure_i$, are interaction terms of time since default year-dummies and an indicator for exposure (investment or deposits) in a bank which goes on to default. All specifications include individual-entrepreneur fixed effects and the following time-varying demographic controls: *log wealth, log income,* and if the entrepreneur has a *child* or purchases a *house* at time t. The specifications also include time since default-year effects, and calendar-year fixed effects. Regression coefficients are estimated with OLS. ***, **, and * indicate significant at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at the pre-crisis primary bank level are in parenthesis.

| | Bank depositors | | Bank merger sample | |
| | Financial wealth | Bank loans | Firm closure | Bank loans |
	(1)	(2)	(3)	(4)
$t_{-9} \times exposure_i$	-0.332	-0.017		
	(0.220)	(0.171)		
$t_{-8} \times exposure_i$	0.117	0.139	0.010	-0.014
	(0.133)	(0.104)	(0.019)	(0.181)
$t_{-7} \times exposure_i$	0.093	0.116	0.012	-0.070
	(0.128)	(0.100)	(0.018)	(0.174)
$t_{-6} \times exposure_i$	0.160	-0.071	0.011	0.242
	(0.111)	(0.087)	(0.017)	(0.165)
$t_{-5} \times exposure_i$	0.077	-0.054	-0.004	0.019
	(0.090)	(0.070)	(0.011)	(0.106)
$t_{-4} \times exposure_i$	0.009	0.054	0.006	0.038
	(0.087)	(0.068)	(0.010)	(0.103)
$t_{-3} \times exposure_i$	0.047	0.055	0.002	-0.005
	(0.085)	(0.066)	(0.010)	(0.100)
$t_{-2} \times exposure_i$	-0.033	0.009	0.007	0.011
	(0.082)	(0.064)	(0.010)	(0.097)
$t_{-1} \times exposure_i$	-	-	-	-
$t_{0} \times exposure_i$	-0.134*	0.001	0.026***	0.011
	(0.080)	(0.062)	(0.010)	(0.094)
$t_{+1} \times exposure_i$	-0.101	0.025	0.016	-0.055
	(0.084)	(0.065)	(0.010)	(0.099)
$t_{+2} \times exposure_i$	-0.091	-0.125*	0.023**	-0.212*
	(0.091)	(0.071)	(0.011)	(0.108)
$t_{+3} \times exposure_i$	0.090	-0.153*	0.016	-0.320***
	(0.111)	(0.086)	(0.012)	(0.121)
$t_{+4} \times exposure_i$	0.140	-0.231**	0.044***	-0.516***
	(0.116)	(0.090)	(0.013)	(0.125)
$t_{+5} \times exposure_i$	0.166	-0.320***	0.018	-0.491***
	(0.136)	(0.106)	(0.013)	(0.130)
Control variables	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes
Calendar-year fixed effects	Yes	Yes	Yes	Yes
Time since default fixed effects	Yes	Yes	Yes	Yes
R^2	0.61	0.75	0.33	0.76
Observations	46,465	46,465	12,039	12,039