Restricted Credit Growth, Loan Cuts, and Employment Growth in the Great Recession*

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Abstract

We study how the 2008-09 bank credit crunch affected employment at small and young firms through two channels: restricted access to new loans and reductions in existing loans. We exploit pre-crisis variation in Danish banks' loan-to-deposit ratios to capture supply-driven tightening of credit. Small-young firms linked to weaker banks faced sharper credit growth constraints, while small-old and large firms were largely unaffected. Among small-young firms, constrained credit growth disproportionately reduced hiring at surviving firms. We find that nearly four-fifths of the employment effect we estimate for small-young firms arises among survivors. In contrast, the estimated effects of loan cuts are small and statistically insignificant. Quantitatively, the bank-health shock explains roughly one-quarter of the decline in employment growth for small-young firms over 2008-2013.

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1 Introduction

Small and young firms are often thought to be most vulnerable to financial crises. This paper examines how the 2008-09 bank credit crunch affected employment growth at small, young firms by disentangling two channels of credit constraints. One channel is restricted access to new loans to finance expansion; the other is reductions in existing loans.

Using Danish administrative data linking firms to their primary banks, we show that small-young firms unable to secure new loans scaled back employment growth. By contrast, the estimated effects of loan cuts are small and statistically insignificant.

We find that nearly four-fifths of the impact of the credit crunch on small-young firms' employment came from survivors. Exit rates were only slightly higher for firms tied to weaker banks and not statistically significant, so the main channel through which the credit crunch affected real activity was constrained hiring rather than widespread firm failure.

Our finding that credit supply shocks primarily affect hiring is consistent with broader evidence from the labor market literature. Shimer (2012) shows that hires account for most cyclical variation in unemployment, while separations play a smaller role. Haltiwanger *et al.* (2018) likewise document that the Great Recession's job losses in the U.S. reflected a collapse in hiring rather than a surge in separations. Our results complement these insights by showing that when credit supply shocks take the form of restricted loan expansions, the hiring margin becomes the dominant channel through which financial shocks curb employment growth at small-young firms.

Our study contributes to a growing literature on how cross-sectional differences in bank health during the Great Recession affected firm employment.[1] This work shows that tighter bank credit disproportionately harms small, bank-dependent firms, especially young ones. For example, Siemer (2019) finds that tight credit reduces employment more in small firms, with particularly strong effects for young firms, and Davis and Haltiwanger (2024) find aggregate employment effects only for small-young firm. These findings are consistent with theories in which younger, less established firms—often lacking collateral and credit history—

[1]The references include Chodorow-Reich (2014); Iyer *et al.* (2014); Duygan-Bump *et al.* (2015); Cingano *et al.* (2016); Gilchrist *et al.* (2017); Bentolila *et al.* (2018); Popov and Rocholl (2018); Berton *et al.* (2018); Huber (2018); Siemer (2019); Greenstone *et al.* (2020); Bonin (2020); Adamopoulou *et al.* (2020); Davis and Haltiwanger (2024); Chodorow-Reich and Falato (2022).

are more vulnerable to credit constraints (e.g., Petersen and Rajan, 1994; Berger and Udell, 1995, 1998).

We contribute by decomposing the effect of bank funding distress into (i) foregone credit expansions (restricted access to new loans) and (ii) contractions of outstanding credit. This is related to Iyer *et al.* (2014) and Bentolila *et al.* (2018), who document credit supply contractions along both the intensive margin (within existing bank-firm relationships) and the extensive margin (formation of new relationships/switching lenders). In our setting, the funding shock affects both access to new credit and loan contractions within existing bank-firm pairs, but importantly the employment effects operate mainly through the expansion margin: constrained firms reduce hiring among survivors rather than increasing separations or exit.

In our empirical strategy, we exploit the fact that some banks were less healthy at the onset of the financial crisis. Less healthy banks reduced their total lending more than healthy banks, and this differential loan reduction mainly hit loan growth in small and young firms. We measure bank health using the loan-to-deposit ratio (LTD), which captures a bank's reliance on deposit funding versus external borrowing. Danish banks have traditionally used deposit financing, but in the run-up to the crisis they increasingly relied on unsecured, short-term interbank loans. Whereas the U.S. crisis originated in loan-side risks from subprime mortgages, the Danish crisis was driven by liability-side fragilities in banks' funding structure. We therefore use the loan-to-deposit ratio (LTD) as our measure of bank fragility. We argue that it is plausibly exogenous whether firms had a bank with high or low LTD in 2007. We find similar pre-trends in both loan growth and employment growth for firms with high and low LTD banks. Furthermore, we find no statistically significant differences in key firm variables between firms with high- and low-LTD banks for large firms (more than 50 employees in 2007) and small-young firms (5-50 employees and 0-3 years old in 2007). For small firms (5-50 employees in 2007), we do find significant differences in means, but the differences are numerically small.

Our analysis proceeds in three steps. First, we compare the employment changes in firms whose primary banks have high and low loan-to-deposit ratios (LTD) at the onset of the crisis. Second, we employ an instrumental variable (IV) strategy using the primary banks' LTD to estimate the causal effect of credit constraints on employment. This approach allows

us to isolate the direct employment effects of constrained credit. With this IV strategy, we isolate how much of a firm's employment change was caused by its bank's inability to lend, as opposed to the firm's own demand conditions. Third, as explained above, we decompose the impact into the two channels – constraints on loan growth versus loan cuts – by exploiting that we observe each firm's loans. Although our loan-to-deposit instrument is relevant, the first-stage F-statistics are occasionally below 10. We therefore report weak-IV-robust estimates using LIML and Fuller alongside 2SLS, and all three estimators deliver very similar results. In our key specifications, Stock-Wright tests reject the null of weak identification, providing additional support that our findings are not driven by weak instruments.

For large firms, the health of their primary bank (measured by high/low LTD) did not result in a significantly larger decrease in loans during the Great Recession. Large firms were likely better positioned with stronger financial histories and diversified financing sources. However, the story was different for small and small-young firms, which experienced greater credit reductions when their primary bank had a high LTD, relative to those with a low-LTD bank. This pattern aligns with evidence from Germany, Portugal, and Spain, where small firms faced a credit squeeze during the financial crisis (see Bentolila *et al.*, 2018; Iyer *et al.*, 2014; Huber, 2018). In Denmark, however, the impact for small-young firms persisted for several years, leading to persistently lower employment growth driven by reduced hiring.

We find that once we pool all small firms or all large firms, cross-bank differences in health have little effect on average employment growth. This pattern is in line with Greenstone *et al.* (2020), who also estimate insignificant employment effects of credit shocks for small firms in the U.S. Given that small-young firms account for only a modest share of total employment in our data, the sizable firm-level effects we estimate therefore only add up to a limited contribution at the aggregate level. Within this segment of small-young firms, however, attachment to a weak bank is important: employment reductions at firms borrowing from high-LTD banks account for about 24% of the total decline in employment growth over 2008 - 2013, and roughly 30% in 2008.

Our finding that positive loan growth has marked effects on firm employment in small-young firms, while negative loan growth seems to have smaller effects, also relates to strands of the finance literature that distinguish between types of loans and their uses. Evidence from guaranteed and subsidized loans to banks supporting small and medium-sized firms

(e.g., Bertoni *et al.*, 2023; Hackney, 2023; De Haas and Gonzalez-Uribe, 2025) shows that expansion credit directed to constrained firms generates substantial short-run increases in employment and sales, consistent with our positive-loan-growth effects. In contrast, some loan programs-particularly those designed as liquidity bridges for firms to withstand the COVID-19 crisis (e.g., Bennedsen *et al.*, 2023; Dörr *et al.*, 2022; Granja *et al.*, 2022; Kacer *et al.*, 2025) – mainly support survival rather than expansion and produce smaller real effects. This pattern suggests that expansion-oriented credit mainly drives new hiring, while liquidity support primarily preserves existing jobs, helping to explain why credit expansions and contractions need not have symmetric effects on employment.

The rest of this paper is organized as follows. Section 2 describes the data and studies worker flows across firms. In Section 3, we show that high LTD banks tightened their credit supply relatively more. Section 4 zooms in on small and young firms and studies how labor market flows respond to financial conditions in these firms. We conclude in Section 5.

2 Data and Descriptive Statistics

This section describes our firm-level dataset, built by linking detailed Danish employer-employee records, firm accounting data, and bank loan information. We present summary statistics showing initial differences across firm types and document key patterns in employment flows that motivate our analysis of how credit constraints affected firms in the Great Recession.

2.1 Data

For our analysis, we draw on several Danish population data sets, which can be combined using unique worker and firm identifiers. We use monthly employer-employee data to construct a quarterly firm-level data set, including worker transitions to and from each firm. Finally, we combine this with data on firms' bank loans and bank connections.

We construct a monthly spell data set covering all persons (employed or non-employed) aged 18-60 years for 2003-2013. This data set has been constructed using five data sets of which four (MIA, CON, RAS, BFL) are maintained by Statistics Denmark, and the fifth

(DREAM) is maintained by the Danish Labor Market Board and contains weekly information on each person's public transfers. We use monthly data to record worker transitions, which we aggregate into a quarterly firm data set. We measure the quarterly employment in a firm as the average monthly employment in the quarter. In Appendix B1, the construction of the spell data is described in more detail.

We only consider private firms. We extract the basic information about the population of firms, such as industry and sector, from the annual FIRM register, maintained by Statistics Denmark. We supplement these data with the KOB dataset (maintained by Experian), which provides accounting information for Danish limited liability firms.

We use the URTEVIRK register, provided by Statistics Denmark and maintained by the Danish Tax Authorities, to link limited liability firms and stock companies to their banks and other lenders.[2] In this register, we observe each firm's loans from each of its lenders by the end of the year. To this, we merge balance-sheet information for the individual banks using data from the Danish Financial Supervisory Authority. We then characterize banks according to their loan-to-deposit ratio, LTD

$$LTD_j = \frac{Loans_j}{Deposits_j} \tag{1}$$

where j indexes the bank. We have information on LTD for 131 banks in 2007, which represent about 93.6% of the firms' total bank loans in 2007.

Jensen and Johannesen (2017) find that Danish banks with higher LTD in 2007 tightened their credit supply to Danish households more in response to the financial crisis. We use a similar strategy to identify bank credit supply shocks to firms.

We divide banks into high and low LTD banks based on whether their LTD in 2007 is above or below the loan-weighted median. Next, we define a firm's primary bank as the bank with the highest loan amount in 2007 and group the firms by their primary bank's LTD. We refer to these two types of firms as high and low LTD firms. We only group firms by their LTD only if loans are at least 7,000 DKK (approximately 1,000 USD) per worker in 2007.[3] Otherwise, we categorize them as having no (or very limited) bank credit in 2007.[4]

[2]Other lenders are foreign banks, other firms, public debt, and other financial institutions (such as holding companies, financial leasing).

[3]In the appendix, we show that we obtain similar results using cut-offs at 3,500 DKK and 14,000 DKK.

[4]The sample of limited liability firms and stock companies covers 1.1 million workers in 2007, which

We restrict our sample to firms with at least 5 employees in the third quarter of 2007 to ensure a minimum size and to exclude micro firms for which measurement of growth can be noisy. Furthermore, we exclude firms that have loans in foreign banks up to 2007 because we cannot track foreign banks. This removes about 2% of the observations. Lastly, we exclude firms in the financial sector. The final dataset contains firm-level information at quarterly frequency, which we use in descriptive figures on worker flows. For the regression analysis, we aggregate all variables to the annual level, consistent with the loan data.

2.2 Summary Statistics

Appendix Table A-1 presents summary statistics for 2007, categorized by firm size and age. We consider three firm groups: large firms (more than 50 employees), small firms (5-50 employees), and small-young firms (5-50 employees and 0-3 years old, all as of 2007). Within each size and age category, we further split firms based on their credit access into firms whose primary bank had a high (above-median) loan-to-deposit (LTD) ratio, firms with a low (below-median) LTD ratio, and firms with no bank credit in 2007.

A first takeaway from Appendix Table A-1 is that firms without bank credit differ markedly from those with bank loans. No-credit firms tend to be much smaller and are less likely to be manufacturers (more likely to be in construction) compared to firms that do borrow. In contrast, firms with high-LTD and low-LTD banks appear quite similar in 2007. The last column of Appendix Table A-1 reports t-tests for differences in means between high- and low-LTD groups, and most differences are statistically insignificant.

While about half of the sample means are significantly different for small firms, we note that the magnitudes of the differences are quite small. Among small firms, those linked to high-LTD banks have on average 0.36 more employees, pay about 1,000 DKK (roughly 140 USD) higher monthly salary per worker, and are about one year older than small firms with low-LTD banks. For large firms, the only significant difference is that 25% of high-LTD firms are located in a large city, versus 21% for low-LTD firms. Small-young firms show no significant differences at all between the high- and low-LTD groups. Furthermore, when we regress a high-LTD indicator on all 11 characteristics from Appendix Table A-1, we find no

represents about 77% of the total private sector employment.

joint significance for either large or small-young firms in explaining selection into high-LTD banks. In other words, observable traits do not systematically differ between firms with healthy versus distressed banks within the large-firm or small-young categories.

2.3 Descriptive Evidence on Worker Flows

Using worker flows for the entire Danish private sector, we find that small firms – especially young ones – had the strongest quarterly employment growth before 2008 and then suffered the sharpest drop during the Great Recession. In Figure 1, small-young firms stand out with a peak-to-trough decline in net employment growth on the order of 6 percentage points, far greater than the contractions seen in any other group. Further, the employment growth of small young firms after the crisis remain at a significant lower level than pre-crisis, indicating long lasting effect of the crisis. By contrast, larger or more mature firms exhibit milder fluctuations, and even high-wage or high-productivity firms (which were fast-growing pre-crisis) see declines only about half as severe as those of small-young firms.[5]

Similar findings have been documented by Haltiwanger *et al.* (2018) for the U.S. and by Bertheau and Vejlin (2022) for Denmark (1992-2013). These observations suggest that credit constraints may have disproportionately reduced employment growth at small-young firms, which we explore in the subsequent analysis.

