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Abstract

We show that set-up costs are a key determinant of the capital structure of young firms. Theoretically, when firms face high set-up costs, they can only be established by lengthening debt maturity. Empirically, we use a large sample of French firms to show that young firms have a significantly higher leverage and issue longer-maturity debt than seasoned companies. As predicted by the model, these patterns are stronger in high set-up cost industries and for firms with lower profitability. Last, we show that, following an exogenous shock that reduces banks' supply of long-term loans, young firms in high set-up cost industries grow significantly less.

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Set-up Costs and the Financing of Young Firms*

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March 13, 2020

Abstract

We show that set-up costs are a key determinant of the capital structure of young firms. Theoretically, when firms face high set-up costs, they can only be established by lengthening debt maturity. Empirically, we use a large sample of French firms to show that young firms have a significantly higher leverage and issue longer-maturity debt than seasoned companies. As predicted by the model, these patterns are stronger in high set-up cost industries and for firms with lower profitability. Last, we show that, following an exogenous shock that reduces banks' supply of long-term loans, young firms in high set-up cost industries grow significantly less.

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Introduction

Despite the importance of young firms in the economy, little is know about their financing and their capital structure, due to severe data limitations. We start by uncovering two novel stylized facts using a large sample of French corporations: young firms have higher leverage and longer-maturity debt than seasoned companies. These facts are a priori surprising if one accepts the usual assumption that young firms are more subject than older firms to adverse selection and moral hazard frictions. Indeed, in standard models (Stiglitz and Weiss, 1981; Diamond, 1991), such frictions are associated with credit rationing and shorter debt maturity: these models predict that leverage and debt maturity should increase, not *decrease*, as firms age.

In this paper, we propose an explanation for these facts, and test a rich set of associated predictions. In sum, the key feature that can reconcile theory and data is the existence of fixed set-up costs, i.e., of a minimum quantity of tangible or intangible assets a firm needs to start operating in a given industry. When firms face set-up costs that are large relative to the entrepreneur's net worth, they need to turn to external financiers. Provided they have limited cash flows when they are young, their ability to repay debt each period is limited. The only way to finance set-up costs is thus to lengthen debt maturity, provided the debt contract remains feasible. These effects are larger in industries where set-up costs are higher.

To formalize predictions on the role of set-up costs, we first develop a simple three-period model with moral hazard, inspired by Holmstrom and Tirole (1997). In this model, firms borrow at date 0 and repay financiers at dates 1 and 2, using cash flows that are subject to moral hazard. In this context, it is efficient for firms to repay debt as soon as possible in order to limit moral hazard problems that can arise in the future. However, firms' ability to repay debt early is limited by the magnitude of their early cash flows. Firms with high set-up costs or low early cash flows thus need to borrow with longer-term debt. Their ability to do so is itself limited by moral hazard problems, so that there is selection of potential entrepreneurs into firm creation: entrepreneurs with too limited net worth cannot create firms, particularly if set-up costs are high.

This model generates three main testable predictions. First, in industries with higher set-up costs, initial leverage and debt maturity are higher, and decline more quickly as firms age. That is, the stylized fact discussed above is particularly strong in industries with high set-up costs. A corollary is that there is tougher selection in these industries: fewer entrepreneurs are able to enter. Second, within industries characterized by a given set-up cost, firms with lower initial profitability should borrow with longer-term debt. This prediction is again at odds with the received view that more constrained firms need to borrow with shorter-term debt. Third, when the ability of financiers to supply longer-term debt is impaired, there can be heterogeneous effects across industries with different set-up costs: the patterns of firm creation and growth will differ across industries. In other words, set-up costs are not only important for firms' capital structure, but also for the transmission of shocks.

We take these hypotheses to the data, using several sources, including balance sheet data on a random 20% of all firms created in France between 2006 and 2016, and detailed loan-level data from the Banque de France. These two sources of data allow us to overcome important data limitations on young and private companies and to test the predictions of the model. First, we present a set of stylized facts about the capital structure of young firms. In our sample, the ratio of total debt to assets falls from an average of 52% in the first two years of existence of firms to about 37% for 10-year old companies. The maturity of the bank debt also decreases significantly with age. At the loan level, the average maturity of new loans falls from 72 to 54 months on average over the first ten years. We then classify 3-digit industries into terciles based on set-up costs measured using data on tangible and intangible assets. Consistent with the model's predictions, the above patterns for leverage and maturity are almost entirely driven by firms operating in industries with high set-up costs. The ratio of total debt over assets decreases from about 70% to about 40% in the first ten years for firms in high set-up cost industries, while this proportion decreases much less, from about 40% to about 35% for firms in the lowest tercile of set-up costs. Similar patterns hold for debt maturity.

We then turn to formal tests using regressions. This allows us to include a variety of controls, as well as firm and time fixed effects. These fixed effects allow us to rule out the possibility that stylized facts are driven by selection, e.g., which could be the case if firms surviving until age 10 are systematically different from firms surviving only until age 2. We confirm the finding that, within a given firm and after removing time effects, leverage and debt maturity decrease with age. We additionally test the second specific prediction from the model, namely that, within industries with a given set-up cost, firms with lower cash flows borrow with longer-maturity debt. We do indeed find that, after including fixed effects at the industry level, firms with lower EBITDA borrow longer-term debt. Moreover, this effect is larger in magnitude during the first few years of existence of firms, consistent with the idea that younger firms are more financially constrained than older firms.

In the last part of the paper, we confirm the prediction that set-up costs are an important determinant of the transmission of financial shocks to the real economy. We do so using a quasi-natural experiment. Specifically, we exploit an event that exogenously forces some French banks to suddenly shorten the maturity of loans to corporations. This event is the failure in 2008 of Dexia, a large French-Belgian bank whose main business was to provide funding to local governments, notably municipalities. Following this shock, municipalities previously relying on loans from Dexia increasingly turned to other pre-existing lenders to borrow. Given that loans to municipalities have very long maturities, the duration mismatch between assets and liabilities increases mechanically for banks making these loans. To reduce this mismatch, they were constrained to reduce the maturity of new loans to corporations. In difference-in-differences regressions, we confirm that treated banks (that is, banks heavily exposed to municipalities that were previously borrowing from Dexia) significantly reduce the maturity of new corporate loans. More importantly, we do find that the effect picked up by the difference-in-differences estimation concentrates on firms in high set-up cost industries, for which the availability of long-term financing is more important. As a last step, we find that maturity rationing by treated banks had real effects: two years after loans were made, firms borrowing from treated banks are smaller and hold less fixed assets. This effect again concentrates on young firms in high set-up cost industries. Therefore, we confirm that set-up costs are a source of heterogeneity in the transmission of financial shocks.

Related literature. This paper contributes to three strands of the recent literature in corporate finance. First, it is related to the literature on the financial constraints of young firms. A number of papers study how financial factors, such as wealth (Evans and Leighton, 1989; Hurst and Lusardi, 2004), collateral constraints (Schmalz et al., 2017) or banking competition (Black and Strahan, 2002) affect the decision to become an entrepreneur. However, these papers are not primarily concerned with the capital structure of young firms, because of the lack of balance sheet data on private firms in most countries.[1] Almost the only exception is the paper by Robb and Robinson (2014), who use the Kauffman Firm Survey to show that young US firms rely heavily on external debt financing, in particular bank loans. Relative to this paper, we rely on panel data, which allow us to focus on time-series variation in the capital structure of young firms, and to use a quasi-natural experiment. Furthermore, while Robb and Robinson (2014) are mostly descriptive, we show that otherwise puzzling stylized facts are well-explained with a simple theoretical model. In general, our findings suggest that set-up costs are an important feature for corporate finance researchers to consider in both theoretical and empirical work.

Second, this study relates to the literature on debt maturity choices by firms. A number of theoretical works show how short-term debt can mitigate information asymmetries (Diamond, 1991) and reduce inefficiencies associated with risk-shifting or debt overhang (Myers, 1977), while potentially creating rollover risk. Recent contributions consider these trade-offs in dynamic contexts (Diamond and He, 2014; He and Milbradt, 2016; Huang et al., 2019). The limited amount of empirical work finds support for the idea that contracting frictions explain part of the variation in firms' debt ma-

[1] A different literature focuses on the financing of innovation and innovative firms (Kerr and Nanda, 2015). We instead focus on the entire set of firms in the economy.

turity (Barclay and Smith, 1995; Guedes and Opler, 1996; Custodio et al., 2013). We enrich this literature by showing, both theoretically and empirically, that set-up costs are an important determinant of firms' debt maturity.

Third, the paper also contributes to the literature on the real effects of shocks to financial institutions. A number of papers study how low net worth or liquidity limits the volume of credit that banks can supply (Kashyap and Stein, 2000; Khwaja and Mian, 2008; Jimenez et al., 2012). Instead, we study a new type of shock, by which banks are forced to reduce the maturity, rather than the volume, of loans. The source of heterogeneity that we highlight in the transmission of banking shocks – cross-industry differences in set-up costs – is also novel.

The remainder of this paper is organized as follows. Section 1 presents a simple model. Section 2 describes the data and the measurement of set-up costs. Section 3 presents stylized facts and tests the model's predictions on the role of set-up costs. Section 4 then investigates the real effects of set-up costs using a quasi-natural experiment.

1 Model and testable predictions

We present a simple model of external financing with fixed set-up costs, building on Holmstrom and Tirole (1997), and use it to generate testable predictions.

1.1 Setup

There are three periods, $t \in \{0, 1, 2\}$. There is a continuum of industries i, each with a fixed cost of starting a firm $I \geq 0$ distributed over $[\underline{I}, \bar{I}]$ with density $f(I)$. This set-up cost can be interpreted as the minimum quantity of equipment or commercial property an entrepreneur needs to start a firm in a given industry. Within each industry, there is a continuum of entrepreneurs a with initial resources $A \geq 0$ distributed over $[\underline{A}, \bar{A}]$ with density $g(A)$. To start the project, an entrepreneur needs $D = \max\{I - A, 0\}$.[2] All agents are risk-neutral. Entrepreneurs have no time preference, and lenders have a discount factor $\beta < 1$ between dates 1 and 2. This discount factor can be interpreted as measuring the reluctance of lenders to engage in long-term debt.

When undertaken, the project yields a safe cash flow e at date 1. At date 2, it yields a risky verifiable cash flow $R > 0$ with probability p, and no cash flow with probability $1-p$. The entrepreneur is subject to moral hazard. When he exerts effort, the probability of success is $p = p_H$ and there is no private benefit to the entrepreneur. When the entrepreneur misbehaves, the probability of success is $p = p_L < p_H$, but the

[2] It is never optimal for the entrepreneur to invest less than A and thus to borrow more that $I - A$.

entrepreneur enjoys a private benefit $B \geq 0$. Importantly, the decision to exert effort is taken by the entrepreneur at date 1, after cash flow e is realized. While simplifying, this assumption captures the intuition that multiperiod projects may require effort to be exercised throughout the life of the project. We assume that the project is viable only in the entrepreneur behaves, that is

$$e + p_H R > I > e + p_L R + B. \tag{1}$$

Therefore, no loan that gives an incentive to misbehave will be granted.

1.2 External financing

The loan contract specifies how cash flows are shared between the lender and the entrepreneur, subject to limited liability. Cash flows to the lender at dates 1 and 2 are denoted L_1 and L_2, while cash flows to the entrepreneur are denoted W_1 and W_2. We assume that lenders are perfectly competitive. Their participation constraint is such that they make zero profit in expectation,

$$L_1 + \beta p_H L_2 = D, \tag{2}$$

provided that the entrepreneur exerts effort.

