Start-Up Costs and the Capital Structure of Young Firms*

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Abstract

We show that start-up costs are a prime determinant of the capital structure of young firms. First, we use a rich dataset of firm-level balance sheets and loan-level debt issues to document novel facts. While they are in principle more financially constrained, young firms exhibit higher leverage and raise longer-maturity debt than old firms. Second, we show theoretically that fixed start-up costs can explain these facts. Third, we estimate start-up costs and test novel predictions from the model. Fourth, we use a quasi-natural experiment to study the real implications of start-up costs. We exploit a negative shock to some banks' supply of maturity to firms at the end of 2008, associated with the failure of a large lender to municipalities, for which some banks had to substitute. Since municipalities borrow longer-term loans than firms and banks have to cap their overall exposure to asset-liability maturity mismatches, this created a negative supply shock on the maturities offered by these banks to firms. We indeed find evidence of a lower maturity of new loans supplied by treated banks to firms in industries with higher start-up costs. Furthermore, young firms affected by this negative maturity supply shock exhibit a lower profitability and a lower tangible capital ratio after two years than other young firms. Thus, we highlight real effects of shocks reducing the ability of banks to supply longer-term loans.

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Introduction

Stylized facts on a large sample of young French companies suggest that the bank debt of French firms tends to decline as they get older, as does the maturity of their loans. This may seem surprising if one considers that young firms are particularly subject to information asymmetries and moral hazard issues, which are traditionally associated with credit rationing and shorter debt maturity (see for example Stiglitz and Weiss, 1981, or Diamond, 1991). We propose a simple explanation for this phenomenon, based on the importance of startup costs for young firms: Young firms have very large fixed costs to start their businesses, therefore they need to raise funds that are significantly larger in magnitude (with respect to, say, the size of their assets) than already established firms. At the same time, firms in the start-up phase have limited cash flows, which constrains their annual debt repayments. To repay levels of debt that are significantly larger than established firms with cash flows that are significantly lower, the young firms that have access to debt financing must extend the maturity of their loans.

To explore this possibility, 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 their loan at dates 1 and 2 using cash flows that are more subject to moral hazard the more distant they are in the future. In such a context, firms prefer to repay their debt as quickly as possible to limit the moral hazard problem, but they may be prevented to borrow when they are financially constrained, i.e., when their early cash flows are small with respect to their borrowing needs. This simple model generates testable hypotheses along two important dimensions of industry and firm characteristics, namely, their startup costs and their level of financial constraints. It predicts that the phenomenon described above (the fact that firms have higher debt levels and longer debt maturity in their early years) should be significantly more severe for two types of firms: Those that operate in industries with larger startup costs, which have greater borrowing needs, and those that are more financially constraints, which have more limited repayment capacities and for which the moral hazard problem is more severe. The model also makes specific predictions about a shock to the supply of credit that would affect the ability or the willingness of banks to make long-term loans. Such a shock should affect the access to credit of young firms, in particular in high-fixed costs industries. It is therefore likely to affect the creation and survival of such firms.

We then take these hypotheses to the data, using two data sources. First, the financial statements of a large sample of private French companies that we are able to follow in their first years of existence, which allows us to analyze the evolution of their bank debt, among other things. Second, we use loan-level data from Banque de France. The data contain detailed information about some important loan characteristics, in particular the maturity of a sample of news loans between 2006 and 2016. We present first a series of stylized facts about the debt of young firms. In our sample, the ratio of debt-to-asset in the average firm goes down markedly in the first years of existence of the firm, from about 52% for new firms to about 37% for 10-year old companies. The maturity of the debt also decreases significantly over time, from about 1.6 years for firms below one year of age to about 1.4 year on average for 10-year old firms. This pattern is even more striking at the loan level: The average maturity of new loans to firms that are at most one-year old is above 80 months, while it is consistently around 50 months for firms above two years of age. Consistent with the model, these patterns are entirely driven by the subsample of firms that operate in high-startup cost industries. For example, in industries in the top tercile of startup costs, the debt-to-asset ratio of the average firm goes form about 70% to 43% in the first ten years of existence of the company, and the maturity of the overall debt decreases from about two years to about 1.5 years in the same time period.