3 The Credit Channel

In the years before the financial crisis leading to the Great Recession, bank lending in Denmark was expanded substantially. For this credit expansion, Danish banks had relied on unsecured, short-term loans on the international interbank market. This was a change in the way Danish banks financed loans as they had traditionally relied on deposit financing. This change in lending channel naturally implied an increasing loan-to-deposit ratio (LTD) of Danish banks in the build-up to the crisis. Between 2000 and 2007, the LTD of the 131 banks we consider went from an average of 1.03 to an average of 1.44.

[5]We define high- (low-) productivity firms as having value added per worker above (below) the median in the year before. High- (low-) wage firms are defined analogously using average salary.

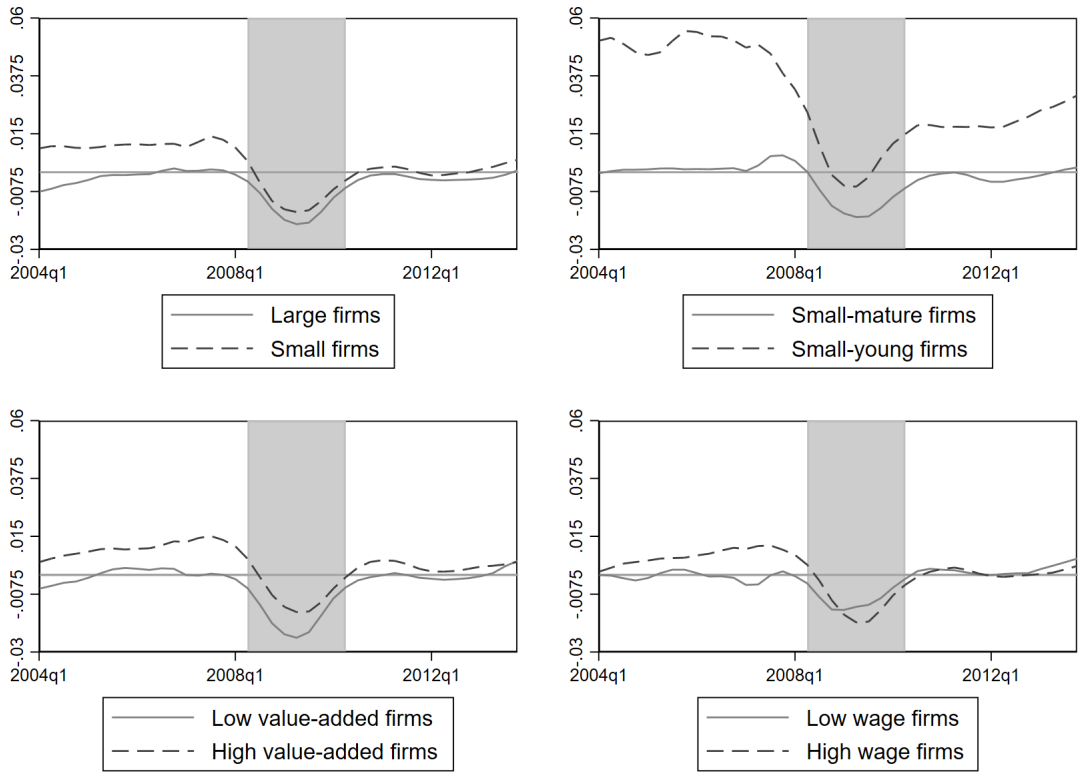

Figure 1: Quarterly net employment flows by firm size, firm age, value added per worker, and average wage. Net flows are defined as hires minus separations per firm-quarter, relative to employment in the previous quarter. Large firms have more than 50 employees in the prior year; small firms fewer than 50. Young firms are 3 years old or younger, mature firms 4 years or older. High value-added firms are above the median value-added per worker in the prior year; low value-added firms are below. High-wage firms have above-median average salaries in the prior year; low-wage firms below. Series are centered moving averages. Flows include firm entry and exit; Online Appendix Figure B-2 shows flows excluding entry and exit.

Danish banks had very little direct exposure to the US subprime mortgage crisis. However, their exposure to the international interbank market made them vulnerable as this market froze following the bankruptcy of Lehman Brothers in September 2008. The financial crisis in Denmark started with the collapse of the 10th largest bank, Roskilde Bank, in August 2008. From this point until the autumn of 2010, the Danish banking sector experienced a systemic financial crisis with liquidity dry-ups and large write-downs on bad loans.

The Danish Central Bank intervened several times to provide liquidity to the banks, and the Danish government provided an unlimited guarantee covering all the liabilities in the Danish banking sector. Despite these interventions, many banks were distressed, and the authorities closed 15 banks from 2008 to 2011, and several other banks agreed to take part in mergers to avoid failure (Rangvid, 2013).

3.1 Banks and Credit Constraints

High-LTD banks were particularly vulnerable when the interbank market froze in September 2008. Facing acute liquidity shortfalls, these banks sharply tightened lending to preserve solvency. In our analysis, we classify each firm based on the health of its primary bank before the crisis. Firms whose primary bank had an above-median LTD ratio in 2007 are labeled as high-LTD firms, while firms whose primary bank had a below-median LTD ratio are labeled as low-LTD firms.[6]

We examine how these lending patterns differed by firm size and age, since younger small firms might be especially sensitive to credit shocks. Figure 2 shows aggregate loan volume (indexed to 1 in 2007) for high- versus low-LTD firms in three groups: large firms (50+ employees), small firms (5-50 employees), and small-young firms (5-50 employees and 0-3 years old in 2007). We focus on small-young firms because, as noted in Subsection 2.3, they experienced the most severe employment contractions during the recession.

After 2007, aggregate loan balances declined for firms in all categories, but the drop was steepest for small-young firms. Among large firms, high- and low-LTD groups show virtually no difference in loan trend. In contrast, small firms – especially the small-young subset – linked to high-LTD banks suffered substantially larger loan contractions in 2008. The decline in credit for small-young firms with high-LTD banks was roughly twice as large as that for similar small firms with healthier banks. Notably, high- and low-LTD firms had very similar loan growth trajectories before 2008 (particularly in the small and small-young categories), which suggests that the divergence observed during the crisis was driven by the sudden credit supply shock rather than differences in firms' initial trends.

[6]Most Danish firms only have bank loans from their primary bank. As much as 96% of the firms' total loan amounts are loans from their primary bank. Furthermore, 89% of the firms have more than 90% of their total bank loans from their primary bank.

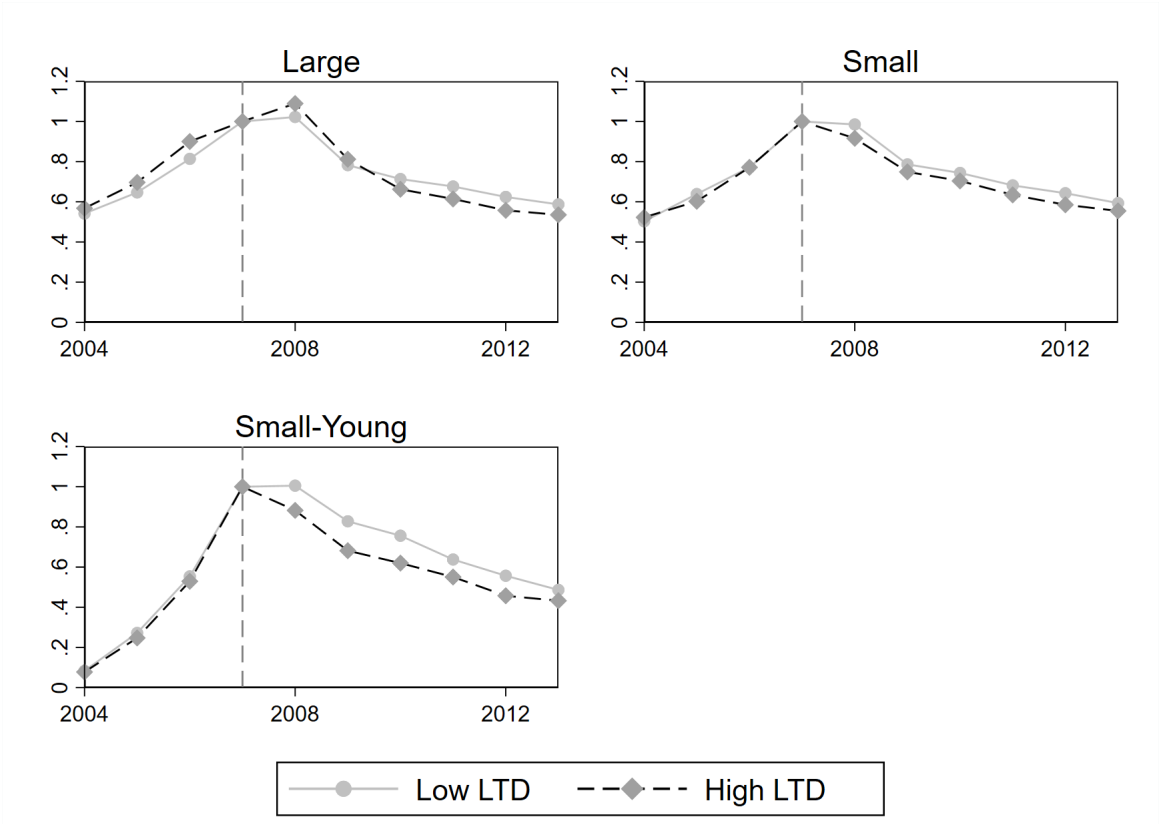

Figure 2: Aggregate loans (index = 1 in 2007) for large firms (more than 50 employees in 2007), small firms (5-50 employees in 2007), and small-young firms (5-50 employees and age up to 3 years in 2007). The sample is restricted to firms with loan amounts above 7,000 DKK per worker in 2007 and includes only firms existing in 2007. Loans are winsorized at the 99% level in 2007.

In summary, firms reliant on distressed (high-LTD) banks experienced weaker credit growth during the crisis, particularly if they were small and young. Next, we formally test whether this credit supply effect is statistically significant at the firm level and what it implies for firm outcomes.

3.2 Event Study of Credit Constraints

While banks faced liquidity and solvency problems and needed to cut lending, some firms also reduced their bank loans as a result of investments being less profitable under the weaker

economic conditions. To isolate the credit supply effect, we exploit the variation in bank health by comparing firms tied to high-LTD banks with those tied to low-LTD banks. This approach relies on the assumption that a firm's primary bank LTD ratio in 2007 is unrelated to the firm's underlying performance or credit demand. Under this assumption, any difference in lending outcomes between high-LTD and low-LTD bank firms can be attributed to the bank's liquidity shock. Thus, we focus on the differential impact of having a weaker (high-LTD) bank on firm-level loan growth.

We next conduct an event-study analysis around the crisis to test whether the loan differences between high- and low-LTD firms observed in Figure 2 are statistically significant at the firm level, and whether their pre-2008 trends were parallel. Specifically, we estimate the following model:

$$log(loan_{i,t}) - log(loan_{i,t-1}) = \psi_i + \beta_t highLTD_{j(i)} + \Omega_t + \delta X_{it} + u_{it} \tag{2}$$

In this model, the outcome is the annual log change in firm i's total bank loans, in which we have recoded zero loans to 1 DKK. The key independent variable is the indicator $highLTD_{j(i)}$ that equals 1 if firm i's primary bank j had an above-median LTD ratio in 2007. We include firm fixed effects to control for time-invariant firm characteristics, and year fixed effects Ω_t to absorb economy-wide shocks. The vector X_{it} adds further controls: industry-by-year and municipality dummies (and for the small-young firm subsample, we also include firm-age-by-year dummies to account for lifecycle effects of young firms). The coefficients β_t measure the year-by-year difference in loan growth between firms with high-LTD banks and those with low-LTD banks, with β_{2007} normalized to zero (so all differences are relative to the pre-crisis baseline year 2007). We cluster standard errors by the firm's primary bank (as of 2007) to allow for correlated shocks among firms sharing the same bank.

In addition, we estimate a simplified difference-in-differences version of the model, where we set all pre-2008 β_t to zero and estimate a common differential post period effect, β:

$$log(loan_{i,t}) - log(loan_{i,t-1}) = \psi_i + \beta highLTD_{j(i)} \times post_t + \Omega_t + \delta X_{it} + u_{it} \tag{3}$$

where $post_t$ is a dummy variable indicating that the year is 2008 or later.[7] The parameter

[7]For the samples of large and small firms, we use a pre-period of 2004-2007, but because small-young firms are 0-3 years old in 2007, we can only use 2005-2007 as the pre-period.

β is the difference-in-differences effect which measures the average annual change in the log of loans for high LTD firms relative to low LTD firms.

It is worth noting that our difference-in-differences strategy captures only a partial equilibrium effect of the credit supply shock. In other words, it measures the direct impact on affected firms and does not incorporate general equilibrium feedback. For example, if reduced lending lowered overall product demand, this could indirectly suppress loan demand across the entire economy. Such general equilibrium effects are instead absorbed by the time dummies included in equations (2) and (3).

Figure 3 plots the estimated year-by-year differences in loan growth (β_t from equation (2)) between high-LTD and low-LTD bank firms with 95% confidence bands. The credit supply shock has its clearest impact in 2008. Small-young firms with high-LTD banks experienced a statistically significant drop in loan growth compared to firms linked to healthier banks. Small firms (5-50 employees) experienced a similar, though statistically insignificant, decline in 2008, while large firms (50+ employees) showed only a minor reduction. For small-young firms, the negative gap persisted through 2013, with β_t remaining below zero in each year following the crisis. This indicates six consecutive years of tighter credit constraints for these firms, although not all annual estimates are individually statistically significant.

Importantly, Figure 3 suggests that loan growth was parallel for high- and low-LTD firms before 2008 as the β_t estimates for 2005-2007 are not significantly different from zero. This supports interpreting the post-2007 divergence as a supply effect from the credit crunch disproportionately affecting high-LTD banks. Furthermore, Appendix Table A-1 shows that, in particular, large and small-young firms had similar characteristics in 2007. Therefore, we argue that firms did not select banks based on the banks' LTD in 2007. Hence, we believe that we can exclude anticipation effects for the banks' credit supply and estimate the causal effect of a high LTD primary bank on firm credit.[8]

Table 1 shows the results from estimating the effect of having a bank with a high LTD as one's primary bank in 2007 on the loan growth rate using the difference-in-differences design in equation (3). This serves as a way of testing the coefficients from Figure 3 jointly. As above, we consider different samples based on firm size and age. Furthermore, we also

[8]Jensen and Johannesen (2017), studying the effect of the credit crunch for consumers with the same research strategy, also find no selection effect for consumers in Denmark.