Furthermore, the loan agreement must preserve the entrepreneur's incentives to behave, that is, an agency rent must be given. His incentive compatibility constraint is

$$W_1 + p_H W_2 \geq W_1 + p_L W_2 + B, \tag{3}$$

that is, $\Delta p W_2 \geq B$, where $\Delta p = p_H - p_L$. At date 1, after e is realized, the highest income that can be pledged to lenders in case of success is $R - B/\Delta p$, so that date-1 expected pledgeable income is

$$p_H(R - \frac{B}{\Delta p}). \tag{4}$$

Because lenders must break even, a loan is feasible only if

$$L_1 + \beta p_H(R - \frac{B}{\Delta p}) \geq D. \tag{5}$$

Whenever the set-up cost is large relative to the entrepreneur's resources (that is, $I > A$ so that $D > 0$), some firms may not obtain external financing. Indeed, only entrepreneurs with initial resources $A \geq A^*(I, \beta)$ will get funding, where

$$A^*(I, \beta) = I - L_1 - \beta p_H(R - \frac{B}{\Delta p}). \tag{6}$$

Intuitively, entrepreneurs with insufficient own resources must borrow a large amount, and thus pledge a large fraction of the date-2 return in case of success. Being left with a small fraction of returns, the entrepreneur has little incentives to exert effort and prefers to shirk. No contracting arrangement makes the project feasible when $A < A^*(I, \beta)$. Furthermore, $A^*(I, \beta)$ is increasing in I. Therefore, a lower proportion of projects obtain financing in industries with high set-up costs: there is stronger selection of new firms in these industries. A corollary is that firms operating in high set-up cost industries have higher average capitalization A (in dollar terms).

Next, Equation (6) makes it possible to solve for the optimal debt repayment schedule. Indeed, $A^*(I, \beta)$ is decreasing in L_1. Therefore, it is always optimal to make sure the entrepreneur repays as much as possible at date 1, that is,

$$L_1 = \min\{e, D\} \quad \text{and} \quad L_2 = \max\{D - e, 0\}. \tag{7}$$

Intuitively, repaying as much as possible early on makes it possible to minimize the moral hazard problems that arise later on. When a larger fraction of the debt is repaid at date 1, a smaller amount has to be repaid at date 2, and the entrepreneur appropriates a larger fraction of the benefits from exerting effort.

Finally, we study the effect of changes in the discount factor β on the share of firms being financed across industries. Variation in β can be interpreted as reflecting changes in lenders' opportunity cost of providing long-term funding (for example due to unmodeled risk management or regulatory reasons). Denote by

$$m(I, \beta) = \int_{A^*(I,\beta)}^{\bar{A}} g(A)\mathrm{d}A, \tag{8}$$

the mass of firms obtaining financing in any given industry characterized by a set-up cost I. From the definition of (6), we see that $\partial m(I, \beta)/\partial \beta > 0$, that is, the mass of firms obtaining financing is larger when lenders are more willing to provide long-term funding (larger β), regardless of I. However, we are interested in the sign of

$$n(I, \beta) = \frac{\partial}{\partial I}\left[\frac{\partial m(I, \beta)}{\partial \beta}/m(I, \beta)\right], \tag{9}$$

that is, we want to know, for a given change in β, whether the share of firms being financed changes differentially across industries with different I. The decrease in the share of financed firms is larger in high set-up cost industries whenever $n(I, \beta) > 0$. From (6) and (8), it is straightforworard to show that

$$n(I, \beta) > 0 \quad \text{if} \quad \frac{\partial g(A^*(I, \beta))}{\partial I} \cdot m(I, \beta) + g(A^*(I, \beta)) > 0 \tag{10}$$

while the second term in (10) is always positive, the sign of the first term is indeterminate and depends on the sign of $\partial g(A^*(I,\beta))/\partial I$, that is, ultimately, on the specific form of the distribution $g(.)$. Therefore, for unspecified distributions of entrepreneurs' net worth, it is not possible to claim that high set-up cost industries are more or less affected by changes in β. However, once standard distributions are assumed, exact predictions can be derived. In the simplest case of a uniform distribution $g(.)$, we have $\partial g(A^*(I,\beta))/\partial I = 0$, which implies that $n(I,\beta) > 0$: in that case, high set-up cost industries are relatively more affected by changes in the availability of long-term debt.

1.3 Empirical predictions

The model yields three main testable predictions. The first one pertains to the capital structure of new firms in the cross-section of industries.

Hypothesis 1. ***(Debt maturity across industries)*** *For a given level of initial resources, conditional on operating the project, firms in industries with higher set-up costs borrow with longer-maturity debt.*

This prediction follows from the fact that, for a given level of initial resources A, firms in high set-up cost industries have greater need for external financing $D = \max\{I - A, 0\}$. For a given level of date-1 cash flow e, the ratio L_2/L_1 is higher (by Equation 7), that is, debt maturity is longer.[3] A corollary prediction is that, for a given level of initial resources, conditional on operating the project, firms in industry with a higher set-up cost have higher leverage.

Hypothesis 2 turns to within-industry predictions.

Hypothesis 2. ***(Debt maturity within industries)*** *Within an industry, conditional on operating the project, more financially constrained firms have longer-term debt.*

This prediction follows from Equation (7). A natural measure of financial constraints in the model is given by the relative magnitude between D and e. When D is large relative to e, the firm has a lot of debt relative to early cash flows, and must thus repay most of the debt at date 2 (i.e., the debt is mostly long-term). Instead, in case e is large relative to D, all of the debt is repaid at date 1 and is thus short-term.

Hypothesis 3. ***(Supply of loanable funds)*** *A negative shock to the supply of long-term financing implies that firms with sufficiently high set-up costs no longer operate.*

[3] The model's predictions arising from Equation (7) are about the share of total debt repaid in period 2, not about debt maturity in a strict sense. Indeed, a high share of date-2 repayments could be implemented by rolling over a large share of one-period debt contracts at date 1. To give empirical content to Equation (7), and derive Hypotheses 1 and 2, we interpret the term structure of repayments (L_1/L_2) as debt maturity. This amounts to assuming that there are (unmodeled) costs associated with debt rollover. Both the theoretical and the empirical literature provide evidence for such costs (He and Xiong, 2012; Almeida et al., 2012).

This prediction follows from the analysis in the previous section and holds only if some properties of $g(A)$ are satisfied, for example if $g(A)$ is a uniform distribution. In this case, a drop in β is associated with a change in the industry composition of new firms: industries with high set-up costs should be underrepresented after the shock.

The predictions from the model are illustrated in Figure 1, which plots moments of interest for a calibration of the model. Panels A and B illustrate Hypothesis 1 by showing that, for a given net worth and conditional on obtaining financing, firms in industries with high set-up costs operate with a larger share of long-term debt and with higher leverage. Panel C illustrates Hypothesis 2 by showing that, for a given net worth and conditional on obtaining financing, firms with lower profitability operate with a larger share of long-term debt. Finally, Panel D shows that, when $g(A)$ is a uniform distribution, a lower supply of long-term external finance (lower β) is associated with a lower share of high set-up costs projects being financed. This is consistent with Hypothesis 3.

2 Data and measurement of set-up costs

We now describe the data and the measurement of set-up costs.

2.1 Data

We rely on three main datasets to test the predictions of the model. First, we obtain data from accounting files used by the Ministry of Finance to collect corporate taxes. Our sample is based on a random draw of 20% of the universe of all firms created in France between 2006 and 2016, after excluding self-employment and financial firms. This sample is representative of both the industry and time-series distributions of firm creation. After a firm is created, we observe yearly balance sheets and income statements until failure (if any), corresponding to 663,465 firm-year observations (for 168,577 unique firms). The data allow us to measure firms' debt structure (bank debt, other financial debt, and trade credit), broken down by *residual* maturity buckets ($\leq$ 1 year, 1 year $< . \leq$ 5 years, 5 years $<$). These data are retrieved from Diane (Bureau van Dijk).[4]

Second, we use proprietary data from the Bank of France (*M-Contran*) on the detailed characteristics of new loans to firms, including their *initial* maturity. This dataset covers all loans granted by a random set of bank branches during the first month of each quarter. While not a panel (since the set of surveyed bank branches rotates over time), these data have advantages over standard credit registers. Indeed,

[4]Diane has the drawback that failing firms are removed from the dataset after three years. To ensure that our results are not driven by survival biases, we later test firm-level predictions after including firm fixed effects.

credit registers typically aggregate old and new loan exposures at the bank-firm level, so that no information on specific loan terms (initial maturity, interest rate, etc.) is available. We restrict the sample to loans financing corporate investment, which leaves us with 114,703 unique loans between 2006Q1 and 2018Q2. Descriptive statistics on the two main datasets are reported in Table 1.

Third, we use the French credit register to construct additional variables that we use in our quasi-natural experiment (Section 4). The dataset records bilateral credit exposures at the bank branch-firm level above a small reporting threshold of EUR 25,000 (EUR 76,000 before 2006). In what follows, we always assess bilateral credit exposures by adding outstanding loans and undrawn credit lines. Last, we use an additional dataset from the Banque de France (*CEFIT*), that collects the amount of loans granted by each bank in each county (*département*), with breakdowns by loan types and borrower types (corporations, households, public administrations). We use this information to compute measures of competition at the county-level.

2.2 Measuring set-up costs

A key variable of interest in the model is the fixed set-up cost for firms in a given industry. We estimate set-up costs at the 3-digit industry level as follows. First, in our full sample of young firms, we keep firms with age zero or one year, where firm age is defined as the difference between the reporting year t and the year of firm creation.[5] Second, for each firm f in industry i, we compute the set-up cost SUC_f^i, equal to the initial investment needed to set-up the company and start operating. SUC_f^i is the mean value of property, plant and equipment (PPE) and intangible assets (IA), in euros, over years 0 to 1,

$$SUC_f^i = \frac{1}{2}\sum_{t=0}^{t=1}\left[PPE_{ft} + IA_{ft}\right]. \tag{11}$$

Next, for each 3-digit industry i, we measure set-up costs as the median of SUC_f^i over all $f = 1, ..., F^i$ firms in industry i,

$$SUC_i = \text{median}\left\{SUC_1^i, ..., SUC_F^i\right\}. \tag{12}$$

Taking the median, rather than the minimum, prevents mismeasurement arising from a few anomalous observations (e.g., firms that are legally created but never operate).[6]

We provide descriptive statistics on set-up costs in Table 2. Panel A shows moments

[5] We do so to avoid measurement problems for firms of age 0. Indeed, some firms are legally created in year t but only acquire fixed assets after a few months, in year $t+1$. Not accounting for this discrepancy would mistakenly lead us to measure set-up costs equal to zero at the end of year t.

[6] To further avoid mismeasurement, we restrict to 3-digit industries with at least 15 different firms with non-missing PPE in year 0 or 1.

of the distribution of set-up costs across the 146 industries for which the measure exists. There is significant cross-sectional variation in set-up costs across industries: the median industry has a set-up cost of 19,000 euros, while the cost jumps to 121,000 euros at the 90th percentile. Panel B reports the 15 industries with the highest and lowest set-up costs. Not surprisingly, industrial activities tend to have high set-up costs (e.g., manufacture of paper products, quarrying of stone, sand and clay), while services relying primarily on human capital have low set-up costs (e.g., translation and interpretation activities, business support service activities).