We confirm these results in a multivariate setting using different sets of controls and fixed effects that allow us to capture unobservable firm and industry characteristics. Bank debt and maturity decrease with firm age, in particular in high-fixed costs industries. We also explore the within-industry variations in debt maturity, testing the prediction that within an industry, more constrained firms (i.e., firms with smaller cash flows) demand longer debt maturities. In line with this prediction, we find that, within industries, the ratio of a firm's Ebitda over its assets is a strong (negative) predictor of the maturity of the firm's debt, in particular in its first few years of existence.

Finally, we analyze the real effects of a change in the supply of long- vs short-term maturity debt by the banking sector for young firms in high-fixed cost industries. To do so, we use the bankruptcy of Dexia, a French-Belgian bank whose main business was to provide funding to public entities, notably local governments and municipalities, as a shock to the supply of loans of various maturities. Following the bankruptcy of Dexia, we assume that banks that were already lending to the same municipalities for which Dexia was very active lender faced a sudden increase in the demand for debt by local public entities. Because the maturity of loans to public entities turns out to be significantly longer than the maturity of corporate loans, the increase in demand for debt by public entities led to an increase in the average maturity of the debt portfolio of affected banks. We first find a confirmation that the banks affected by this shock increased their loan supply to municipalities for invetsment purpose and reduced the maturity of their corporate loans, in particular those to young firms in high-startup cost industries. We then look after possible real effects of this negative maturity supply shock. Using the Dexia shock as an instrument again, we find that young firms borrowing from the maturity constrained banks tend to be relatively less profitable and build less tangible assets two years after they issued their investment loan.

Contributions to the existing literature [tba].

The remainder of this paper is organized as follows. Section **??** presents the theoretical model. Section **??** describes the data and the construction of our measure of industry-level start-up costs. Section **??** presents novel stylized facts about the capital structure of -and the maturity at issuance of loans to- young firms, and tests the model's predictions on the role of fixed costs in the demand for longer maturities. Section **??** then investigates the real effects of bank-level frictions that impede the access of young firms to the desired long maturity loans. Section **??** then concludes.

1 Model and testable predictions

We present a simple model of external financing with fixed start-up costs, building on **?**. We then use the model 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 $f(I)$. 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 $D = \max\{I - A, 0\}$.[1] All agents are risk-neutral and have no time preference. Lenders have an opportunity cost of funds $r > 0$, which we take as exogenous in this section.

When undertaken, the project yields a safe cash flow e at date 1, and a risky verifiable cash flow $R > 0$ with probability p at date 2, 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 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

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

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,

$$L_1 + p_H L_2 = D(1 + r), \tag{2}$$

[1] We later show that it is never optimal for the entrepreneur to invest less than A and thus to borrow more that $I - A$.

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

$$L_1 + p_H(R - \frac{B}{\Delta p}) \geq D(1+r). \tag{5}$$

Whenever the fixed 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 $A \geq A^*(I, r)$ will get funding, where

$$A^*(I,r) = I - \frac{L_1}{1+r} - \frac{p_H}{1+r}(R - \frac{B}{\Delta p}). \tag{6}$$

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 $A < A^*(I, r)$.

Next, Equation (**??**) also makes it possible to solve for the optimal debt repayment schedule. Indeed, $A^*(I, r)$ 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.

1.3 Equilibrium supply of loanable funds

To consider the effect of shocks to the supply of loanable funds, we endogenize r and now treat it as the interest rate that clears the market for loanable funds (as in **?**). Denote $S(r)$ the total supply of loanable funds. The demand for loanable funds across all firms and industries equals

$$D(r) = \int_{\underline{I}}^{\bar{I}} \int_{A^*(I,r)}^{\bar{A}} f(I)g(A)\max\{I - A, 0\}\mathrm{d}A\mathrm{d}I. \tag{8}$$

The market for loanable funds clears when $D(r) = S(r)$.

A shock to lenders is interpreted as drop in the supply of loanable funds for a given r. The equilibrium implications are straightforward. First, to clear the market for loanable funds, the equilibrium interest rate has to go up. Second, as seen in Equation (**??**), $A^*(I, r)$ is increasing in r. Therefore, regardless of the industry, entrepreneurs with low initial resources A no longer have access to outside financing and stop operating projects. For industries with sufficiently high fixed costs, a large increase in r may be such that $A^*(I, r) > \bar{A}$, that is, no more projects can be financed in this industry.