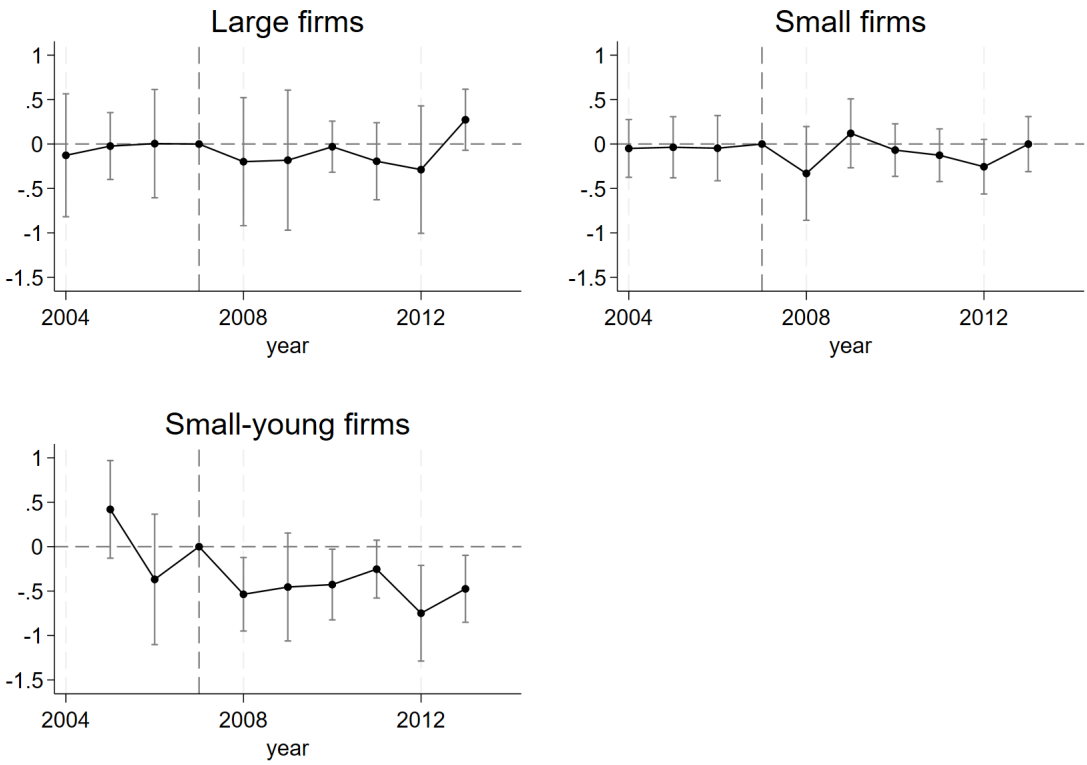

Figure 3: Estimated differential year effects between high- and low-LTD firms, i.e. β_t from equation (2), where the dependent variable is loan growth. Effects are shown separately for large firms (more than 50 employees in 2007), small firms (5-50 employees in 2007), and small-young firms (5-50 employees and age up to 3 years in 2007). All regressions include industry $\times$ year, municipality, and firm fixed effects; for small-young firms we also include firm-age $\times$ year fixed effects. Online Appendix Figure B-3 shows estimates with only year and firm fixed effects. The sample is restricted to firms with loan amounts above 7,000 DKK per worker in 2007. Online Appendix Figures B-4 and B-5 report estimates using cutoffs of 3,500 and 14,000 DKK per worker. Confidence intervals are 95% pointwise, based on standard errors clustered at the primary bank level.

consider different post-treatment periods: 2008, 2008-2009, and up to 2008-2013. Each cell in Table 1 gives the difference-in-differences estimate of β from equation (3) for a different sample. For example, in the first row, we only include 2008 as the post-treatment period, and in the first column, the results are for large firms.

In line with our results from Figure 3, we estimate substantially larger differential reductions in loan growth for small-young firms compared to large and small firms. Specifically,

we estimate a differential effect of -0.50 log points for small-young firms with 2008 as the post period. The same effect is -0.19 log points for large firms and -0.34 for small firms, though it is not significant at a 5% level for large firms. Extending the post-period diminishes the estimates for small firms, and the loan reductions are all insignificant. In contrast, estimates for small-young firms remain high and significant for all considered post-periods. This implies that the post-period effects from Figure 3 are jointly significant for small-young firms, indicating that they experienced persistently lower loan growth rates after 2007.

Our conclusions from Figure 3 and Table 1 regarding small and small-young firms are in line with the banking literature, which suggests that lending to small firms was adversely affected in the Great Recession (see e.g., Albertazzi and Marchetti (2010), Chodorow-Reich (2014), and Iyer *et al.* (2014) and the review in Udell (2020)). Small firms typically do not have access to the corporate bond market, limiting their ability to raise liquid capital. Furthermore, due to large information asymmetries in the capital market, credit is rationed. This rationing of credits especially affects small firms and particularly small-young firms since assessing small-young firms' future prospects is more difficult for lenders. Furthermore, small-young firms, by definition, have shorter bank-firm relationships than older firms.

To further pinpoint which small firms drove the credit supply effect, Figure 4 breaks down the small firm category by firm age (0-3, 4-9, 10-14, and 15+ years old in 2007). This reveals that the credit shock's impact is concentrated among the youngest small firms. Slightly older small firms (4-9 years) exhibit a weaker and less consistent effect (with a significant gap appearing only in 2011) than the youngest firms aged 0-3 years. Small firms over 10 years old experienced virtually no difference in loan growth between high- and low-LTD bank groups.

In summary, our findings in Sections 3.1 and 3.2 confirm a significant credit supply contraction for firms connected to distressed banks, particularly among small-young firms. In the next section, we examine how these differential credit constraints translated into differences in employment growth.

	Large firms	Small firms	Small-young firms
HighLTD X 2008	-0.193	-0.335**	-0.498***
	(0.217)	(0.167)	(0.153)
HighLTD X 2008-2009	-0.185	-0.0876	-0.374**
	(0.208)	(0.127)	(0.181)
HighLTD X 2008-2010	-0.124	-0.0820	-0.388**
	(0.132)	(0.101)	(0.158)
HighLTD X 2008-2011	-0.118	-0.0915	-0.365**
	(0.119)	(0.0868)	(0.149)
HighLTD X 2008-2012	-0.119	-0.117	-0.435***
	(0.118)	(0.0767)	(0.144)
HighLTD X 2008-2013	-0.0781	-0.0870	-0.406***
	(0.104)	(0.0744)	(0.128)
Observations			
2008	7,513	49,059	5,847
2008-2009	9,063	60,731	9,062
2008-2010	10,468	70,448	11,190
2008-2011	11,817	79,402	13,103
2008-2012	13,110	87,668	14,801
2008-2013	14,360	95,325	16,356

Table 1: The effect of having a primary bank with a high LTD on annual log changes in total loan amounts, estimated as in equation (3). Each cell reports the difference-in-differences estimate β from regressing loan growth on a high-LTD dummy interacted with post-periods. All regressions include industry $\times$ year, municipality, and firm fixed effects; for small-young firms we also include firm-age $\times$ year fixed effects. Large firms have more than 50 employees in 2007, small firms 5-50 employees, and small-young firms 5-50 employees and age up to 3 years in 2007. The sample is restricted to firms with loan amounts above 7,000 DKK per worker in 2007. Online Appendix Tables B-1 and B-3 report results with only year and firm fixed effects and from employment-weighted regressions. Online Appendix Table B-4 shows results using cutoffs of 3,500 and 14,000 DKK per worker. Online Appendix Table B-5 recodes zero loans to 0.001 and 1,000 DKK, and Online Appendix Table B-6 reports intensive-margin results. Standard errors are clustered at the primary bank level. *** $p < 0.01$, ** $p < 0.05$, *$p < 0.1$.

4 Employment Growth and Credit Constraints

Subsection 2.3 revealed that small-young firms suffered especially large reductions in net employment flows during the Great Recession. Next, Section 3 established that it was the small firms and mainly the small-young firms with a high LTD bank that experienced rel-

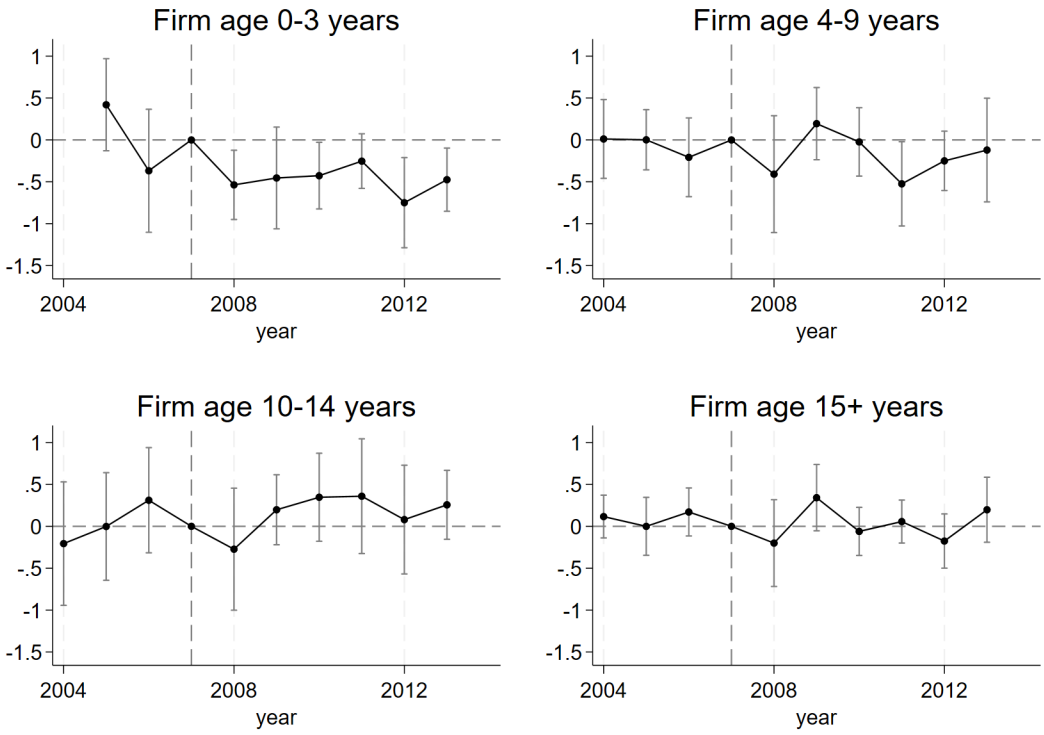

Figure 4: Estimated differential year effects (β_t from equation 2) between high- and low-LTD firms, for small firms (5-50 employees in 2007) by age group (0-3, 4-9, 10-14, 15+ years). Outcome: annual loan growth. Controls: industry × year, municipality, and firm fixed effects; firm-age × year fixed effects for 0-3 year-old firms. Firms with loans <7,000 DKK per worker in 2007 excluded. 95% confidence intervals based on standard errors clustered at the primary bank level. Online Appendix Figure B-6 shows results with only year and firm fixed effects.

atively weaker credit growth. Building on these findings, this section examines how bank credit constraints affected employment growth. Subsection 4.1 begins by documenting how employment growth varied across firms depending on whether their primary bank had a high LTD in 2007. Subsection 4.2 then quantifies the direct impact of credit on employment growth by instrumenting firm-level loan growth with LTD. In Subsection 4.3, we examine heterogeneous outcomes by distinguishing between positive and negative loan growth. Subsection 4.4 turns to firm survival, investigating whether constrained credit also increased firm closures.

4.1 Bank Credit Exposure and Employment Growth

Figure 5 illustrates the trajectory of aggregate net employment flows for each firm type, grouping firms by their banks' 2007 LTD ratios (high versus low). Two insights are clear from the figure. First, among small firms – and particularly among the youngest ones – those without any pre-crisis bank credit experienced the least severe declines in net employment during the recession.[9] For instance, small firms without bank credit had a minimum quarterly growth rate of -1.8%, much milder than the -2.8% low point for bank-dependent firms. All three types of firms had around 2% employment growth before the crisis. Note that we do not interpret better outcomes for firms without 2007 loans as causal, since the decision to have bank credit itself reflects firm traits (Appendix Table A-1).[10]

Second, for large and older small firms, employment growth is similar across high- and low-LTD bank groups. Only small-young firms exhibit a clear divergence: those tied to high-LTD banks suffer a sharper initial drop in net employment and remain on a lower growth path through early 2012, compared to peers with healthier banks.

Figure 6 further breaks down small firms by age (0-3, 4-9, 10-14, 15+ years) to examine whether the credit effect persists as firms mature. Consistent with the earlier loan growth patterns (see Figure 4), any employment growth gap disappears for firms older than 3 years. This age breakdown also explains why Figure 5's small-firm series showed little difference overall as young firms (defined by being 0-3 years) form only a small fraction of all small firms and an even smaller fraction of their total employment.[11]

We interpret the differential post-2008 employment trends as causal effects of credit supply shocks under the parallel-trends assumption – namely, that in the absence of the credit shock, high-LTD and low-LTD firms would have had similar loan and employment

[9] We do not show the development in net employment growth for large firms with no bank credit since this series is too noisy due to too few observations.

[10] Consequently, we drop firms without bank credit in 2007 in all subsequent analysis. In our main specifications, e.g. Table 2, we also exclude firms with loans per worker in 2007 being below 7,000 DKK (roughly 1,000 USD). As a robustness check, Online Appendix Table B-8 uses cutoffs of 3,500 and 14,000 DKK per worker, yielding qualitatively similar results.

[11] There are 2.218 small-young firms and 11.358 small firms with bank credit in our sample. On average, the small-young firms with bank credit have 13 employees, whereas small firms with bank credit have 15 employees per firm. Together, this means that small-young firms employ approximately 17% of the overall sample of workers in small firms in 2007.