Panel C of Table 2 presents the correlation between selected balance sheet characteristics of firms and industry-level set-up costs. To do so, it regresses balance sheet characteristics on a constant and on two dummy variables capturing whether the firm operates in an industry either in the second ($MidCost$) or third ($HighCost$) tercile of the set-up cost distribution. Relative to firms in the lowest tercile, firms in high set-up cost industries have significantly higher ratios of PPE/Assets and Intangibles/Assets (by 16.3 and 22.2 percentage points, respectively) when they start operating. Thus, firms in high set-up cost industries not only require a large absolute amount of tangibles and intangibles to operate, but these assets also represent a large proportion of their balance sheets. Finally, firms in these industries also start with significantly larger size. These differences are persistent when firms age.

3 Stylized facts and empirical tests

This section presents stylized facts about the capital structure of young firms, and tests the model's predictions on the role of set-up costs in the capital structure of young firms.

3.1 Stylized facts

We start by plotting several variables of interest to establish stylized facts about the capital structure of young firms. In Figure 2, we display the mean value of several firm characteristics between creation and age 10, in the pooled sample of newly-created firms. The top-left panel shows that leverage is strikingly decreasing with age, from an average ratio of total debt to assets of about 52% at firm creation, to a ratio of 37% at age 10. The top-right panel studies the average maturity of total debt, measured as

$$Maturity_{it} = 12 \cdot \frac{\text{Debt} \leq 1\text{y}}{\text{Total debt}} + 36 \cdot \frac{\text{Debt} \in (1\text{y}, 5\text{y}]}{\text{Total debt}} + 84 \cdot \frac{\text{Debt} > 5\text{y}}{\text{Total debt}},$$

that is, by assigning maturities of 12, 36 and 84 months to debt in each of the reported buckets. We find that the average maturity of total debt is also decreasing with age, from about 19 to about 16 months over the first 10 years.

Both patterns on leverage and maturity are surprising from the viewpoint of a number of received theories. Indeed, if young firms are subject to more severe financial frictions (e.g., more information asymmetries or greater commitment problems), we should expect them to have a harder access to external finance, thus to borrow less and with shorter-term debt.[7] They are instead consistent with our model. The last three panels show that the decrease in total debt over firms' lifetime is primarily driven by bank debt (which is cut by half, from about 20% to about 10% of total assets), and to a lesser extent by other financial debt (which decreases from about 15% to about 10% of total assets). This fact is also surprising, since bank debt is a priori subject to more severe financial frictions than other financial debt (which is obtained from equityholders, that is, mainly family and friends for young firms), and could thus be expected to grow more over time. However, the fact that bank debt decreases much more with age than other financial debt (obtained from equityholders) is consistent with the model, if the latter is subject to milder moral hazard problems than the former. Indeed, when moral hazard problems are not severe (as is arguably the case for family and friends), there is no gain from repaying most of the debt early on. Finally, the ratio of payables to total assets is stable over the lifetime of firms, in line with the view that the general pattern that we document is not related to firms' operations but to financing.

Next, we provide preliminary evidence in Figure 3 that set-up costs are critical to explain these patterns. We reproduce the same charts as in Figure 2, after breaking down the sample based on whether firms operate in industries with low, intermediate or high set-up costs (based on terciles across industries, as defined previously). For both leverage and maturity, the aggregate patterns are overwhelmingly driven by industries with high set-up costs. For industries in the top tercile of set-up costs, leverage is cut by close to 40% over the first 10 years (from 70% to 43%) while the decrease is much less pronounced for firms in other industries. Regarding maturities, the patterns are even more striking. For firms operating in industries with low or intermediate set-up costs, debt maturity is stable with age. The decrease in maturity is strong only for firms in high-set-up cost industries (from about 24 to about 18 months). The three subsequent panels confirm that bank debt is the main driver of this pattern. Finally, Figure 3 also confirms that there is no age pattern in terms of payables regardless of the set-up cost, which is reassuring since the model does not make any prediction for this specific type of debt.

While all these figures are consistent with the model, they do not provide a formal

[7] This chart is potentially consistent with the pecking order theory (Myers and Majluf, 1984): If equity is more costly to issue than debt due to more severe adverse selection problems, then firms should first issue debt, and issue equity as they age, thus reducing leverage. However, this explanation is unlikely to explain the stylized facts: the small private firms in our sample virtually never issue external equity; the increase in book equity almost entirely comes from retained earnings.

test. Indeed, they could be driven by differences in survival rates across firms with different characteristics, or by time effects. We now turn to explicit tests of the model's predictions.

3.2 Cross-industry tests

We start by testing Hypothesis 1: within firms, that is, after including firm fixed effects, leverage and maturity should be decreasing with age. This negative relation between age and both leverage and debt maturity should be stronger in industries with high set-up costs. Our main specification is

$$\begin{aligned} Y_{ijt} &= \beta_0 \cdot Age_{it} + \beta_1 \cdot Age_{it} \cdot MidCost_{ij} + \beta_2 \cdot Age_{it} \cdot HighCost_{ij} \\ &\quad + \gamma_3 \cdot Controls_{it} + \nu_i + \lambda_t + \epsilon_{ijt}, \end{aligned} \tag{13}$$

where Y_{ijt} is either the leverage or the maturity of the debt of firm i in industry j in year t. Age_{it} is the age of firm i in year t, while $MidCost_{ij}$ and $HighCost_{ij}$ are dummy variables equal to one for firm i when its industry j is in the middle or top tercile of the set-up cost distribution, respectively. Furthermore, a firm fixed effect ν_i ensures that we are exploiting within-firm variation, that is, our results cannot be explained by differential survival rates of firms across industries. Finally, λ_t is a time fixed effect. Throughout the tests, we treat the set-up cost as a characteristic of the industry that is exogenous for any individual firm. Based on the model, we expect the baseline coefficient β_0 to be negative, and the interaction coefficient β_2 to also be negative: the effect of age on leverage and maturity should be larger in industries with high set-up costs.

The estimation results are reported in Table 3. We first confirm that, regardless of set-up costs, bank debt and maturity decrease with age, after including firm fixed effect (columns 1 and 5). Therefore, our stylized facts are not driven by the selection of issuers with respect to age. In columns 2 and 6, we find that the total effect is driven to a large extent by firms in high set-up cost industries, which is fully consistent with the model. In columns 3 and 7, we show that these results are robust to the inclusion of standard control variables, such as size, tangibility and financial leverage. Finally, in columns 4 and 8, we keep only firms that survive at least 5 years, to further rule out concerns that survival biases could explain the findings. We find very similar coefficients.

3.3 Within-industry tests

We next turn to Hypothesis 2. The prediction is that, within a given industry, more financially constrained firms (that is, firms with low date-1 cash flow e) have longer-maturity debt. We adopt the following specification,

$$Maturity_{ijt} = \sum_{s=1}^{3} \beta_s \cdot \frac{EBITDA}{Assets} \cdot \mathbb{1}(AgeBucket = s) + \phi_j + \mu_s + \lambda_t + \epsilon_{ijt}, \qquad (14)$$

where $Maturity_{ijt}$ is the debt maturity for firm i operating in industry j in year t, $\mathbb{1}(AgeBucket = s)$ is a dummy variable equal to one when the firm is in age bucket s, and ϕ_j, μ_s and λ_t are industry, age bucket and year fixed effects, respectively. As the empirical equivalent of the date-1 cash flow e, we use the ratio of EBITDA over total assets. Therefore, Equation (14) tests whether, for firms of a given age within a given industry, a higher EBITDA is associated with longer or shorter-maturity debt. We also allow for this effect to vary with firm age. The model predicts that coefficients β_s are generally negative. However, as firms move away from financial constraints with age, the role of the EBITDA should be less relevant, that is, the coefficient β_s should converge to zero as s increases.

The estimation results are reported in Table 4. The first column estimates Equation (14) on the limited sample of new firms (with age below 1 year). Consistent with Hypothesis 2, we find a negative and significant effect of EBITDA on debt maturity. In the second column, we estimate Equation (14) in the full sample and find consistent results, albeit of a smaller magnitude. In the third column, we break down the effect by age, and confirm the prediction that EBITDA influences debt maturity for young firms more strongly: the estimate of β_s is the most negative at firm creation, then it becomes less negative with age. This is consistent with the idea that firms move away from financial constraints as they age, so that the relation between cash-flows and debt maturity is weaker. Finally, the fourth column confirms this result with a more stringent fixed effect specification, as we now include industry-age effects instead of separate industry and age effects. To conclude, the data lends strong support to Hypothesis 2, both with respect to the sign and to the time-series variation of the effect.

3.4 Measuring maturity using loan-level data

The main concern with the previous results is that debt maturity could be mismeasured. Indeed, data from tax filings only measure debt maturity based on three buckets of maturity and our measure relies on the assumption that the average debt maturity in each of these buckets is constant across firms. Furthermore, these data measure the *residual* maturity of *total* debt (including trade credit), while the model's predictions pertain to the *initial* maturity of *financial* debt. We address these concerns by replicating some of the previous results using the loan-level data from *M-Contran* – in which we know the exact maturity of new bank loans granted to a sample of firms for investment purposes.

First, consistent with the predictions of the model and the evidence we obtain when using accounting data, the last panel of Figure 2 confirms the finding that young firms borrow from banks at longer maturities than older firms. Unconditionally, a firm of age 4 borrows on average at a maturity that is 14 months shorter than a firm in its first year of existence. Also consistent with this stylized fact, the last panel of Figure 3 shows that this pattern is more pronounced for firms in high set-up cost industries. For example, the average loan maturity for firms in the top tercile of set-up costs decreases by 18 months over the first two years of existence of the firm, while it decreases by 10 to 15 months in the other two terciles.

Second, the regressions in Table 5 confirm that young firms in industries with high set-up costs issue longer-maturity debt. In these regressions, we use the sample of loans made to new firms (with age either 0 or 1 year) to explain their maturity with a dummy for firms in high set-up industries, after controlling for loan characteristics as well as quarter and bank fixed effects. The results in the first two columns show that young firms in high set-up cost industries borrow with longer maturities (by 8 months on average). In columns 3 and 4 of Table 5, we focus on the subsample of firms for which balance sheet data are available, which allows us to control for firm characteristics. Adding these firm-level controls leads to very similar estimates. Finally, in the last two columns, we consider standalone firms only to ensure that our results are not driven by firms belonging to business groups. Again, we find that young firms in high set-up cost industries have bank debt with longer maturities (by 6 to 9 months on average).

Third, Table 6 repeats the within-industry tests of Table 4 at the loan level. The regressions test the prediction that, within a given industry, firms with lower cash flow have longer-maturity debt. The first column shows that this is true for loans by firms with an age below 1 year. Column 2 shows that it is also true when firms are older, after controlling for age fixed effects. The fact that coefficients do converge to zero, as in Table 4, may be due to the fact that our loan-level sample is not a panel but a survey (most firms appear just once). Therefore, sample selection due to differences in survival rates across firms with distinct characteristics is a bigger concern. That said, these loan-level findings are overall consistent with our previous results and with the model's predictions about the relation between set-up costs and debt maturity.