1.4 Empirical predictions

The model yields several testable predictions. The first one pertains to the pool of projects that obtain financing.

Hypothesis 1. ***(Selection)*** *A higher proportion of projects obtain financing in industries with low fixed costs.*

This can be seen directly from Equation (**??**), which shows that the minimum level of entrepreneurial resources needed for projects to be financed is increasing in I. The mass of firms borrowing in any industry i is $\int_{A^*(I,r)}^{\bar{A}} g(A)\mathrm{d}A$, which is decreasing in I_i. A corollary of Hypothesis **??** is that firms operating in high fixed cost industries will have higher capitalization A(in dollar terms).

The next hypothesis is related to the capital structure of new firms in the cross-section of industries.

Hypothesis 2. ***(Debt maturity across industries)*** *For a given initial resources, conditional on operating the project, firms in industry with a higher fixed cost borrow with longer-maturity debt.*

This prediction follows from the fact that, for a given level of initial resources A, firms in high fixed 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 **??**), that is, debt maturity is longer. A corollary prediction is that, for a given initial resources, conditional on operating the project, firms in industry with a higher fixed cost have higher leverage.[2]

Hypothesis **??** turns to within-industry predictions.

Hypothesis 3. ***(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 (**??**). 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 4. ***(Supply of loanable funds)*** *A negative shock to the supply of loanable funds implies that industries with sufficiently high fixed costs no longer operate.*

This prediction follows from the analysis in Section **??** and holds whenever some industries are in the region where $A^*(I, r) > \bar{A}$. Thus, a shock the the supply of savings or to the banking system can change the industry composition of new firms: industries with high fixed costs should be underrepresented after the shock.

[2]Predictions on average debt maturity and average leverage in the cross-section on industries are developed in Appendix **??**. When the prediction is not conditional on a given A, two opposite forces are at play. Indeed, for a given A, firms in high fixed cost industries have higher leverage. However, only firms with sufficiently high A operate. We derive conditions on the distribution $g(A)$ such that the average leverage increases with start-up costs in the cross-section of industries.

2 Data and measurement of start-up costs

We combine several data sources to test the model's predictions.

2.1 Data

We rely on two main datasets. First, we obtain detailed data from Diane (Bureau van Dijk) on the balance sheet and income statement of firms created in France between 2006 and 2016. Our sample is based on a random draw of 20% of the universe of firms created, which is representative both of the industry and time distributions of firm creation.[3] We end up with a sample of XXX firms, for which we have detailed balance sheet data, including for their debt structure (bank debt, other financial debt, and trade credit), broken down by maturity ($. \leq 1$ year, 1 year $< . \leq 5$ years, 5 years $<$.).

Given our focus on access to credit by new firms, we also use a proprietary dataset by the Bank of France, *M-Contran*. This dataset contains extensive information on all loans granted by a random set of bank branches, at a quarterly frequency.[4] The Banque de France uses these data to compute aggregate measures of the cost of credit. While not a panel (since the set of surveyed bank branches rotates somewhat every quarter), these data have advantages over standard credit registers. Indeed, credit registers are typically about exposures at the bank-firm level, that is, aggregate both old and new loans. Therefore, there is typically no information on the specific terms of each loan (exact maturity, interest rate, etc.). After some cleaning, we instead have all this information for a total number of some 253,000 new corporate loans between January 2006 and April 2018.[5] That said, we also use the French credit register to construct a few additional variables, as detailed below.

[3]All French firms, even when private, are required to report yearly balance sheet and income statement data to the tribunal of commerce. Diane collects data from these reports. A small number of very small firms – mostly individual entrepreneurs – are missing. Furthermore, 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.

[4]As recorded by branches during the first month of each quarter.

[5]This includes only corporate loans that fund corporate investment, and thus excludes credit lines.

2.2 Measuring start-up costs

Based on the model, our main object of interest is the fixed cost of starting up a firm. This fixed cost can be interpreted as the minimum quantity of equipment or commercial property an entrepreneur needs to start a firm in a given industry. We estimate fixed costs at the 3-digit industry level as follows. First, based on full sample of firms in Diane, we keep only non-financial firms with age zero or one year.[6] Second, for each firm f, we compute the start-up investment INV_f as the mean value of property, plant and equipment (PPE) and intangible assets (IA), in euros, over years 0 to 1,

$$INV_f = \frac{1}{2}\sum_{t=0}^{t=1}\left[PPE_{ft} + IA_{ft}\right]. \tag{9}$$

Third, for each 3-digit industry i, we measure start-up costs as the median of INV_f over all firms in industry i. 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).[7] That said, we show in Appendix **??** that our measurement of fixed start-up costs is robust to a number of alternative definitions.