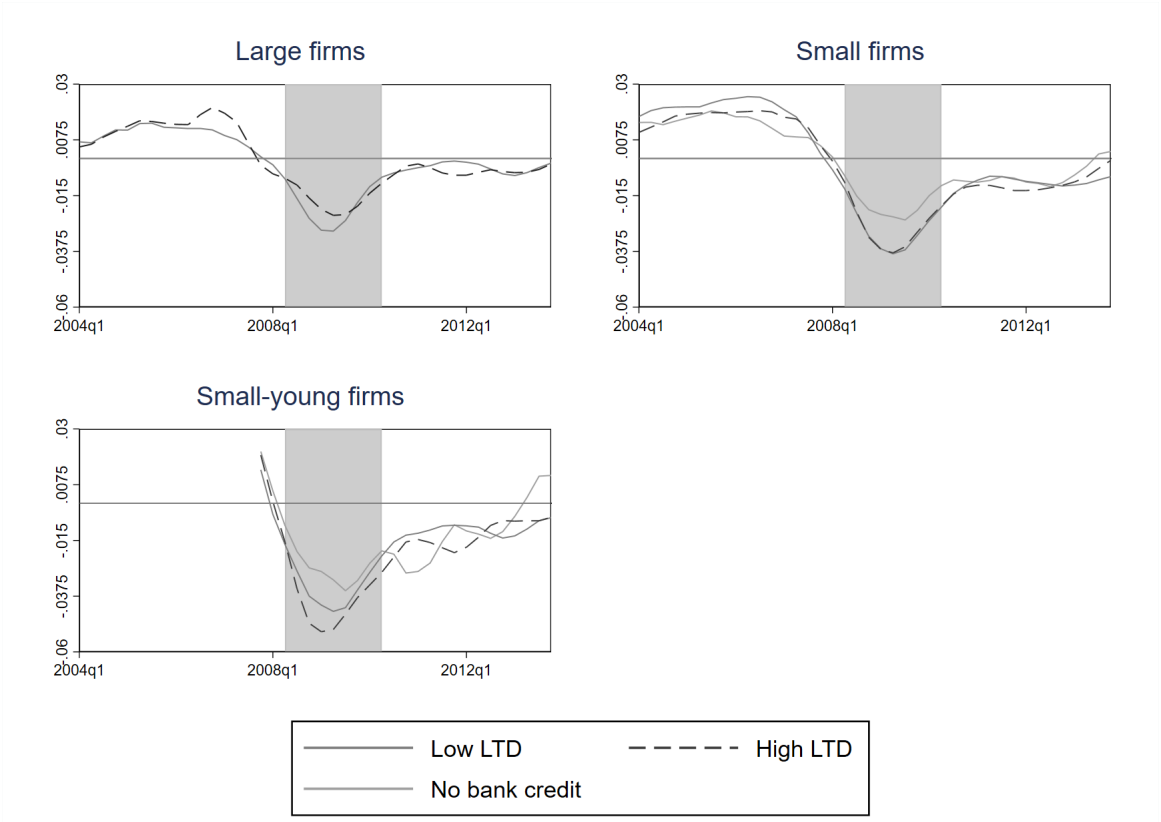

Figure 5: Quarterly net employment flows for firms by credit exposure (no bank credit, low-LTD bank, high-LTD bank). Small firms: 5-50 employees in 2007; young firms: 0-3 years old; large firms: 50+ employees. Large firms without bank credit omitted (few observations). Flows include firm exits; Online Appendix Figure B-8 excludes exits. Series are centered moving averages.

trajectories. The fact that their pre-2008 trends in Figure 6 are very similar supports this assumption, so we proceed with a difference-in-differences analysis.[12]

In Table 2, we present difference-in-differences estimates from reduced-form regressions that replace total loan growth in equation (3) with employment growth as the dependent variable. We measure annual employment growth as net employment flows (hires minus separations) divided by the previous year's workforce.

[12]Additionally, Appendix Table A-1 showed that small-young and large firms seem balanced across high and low LTD. The pre-crisis loan growth trends are also parallel, as demonstrated in Figures 2 and 3, further supporting the assumption of comparable counterfactual loan and employment growth across firm types.

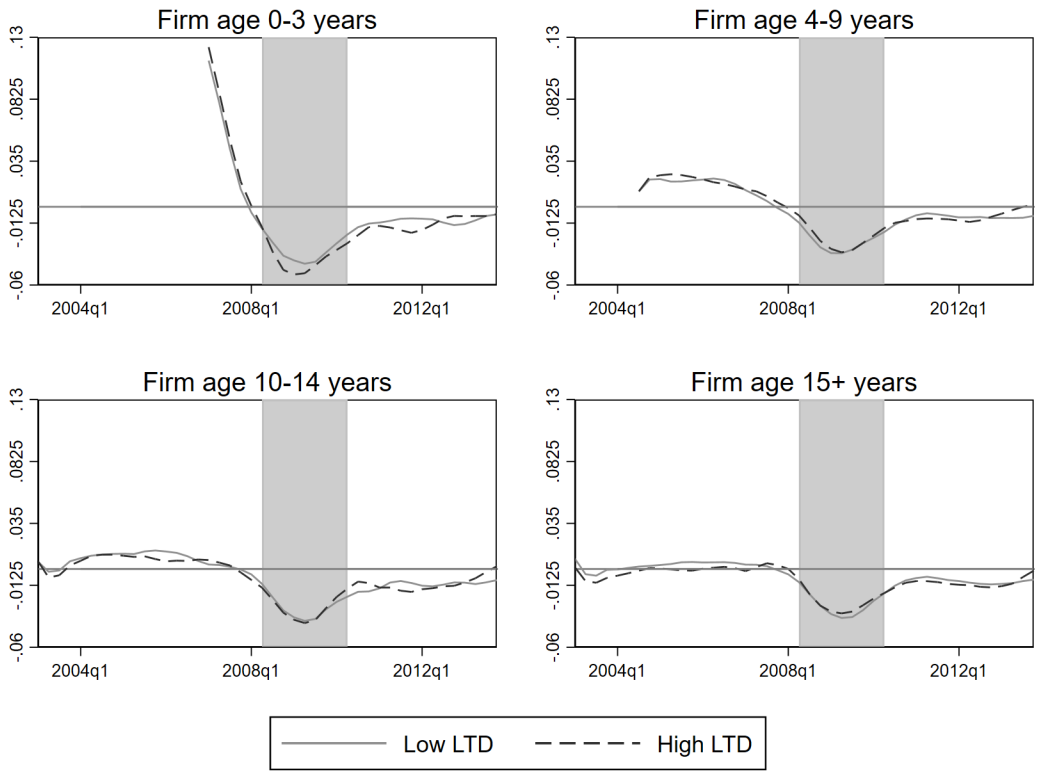

Figure 6: Quarterly net employment flows for small firms (5-50 employees in 2007Q3), by firm age (0-3, 4-9, 10-14, 15+ years in 2007). Comparison: low- vs. high-LTD banks. Flows include firm exits. Appendix Figure A-1 extends the pre-period by one year for 0-3 year-old firms to check parallel pre-trends. Series are centered moving averages.

Columns 1-2 show negligible, statistically insignificant effects on employment for large and small firms. This outcome is unsurprising for large firms, given the insignificant first-stage results in Table 1. While the first stage is significant for small firms in 2008, it does not translate into a discernible employment impact.

By contrast, small-young firms with high-LTD banks experience a notable decline in net employment growth compared to those with low-LTD banks. Specifically, Table 2 (column 3, row 1) indicates an 8.1 percentage-point drop in net employment growth from 2007 to 2008 for small-young firms tied to high-LTD banks. These annual regression coefficients naturally exceed the quarterly figure-based estimates by inflating the measured magnitude. Moreover,

	Large firms	Small firms	Small-young firms
HighLTD X 2008	-0.0247	-0.000523	-0.0808**
	(0.0266)	(0.0123)	(0.0328)
HighLTD X 2008-2009	-0.0169	0.00217	-0.0637**
	(0.0214)	(0.0108)	(0.0247)
HighLTD X 2008-2010	-0.0120	0.00300	-0.0579**
	(0.0182)	(0.0104)	(0.0234)
HighLTD X 2008-2011	-0.0112	0.00319	-0.0668***
	(0.0165)	(0.00948)	(0.0229)
HighLTD X 2008-2012	-0.0118	0.00200	-0.0665***
	(0.0155)	(0.00945)	(0.0232)
HighLTD X 2008-2013	-0.0118	0.00384	-0.0646***
	(0.0149)	(0.00949)	(0.0232)
Observations			
2008	7,619	50,985	6,155
2008-2009	9,181	62,859	9,412
2008-2010	10,617	72,963	11,658
2008-2011	11,993	82,307	13,677
2008-2012	13,308	90,993	15,486
2008-2013	14,577	99,128	17,171

Table 2: Effect of having a primary bank with high LTD on annual employment growth, defined as net employment flows (hires-separations) over lagged employment. Each cell reports a difference-in-differences estimate (β from equation (3)) with employment growth as the dependent variable. Controls: firm age $\times$ year, industry $\times$ year, municipality, and firm fixed effects. Sample restricted to firms with loans >7,000 DKK per worker in 2007. Online Appendix Tables B-7-B-8 show robustness to alternative fixed effects, employment-weighted regressions, and loan cutoffs (3,500 and 14,000 DKK). Standard errors clustered at the primary bank level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

the employment gap remains substantial in the following years. Having a high-LTD bank is associated with approximately 6.5 percentage points lower annual job growth (on average for 2008-2013), and this effect is statistically significant.

We can use the reduced-form estimates to calculate how much the tightening in credit supply contributed to the total employment reduction among firms with high LTD banks. Table A-8 suggests that at least 30% of the initial (2008) employment reduction observed among small-young high LTD firms can be attributed directly to the contraction in credit. Even over the longer horizon following 2008, our findings suggest that credit constraints still explain at least 24% of the total decline in employment. These results underscore that access to credit plays an important role for small-young firms. Our estimated shares are broadly

comparable in magnitude to the short-term results in Chodorow-Reich (2014) for small and medium-sized U.S. firms (30-50%) and in Siemer (2019) for small and young U.S. firms (30-35%). They are also consistent with evidence from Spain, where Bentolila *et al.* (2018) find that attachment to weak savings banks accounts for roughly 25% of the employment decline at exposed firms during 2006-2010.

4.2 The Direct Effect of Credit on Employment Growth

To quantify how a change in credit affects firm-level employment, we estimate an elasticity of employment growth with respect to loan growth, using the following regression:

$$\frac{NEF_{it}}{emp_{i,t-1}} = \phi_i + \alpha \left[log(loan_{i,t}) - log(loan_{i,t-1}) \right] + \Theta_t + \pi X_{it} + v_{it} \tag{4}$$

In this equation, the left-hand side is the net employment flow (NEF_{it}) at firm i divided by the previous year's employment. We include firm fixed effects ϕ_i to absorb time-invariant firm differences and year effects (Θ_t) to capture common shocks. X_{it} contains additional controls (industry-by-year, municipality, and firm-age-by-year dummies). The coefficient α is our parameter of interest, capturing the employment-growth elasticity with respect to loan growth.

For our baseline IV specification, we instrument the change in log loans with $highLTD_i \times post_t$ (from equation (3)), which captures being attached to a distressed bank after 2008. The 2SLS estimates (Table 3, column 1) suggest an employment-loan growth elasticity around 0.13 to 0.16, although these estimates are only significant at the 5% level for the post-periods that include 2012 onward.[13] We probe the robustness of this result using alternative instrument sets in Table 3. All variants interact the instrument with a post-2008 dummy. First, instead of a high-LTD dummy, column 2 uses a linear LTD term ($LTD_i \times post_t$), treating bank health as continuous.[14] Second, column 3 combines the high-LTD dummy with a linear term for banks below the median LTD, ($LTD_i \times (1 - highLTD_i) \times post_t$), since the relationship between LTD and loan growth is stronger in the lower half of the

[13] We have not reported the insignificant 2SLS estimates for large and small firms since the reduced-form estimates are insignificant.

[14] For this regression with linear LTD as instrument, the dataset was trimmed at the top 1% of LTD values to obtain a stronger first stage.

distribution. As a balance test, we regress each of the three instruments – omitting their interaction with the post-2008 dummy – on the 11 variables from Appendix Table A-1 for the small-young firm sample and find no evidence of joint significance (Online Appendix Table B-9).[15] This does not prove exogeneity but is reassuring.

Using the alternative instruments in columns 2 and 3, we obtain both higher and lower estimates. Reassuringly, the two alternative IV estimates lie within the baseline 2SLS estimate's 95% confidence interval. In column 3, we obtain significant effects at the 5% level for all post-periods that include 2011 onwards.

One concern with the IV results is instrument weakness, given that several of the Kleibergen-Paap F-statistics for the first stages associated with the IV estimations in Table 3 are below 10 (as shown in Appendix Table A-2). Nonetheless, across all specifications, Stock-Wright weak-IV-robust inference yields p-values that remain below conventional significance levels for the key employment effects (Appendix Table A-2), indicating that our conclusions are robust to weak-instrument concerns. When both HighLTD and the lowLTD linear term are included (column 3), the first-stage Kleibergen-Paap F-statistics in most cases exceed 10. To further validate these findings, we re-estimate the overidentified specification (column 3 in Table 3) using LIML, which is more robust to weak instruments, and the Fuller estimator, a bias-corrected version of LIML. The resulting LIML and Fuller estimates (columns 4 and 5) closely match those from 2SLS and, together with the expected signs and significance in the reduced-form relationships, reinforce confidence in our IV strategy.

Overall, our findings align with those of Greenstone *et al.* (2020) and Davis and Haltiwanger (2024) in that credit shocks have only modest aggregate employment effects on average for small firms. At the same time, within the small-young segment bank credit has a statistically and economically significant effect on employment growth during the Great Recession. In Greenstone *et al.* (2020), the estimated elasticities are below 0.025, whereas our preferred estimates for small-young firms are around 0.10-0.15. Davis and Haltiwanger (2024) also estimate positive employment elasticities for small-young firms, and our preferred estimates are roughly two to three times larger, although the elasticities are not directly

[15] Across the three regressions, we estimate, only an indicator for manufacturing is significantly related to $LTD_i \times (1 - highLTD_i)$.