3.5 Alternative mechanisms

One potential alternative explanation for some of our results could be that firms with higher set-up costs buy assets with greater pledgeability, and so can borrow more and with longer-term debt, by using these assets as collateral. While it is certainly true that pledgeability determines debt capacity, it cannot be the main explanation behind our stylized facts.[8] To begin with, pledgeability can explain differences in the average *levels* of debt and maturity (as seen from the sign of estimated coefficients on tangibility in Table 3), but not the time-series *changes*. Indeed, for tangibility to explain changes in maturity and leverage, it would have to be the case that tangibility decreases with age. We do not observe this to be the case: on average, firms in our sample invest every year to compensate the depreciation of assets. Furthermore, for in our sample are on average growing with age. Therefore, the monotonic decrease in both leverage and maturity with age cannot be explained by tangibility. Furthermore, to alleviate remaining concerns, all our econometric results in Section 3.2 are robust to including measures of asset tangibility (PPE/Assets) as control variables, as seen in Table 3.

Another possible interpretation of our findings could be that the longer loan maturity of firms with higher set-up costs reflects the fact that their assets have a longer duration. If so, firms could match the maturity of cash flows from assets and liabilities, which could be valuable for risk management purposes (e.g., if they face financial constraints). This explanation would consistent with our finding that firms in industries with high set-up costs, which also tend to be industries in which assets have longer duration, borrow at longer horizons. However, this explanation can be rejected for the exact same reason that led us to reject the alternative explanation based on tangibility Specifically, for this explanation to be true, it would need to be the case that asset duration decreases monotonically with firm age. This is not the case due to the fact that firms periodically reinvest and replace maturing assets with other assets of similar duration. Therefore, the fact that we highlight does not stem from a property of the assets (which tend to remain similar over the life of a firm), but a property of the first few years. It is an "age effect" that is linked to set-up costs that are paid only once.

4 Set-up costs and the transmission of financial shocks

We now use a quasi-natural experiment to study the impact of set-up costs on the transmission of financial shocks.

4.1 A quasi-natural experiment

The shock we study arguably provides exogenous variation in the ability of some banks to supply long-term loans. In the context of the model, this corresponds to a drop

[8]For evidence on the relation between pledgeability and debt maturity of leverage, see for example Benmelech et al. (2005) and Benmelech (2009).

in β. Our goal is to test whether firms in high set-up cost industries are affected differentially more.

The setup we use is the failure of the large Franco-Belgian bank Dexia in 2008.[9] This bank was specialized in lending to local public administrations and local governments (call "municipalities" for simplicity), with a market share of 40% in France. In 2008, Dexia was hit by severe credit losses in the US subprime market that were unrelated to French municipalities.[10] It also had a fragile capital structure with a heavy reliance on wholesale funding. In October 2008, after the collapse of Lehman Brothers, Dexia was illiquid, forcing the French and Belgian governments to inject cash and to guarantee new bond issues. However, the bank never recovered and was dismantled in the winter 2012-2013.[11] For our purposes, the key fact is that Dexia had to sharply reduce the supply of credit to municipalities starting in early 2008 (before the failure of Lehman Brothers) and until 2012. According to its annual reports, the annual lending volume of Dexia was cut by 50% between end-2007 and end-2010.

We exploit the near failure of Dexia in late 2008 as an exogenous event that affected differentially the ability of other French banks to accomodate the demand of long-maturity loans by firms. Our identification strategy proceeds in three steps. We first use data from the French credit register to identify municipalities that were highly dependent on Dexia before the start of the subprime crisis in August 2007.[12] A municipality is defined as being Dexia-dependent whenever the share of Dexia in its total bank debt in June 2007 is above 50%. This roughly corresponds to municipalities in the top quartile of the distribution of Dexia market shares across all municipalities at this date.

In a second step, we classify other commercial banks based on their share of loans to Dexia-dependent municipalities within their total lending to municipalities, also as of June 2007. Using this ratio, banks above the median are considered as *treated* by the Dexia shock in 2008. The underlying assumption is that municipalities that were relying heavily on Dexia are, after 2008, forced to borrow more from other relationship lenders. In this context, Table 7 gives reassurance that treated and control banks are not extremely different from each other: while they differ in terms of their volume of

[9] The French public finance watchdog (*Cour des comptes*) published in 2013 a detailed report on the failure of Dexia. Statistics quoted in this section are taken from this report and from Dexia's annual reports over 2008-2012.

[10] In addition to direct losses in the US subprime market, losses came from exposures to several European banks that were themselves hit by the US subprime market, and to the Financial Security Assurance (FSA), a monoline credit insurer that was a subsidiary of Dexia.

[11] The French part of its loan portfolio was acquired by three state-owned credit institutions, CDC, SFIL and La Banque Postale.

[12] "Municipalities" here refer to each of the 36,464 municipalities in a strict sense (representing 50% of credit to local public entities), but also to the 22 regions and 95 counties, as well as to some groupings of municipalities. Together, they account for more than 95% of local public credit. Excluded public entities are largely irrelevant (e.g., school cashboxes or municipal pawnshops).

loans to municipalities, they are extremely similar in terms of the size of their loan portfolio to corporations. Figure 4, which plots total lending to municipalities by treated and control banks, confirms that treated banks differentially increase lending to municipalities after the shock. Specifically, we observe fairly parallel trends in credit to municipalities for the two groups of banks until early 2008, precisely when Dexia enters distress. After 2008, the patterns of municipal lending for treated and control banks diverge dramatically: between the end of 2007 and the end of 2009, credit to municipalities goes up by more than 10 percent for treated banks, while it increase by less than 5 percent for control banks. Then, it remains approximately flat for control banks, while it keeps growing for treated banks, to reach about 125 percent of the 2008 volume at the end of 2010.

In Table 8, we confirm this finding in a regression framework. We regress the average growth rate of loans to municipalities and corporations between the two-year periods before (2006Q3 to 2008Q2) and after (2006Q3 to 2008Q2) the treatment on a dummy variable for treated banks. Importantly, we include borrower fixed effects to absorb borrower-specific heterogeneity (such as differential demand patterns). Using within-borrower estimation, we find that municipalities indeed receive more credit from treated banks (by about 5%). In the last two columns of Table 8, we reproduce the regression for lending volumes to corporations around the Dexia treatment. When we control for the stock of credit to municipalities and corporations of banks at the time of the shock (in column 4), we find that treated banks reduce their lending to corporations by a more modest 1% after the shock.

The third step of our identification strategy uses the fact that loans to municipalities have significantly longer maturities than loans to non-financial firms. In our data, on average over the sample period, the initial maturity of loans to municipalities is 13 years, as opposed to 6 years for non-financial firms. Therefore, the sudden increase in loans to municipalities by treated banks increases massively the duration of their assets. Provided these banks have to meet risk management or regulatory limits in terms of asset-liability mismatch, their ability to supply long-term loans to companies should be reduced when they face higher loan demand from municipalities after the Dexia shock. We confirm that this is the case in the next section.

Before turning to the difference-in-differences analysis, one potential concern about this event is its timing. Since it is close to the failure of Lehman Brothers, one may worry that treated and control banks are affected differentially by events unrelated to Dexia. However, given the methodology we use to construct the treatment, this is unlikely to be the case. Treated banks are identified by aggregating data from more than 36,000 municipalities. For the failure of Lehman Brothers to be a concern, it would need to be the case that some of these municipalities are more affected than others by Lehman Brothers. This is extremely unlikely, especially since we observe no concentration of Dexia-dependent municipalities in specific regions (as Appendix Figure A1 shows).

4.2 First stage: Banks' supply of long-term corporate loans

For the treatment to have real effects, we first need to check whether banks affected by the Dexia shock indeed reduce the maturity of corporate loans. Figure 5 provides a first answer by comparing the average maturity of new loans to young firms (less than 2 years) across treated and control banks. Before 2008, we see no difference, while a gap appears around 2008, and closes only in 2012. The magnitude of the maturity difference is about 6 months on average. This first step confirms the relevance of our identification strategy: it is indeed the case that banks that make more long-term loans to municipalities following the near-failure of Dexia reduce the maturity of loans to corporations.

Next, we check whether this effect is stronger for firms in high set-up cost industries, which rely more on long-term debt. Figure 6 provides an unambiguous answer: the two upper panels replicate the same exercise, after breaking down the sample between high and low set-up cost industries. We find that the drop in loan maturities following the Dexia shock affects only firms in high set-up cost industries. Additionally, the bottom panels show that no such effect is observed on loan volumes: this means that we have isolated a shock that affects only loan maturity, which is exactly what is needed to test Hypothesis 3.

These effects are confirmed when using difference-in-differences regressions at the loan level, as seen in Table 9. In specifications with loan-level controls as well as industry and quarter fixed effects, the effect appears to be statistically significant at the 5% level: treated banks reduce the maturity of corporate loans to young firms by more than 3 months on average. The comparison of columns 3 and 4 shows that this effect is entirely driven by firms in high set-up cost industries. Finally, to better understand the mechanism, we additionally break down the sample between counties with levels of bank competition above or below the median (based on the Herfindhal-Hirschmann index computed with loan shares). Comparison of columns 5 and 6 shows that the effect is almost entirely driven by areas with below-median competition. This is consistent with the intuition that, in areas where bank competition is more limited, local banks enjoy greater discretion to change the terms of the loans they make to corporations than when they face greater competition.

4.3 Second stage: Real effects of maturity rationing

As a last step, we investigate whether maturity rationing has any consequences for young firms. Specifically, if young contrained firms are denied long enough maturities, they may simply not start operating (which we cannot observe), or they may be forced to scale down or postpone some key investment, and therefore grow at a lower pace. We focus on this last prediction by estimating difference-in-differences regressions at the loan level. For each firm obtaining a loan and for which accounting data is available, we explain firm-level outcomes *two years after* loan issuance. We compare firms obtaining loans from treated or control banks.[13] We further control for firm age, as well as time and industry fixed effects.

Table 10 compiles the estimates, using four different measures of size as dependent variables: (the log of) total assets, tangible assets, intangible assets, or the sum of the last two (i.e., fixed assets). The comparison of columns 1 and 2 shows that, after 2008, firms are smaller two years after they obtain a loan from a treated bank than when the loan is coming from a control bank. This effect is significant at the 1% level. In column 3, we further break down the effect between firms in high and low set-up cost industries. The coefficient on the triple interaction confirms that the effect is driven by firms in high set-up cost industries. In columns 4 to 6, we reproduce the exact same regression for specific types of assets and confirm the findings. Tangibles assets for firms borrowing from treated banks are lower after two years (albeit not significant), while intangible and fixed assets are significantly lower. These findings thus confirm that set-up costs are an important determinant of the transmission of financial shocks to young firms.

Conclusion

Our main takeaway is that fixed set-up costs are essential to understand young firms. First, they explain otherwise puzzling features of their capital structure, both across and within industries. Most importantly, they explain why young firms borrow more, and with longer-maturity debt. Second, set-up costs explain the heterogeneous response of firms to financing shocks. When lenders are forced to reduce the maturity of debt contracts, firms in high set-up cost industries are hurt more.

The fact that young firms have high leverage and long-term debt does not imply that there are no financial constraints. Indeed, these facts are conditional on firms being created. Instead, the model suggests that financial constraints operate via the selection of potential entrepreneurs into firm creation. In high set-up costs industries, the selection is tougher, and only the best-capitalized entrepreneurs are able to enter. Therefore, the fact that observed firms in these industries have high leverage and long-term debt is not a sign that financial constraints are absent, but a sign that

[13] For this regression, we define young firms as firms with age below 3 years, in order to increase the sample size. Indeed, matching loan-level data with balance sheet controls reduces the sample size for firms in their first two years.

many potential entrepreneurs are selected out of this industry, and thus unobserved.