We provide descriptive statistics of start-up costs in Table **??**. Panel A first shows moments of distribution of start-up costs across XXX industries for which the measure exists. As seen, there is important variation: the median industry has a start-up cost of XX euros, while the cost jumps to XXX euros at the 90th percentile. Panel B reports the 10 industries with the highest and lowest start-up costs. Not surprisingly, industrial activities tend to have high start-up costs (e.g., XX or XX), while services relying primarily on human capital have low start-up costs (e.g., XX or XX). Panel C investigates the characteristics of high fixed cost industries more systematically, by correlating industry-level fixed costs with industry-level balance sheet characteristics (averaged across firms in the pooled sample). In particular, we see that high fixed costs industries are those where PPE over total assets is also high.

[6] We do so to avoid potential measurement problems for firms or age 0 or 1 year. 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 to measure fixed costs of zero at the end of year t. Firm age is defined as the difference between the reporting year t and year of firm creation.

[7] 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.

3 Stylized facts and empirical tests

This section presents novel stylized facts about the capital structure of young firms, and tests the model's predictions on the role of fixed costs.

3.1 Stylized facts

We start by plotting several variables of interest to establish novel facts about the capital structure of young firms. In Figure **??**, we display the mean value of several firm characteristics between creation and age 10, in the pooled sample of firms from Diane. The first 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 second panel shows that the average maturity of total debt is also decreasing with age, from about 1.6 to about 1.4 years over the first 10 years[8].

Both facts 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. The last three panels then 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 debt from family and friends (which goes from about 15% to about 10%). This is also surprising, since bank debt is a priori subject to more severe financial frictions than debt from family and firms, and could thus be expected to grow more over time. Finally, the ratio of payables to total assets is stable over the lifetime of firms.

Then, we provide preliminary evidence in Figure **??** that fixed costs are critical to explain these patterns, consistent with the model. We reproduce the same charts as in Figure **??**, after breakdown down the sample based on whether firms operate in industries with low, intermediate or high start-up costs (based on terciles across industries). Both for leverage and maturity, we see that the aggregate patterns are overwhelmingly driven by industries with high start-up costs. For industries in the

[8] See if we can do the same chart after excluding payables, which all have a maturity below one year.

top tercile of start-up costs, leverage is almost cut by close to 40% over the first 10 years (from 70% to 43%) while the decrease is much less significant for firms in other industries. Regarding maturities, the patterns are even more striking. For firms with low or intermediate fixed cost, debt maturity is stable with age. The decrease in maturity is strong only for firms with high fixed costs (from about 2 to about 1.55 year). Both facts are consistent with the model, even though they do not provide a clean test at this stage. The last three panels confirm that that bank debt is driving the pattern in terms of leverage. Furthermore, the fact that bank debt decreases much more with age than debt from family and friends is also 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, there is no gain from repaying most of the debt early on. Finally, Figure **??** also confirms that there is no age pattern in terms of payables, regardless of the fixed cost, which is reassuring since the model does not make any prediction for this specific type of debt. That said, these figures do not provide tests of the model, since they could be driven by differences in survival rates across firms with different characteristics, or by time effects. Thus, we now turn to explicit tests of the model's predictions.

3.2 Cross-industry tests

We start by testing Hypothesis **??**: in the cross-section of industries, firms in high fixed cost industries should have higher leverage and longer-maturity debt.[9] Within firms, that is, after including firm fixed effects, leverage and maturity should be decreasing over time. Our main specification is

$$\begin{aligned} Y_{ijt} &= \beta_0 \cdot Age_{it} + \beta_1 \cdot Age_{it} \cdot MidCost_{ij} + \beta_2 \cdot Age_{it} \cdot HighCost_{ij} \\ &\quad + \gamma_3 \cdot Controls_{it} + \nu_i + \lambda_t + \epsilon_{ijt}, \end{aligned} \tag{10}$$

where Y_{ijt} is either the leverage or the maturity of the debt of firm i in industry j in year t. Y_{ijt} is the age of firm i in year t, while $MidCost_{ij}$ and $HighCost_{ij}$ are dummy