	Loan growth				
2008	0.128*	0.267*	0.116*	0.122*	0.110*
	(0.0692)	(0.156)	(0.0610)	(0.0656)	(0.0557)
2008-2009	0.150	0.353	0.104*	0.132	0.114*
	(0.0964)	(0.245)	(0.0570)	(0.0856)	(0.0667)
2008-2010	0.127*	0.268*	0.0911*	0.110*	0.0971*
	(0.0761)	(0.151)	(0.0476)	(0.0644)	(0.0525)
2008-2011	0.163*	0.301*	0.124**	0.148**	0.129**
	(0.0856)	(0.152)	(0.0509)	(0.0719)	(0.0550)
2008-2012	0.135**	0.238**	0.116**	0.124**	0.113***
	(0.0630)	(0.111)	(0.0441)	(0.0495)	(0.0422)
2008-2013	0.142**	0.234**	0.125***	0.133**	0.120***
	(0.0635)	(0.0984)	(0.0471)	(0.0523)	(0.0437)
Estimation:	2SLS	2SLS	2SLS	LIML	Fuller
Instruments:					
High LTD	✓		✓	✓	✓
Linear LTD		✓			
Linear LTD for low LTD			✓	✓	✓
Observations					
2008	5,847	5,761	5,847	5,847	5,847
2008-2009	9,062	8,933	9,062	9,062	9,062
2008-2010	11,190	11,029	11,190	11,190	11,190
2008-2011	13,103	12,913	13,103	13,103	13,103
2008-2012	14,801	14,585	14,801	14,801	14,801
2008-2013	16,356	16,115	16,356	16,356	16,356

Table 3: Effect of annual loan growth on annual employment growth for small-young firms (net employment flows over lagged employment). Estimates from IV regressions across different post-periods. Columns 1-3 use 2SLS, column 4 LIML, and column 5 the Fuller estimator ($\alpha = 1$). Instruments: (1) high-LTD dummy $\times$ post dummy (col. 1); (2) linear LTD $\times$ post dummy, trimming top 1% of LTD values for stronger first stage (col. 2); (3-4) high-LTD dummy and linear LTD (below-median values) $\times$ post dummy. Controls: firm age $\times$ year, industry $\times$ year, municipality, and firm fixed effects. Sample restricted to firms with loans >7,000 DKK per worker in 2007. First-stage results in Appendix Table A-2. Robustness: Online Appendix Table B-10 (only year and firm FE) and Table B-11 (zeros recoded as 0.001 or 1,000 DKK). Standard errors clustered at the primary bank level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

comparable.[16] We also note that the magnitude of our elasticity is sensitive to how we treat zero-loan observations in the first stage. If, for example, we recode zero loan values as 0.001 DKK instead of 1 DKK, the estimated elasticities for small-young firms drop slightly (to around 0.09-0.12, see Online Appendix Table B-11).[17] Thus, despite some sensitivity in magnitude, the evidence consistently indicates that increases in credit availability led to higher employment growth for small, young firms during the Great Recession.

4.3 Loan Increases, Loan Cuts, and Employment Growth

In contrast to other small firms, many small-young firms are in an expansion phase that often requires external financing. To assess whether credit constraints primarily limited growth or triggered employment reductions, Table 4 classifies small-young firms by whether they expanded, contracted, or closed during the crisis period (2008:Q2-2010:Q2) and then tracks cumulative employment growth through the recovery, ending in 2013.[18] Across all three groups, firms linked to high-LTD banks exhibited weaker employment growth than those linked to low-LTD banks. Importantly, during the crisis the high-low gap is larger among firms that expanded (job creation of 0.104 vs. 0.131, a 2.7 percentage-point gap) than among firms that contracted (job destruction of -0.161 vs. -0.143, a 1.8 percentage-point gap), consistent with credit constraints disproportionately limiting growth at firms attempting to expand.

Table 4 shows that a larger share of small-young firms contracted (39%) than expanded (25%) during the crisis. Another 13% maintained a constant workforce, and 23% closed. Closure rates were very similar across high- and low-LTD groups (24% vs. 23%). Over the combined crisis-and-recovery period, the cumulative high-low differences are of similar magnitude for contracting and expanding firms. However, because contracting firms are more prevalent during the crisis, this implies that the average *per-firm* differential is smaller

[16] The main focus of Davis and Haltiwanger (2024) is the effect of housing prices on MSA-level employment growth. For small-business loans, they use a shift-share variable weighting each bank's national loan growth by its MSA lending share. Our elasticity estimates are about 2-3 times larger, which is intuitive since credit tightening likely does not affect all MSA firms equally.

[17] When recoding zero loans to 1,000 DKK, we obtain elasticities in the range of 0.21 to 0.25.

[18] Online Appendix Figure B-10 depicts the evolution for firms expanding and contracting in the crisis period (2008:Q2-2010:Q2).

	Crisis		Recovery		Crisis and recovery	
	Low LTD	High LTD	Low LTD	High LTD	Low LTD	High LTD
Contracting firms:						
Share of firms	0.39	0.39	0.39	0.39	0.39	0.39
Job destruction	-0.143	-0.161	-0.088	-0.104	-0.232	-0.266
Expanding firms:						
Share of firms	0.26	0.24	0.26	0.24	0.26	0.24
Job creation	0.131	0.104	-0.037	-0.043	0.093	0.061
Closing firms:						
Share of firms	0.23	0.24	.	.	.	.
Job destruction	-0.267	-0.279	.	.	.	.
Number of firms	2022	1501	2022	1501	2022	1501
Employment in 2007	23581	18335	23581	18335	23581	18335

Table 4: Cumulative employment growth for small-young firms (5-50 employees in 2007Q3; age 0-3 years in 2007) during the crisis (2008:Q2-2010:Q2), recovery (2010:Q3-2013:Q4), and combined period (2008:Q2-2013:Q4). Job creation/destruction measured relative to the total 2007 small-young firm employment and not seasonally adjusted (unlike Figure B-10). Firm shares measured in 2007. Comparison: low- vs. high-LTD banks. Firms classified as contracting, expanding, or closing during the crisis; contracting excludes crisis exits, and constant-workforce firms are omitted. Contracting/expanding firms that later closed in the recovery are counted as job destruction.

among contracting firms. Thus, conditional on survival, limited growth capacity appears more consequential for employment than downsizing.

Given this evidence, we next ask whether small-young firms' employment was depressed mainly by an inability to secure new loans or by cuts in existing credit. The prolonged differential decline in loan growth for small-young firms, visible in Figure 3, suggests that high-LTD banks were not only reducing outstanding credit but also reluctant to extend new loans to these firms. To understand whether employment growth of small-young firms is primarily affected by reductions or the absence of increases in credit, we distinguish between

positive and negative loan growth in the following equation:

$$\begin{aligned}\frac{NEF_{it}}{emp_{i,t-1}} &= \phi_i + \beta_1 loangrowth_{it} \times 1(loangrowth_{it} > 0) + \\ &\quad \beta_2 loangrowth_{it} \times 1(loangrowth_{it} < 0) + \Theta_t + \pi X_{it} + v_{it} \end{aligned} \tag{5}$$

where $loangrowth_{it} = log(loan_{i,t}) - log(loan_{i,t-1})$. The interpretation of β_1 and β_2 is the same as for α in equation (4) and measure the effect of an additional loan amount given respectively as a loan increase and as a loan reduction. We need more than one instrument to estimate both β_1 and β_2 by 2SLS and use the same instruments as before, i.e. the high LTD ratio and the linear LTD ratio below the median, both of which are interacted with the post 2008 dummy.

The first-stage results (Appendix Table A-2) confirm that credit constraints operated through both channels: the high-LTD instrument significantly predicts both restricted new lending (positive loan growth) and the occurrence of loan cuts (negative loan growth), with roughly similar effect sizes. Interestingly, the second-stage estimates (Table 5, columns 1-2) reveal an asymmetry in employment responses. For the full post-period, we estimate an employment elasticity of 0.15 for positive loan growth, which is significant at the 5% level. The elasticity for negative loan growth is 0.06, but not statistically significant. Across all periods considered, negative loan growth shows no significant effect, while positive loan growth consistently shows significant employment effects at the 5% level for post-periods 2008-2011 and beyond. To bolster our confidence in these joint estimates of positive and negative loan growth, we re-estimate the specification including only one endogenous regressor at a time–either positive or negative loan growth. The remaining columns of Table 5 report these estimates and lead to similar conclusions.

Overall, our results point to an asymmetry: increases in loan supply are linked to stronger employment responses, while estimated effects of loan reductions are not statistically different from zero. Our finding underscores the importance of credit availability for firms looking to expand.

As with the loan growth estimates in Table 3, discussed in the previous subsection, a potential concern is instrument strength. The first-stage F-statistics fall below the conventional threshold of 10 in most specifications. In particular, the F-statistic is lower for positive loan

	Joint IV estimation		Separate IV estimations					
	Positive loan growth	Negative loan growth	Positive loan growth	Negative loan growth	Positive loan growth	Negative loan growth	Positive loan growth	Negative loan growth
2008	0.156	-0.0136	0.154*	0.194	0.154*	0.604	0.143*	0.282
	(0.0987)	(0.131)	(0.0907)	(0.172)	(0.0908)	(1.239)	(0.0793)	(0.309)
2008-2009	0.155*	0.0087	0.154*	-0.0083	0.154*	-0.793	0.145*	-0.0902
	(0.0897)	(0.0834)	(0.0886)	(0.0901)	(0.0887)	(23.87)	(0.0786)	(0.721)
2008-2010	0.134*	0.0040	0.134*	-0.0019	0.134*	-0.681	0.127*	-0.0518
	(0.0767)	(0.0804)	(0.0765)	(0.0907)	(0.0765)	(33.22)	(0.0690)	(0.665)
2008-2011	0.167**	0.0256	0.165**	0.0055	0.166**	-6.756	0.157**	-0.0161
	(0.0781)	(0.0753)	(0.0777)	(0.0982)	(0.0784)	(7,414)	(0.0704)	(0.610)
2008-2012	0.146**	0.0531	0.148**	0.0660	0.151**	0.509	0.144**	0.214
	(0.0663)	(0.0681)	(0.0668)	(0.0664)	(0.0697)	(2.633)	(0.0638)	(0.326)
2008-2013	0.148**	0.0571	0.147**	0.0484	0.150**	1.113	0.143**	0.164
	(0.0635)	(0.0786)	(0.0640)	(0.0906)	(0.0665)	(19.75)	(0.0610)	(0.290)
Estimation	2SLS		2SLS	2SLS	LIML	LIML	Fuller	Fuller
Observations								
2008	5,847		5,847	5,847	5,847	5,847	5,847	5,847
2008-2009	9,062		9,062	9,062	9,062	9,062	9,062	9,062
2008-2010	11,190		11,190	11,190	11,190	11,190	11,190	11,190
2008-2011	13,103		13,103	13,103	13,103	13,103	13,103	13,103
2008-2012	14,801		14,801	14,801	14,801	14,801	14,801	14,801
2008-2013	16,356		16,356	16,356	16,356	16,356	16,356	16,356

Table 5: Effect of positive and negative annual loan growth on annual employment growth for small-young firms (net employment flows over lagged employment). Positive loan growth is $loangrowth_{it} \times 1(loangrowth_{it} > 0)$; negative loan growth is $loangrowth_{it} \times 1(loangrowth_{it} < 0)$. Estimates from IV regressions across different post-periods. Columns 1-2 report joint 2SLS estimates including both terms; columns 3-4 separate 2SLS estimates; columns 5-6 separate LIML estimates; columns 7-8 separate Fuller estimates ($\alpha = 1$). Instruments: high-LTD dummy and linear LTD (below median) × post dummy. Controls: firm age × year, industry × year, municipality, and firm fixed effects. Sample restricted to firms with loans >7,000 DKK per worker in 2007. First-stage results in Appendix Table A-2. Standard errors clustered at the primary bank level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

growth for all post-periods from 2008-2009 to 2008-2013 since our second instrument, linear LTD for low values of LTD, is only significant in the first-stages for negative loan growth. However, the Stock-Wright score test still rejects the null hypothesis of weak identification using our two instruments.

To better understand the mechanism behind the stronger employment response to credit expansions, we decompose net employment growth into its two components: hires and separations. Firms with higher loan growth exhibit substantially greater hiring activity, consistent with credit availability directly fueling job creation (Appendix Figure A-2 and Table A-3). By contrast, we find no evidence that increased credit access reduces separations. Actually, the estimates in Appendix Table A-4 also show *positive* (and smaller) coefficient estimates on separations, suggesting that better credit conditions might coincide with slightly higher separation rates. One plausible explanation is that rapidly expanding firms experience greater workforce turnover – in other words, more churning – as they reorganize and grow. Consistent with this interpretation, Hackney (2023) finds that greater presence of government-guaranteed lenders increases employment and labor-market churning in small- and medium-sized U.S. firms. Nevertheless, our estimated effect on separations is less robust: the Stock-Wright score tests indicate that we cannot reject the null of weak identification for almost all of the separations regressions. When we separate positive and negative loan growth in Appendix Tables A-5 and A-6, we find that only the effect of positive loan growth on hires is statistically significant at the 5% level. Overall, the results point to credit availability primarily affecting the hiring margin, with no reliable impact on separations.

4.4 Credit and Firm Closure

Having focused on the intensive margin among surviving firms, we now turn to the extensive margin and examine whether credit constraints increased the likelihood of firm closure. Conventional wisdom holds that reductions in existing loans or a lack of new credit can force small-young firms out of business, especially when sales are depressed. Consistent with this view, Figure 7 shows that from 2008 to 2013, small-young firms connected to high-LTD banks experienced higher closure rates, whereas large firms and mature small firms showed no difference in exit rates based on their bank's health.