These findings have important implications. First, they can help design policies to foster firm creation. In particular, one cannot assume that all firms can start with arbitrarily small size and then grow. There are important "threshold effects" in firm creation. Policies that ignore this fact may end up helping only firms in low set-up cost industries, which are the least constrained. Second, our results can help better understand recoveries following financial crises. If industries with high set-up costs are affected differentially more, then financial crises may be associated with long-lasting changes in industry composition. This prediction remains to be explored.

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Table 1 – Descriptive statistics.

This table shows descriptive statistics in the pooled samples for the variables used in our analysis. Firms are aged at most 10 years. Panel A is for the firm-level dataset (random 20% of the universe of firms created in France between 2006 and 2016). Panel B is for the loan-level dataset (survey of bank branches from 2006 to 2018). The definition of the variables is provided in Appendix A.

	Mean	St. dev.	p10	p25	Median	p75	p90	N. Obs.
Panel A: Firm-level dataset								
Size (log Assets)	4.78	1.61	2.90	3.81	4.74	5.75	6.76	663,364
Age (in years)	3.15	2.40	1	1	3	5	7	663,364
Total debt / Assets	0.47	0.29	0.07	0.22	0.46	0.70	0.87	355,600
Financial debt / Assets	0.30	0.28	0.00	0.04	0.22	0.52	0.75	358,803
Bank debt / Assets	0.17	0.23	0	0	0.04	0.31	0.56	656,432
Other fin. debt / Assets	0.13	0.19	0	0.00	0.04	0.18	0.40	367,262
Accounts payables / Assets	0.16	0.17	0	0	0.10	0.23	0.41	655,040
Debt maturity (in months)	18.11	10.49	12	12	12.60	20.45	30.46	255,950
Debt $\leq$ 1y / Debt	0.57	0.42	0	0	0.71	1	1	358,768
Debt $>$ 1y and $\leq$ 5y / Debt	0.09	0.17	0	0	0	0.13	0.37	377,722
Debt $>$ 5y / Debt	0.02	0.09	0	0	0	0	0.03	377,571
PPE / Assets	0.15	0.21	0	0.00	0.06	0.20	0.45	378,681
Intangibles / Assets	0.15	0.25	0	0	0.00	0.23	0.61	342,577
EBITDA / Assets	0.10	0.16	-0.08	0.01	0.10	0.19	0.30	328,806
Panel B: Loan-level dataset								
Loan characteristics								
Initial maturity (in months)	61.13	29.42	36.00	44.00	60.00	84.00	84.00	114703
Loan amount (Th. euros)	218.73	1576.17	10.00	18.39	37.33	100.00	300.00	114703
Loan interest rate (in %)	3.17	1.52	1.11	1.87	3.21	4.31	5.12	114703
Fixed interest rate (dummy)	0.93	0.26	1.00	1.00	1.00	1.00	1.00	114703
Subsidized loan (dummy)	0.08	0.27	0.00	0.00	0.00	0.00	0.00	114703
Regulated loan (dummy)	0.08	0.27	0.00	0.00	0.00	0.00	0.00	114703
Borrower characteristics								
Size (log Assets)	6.36	1.59	4.68	5.30	6.11	7.10	8.28	63141
Age (in years)	3.95	3.27	0.00	1.00	3.00	7.00	9.00	114703
Standalone SME (dummy)	0.87	0.34	0.00	1.00	1.00	1.00	1.00	114703
Financial debt / Assets	0.40	0.25	0.10	0.19	0.36	0.58	0.77	47293
PPE / Assets	0.24	0.23	0.02	0.07	0.17	0.34	0.59	48295
EBITDA / Assets	0.11	0.15	-0.03	0.04	0.11	0.19	0.27	46008

Table 2 – Descriptive statistics on set-up costs

This table provides descriptive statistics on set-up costs, measured at the 3-digit industry level. Panel A displays moments of the cross-industry distribution of set-up costs. The measurement of industry-level set-up costs is described in Section 2.2. Panel B shows the 15 industries with the lowest (left panel) and with the highest (right panel) set-up costs. Panel C regresses balance sheet characteristics at the firm-year level on a constant and on two dummies capturing whether the firm operates in an industry in the second (*MidCost*) or third (*HighCost*) tercile of the set-up cost distribution. The regressions are estimated on the sample of firms with age 0 or 1 (left lanel) and on the full sample of firms (right panel). Heteroskedasticity-robust standard errors are reported in brackets. *, ** and *** denote respectively statistical significance at the 10%, 5% and 1% levels.

Panel A: Descriptive statistics

	Mean	10th	25th	50th	75th	90th	St. dev.	N. Obs
SUC_f^i (in Th. euros)	46.5	2.3	5.5	19.2	48.4	121.0	81.8	146

Panel B: Industries with lowest and highest set-up costs

Top-15 lowest		Top-15 highest	
3-digit industry	SUC_i	3-digit industry	SUC_i
Other civil engineering projects	0	Fishing	612.4
Activities of head offices	0	Steam and air conditioning supply	539.8
Translation and interpretation activities	0.6	Manufacture of paper products	255.4
Other human resources provision	0.7	Hotels and similar accommodation	235.1
Management consultancy activities	0.8	Hospital activities	220.4
Office administrative and support activities	1.0	Manufacture of concrete products	204.4
Business support service activities	1.1	Bakery	192.7
Other postal activities	1.2	Veterinary activities	188.1
Wholesale on a fee or contract basis	1.4	Sea and coastal passenger water transport	181.5
Other scientific and technical activities	1.4	Medical and dental practice activities	176.1
Market research and public opinion polling	1.7	Quarrying of stone, sand and clay	155.4
Non-specialised wholesale trade	1.8	Dairy productions	149.3
Computer programming and related activities	1.9	Other retail sale in specialised stores	148.4
Activities of employment placement agencies	2.2	Camping grounds and trailer parks	127.5
Specialised design activities	2.3	Other human health activities	121.0

Panel C: Set-up costs and balance sheet characteristics

	Firms below age 1			All firms		
	PPE / Assets	Intangibles / Assets	Size	PPE / Assets	Intangibles / Assets	Size
Constant (LowCost)	0.076***	0.066***	4.116***	0.075***	0.065***	4.616***
	[0.001]	[0.001]	[0.006]	[0.000]	[0.000]	[0.004]
MidCost dummy	0.112***	-0.000	0.081***	0.110***	0.001*	0.042***
	[0.002]	[0.001]	[0.008]	[0.001]	[0.001]	[0.005]
HighCost dummy	0.163***	0.222***	0.649***	0.138***	0.243***	0.446***
	[0.001]	[0.002]	[0.008]	[0.001]	[0.001]	[0.004]
R^2	0.109	0.193	0.036	0.087	0.215	0.016
N. Obs.	105,287	97,549	204,052	378,681	342,577	663,364

Table 3 – Cross-industry tests: The role of set-up costs

This table provides estimates of Equation (13), using either bank debt over total assets or the residual maturity of total debt (measured in months) as dependent variables. *MidCost* and *HighCost* are dummy variables equal to one for firms in 3-digit industries that are respectively in the middle and top terciles of the set-up cost distribution. The estimation is conducted in the pooled sample of Diane firms. The definition of the variables is provided in Appendix A. Standard errors, clustered at the firm level, are reported in brackets. *, ** and *** denote respectively statistical significance at the 10%, 5% and 1% levels.

	Dependent variable:							
	Bank debt / Assets				Maturity of total debt (in months)			
Age	-0.015***	-0.004***	-0.005***	-0.005***	-0.575***	-0.273***	-0.414***	-0.400***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.021]	[0.023]	[0.022]	[0.024]
Age·MidCost		-0.002***	-0.000	-0.000		0.143***	0.121***	0.124***
		[0.000]	[0.000]	[0.000]		[0.029]	[0.023]	[0.024]
Age·HighCost		-0.026***	-0.015***	-0.015***		-0.927***	-0.571***	-0.537***
		[0.000]	[0.000]	[0.000]		[0.026]	[0.025]	[0.026]
Size			0.021***	0.021***			1.717***	1.780***
			[0.001]	[0.001]			[0.054]	[0.061]
PPE / Assets			0.294***	11.942***			0.995***	12.061***
			[0.005]	[0.006]			[0.165]	[0.407]
Financial leverage							7.163***	7.790***
							(0.181)	(0.195)
Within-R^2	0.073	0.118	0.388	0.413	0.032	0.060	0.173	0.186
Survival $\geq$ 5 y.	No	No	No	Yes	No	No	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N. Obs	656,432	656,432	355,431	243,407	255,950	255,950	240,945	168,587

Table 4 – Within-industry tests: The role of cash flows

This table provides the estimates of Equation (14), with the residual maturity of total debt as dependent variable. The estimation is conducted in the pooled sample of Diane firms. The regression is estimated without constant. The definition of the variables is provided in Appendix A. Standard errors, clustered at the firm level, are reported in brackets. *, ** and *** denote respectively statistical significance at the 10%, 5% and 1% levels.

	Dependent variable: Maturity of total debt (in months)			
EBITDA / Assets	-3.811***	-1.649***		
	[0.372]	[0.146]		
EBITDA / Assets · Age 0-1			-2.548***	-2.923***
			[0.223]	[0.221]
EBITDA / Assets · Age 2-4			-1.009***	-0.916***
			[0.189]	[0.191]
EBITDA / Assets · Age 5-10			-1.527***	-0.959***
			[0.279]	[0.276]
Size			1.820***	1.749***
			[0.030]	[0.030]
PPE / Assets			11.872***	11.344***
			[0.263]	[0.267]
R^2	0.796	0.803	0.803	0.810
Firm age	<1y	All	All	All
Industry FE	Yes	Yes	Yes	No
Age FE	No	Yes	Yes	No
Industry·Age FE	No	No	No	Yes
Year FE	Yes	Yes	Yes	Yes
N. Obs	17,672	224,006	224,006	224,006

Table 5 – Cross-industry tests using loan-level data

This table provides the estimates of Equation (13) using loan-level data from *M-Contran*. The dependent variable is the initial maturity of new loans, measured in months. *HighCost* is a dummy variable equal to one for firms in 3-digit industries in the top tercile of the set-up cost distribution. The estimation is conducted in the sample of firms with age below or equal to one year. Columns 1 and 2 use the sample of all firms, columns 3 and 4 the sample of firms with balance sheet data, and columns 5 and 6 the sample of standalone firms with balance sheet data (that is, we exclude subsidiaries). The definition of the variables is provided in Appendix A. Standard errors, clustered at the 3-digit industry level, are reported in brackets. *, ** and *** denote respectively statistical significance at the 10%, 5% and 1% levels.

	Dependent variable: Initial maturity of new loans					
	All firms		Firms with balance sheets		Standalone firms	
	(1)	(2)	(3)	(4)	(5)	(6)
HighCost dummy	8.926***	8.785***	10.196***	7.047***	8.784***	6.554***
	[2.129]	[2.183]	[2.865]	[2.547]	[2.156]	[2.418]
Subsidized loan		5.792***	5.464***	6.741***	5.884***	6.816***
		[0.884]	[1.663]	[1.614]	[0.811]	[1.579]
Fixed rate loan		4.304*	0.109	8.122***	4.208*	7.390**
		[2.437]	[3.161]	[2.886]	[2.490]	[2.853]
Regulated loan		-3.888***	-1.900	-2.247	-3.798***	-1.979
		[1.451]	[2.280]	[2.060]	[1.438]	[2.035]
Standalone SME				8.331		
				[8.713]		
Size				4.821***		4.697***
				[1.250]		[1.269]
Financial leverage				25.538***		26.554***
				[4.357]		[4.251]
PPE / Assets				-3.464		-3.774
				[6.233]		[5.934]
EBITDA / Assets				-4.125		-4.085
				[3.963]		[3.769]
Adj. R^2	0.07	0.08	0.15	0.22	0.08	0.21
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	No	No	Yes	No	Yes
N. Clusters	169	169	135	135	168	135
N. Obs	22,330	22,330	3,048	3,048	21,732	2,973

Table 6 – Within-industry tests using loan-level data

This table provides the estimates of Equation (14), using loan-level data from *M-Contran*. The dependent variable is the initial maturity of new loans, measured in months. The estimation is conducted in the sample of firms with age below or equal to 10 year over the 2006-2018 period. The regression is estimated without constant. The definition of the variables is provided in Appendix A. Standard errors, clustered at the 3-digit industry level, are reported in brackets. *, ** and *** denote respectively statistical significance at the 10%, 5% and 1% levels.