[9] [Clarify even more: the prediction should be that the age patterns are driven by differences in fixed costs. In general there is a slight ambiguity about the model and predicions: whether it is about the evel or the time-series dynamics.]

variables equal to one for firm i when it operates in a 3-digit industry respectively in the middle and top terciles of the fixed cost distribution. Furthermore, a firm fixed effect ν_i ensures that we are exploiting within-firm variation, that is, our results cannot be explain by differential survival rates of firms in across industries. Finally, λ_t is a time fixed effect. Throughout the tests, we treat the fixed cost as an industry characteristic 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 a high fixed cost.

The estimation results are reported in Table **??**. We first confirm that, regardless of fixed costs, bank debt and maturity decrease with age, both without fixed effect (columns 1 and 5) and after including firm fixed effects (columns 2 and 6). Therefore, our stylized facts are not driven by the selection of issuers with respect to age. In columns 3 and 7, we find that the total effect is driven to a large extent by firms in high fixed cost industries, which is fully consistent with the model. Finally, in columns 4 and 8, we show that these results are robust to the inclusion of standard control variables, such as size, tangibility and leverage.

3.3 Within-industry tests

We then turn to the test of Hypothesis **??**. 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,

$$Maturity_{ijt} = \sum_{s=0}^{10} \beta_s \cdot \frac{EBITDA}{Assets} \cdot \mathbb{1}(Age = s) + \phi_j + \mu_s + \lambda_t + \epsilon_{ijt}, \tag{11}$$

where $Maturity_{ijt}$ is the debt maturity for firm i operating in industry j in year t, $\mathbb{1}(Age = s)$ is a dummy variable equal to one when the firm has age s, and ϕ_j, μ_s and λ_t are respectively industry, age and year fixed effect. As the empirical equivalent of the date-1 cash flow e, we use the ratio of EBITDA over total assets. Therefore, Equation (**??**) 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 **??**. The first column estimates Equation (**??**) on the limited sample of new firms (with age below 1 year). Consistent with Hypothesis **??**, we find a negative and significant effect of EBITDA on debt maturity. [Comment on the magnitude] In the second column, we estimate (**??**) in the full sample, but without allowing for differential age effects. We 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 more strongly influences debt maturity for young firms: the estimate of β_s is most negative at firm creation, then becomes less negative with age, and is not statistically significant from zero after 8 years. This is consistent with the idea that firms move away from financial constraints as they age. 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 **??**, both with respect to the sign and to the time-series variation of the effect of cash flows on debt maturity. This is reassuring, given that this hypothesis is specific to our model.

3.4 Alternative mechanisms

One potential alternative explanation for some of our results could be that firms with higher start-up costs buy assets with greater pledgeability, and so can borrow more and with long-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.[10] First of all, pledgeability can explain differences in the average *levels* of debt and maturity, not the time-series *changes*. Instead, the pattern we highlight is a monotonic decrease in both leverage and maturity with firm age. Second, all our econometric results in Section **??** are robust to including measures of asset tangibility (either PPE/Assets or PPE/Fixed assets) as a control variable, as seen in columns X

[10]For evidence on the relation between pledgeability and debt maturity of leverage, see for example **?** and **?**.

and X.[11] Third, [think how to exploit differences between tangibles (pledgeable) and intangibles (non-pledgeable)]

Another possible interpretation of our findings is that the longer loan maturity of firms with higher fixed costs reflects the fact that their assets have a longer lifetime. Perhaps firms match the maturity of cash flows from their assets and liabilities to smooth their overall cash flows over time. This might be valuable to firms facing financial constraints. This explanation is consistent with our finding that firms in industries with high fixed costs, which also tend to be industries in which assets have longer lifetimes, borrow at longer horizons. However, this is inconcistent with the sharp decrease in debt maturity and in the maturity of new loans taken by firms in these industries after a few years of existence.

4 Real implications of a constrained access to long-term loans for new firms

In this section, we exploit the failure 2008 of a French bank specialized in lending to local public administrations and local governments (denoted hereafter as "municipalities" for simplicity) as an exogenous shock reducing the ability of some French banks to supply long-term loans to non-financial firms. We show that banks hit by this shock did indeed shorten their supply of maturity to firms in high start-up costs and investigate real conseqeunces of this friction for young firms.