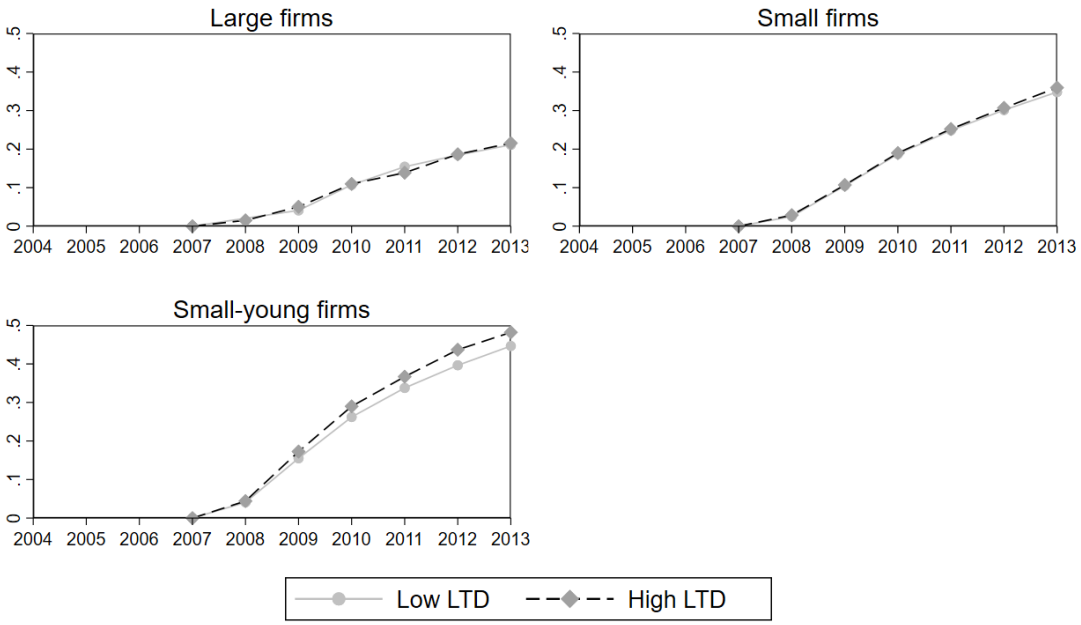

Figure 7: Cumulative exit rates since 2007 for large firms, small firms (5-50 employees in 2007), and small-young firms (0-3 years old in 2007). Comparison: high- vs. low-LTD banks.

Unlike in the employment growth analysis, we cannot observe a true pre-crisis period for firm exits because the sample is conditioned on firms surviving through 2007. Nevertheless, as Figure 7 shows, closures were very rare in 2008, allowing us to treat 2008 as a quasi-pre-period when examining how loan changes affect subsequent survival. We then estimate the effect of loan growth on firm closure, with results reported in Appendix Table A-7.

In Appendix Table A-7, no specifications yield coefficients on loan growth that are statistically significant at the 5% level, though in some longer post-periods the effects are negative and significant at the 10% level. However, these findings are not statistically reliable enough to support definitive conclusions. The first-stage Kleibergen-Paap F-statistics are low, and the Stock-Wright score test yields p-values above 5% and, in most cases, above 10%.[19] This is likely a result of only having a single year as pre-period. When separately estimating positive and negative loan effects (Online Appendix Table B-18), all effects are insignificant.

[19]The exception is when using the linear LTD instrument, but for these regressions the Kleibergen-Paap F-statistics are consistently below 4.

5 Conclusion

Using Danish data, we find that credit-supply disruptions during the Great Recession had significant employment effects for small-young firms, and that these effects operated mainly through missed growth opportunities rather than firm destruction. Among small-young firms attached to weaker banks, roughly four-fifths of the total employment effect arose among survivors, reflecting curtailed hiring rather than mass closures. In contrast, large and older small firms saw little to no impact from bank health, underscoring that the mechanism was concentrated in the segment most dependent on new external finance.

We disentangle two channels of credit contraction–restricted access to new loans and outright cuts to existing loans. Our evidence suggests that for small-young firms the employment effects are driven mainly by the former: firms connected to weaker banks obtained fewer new loans and subsequently curtailed hiring. In contrast, the estimates for loan cuts are smaller and statistically imprecise. These findings help explain why aggregate studies sometimes find muted real effects of banking distress: if most firms are mature and less reliant on new borrowing, the aggregate impact will appear limited even though small-young firms are persistently constrained.

For policy targeted at small-young firms, our results suggest that downturn interventions should aim to preserve the flow of new credit to the small-young segment, where the scarring effects are most pronounced. Instruments such as guarantees or liquidity facilities that specifically support new lending to small-young firms may help sustain expansion and limit medium-term job creation losses. In our setting, most of the employment damage appears in forgone growth rather than firm exits, underscoring the value of measures that protect firms' ability to expand when conditions recover.

References

Adamopoulou, E., De Philippis, M., Sette, E. and Viviano, E. (2020). The long run earnings effects of a credit market disruption.

Albertazzi, U. and Marchetti, D. J. (2010). Credit supply, flight to quality and evergreening: an analysis of bank-firm relationships after lehman. *Bank of Italy Temi di Discussione (Working Paper) No*, **756**.

Bennedsen, M., Larsen, B., Schmutte, I. M. and Scur, D. (2023). The effect of preserving job matches during a crisis. *Labour Economics*, **84**, 102406.

Bentolila, S., Jansen, M. and Jiménez, G. (2018). When credit dries up: Job losses in the great recession. *Journal of the European Economic Association*, **16** (3), 650–695.

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

— and — (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** (6-8), 613–673.

Bertheau, A. and Vejlin, R. (2022). *Job Ladders by Firm Wage and Productivity*. Tech. rep.

Berton, F., Mocetti, S., Presbitero, A. F. and Richiardi, M. (2018). Banks, firms, and jobs. *The Review of Financial Studies*, **31** (6), 2113–2156.

Bertoni, F., Colombo, M. G. and Quas, A. (2023). The long-term effects of loan guarantees on sme performance. *Journal of Corporate Finance*, **80** (C).

Bonin, S. M. (2020). The long-lasting effect of a credit crunch: Firms' adjustments during the great recession in denmark. *Aarhus University, August 2020*.

Chodorow-Reich, G. (2014). The employment effects of credit market disruptions: Firm-level evidence from the 2008-09 financial crisis. *Quarterly Journal of Economics*, **129** (1), 1–59.

— and Falato, A. (2022). The loan covenant channel: How bank health transmits to the real economy. *The Journal of Finance*, **77** (1), 85–128.

Cingano, F., Manaresi, F. and Sette, E. (2016). Does credit crunch investment down? new evidence on the real effects of the bank-lending channel. *The Review of Financial Studies*, **29** (10), 2737–2773.

Davis, S. J. and Haltiwanger, J. (2024). Dynamism diminished: The role of housing markets and credit conditions. *American Economic Journal: Macroeconomics*, **16** (2), 29–61.

De Haas, R. and Gonzalez-Uribe, J. (2025). *Public policies for private finance*. Tech. rep.

Dörr, J. O., Licht, G. and Murmann, S. (2022). Small firms and the covid-19 insolvency gap. *Small business economics*, **58** (2), 887–917.

Duygan-Bump, B., Levkov, A. and Montoriol-Garriga, J. (2015). Financing constraints and unemployment: Evidence from the great recession. *Journal of Monetary Economics*, **75**, 89–105.

Gilchrist, S., Schoenle, R., Sim, J. and Zakrajšek, E. (2017). Inflation dynamics during the financial crisis. *American Economic Review*, **107** (3), 785–823.

Granja, J., Makridis, C., Yannelis, C. and Zwick, E. (2022). Did the paycheck protection program hit the target? *Journal of Financial Economics*, **145** (3), 725–761.

Greenstone, M., Mas, A. and Nguyen, H.-L. (2020). Do credit market shocks affect the real economy? quasi-experimental evidence from the great recession and" normal" economic times. *American Economic Journal: Economic Policy*, **12** (1), 200–225.

Hackney, J. (2023). Small business lending in financial crises: The role of government-guaranteed loans. *Review of Finance*, **27** (1), 247–287.

Haltiwanger, J. C., Hyatt, H. R., Kahn, L. B. and McEntarfer, E. (2018). Cyclical job ladders by firm size and firm wage. *American Economic Journal: Macroeconomics*, **10** (2), 52–85.

Huber, K. (2018). Disentangling the effects of a banking crisis: Evidence from german firms and counties. *American Economic Review*, **108** (3), 868–98.

Iyer, R., Peydró, J.-L., da Rocha-Lopes, S. and Schoar, A. (2014). Interbank liquidity crunch and the firm credit crunch: Evidence from the 2007–2009 crisis. *The Review of Financial Studies*, **27** (1), 347–372.

Jensen, T. L. and Johannesen, N. (2017). The consumption effects of the 2007–2008 financial crisis: Evidence from households in denmark. *American Economic Review*, **107** (11), 3386–3414.

Kacer, M., Wilson, N., Zouari, S. and Cowling, M. (2025). Entrepreneurial finance and the survival of equity-funded firms in crisis periods: the case of covid-19. *Small Business Economics*, **2025**, 1–34.

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

Popov, A. and Rocholl, J. (2018). Do credit shocks affect labor demand? evidence for employment and wages during the financial crisis. *Journal of Financial Intermediation*, **36**, 16–27.

Rangvid, J. (2013). *Den finansielle krise i Danmark*. Danish ministry for business and growth. government committee report.

Shimer, R. (2012). Reassessing the ins and outs of unemployment. *Review of Economic Dynamics*, **15** (2), 127–148.

Siemer, M. (2019). Employment effects of financial constraints during the great recession. *Review of Economics and Statistics*, **101** (1), 16–29.

Udell, G. F. (2020). Sme access to finance and the global financial crisis. *Journal of Financial Management, Markets and Institutions*, **8** (01), 2040003.

APPENDICES

A1 Appendix Figures and Tables

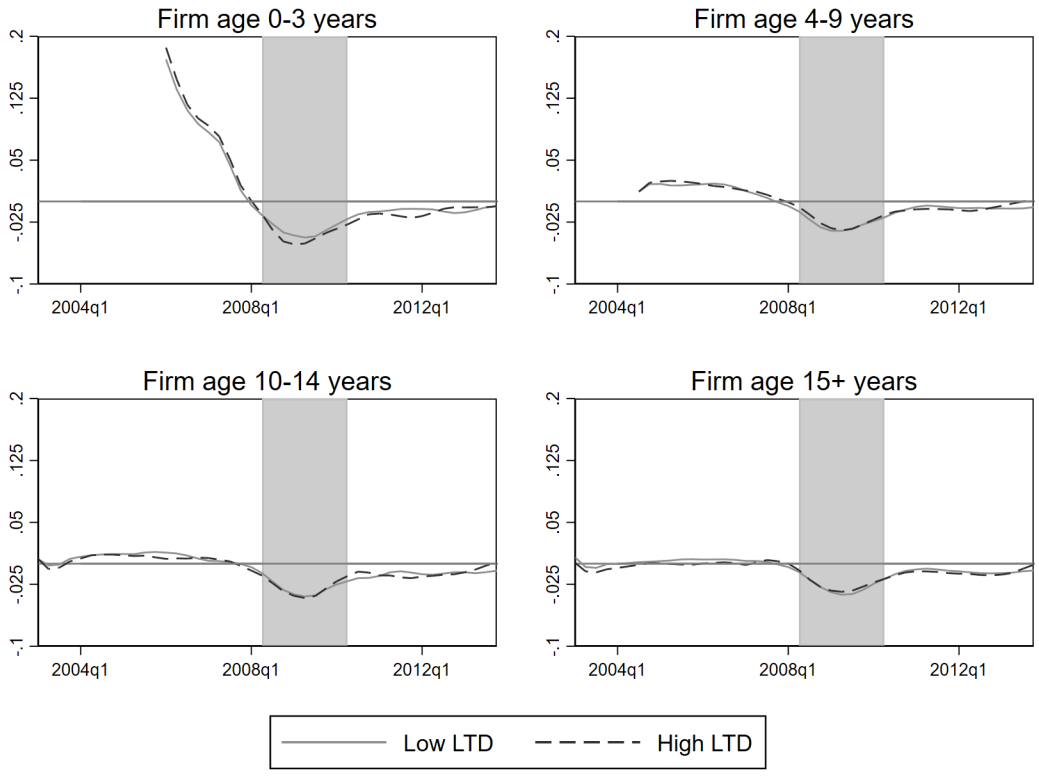

Figure A-1: Quarterly net employment flows for small firms (between 5 and 50 employees in the third quarter of 2007) by age in 2007, divided into categories of ages 0 to 3, ages 4 to 9, ages 10 to 14, and ages 15 and above. We compare firms with low LTD banks and firms with high LTD banks. The flows include firm exits. In this figure, the pre-period has been extended by one year compared to Figure 6 for firms aged 0-3 years in 2007 to verify that the pre-trends indeed are parallel. The plotted series are centered moving averages.

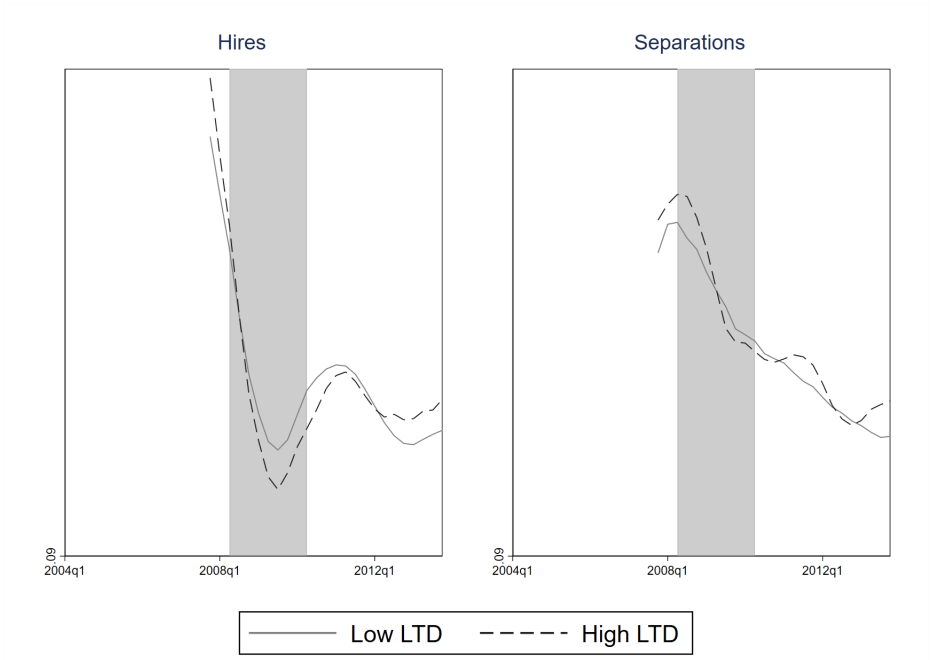

Figure A-2: Quarterly hires and separations for small-young firms (between 5 and 50 employees in the third quarter of 2007 and aged 0 to 3 years in 2007). We compare firms with low LTD banks and firms with high LTD banks. The flows include firm exits. The plotted series are centered moving averages.