	Dependent variable: Initial maturity of new loans			
	$< 2y$	All	All	All
	(1)	(2)	(3)	(4)
EBITDA/Assets	-10.648***	-13.376***		
	[2.260]	[1.883]		
EBITDA/Assets . Age 0-1			-10.991***	-9.319***
			[1.979]	[1.900]
EBITDA/Assets . Age 2-4			-13.561***	-13.567***
			[2.767]	[2.858]
EBITDA/Assets . Age 5-10			-14.925***	-16.167***
			[2.563]	[2.814]
Subsidized loan	4.262***	4.773***	4.780***	4.646***
	[1.388]	[0.733]	[0.731]	[0.732]
Fixed rate loan	7.979**	9.704***	9.693***	9.230***
	[3.247]	[1.375]	[1.369]	[1.375]
Regulated loan	-2.565*	-0.660	-0.682	-0.511
	[1.421]	[0.825]	[0.824]	[0.858]
Standalone SME	-0.707	1.704*	1.702*	1.539
	[4.315]	[0.902]	[0.907]	[0.980]
Size	3.250**	2.795***	2.802***	2.836***
	[1.298]	[0.626]	[0.624]	[0.643]
Financial leverage	22.601***	21.824***	21.919***	22.201***
	[3.540]	[2.949]	[2.967]	[3.012]
PPE / Assets	1.701	15.991***	15.945***	16.006***
	[5.040]	[3.867]	[3.873]	[3.918]
Adj. R^2	0.29	0.30	0.30	0.31
Quarter FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	No
Age FE	No	Yes	Yes	No
Industry*Age FE	No	No	No	Yes
N. Clusters	147	196	196	189
N. Obs	8,128	45,046	45,046	44,966

Table 7 – Comparison of treated and control banks

This table compares the loan volume of treated and control banks, as defined in Section 4.1. The loan volumes are computed before the treatment by the Dexia shock, as averages over the period from 2006Q3 to 2008Q2. We further break down total loan volumes between loans to municipalities and loans to corporations. Loan volumes are expressed in million euros.

	N. Obs.	Mean	St. dev.	p25	Median	p75
			Control banks			
Municipal loans	104	317.62	1,038.95	0.80	6.09	302.84
Corporate loans	104	1,522.77	4,844.41	117.03	353.20	1,132.98
			Treated banks			
Municipal loans	103	524.61	1,428.12	4.50	134.79	676.66
Corporate loans	103	1,556.29	4,198.65	201.30	565.86	1,258.75
			All banks			
Municipal loans	207	420.62	1,249.14	1.93	30.44	547.30
Corporate loans	207	1,539.45	4,523.62	145.48	467.90	1,199.55

Table 8 – Loan growth following the Dexia treatment

This table regresses the log growth of average bilateral bank-borrower credit amounts between 2006Q3-2008Q2 and 2008Q3-2010Q2. In columns 1 and 2, borrowers are municipalities, while they are non financial firms in columns 3 and 4. In some specifications, we use the log volume of municipal and corporate loan books as controls (as averages over the period from 2006Q3 to 2008Q2). Dexia and three state-owned banks are excluded from the sample. The definition of the variables is provided in Appendix A. Robust standard errors are reported in brackets. *, ** and *** denote respectively statistical significance at the 10%, 5% and 1% levels.

	Dependent variable: Loan growth			
	To municipalities		To corporations	
Treated bank	0.049***	0.051***	-0.002	-0.010***
	[0.008]	[0.008]	[0.003]	[0.003]
Municipal loan book		0.004		0.005***
		[0.003]		[0.001]
Corporate loan book		-0.021***		-0.002*
		[0.003]		[0.001]
Adj. R^2	0.01	0.01	0.10	0.10
Borrower FE	Yes	Yes	Yes	Yes
N. Obs.	24,231	24,231	175,260	175,260

Table 9 – Loan maturity following the Dexia treatment

This table estimates a difference-in-differences model with the initial maturity of new loans to young non-financial firms (below 2 years) as dependent variable. The treatment is defined at the bank level, as described in Section 4.1. In sum, a bank is treated by the Dexia shock if it is highly exposed to municipalities borrowing heavily from Dexia before 2008. 3-digit industries for low and high set-up costs (SUC) are respectively industries in the bottom and the top tercile of the set-up cost distribution. Counties with high bank competition are counties is the lowest half of the Herfindhal-Hirschmann index distribution (computed based on corporate loan shares). The estimation period is from 2006 to 2012. The definition of the variables is provided in Appendix A. Standard errors, clustered at the bank level, are reported in brackets. *, ** and *** denote respectively statistical significance at the 10%, 5% and 1% levels.

	Dependent variable: Initial maturity of new loans					
	All $< 1y$		Low SUC	High SUC		
					Low comp.	High comp.
Treated bank · Post	-3.126**	-3.067**	0.300	-3.618*	-6.301**	-2.177
	[1.456]	[1.453]	[2.761]	[1.921]	[2.913]	[1.939]
Treated bank	-1.107	-1.161	-3.209	-1.011	1.913	-2.406
	[1.653]	[1.610]	[2.336]	[2.002]	[2.158]	[2.210]
Adj. R^2	0.15	0.16	0.07	0.07	0.09	0.08
Industry FE	Yes	No	Yes	Yes	Yes	Yes
Quarter FE	Yes	No	Yes	Yes	Yes	Yes
Indus.*Post FE	No	Yes	No	No	No	No
Loan controls	Yes	Yes	Yes	Yes	Yes	Yes
N. Clusters	141	141	122	131	100	128
N. Obs.	20,279	20,264	2,937	12,240	3,214	8,964

Table 10 – Firm size following the Dexia treatment

This table estimates a difference-in-differences model with several measures of firm size (log total assets, log tangible assets, log intangible assets and log fixed assets) two years after a loan as dependent variables. The sample of borrowing firms includes young non-financial firms (below 3 years). The treatment is defined at the bank level, as described in Section 4.1. In sum, a bank is treated by the Dexia shock if it is highly exposed to municipalities borrowing heavily from Dexia before 2008. 3-digit industries for low and high set-up costs (SUC) are respectively industries in the bottom and the top tercile of the set-up cost distribution. Counties with high bank competition are counties is the lowest half of the Herfindhal-Hirschmann index distribution (computed based on corporate loan shares). The estimation period is from 2006 to 2012. The definition of the variables is provided in Appendix A. Standard errors, clustered at the bank level, are reported in brackets. *, ** and *** denote respectively statistical significance at the 10%, 5% and 1% levels.

	Dependent variable: Bank size after 2 years					
	Assets(+2)			Tang.(+2)	Intang.(+2)	Fixed ass.(+2)
	(1)	(2)	(3)	(4)	(5)	(6)
	Low SUC	High SUC	All	All	All	All
Treated bank	-0.596**	0.043	-0.284*	-0.233	-0.980**	-0.217
	[0.278]	[0.073]	[0.152]	[0.180]	[0.474]	[0.183]
Treated bank · Post	0.575**	-0.194***	0.191	0.162	1.126**	0.182
	[0.277]	[0.072]	[0.148]	[0.199]	[0.535]	[0.174]
Treated bank · High SUC			0.326**	0.201	1.073**	0.242
			[0.141]	[0.178]	[0.490]	[0.177]
Post · High SUC			0.341**	0.320	0.688	0.361**
			[0.141]	[0.208]	[0.466]	[0.165]
Treated bank · Post · High SUC			-0.385***	-0.271	-1.297**	-0.312*
			[0.147]	[0.235]	[0.602]	[0.184]
Firm's age	0.317***	0.177***	0.249***	0.325***	-0.169**	0.224***
	[0.080]	[0.021]	[0.027]	[0.034]	[0.080]	[0.031]
Adj. R^2	0.21	0.20	0.25	0.29	0.15	0.25
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N. Clusters	126	127	134	133	128	132
N. Obs.	2,625	8,975	16,534	11,096	9,339	10,338

Figure 1 – Model dynamics

This figure summarizes the model dynamics, using a baseline calibration with $\underline{A} = 0$, $\bar{A} = 9$, $I = 10$, $\beta = 1$, $p_H = 0.7$, $p_L = 0.5$, $R = 12$, $B = 2$, $e = 3$, and a uniform distribution g of net worth. Panel A studies the share of debt repayment made at date 2, as a function of net worth A, for low and high set-up cost industries ($I = 7$ and $I = 10$ respectively). Panel B studies the share of external financing as a function of net worth, for low and high set-up cost industries ($I = 7$ and $I = 10$ respectively). Panel C studies the share of debt repayment made at date 2, as a function of net worth A, for low and high profitability firms ($e = 3$ and $e = 6$ respectively). Panel D studies the share of funded projects as a function of lenders' discount factor β, for low and high set-up cost industries ($I = 7$ and $I = 10$ respectively). In Panels A, B, and C, vertical lines represent the threshold $A^*(I, \beta)$ below which firms do not obtain financing.

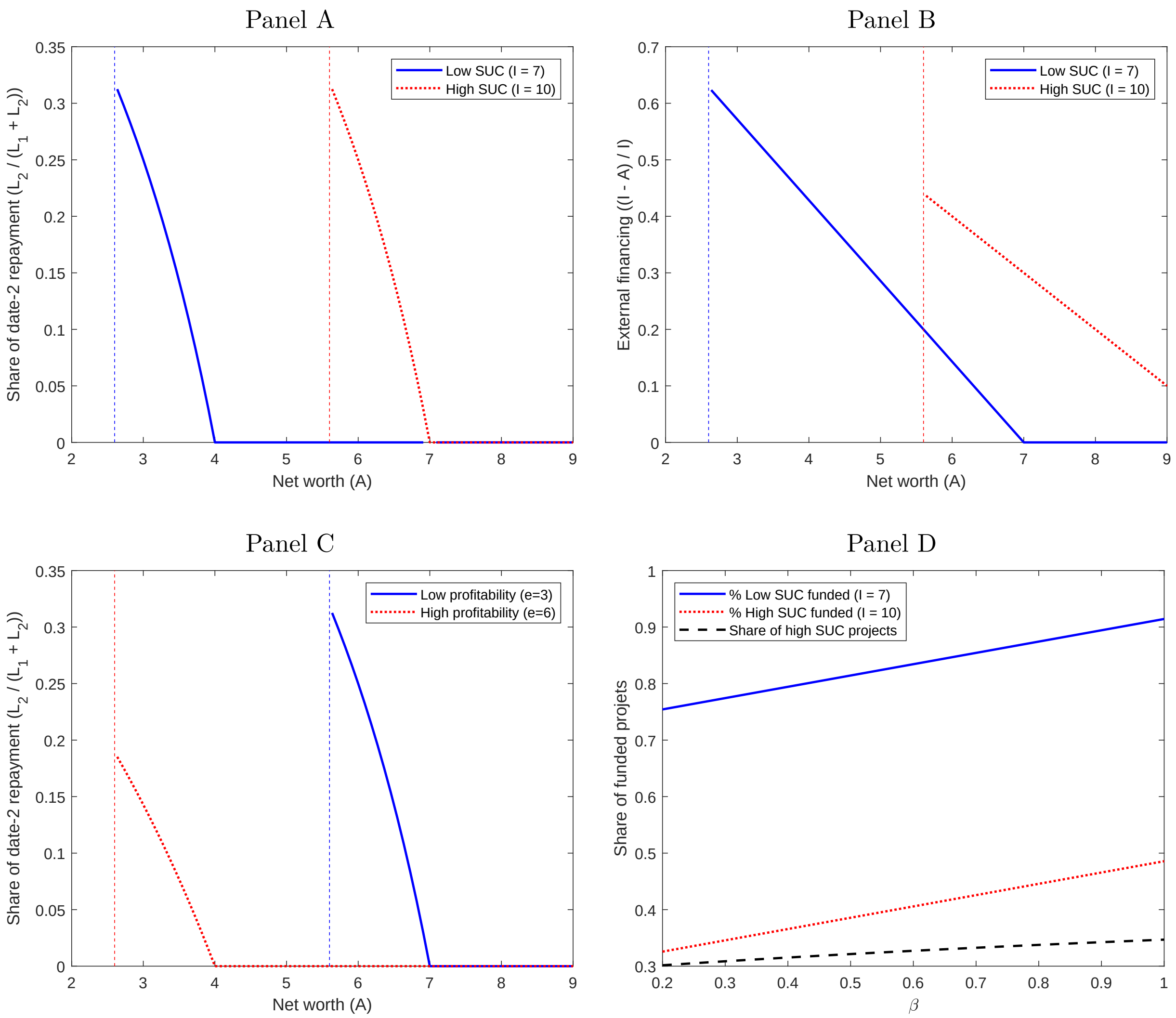


Figure 2 – Stylized facts – Pooled sample: balance sheet structure

This figure plots stylized facts about the capital structure of firms between their creation and age 10. Each line is obtained by computing the mean of the relevant variable in the pooled sample of Diane firms. Total debt is defined to include both financial debt (from banks or other lenders, including family and friends) and payables. In the first five panels, the data are from Diane and the maturity of debt is the residual maturity of total debt. In the last panel, the maturity of bank loans is exactly measured from *M-Contran*.

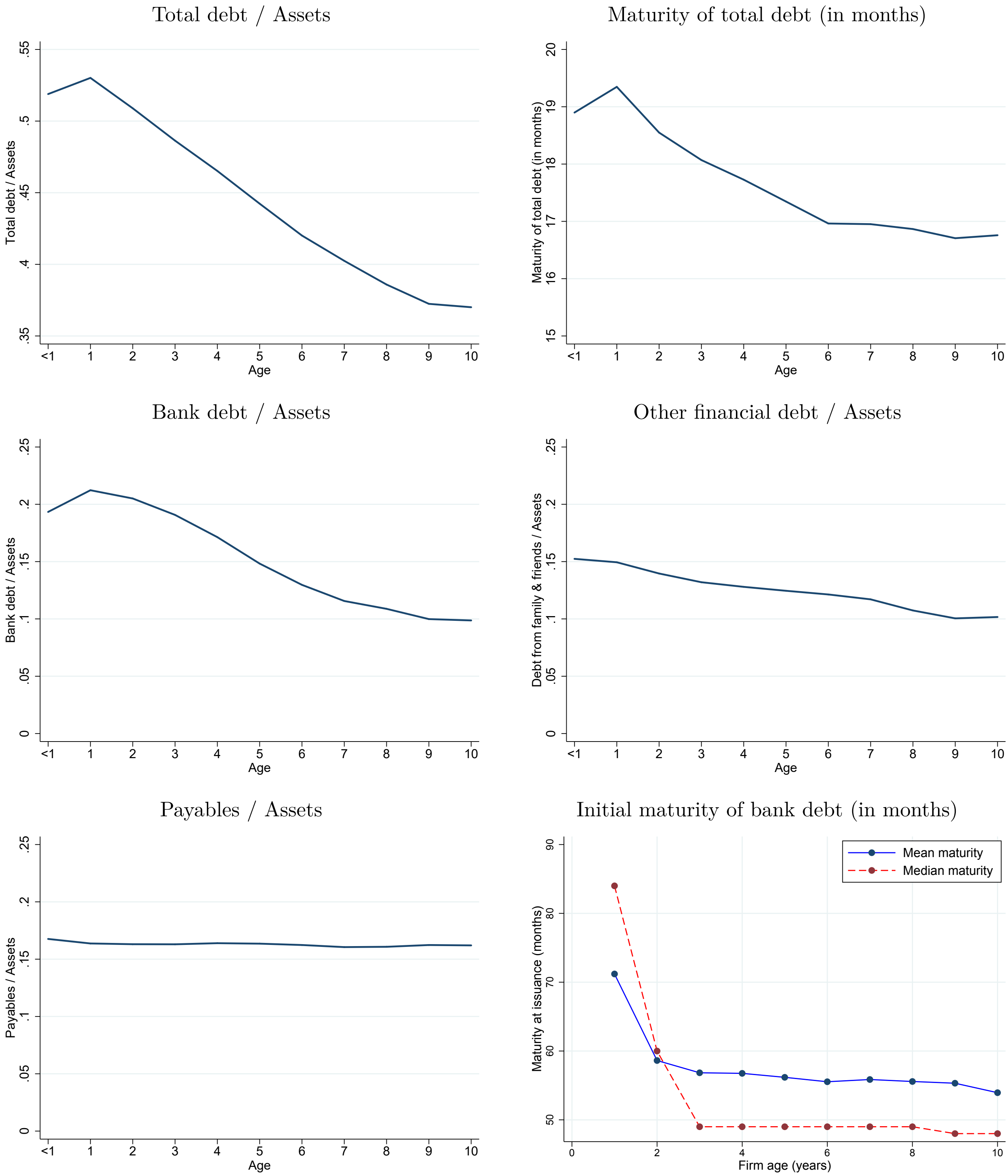


Figure 3 – Stylized facts – By set-up cost terciles: balance sheet structure

This figure plots stylized facts about the capital structure of firms between their creation and age 10. Each line is obtained by computing the mean of the relevant variable for all firms in each tercile of the measure of set-up cost. Set-up costs are computed at the 3-digit industry level using the procedure described in Section 2.2. Total debt is defined to include both financial debt (from banks or other lenders, including family and friends) and payables. In the first five panels, the data are from Diane and the maturity of debt is the residual maturity of total debt. In the last panel, the maturity of bank loans is exactly measured from *M-Contran*.

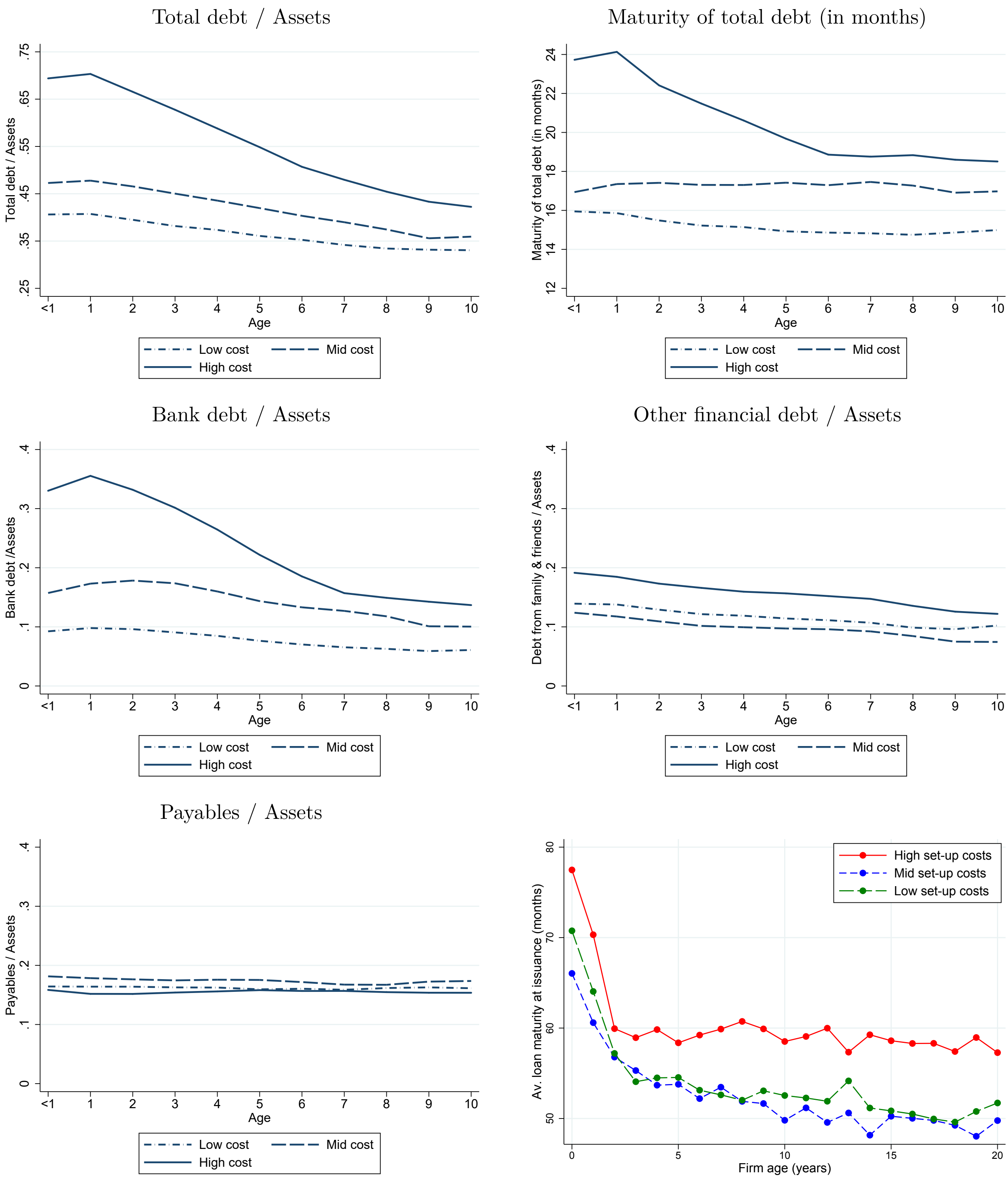


Figure 4 – Lending to municipalities across treated and control banks

This figure shows total lending to municipalities across treated and control banks, as defined in Section 4.1. In sum, a bank is treated by the Dexia shock if it is highly exposed to municipalities borrowing heavily from Dexia before 2008. The loan volumes are normalized to 100 in 2007Q4.