Large firms	Low LTD		High LTD				t-test
	Average	Std.error	Average	Std.error			low vs. high
Number of employed	194.88	25.68	217.21	23.51			-0.64
Manufacturing	0.41	0.02	0.42	0.02			-0.47
Construction	0.09	0.01	0.08	0.01			1.01
Large city	0.21	0.01	0.25	0.02			-2.11
Firm age	21.52	0.60	23.19	0.64			-1.92
Value-added per worker	546	25	545	22			0.05
Average salary per firm	27.9	0.25	28.6	0.26			-1.69
Total loans per worker	592	128	400	60			1.35
Total loan / total asset	0.24	0.01	0.23	0.01			1.14
Total debt / total asset	0.69	0.01	0.68	0.01			1.18
Equity per worker	788	110	1,045	259			-0.91
Firms	807		778				
Small firms	Low LTD		High LTD		No bank credit		t-test
	Average	Std.error	Average	Std.error	Average	Std.error	low vs. high
Number of employed	15.15	0.13	15.51	0.14	14.71	0.24	-1.88
Manufacturing	0.18	0.00	0.21	0.01	0.15	0.01	-4.03
Construction	0.20	0.00	0.18	0.01	0.25	0.01	2.47
Large city	0.21	0.01	0.21	0.01	0.19	0.01	-0.48
Firm age	12.29	0.13	13.51	0.16	13.64	0.27	-5.83
Value-added per worker	514	12	539	10	663	42	-1.64
Average salary per firm	25.5	0.10	26.5	0.13	28.2	0.25	-6.34
Total loans per worker	473	28	542	48	81	17	-1.23
Total loan / total asset	0.30	0.01	0.29	0.01	0.06	0.00	0.95
Total debt / total asset	0.74	0.00	0.72	0.00	0.59	0.01	4.62
Equity per worker	817	110	1,016	156	1,230	581	-1.04
Firms	6,298		5,050		1,641		
Small-young firms	Low LTD		High LTD		No bank credit		t-test
	Average	Std.error	Average	Std.error	Average	Std.error	low vs. high
Number of employed	12.42	0.22	13.04	0.28	12.56	0.54	-1.73
Manufacturing	0.13	0.01	0.14	0.01	0.09	0.02	-0.93
Construction	0.25	0.01	0.24	0.01	0.26	0.03	0.25
Large city	0.24	0.01	0.22	0.01	0.16	0.02	1.26
Firm age	2.10	0.02	2.09	0.03	2.09	0.05	0.37
Value-added per worker	437	20	461	15	491	19	-0.97
Average salary per firm	24.4	0.22	24.8	0.26	28.9	0.78	-1.21
Total loans per worker	306	35	414	70	87	21	-1.37
Total loans / total assets	0.37	0.02	0.37	0.02	0.12	0.02	0.06
Total debt / total assets	0.78	0.01	0.78	0.01	0.65	0.01	0.22
Equity per worker	430	160	378	102	256	33	0.27
Firms	1,321		894		243		

Table A-1: Summary statistics for firms in 2007. Large firms have >50 employees, small firms 5-50, and young firms 0-3 years old (all in 2007). Firms are split by their bank's LTD at the median. No-credit firms had no bank connection or zero credit in 2007. High- and low-LTD firms had >7,000 DKK in loans in 2007. Value-added per worker, average salary, loan amount per worker, and equity per worker are in 1,000 DKK (2007), annual except salary (monthly). Accounting variables come from KOB, with coverage of 77% in small-young, 88% in small, and 95% in large firms. Statistics for large firms without credit are omitted due to too few observations.

		Loan growth			Positive loan growth	Negative loan growth
2008	HighLTD	-0.498***		-0.763***	-0.432***	-0.331**
		(0.153)		(0.192)	(0.157)	(0.157)
	Linear LTD		-0.0077*			
			(0.00388)			
	Linear LTD			-0.0028	-0.0002	-0.0026*
	(low values)			(0.0018)	(0.0011)	(0.0014)
2009	HighLTD	-0.374**		-0.763***	-0.285*	-0.478***
		(0.181)		(0.174)	(0.155)	(0.0899)
	Linear LTD		-0.00522			
			(0.00351)			
	Linear LTD			-0.004***	0.0008	-0.005***
	(low values)			(0.0015)	(0.0010)	(0.0009)
2010	HighLTD	-0.388**		-0.761***	-0.292**	-0.469***
		(0.158)		(0.147)	(0.139)	(0.0888)
	Linear LTD		-0.0063*			
			(0.00324)			
	Linear LTD			-0.0039**	0.0008	-0.005***
	(low values)			(0.0015)	(0.0009)	(0.0009)
2011	HighLTD	-0.365**		-0.706***	-0.281**	-0.425***
		(0.149)		(0.199)	(0.122)	(0.148)
	Linear LTD		-0.0061**			
			(0.00298)			
	Linear LTD			-0.0036*	0.0008	-0.004***
	(low values)			(0.0019)	(0.0008)	(0.0015)

(continues on next page)

		Loan growth			Positive loan growth	Negative loan growth	
2012	HighLTD	-0.435***		-0.781***	-0.292**	-0.489***	
		(0.144)		(0.163)	(0.116)	(0.130)	
	Linear LTD		-0.0075**				
			(0.0033)				
	Linear LTD			-0.0036**	0.0010	-0.005***	
	(low values)			(0.0016)	(0.0007)	(0.0014)	
2013	HighLTD	-0.406***		-0.695***	-0.287**	-0.408***	
		(0.128)		(0.141)	(0.110)	(0.105)	
	Linear LTD		-0.0076**				
			(0.00287)				
	Linear LTD			-0.0030**	0.0010	-0.004***	
	(low values)			(0.0015)	(0.0007)	(0.0011)	
Observations							
2008		5,847	5,761	5,847	5,847	5,847	
2008-2009		9,062	8,933	9,062	9,062	9,062	
2008-2010		11,190	11,029	11,190	11,190	11,190	
2008-2011		13,103	12,913	13,103	13,103	13,103	
2008-2012		14,801	14,585	14,801	14,801	14,801	
2008-2013		16,356	16,115	16,356	16,356	16,356	
Kleibergen-Paap rk Wald F-statistic							Joint tests
2008		10.61	3.944	9.091	4.845	2.552	1.180
2008-2009		4.254	2.216	10.01	3.076	21.44	16.70
2008-2010		6.061	3.712	13.41	4.040	19.98	14.16
2008-2011		6.026	4.234	7.001	5.472	4.987	6.530
2008-2012		9.141	5.326	12.13	7.073	7.981	10.05
2008-2013		10.11	6.932	13.05	7.721	9.225	11.39
Stock-Wright S-test p-value							
2008		0.0110	0.0273	0.0390	0.0390	0.0390	0.0172
2008-2009		0.00743	0.00955	0.0239	0.0239	0.0239	0.0150
2008-2010		0.0106	0.0104	0.0327	0.0327	0.0327	0.0220
2008-2011		0.00492	0.00513	0.0189	0.0189	0.0189	0.0108
2008-2012		0.00592	0.0105	0.0214	0.0214	0.0214	0.0163
2008-2013		0.00783	0.0132	0.0280	0.0280	0.0280	0.0216

Table A-2: First-stage results for the IV models of employment growth in Tables 3 and 5. Columns 1-3 report the first stages of columns 1-3 in Table 3. Column 4 corresponds to columns 3 and 5 in Table 5, and column 5 to columns 4 and 6. Columns 4-5 are also the first stages of the joint estimation in columns 1-2 of Table 5. Column 6 reports the joint F-test and p-value of the Stock-Wright score test. Since the Stock-Wright weak identification test is based on the reduced form, it is identical across columns with the same outcome and instruments. All instruments are interacted with the post-2008 dummy. Regressions include firm age × year, industry × year, municipality, and firm fixed effects. Firms are included only if loan amount per worker exceeded 7,000 DKK in 2007. The column 3 parameter estimate equals the sum of columns 4 and 5, since $y = (y > 0) \cdot y + (y \leq 0) \cdot y$. Standard errors clustered at the primary bank level. $p < 0.01$, ** $p < 0.05$, *$p < 0.1$.

	Loan growth				
2008	0.150*	0.341*	0.150**	0.150**	0.136**
	(0.0807)	(0.189)	(0.0722)	(0.0722)	(0.0622)
2008-2009	0.223	0.503	0.183**	0.197**	0.174**
	(0.136)	(0.326)	(0.0830)	(0.0952)	(0.0761)
2008-2010	0.208*	0.412*	0.169**	0.185**	0.165**
	(0.118)	(0.222)	(0.0734)	(0.0864)	(0.0707)
2008-2011	0.240*	0.428**	0.200***	0.217**	0.192***
	(0.122)	(0.214)	(0.0758)	(0.0893)	(0.0699)
2008-2012	0.204**	0.353**	0.183***	0.190***	0.173***
	(0.0933)	(0.159)	(0.0661)	(0.0705)	(0.0602)
2008-2013	0.220**	0.356**	0.200***	0.208***	0.187***
	(0.0985)	(0.145)	(0.0731)	(0.0779)	(0.0651)
Estimation:	2SLS	2SLS	2SLS	LIML	Fuller
Instruments:					
High LTD	✓		✓	✓	✓
Linear LTD		✓			
Linear LTD for low LTD			✓	✓	✓
Observations					
2008	5,847	5,761	5,847	5,847	5,847
2008-2009	9,062	8,933	9,062	9,062	9,062
2008-2010	11,190	11,029	11,190	11,190	11,190
2008-2011	13,103	12,913	13,103	13,103	13,103
2008-2012	14,801	14,585	14,801	14,801	14,801
2008-2013	16,356	16,115	16,356	16,356	16,356
Kleibergen-Paap rk Wald F-statistic					
2008	10.61	3.944	9.091	9.091	9.091
2008-2009	4.254	2.216	10.01	10.01	10.01
2008-2010	6.061	3.712	13.41	13.41	13.41
2008-2011	6.026	4.234	7.001	7.001	7.001
2008-2012	9.141	5.326	12.13	12.13	12.13
2008-2013	10.11	6.932	13.05	13.05	13.05
Stock-Wright score test p-value					
2008	0.0317	0.0264	0.0605	0.0605	0.0605
2008-2009	0.0116	0.00520	0.0373	0.0373	0.0373
2008-2010	0.0116	0.00783	0.0412	0.0412	0.0412
2008-2011	0.0112	0.00701	0.0400	0.0400	0.0400
2008-2012	0.0111	0.00802	0.0386	0.0386	0.0386
2008-2013	0.0110	0.0107	0.0389	0.0389	0.0389

Table A-3: The effect of annual loan growth on annual hires for small-young firms. Dependent variable: hires in year t divided by lagged employment. Results are from IV estimations, each row showing different post-periods. Columns 1-3 use 2SLS, column 4 LIML, and column 5 the Fuller estimator ($\alpha = 1$). Column 1 instruments loan growth with a high-LTD dummy × post dummy. Column 2 uses linear LTD × post dummy, trimming the top 1% of LTD values to strengthen the first stage. Columns 3-5 use both instruments (high-LTD dummy and linear LTD for below-median values), each × post-2008 dummy. All regressions include firm-age × year, industry × year, municipality, and firm fixed effects. Firms are included only if loan amount per worker exceeded 7,000 DKK in 2007. Online Appendix Table B-13 reports estimates with only year and firm fixed effects. First-stage results are in Appendix Table A-2. Standard errors clustered at the primary bank level. $p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

	Loan growth				
2008	0.0228	0.0738	0.0337	0.0363	0.0328
	(0.0412)	(0.0688)	(0.0342)	(0.0372)	(0.0332)
2008-2009	0.0728	0.151	0.0785**	0.0788**	0.0700**
	(0.0562)	(0.108)	(0.0365)	(0.0368)	(0.0303)
2008-2010	0.0811	0.145	0.0774**	0.0776**	0.0696**
	(0.0554)	(0.0889)	(0.0360)	(0.0362)	(0.0306)
2008-2011	0.0769	0.127	0.0760**	0.0760**	0.0673**
	(0.0546)	(0.0812)	(0.0365)	(0.0365)	(0.0308)
2008-2012	0.0692	0.115*	0.0674**	0.0674**	0.0614**
	(0.0449)	(0.0645)	(0.0322)	(0.0323)	(0.0285)
2008-2013	0.0776	0.122*	0.0752**	0.0754**	0.0676**
	(0.0491)	(0.0632)	(0.0366)	(0.0367)	(0.0317)
Estimation:	2SLS	2SLS	2SLS	LIML	Fuller
Instruments:					
High LTD	✓		✓	✓	✓
Linear LTD		✓			
Linear LTD for low LTD			✓	✓	✓
Observations					
2008-2008	5,847	5,761	5,847	5,847	5,847
2008-2009	9,062	8,933	9,062	9,062	9,062
2008-2010	11,190	11,029	11,190	11,190	11,190
2008-2011	13,103	12,913	13,103	13,103	13,103
2008-2012	14,801	14,585	14,801	14,801	14,801
2008-2013	16,356	16,115	16,356	16,356	16,356
Kleibergen-Paap rk Wald F-statistic					
2008	10.61	3.945	9.093	9.093	9.093
2008-2009	4.255	2.217	10.01	10.01	10.01
2008-2010	6.062	3.713	13.41	13.41	13.41
2008-2011	6.026	4.234	7.002	7.002	7.002
2008-2012	9.141	5.327	12.13	12.13	12.13
2008-2013	10.11	6.932	13.05	13.05	13.05
Stock-Wright score test p-value					
2008	0.586	0.277	0.125	0.125	0.125
2008-2009	0.149	0.0715	0.0434	0.0434	0.0434
2008-2010	0.0972	0.0486	0.0740	0.0740	0.0740
2008-2011	0.151	0.0792	0.155	0.155	0.155
2008-2012	0.116	0.0503	0.134	0.134	0.134
2008-2013	0.0977	0.0455	0.104	0.104	0.104