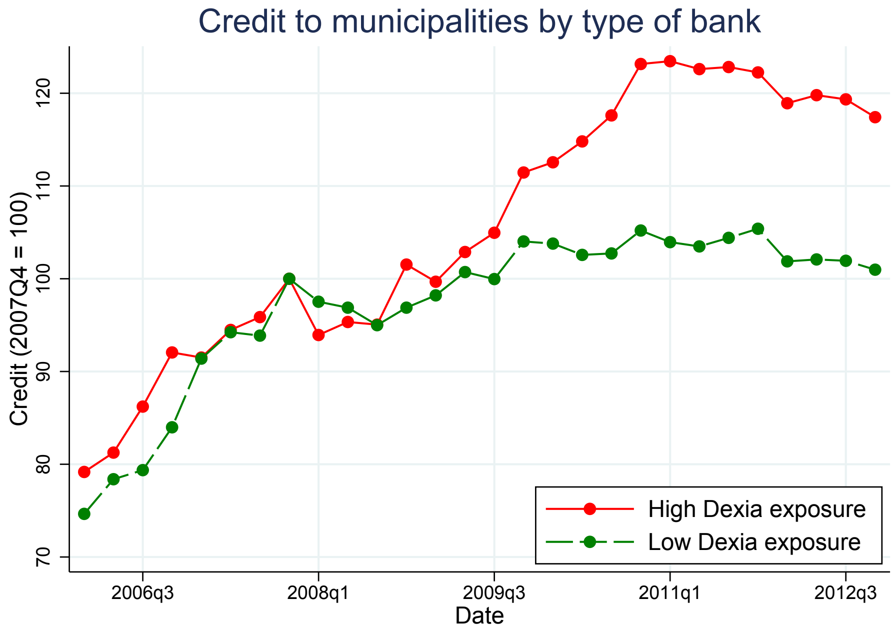


Figure 5 – Corporate loan maturity across treated and control banks

This figure shows the initial maturity of loans to young firms (below 2 years) across treated and control banks, as defined in Section 4.1. In sum, a bank is treated by the Dexia shock if it is highly exposed to municipalities borrowing heavily from Dexia before 2008.

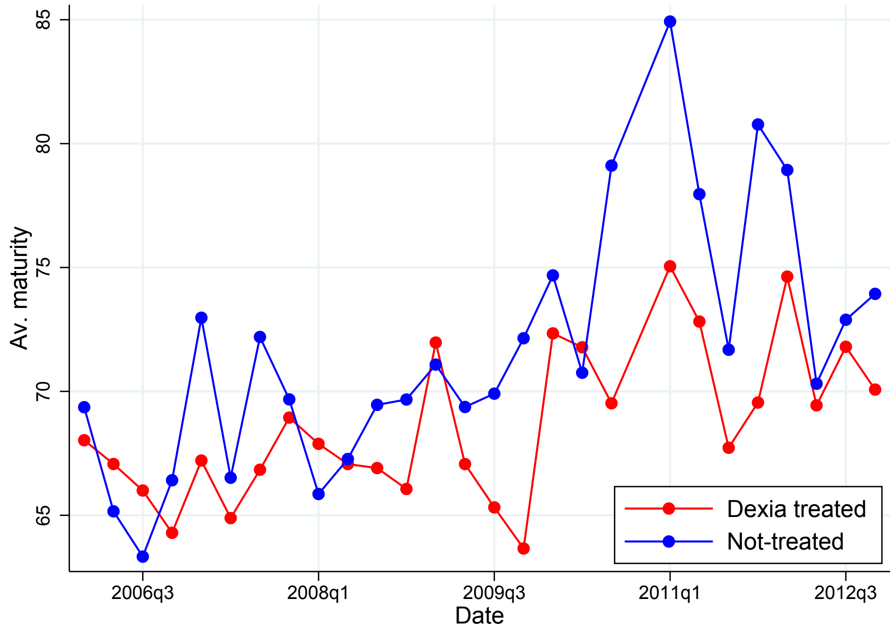
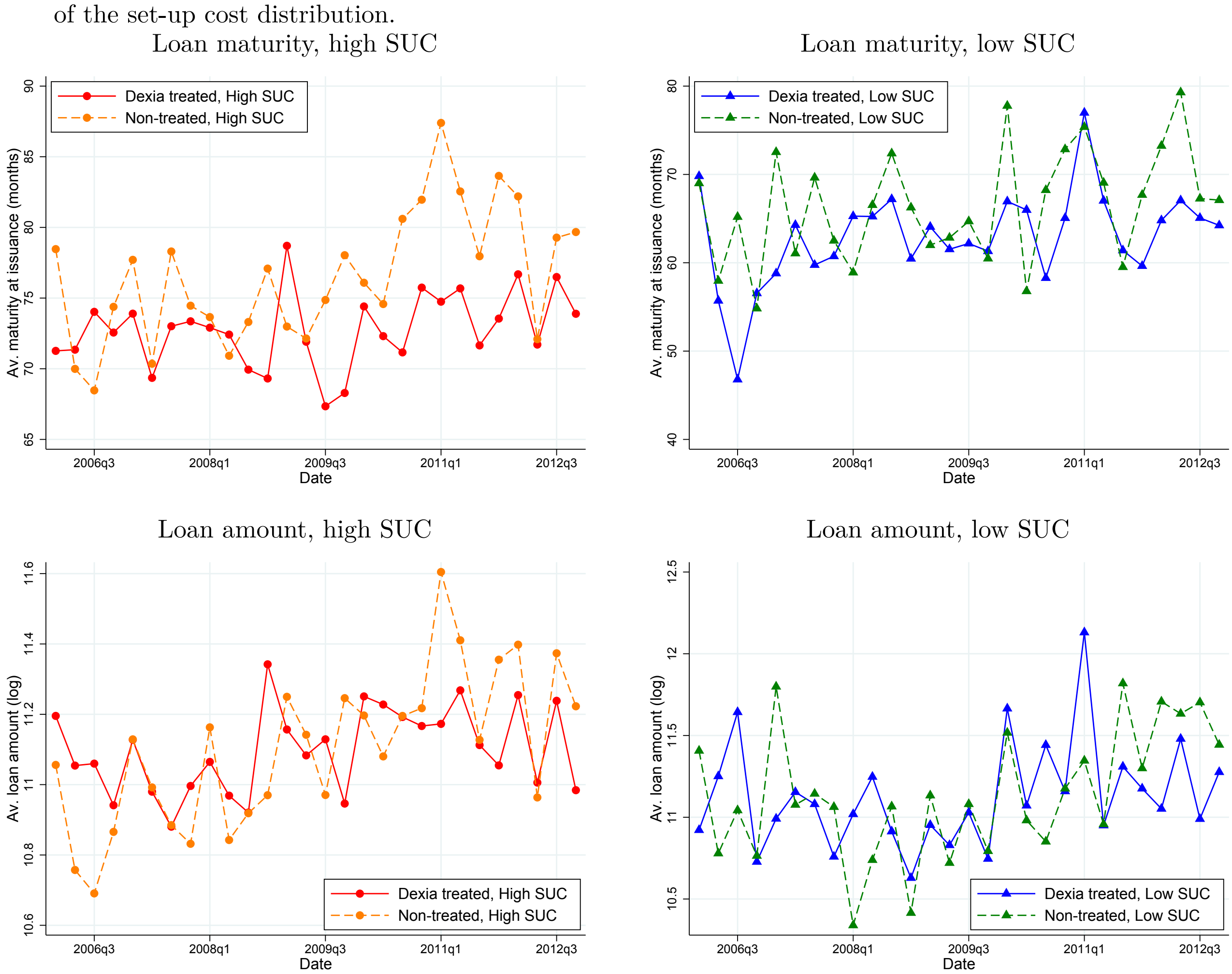


Figure 6 – Corporate loan maturity and amount across treated and control banks: By set-up costs

This figure shows the initial maturity of loans and loan amounts to young firms (below 2 years) across treated and control banks, as defined in Section 4.1. In sum, a bank is treated by the Dexia shock if it is highly exposed to municipalities borrowing heavily from Dexia before 2008. In each panel, we break down the sample between firms in low and high start-up cost (SUC) industries. 3-digit industries for low and high set-up costs are respectively industries in the bottom and the top tercile of the set-up cost distribution.



A Definition of variables

This appendix provides a detailed description of all variables.

A.1 Firm-level data

All firm-level data come from firms' tax filings (*Liasse fiscale*). The variables identifiers are from this filing.

- **Size**: Logarithm of net total assets (variable id: $CO - 1A$).
- **Age**: Difference between reporting year and year of firm creation.
- **Total debt / Assets**: Sum of all financial and non-financial debt (variable id: EC). Normalized by total assets.
- **Financial debt / Assets**: Sum of all financial debt (variable id: $EC - DX$). Normalized by total assets.
- **Bank debt / Assets**: Sum of all debt from credit institutions (variable id: DU). Normalized by total assets.
- **Other fin. debt / Assets**: Sum of other financial debt; comprises mostly debt from equityholders, that is, in our sample, the entrepreneur as well as family and friends (variable id: DV). Normalized by total assets.
- **Accounts payables / Assets**: Sum of all debt to suppliers (variable id: DX). Normalized by total assets.
- **Debt maturity (residual)**: Weighted average maturity of total debt (including accounts payables). The breakdown of the residual maturity of total debt is known for three buckets (up to one year, between one and five years, above five years). We assume that debt with a maturity up to one year has maturity of one year, that debt with a maturity between one and five years has a maturity of three years, and that debt with a maturity above five years has a maturity of seven years. We then compute a weighted average of these maturities, in years (variable id: VZ).
- **Debt $\leq$ 1y / Debt**: Share of total debt (including accounts payables) that has a residual maturity up to one year (variable id: VZ). Normalized by total debt.

- **Debt $>$ 1y and $\leq$ 5y / Debt**: Share of total debt (including accounts payables) that has a residual maturity above one year and up to five years (variable id: VZ). Normalized by total debt.
- **Debt $>$ 5y / Debt**: Share of total debt (including accounts payables) that has a residual maturity above five years (variable id: VZ). Normalized by total debt.
- **PPE / Assets**: Sum of net tangible assets (variable id: $(AN - AO) + (AP - AQ) + (AR - AS) + (AT - AU) + (AV - AW) + (AX - AY)$). Normalized by total assets.
- **Intangibles / Assets**: Sum of net intangible assets (variable id: $(AB - AC)$ $+ (AD - AE) + (AF - AG) + (AH - AI) + (AJ - AK) + (AL - AM)$). Normalized by total assets.
- **EBITDA / Assets**: EBITDA (variable id: GG). Normalized by total assets.

A.2 Loan-level data

All loan-level data come from *M-Contran*, as described in Section 2.1. Borrowing firms are matched with balance sheet data from tax filings. Therefore, all balance sheet variables in loan-level regressions (Size, Financial Debt / Assets, PPE / Assets, EBITDA / Assets) are computed as in Section A.1.

- **Loan maturity**: Maturity of the loan at issuance, expressed in months.
- **Fixed rate loan**: Dummy variable equal to 1 if the loan contract has a fixed interest rate.
- **Subsidized investment loan**: Dummy variable equal to 1 if the interest rate benefits from a public subsidy.
- **Regulated loan**: Dummay variable equal to 1 if any other regulation impacts the interest rate.
- **Standalone SME**: Dummy variable equal to 1 if the borrowing firm operates as a standalone company, that is, has no parent company.

B Additional figures

Figure A1 – Intensity of treatment and competition at the county level

This figure plots the intensity of the treatment and of bank competition at the county level (*département*). Panel A shows county-level market shares in 2007 of banks treated by the "Dexia shock." A bank is treated nation-wide whenever its share of loans to municipalities borrowing from Dexia was above the sample median in June 2007. Darker areas denote upper quartiles of the distribution of market shares across counties in 2007. Panel B shows Herfindahl-Hirschmann indices (HHI) for loans to non-financial corporations (NFCs) at the county level in 2007. Darker areas denote upper quartiles of the distribution of HHI and correspond to lower local levels of bank competition.