Table A-4: The effect of annual loan growth on annual separations for small-young firms. Dependent variable: separations in year t divided by lagged employment. Results are from IV estimations, each row showing different post-periods. Columns 1-3 use 2SLS, column 4 LIML, and column 5 the Fuller estimator ($\alpha = 1$). Column 1 instruments loan growth with a high-LTD dummy × post dummy. Column 2 uses linear LTD × post dummy, trimming the top 1% of LTD values to strengthen the first stage. Columns 3-5 use both instruments (high-LTD dummy and linear LTD for below-median values), each × post-2008 dummy. All regressions include firm-age × year, industry × year, municipality, and firm fixed effects. Firms are included only if loan amount per worker exceeded 7,000 DKK in 2007. Online Appendix Table B-14 reports estimates with only year and firm fixed effects. First-stage results are in Appendix Table A-2. Standard errors clustered at the primary bank level. $p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

	Joint IV estimation		Separate IV estimations					
	Positive loan growth	Negative loan growth	Positive loan growth	Negative loan growth	Positive loan growth	Negative loan growth	Positive loan growth	Negative loan growth
2008	0.151	0.146	0.183*	0.347	0.187*	0.548	0.174*	0.348
	(0.116)	(0.219)	(0.100)	(0.260)	(0.105)	(0.582)	(0.0916)	(0.261)
2008-2009	0.227*	0.0990	0.221*	0.0740	0.231*	0.661	0.217*	0.278
	(0.128)	(0.102)	(0.121)	(0.107)	(0.133)	(3.067)	(0.117)	(0.543)
2008-2010	0.216*	0.0725	0.215*	0.0630	0.220*	0.833	0.208*	0.257
	(0.118)	(0.0962)	(0.117)	(0.107)	(0.123)	(6.718)	(0.110)	(0.552)
2008-2011	0.244**	0.0994	0.238**	0.0700	0.247**	1.392	0.233**	0.281
	(0.112)	(0.0954)	(0.111)	(0.116)	(0.119)	(21.42)	(0.107)	(0.593)
2008-2012	0.216**	0.114	0.221**	0.134	0.233**	0.666	0.222**	0.365
	(0.101)	(0.0880)	(0.101)	(0.0823)	(0.111)	(1.955)	(0.102)	(0.464)
2008-2013	0.226**	0.123	0.224**	0.110	0.235**	1.192	0.224**	0.348
	(0.100)	(0.1000)	(0.100)	(0.110)	(0.109)	(8.148)	(0.100)	(0.490)
Estimation:	2SLS		2SLS	2SLS	LIML	LIML	Fuller	Fuller
Observations								
2008	5,847		5,847	5,847	5,847	5,847	5,847	5,847
2008-2009	9,062		9,062	9,062	9,062	9,062	9,062	9,062
2008-2010	11,190		11,190	11,190	11,190	11,190	11,190	11,190
2008-2011	13,103		13,103	13,103	13,103	13,103	13,103	13,103
2008-2012	14,801		14,801	14,801	14,801	14,801	14,801	14,801
2008-2013	16,356		16,356	16,356	16,356	16,356	16,356	16,356
Kleibergen-Paap rk Wald F-statistic								
2008	1.463		4.845	2.552	4.845	2.552	4.845	2.552
2008-2009	18.83		3.076	21.44	3.076	21.44	3.076	21.44
2008-2010	20.85		4.040	19.98	4.040	19.98	4.040	19.98
2008-2011	5.086		5.472	4.987	5.472	4.987	5.472	4.987
2008-2012	8.045		7.073	7.981	7.073	7.981	7.073	7.981
2008-2013	9.323		7.721	9.224	7.721	9.224	7.721	9.224
Stock-Wright score test p-value								
2008	0.0605		0.0605	0.0605	0.0605	0.0605	0.0605	0.0605
2008-2009	0.0373		0.0373	0.0373	0.0373	0.0373	0.0373	0.0373
2008-2010	0.0412		0.0412	0.0412	0.0412	0.0412	0.0412	0.0412
2008-2011	0.0400		0.0400	0.0400	0.0400	0.0400	0.0400	0.0400
2008-2012	0.0386		0.0386	0.0386	0.0386	0.0386	0.0386	0.0386
2008-2013	0.0389		0.0389	0.0389	0.0389	0.0389	0.0389	0.0389

Table A-5: The effect of annual loan growth on annual hires for small-young firms. The dependent variable is hires in year t divided by lagged employment. All results are from IV estimations, with each row corresponding to a different post-period. Columns 1-4 report 2SLS estimates, columns 5-6 LIML estimates, and columns 7-8 Fuller estimates ($\alpha = 1$). Because the Stock-Wright weak identification test is based on the reduced-form regression, it is identical across all columns that share the same outcome and instruments. Online Appendix Table B-15 shows estimates with only year and firm fixed effects. Standard errors are clustered at the primary bank level. $p < 0.01$, ** $p < 0.05$, *$p < 0.1$.

	Joint IV estimation		Separate IV estimations					
	Positive loan growth	Negative loan growth	Positive loan growth	Negative loan growth	Positive loan growth	Negative loan growth	Positive loan growth	Negative loan growth
2008	-0.005	0.159	0.0289	0.152	0.0313	0.153	0.0292	0.112
	(0.101)	(0.166)	(0.0476)	(0.118)	(0.0525)	(0.118)	(0.0481)	(0.0732)
2008-2009	0.0722	0.0902*	0.0667	0.0823	0.0752	0.110	0.0702	0.0922
	(0.0606)	(0.0496)	(0.0541)	(0.0495)	(0.0642)	(0.0761)	(0.0581)	(0.0579)
2008-2010	0.0819	0.0685	0.0803	0.0649	0.0854	0.112	0.0805	0.0883
	(0.0591)	(0.0474)	(0.0577)	(0.0452)	(0.0633)	(0.103)	(0.0579)	(0.0687)
2008-2011	0.0770	0.0738	0.0729	0.0645	0.0780	0.114	0.0736	0.0862
	(0.0563)	(0.0533)	(0.0547)	(0.0508)	(0.0598)	(0.118)	(0.0554)	(0.0736)
2008-2012	0.0702	0.0614	0.0728	0.0676	0.0763	0.111	0.0728	0.0876
	(0.0531)	(0.0475)	(0.0520)	(0.0438)	(0.0554)	(0.0984)	(0.0520)	(0.0639)
2008-2013	0.0783	0.0659	0.0770	0.0612	0.0803	0.158	0.0766	0.102
	(0.0530)	(0.0522)	(0.0527)	(0.0497)	(0.0559)	(0.219)	(0.0524)	(0.0972)
Estimation:	2SLS		2SLS	2SLS	LIML	LIML	Fuller	Fuller
Observations								
2008	5,847		5,847	5,847	5,847	5,847	5,847	5,847
2008-2009	9,062		9,062	9,062	9,062	9,062	9,062	9,062
2008-2010	11,190		11,190	11,190	11,190	11,190	11,190	11,190
2008-2011	13,103		13,103	13,103	13,103	13,103	13,103	13,103
2008-2012	14,801		14,801	14,801	14,801	14,801	14,801	14,801
2008-2013	16,356		16,356	16,356	16,356	16,356	16,356	16,356
Kleibergen-Paap rk Wald F-statistic								
2008	1.463		4.845	2.552	4.845	2.552	4.845	2.552
2008-2009	18.83		3.076	21.44	3.076	21.44	3.076	21.44
2008-2010	20.85		4.040	19.98	4.040	19.98	4.040	19.98
2008-2011	5.086		5.472	4.987	5.472	4.987	5.472	4.987
2008-2012	8.045		7.073	7.981	7.073	7.981	7.073	7.981
2008-2013	9.323		7.721	9.224	7.721	9.224	7.721	9.224
Stock-Wright score test p-value								
2008	0.107		0.107	0.107	0.107	0.107	0.107	0.107
2008-2009	0.0408		0.0408	0.0408	0.0408	0.0408	0.0408	0.0408
2008-2010	0.0696		0.0696	0.0696	0.0696	0.0696	0.0696	0.0696
2008-2011	0.148		0.148	0.148	0.148	0.148	0.148	0.148
2008-2012	0.132		0.132	0.132	0.132	0.132	0.132	0.132
2008-2013	0.0866		0.0866	0.0866	0.0866	0.0866	0.0866	0.0866

Table A-6: The effect of annual loan growth on annual separations for small-young firms. The dependent variable is separations in year t divided by lagged employment. All results are from IV estimations, with each row corresponding to a different post-period. Columns 1-4 report 2SLS estimates, columns 5-6 LIML estimates, and columns 7-8 Fuller estimates ($\alpha = 1$). Because the Stock-Wright weak identification test is based on the reduced-form regression, it is identical across all columns that share the same outcome and instruments. Online Appendix Table B-16 shows estimates with only year and firm fixed effects. Standard errors are clustered at the primary bank level. $p < 0.01$, ** $p < 0.05$, *$p < 0.1$.

	Loan growth				
2009	-0.0365	-0.121	-0.0348	-0.0349	-0.0331
	(0.0291)	(0.105)	(0.0267)	(0.0269)	(0.0247)
2009-2010	-0.0515	-0.232	-0.0351	-0.0380	-0.0350
	(0.0431)	(0.289)	(0.0340)	(0.0383)	(0.0339)
2009-2011	-0.0525	-0.172	-0.0360	-0.0391	-0.0359
	(0.0374)	(0.164)	(0.0283)	(0.0320)	(0.0283)
2009-2012	-0.0699*	-0.178	-0.0455*	-0.0552	-0.0490
	(0.0418)	(0.138)	(0.0269)	(0.0353)	(0.0297)
2009-2013	-0.0579*	-0.135	-0.0440*	-0.0479	-0.0441*
	(0.0333)	(0.0911)	(0.0258)	(0.0291)	(0.0259)
Estimation:	2SLS	2SLS	2SLS	LIML	Fuller
Instruments:					
High LTD	✓		✓	✓	✓
Linear LTD		✓			
Linear LTD for low LTD			✓	✓	✓
Observations					
2009	4,198	4,138	4,198	4,198	4,198
2009-2010	7,412	7,309	7,412	7,412	7,412
2009-2011	9,545	9,410	9,545	9,545	9,545
2009-2012	11,458	11,294	11,458	11,458	11,458
2009-2013	13,157	12,967	13,157	13,157	13,157
Kleibergen-Paap rk Wald F-statistic					
2009	7.104	2.085	5.387	5.387	5.387
2009-2010	2.903	0.690	7.637	7.637	7.637
2009-2011	3.674	1.163	9.395	9.395	9.395
2009-2012	4.219	1.697	7.161	7.161	7.161
2009-2013	6.354	2.530	10.51	10.51	10.51
Stock-Wright score test p-value					
2009	0.113	0.0722	0.282	0.282	0.282
2009-2010	0.0822	0.0127	0.181	0.181	0.181
2009-2011	0.0775	0.0152	0.182	0.182	0.182
2009-2012	0.0450	0.0124	0.119	0.119	0.119
2009-2013	0.0533	0.0198	0.144	0.144	0.144

Table A-7: The effect of annual loan growth on firm closure. All results are from IV estimations, with each row showing different post-periods. Columns 1-3 use 2SLS, column 4 LIML, and column 5 the Fuller estimator ($\alpha = 1$). In column 1, loan growth is instrumented with a high-LTD dummy interacted with a post-period dummy. In column 2, we use linear LTD interacted with the post dummy; here the top 1% of LTD values are trimmed to strengthen the first stage. Columns 3-5 use both the high-LTD dummy and linear LTD (for LTDs below the median), interacted with a post-2009 dummy. All regressions include firm age × year, industry × year, municipality, and firm fixed effects. Firms are included only if loan amount per worker exceeded 7,000 DKK in 2007. The corresponding first-stage results are reported in Online Appendix Table B-20. Standard errors are clustered at the primary bank level. $p < 0.01$, ** $p < 0.05$, *$p < 0.1$.

	Reduced-form	Total employment effect	Minimum share	
			Firm-weighted	Employment-weighted
2008	-0.0808***	-0.250***	0.323	0.304
	(0.0237)	(0.0256)		
2008-2009	-0.0637***	-0.286***	0.223	0.220
	(0.0199)	(0.0215)		
2008-2010	-0.0579***	-0.280***	0.207	0.213
	(0.0194)	(0.0203)		
2008-2011	-0.0668***	-0.281***	0.238	0.233
	(0.0192)	(0.0203)		
2008-2012	-0.0665***	-0.277***	0.240	0.252
	(0.0192)	(0.0200)		
2008-2013	-0.0646***	-0.277***	0.233	0.243
	(0.0192)	(0.0198)		
2008	6,155	2,396		
2008-2009	9,412	3,731		
2008-2010	11,658	4,628		
2008-2011	13,677	5,429		
2008-2012	15,486	6,144		
2008-2013	17,171	6,807		

Table A-8: The table shows the minimum share of total employment growth attributable to tightened credit constraints. This share is calculated by assuming that loan reductions in high-LTD banks reflect only lower loan demand, i.e. dividing the reduced-form estimate in column 2 by the total employment effect in column 3 to obtain column 4. The reduced-form estimates are the effect of having a high-LTD bank after 2007, identical to column 10 of Online Appendix Table B-7. The estimates in column 3 are obtained by regressing employment growth on year dummies for 2005-2006 and a post-period dummy, including industry $\times$ municipality dummies and firm fixed effects. The sample is restricted to small-young firms (5-50 employees and age 0-3 years in 2007) with loan amounts per worker above 7,000 DKK in 2007. All estimates are weighted by firm employment in year $t-1$. Standard errors are clustered at the primary bank level. *** $p < 0.01$, ** $p < 0.05$, *$p < 0.1$.