4.1 The near failure of Dexia in 2008 as a quasi-natural experiment

Dexia was a Franco-Belgian bank specialized in credit to local governments.[12] In 2008, Dexia was severely hit by the ongoing international financial crisis due to direct losses on the subprime market, to its exposures to several European banks that were

[11]The estimated sign on this coefficient is indeed consistent with the idea that pledgeability increases leverage and maturity.

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

themselves heavily affected by the crisis, and to the financial difficulties of Financial Security Assurance (FSA), a US subsidiary of Dexia and a monoline credit insurer specialized in insuring municipal bonds, asset-backed securities and mortgage-backed securities. Furthermore, Dexia had a fragile capital structure as it posted only a limited amount of deposits and had to resort massively to the interbank market for its funding. In October 2008, after the collapse of Lehman Brothers and the ensuing financial panic, the French and Belgian governments had to intervene to back up Dexia that faced a severe liquidity stress. They injected cash in the bank and guaranteed its new bond issues. The new governance that was required by the two States failed to be implemented orderly and the bank never recovered enough. The bank was eventually dismantled in the Winter 2012-2013. As far as France is concerned, its municipal loans portfolio was then acquired by three state-owned credit institutions, CDC, SFIL and La Banque postale.

Dexia was only a mid-size bank, with some 37,000 employees worldwide and total assets of EUR 650bn in 2008. However, it used to be the world leader in its main activity, the financing of local governments. In France, its market share in this business line was estimated at around 40% before the start of the financial crisis. When the US subprime crisis hit France in early 2008, Dexia already started to slow its municipal lending activity. After the government bailout of October 2008, it had to shrink even more the size of its municipal bonds ans loans portfolio, which affected its lending to local governments even more. According to the *Cour des comptes*, the bad financial health of Dexia put indeed a great strain on the funding of French local governments over the years 2008-2012. As a matter of fact, the flow of new loans granted by Dexia to local governments fell from about EUR 14bn in 2007 to about EUR 10bn in 2008, and they kept receding in the following years, reaching only about EUR 7bn in 2010 according to Dexia's annual reports.

We exploit the near failure of Dexia in late 2008 as an exogenous event that affected differently the ability of French banks to accomodate the demand of longer-maturity loans by young firms. Our identification strategy proceeds in two steps and relies extensively on the bilateral credit exposures reported in the French credit register, which covers all lending exposures (above a small threshold of 25 kEUR) by all resident credit institutions to non-financial firms but also to all local public administrations. We first identify municipalities that were highly dependent on Dexia before the shock.[13] A local government is defined as being highly dependent on Dexia whenever the share of Dexia in its total bank debt in September 2008 is in the top quartile of the distribution of Dexia market shares across all municipalities (which means a market share of Dexia above 58%).

In a second step, we categorize banks according to the share of their loans to Dexia-dependent municipalities within their total municipal lending business in France in September 2008. We define banks above the median of this share as *treated* by the Dexia shock. The underlying assumption is that municipalities relying heavily on Dexia were forced to borrow more from their other relationship lenders once Dexia was constrained to shut down lending after October 2008. It is well known that municipalities borrow for investment purpose at much longer maturities than do non-financial firms: as figure **??** shows, the average maturity at issuance of investment loans to municipalities is twice as large as the maturity of loans to firms.[14] Since banks have to meet internal and regulatory limits in terms of asset liquidity and asset-liability maturity mismatches, we therefore assume that the banks that locally accomodate the sudden increased demand of long maturity loans by municipalities were forced in the same time to ration their supply of long maturity loans to firms. This should have affected young firms in high start-up industries disproportionately.

As a vindication of our identification strategy, Figure **??** compares lending patterns when bank-level investment loans to municipalities are aggregated into two groupings: loans held by Dexia-treated banks on the one hand, loan amounts held by other banks on the other hand. The figure shows that lending to local governments by both types of banks follow roughly parallel trends from 2004 to 2007. This however changes dramat-

[13]Mainland France administrative map was broken down in 2008 into 22 *regions* (now only 15), 90 *départements* (counties) and some 36,000 *communes* (municipalities). Several administative groupings of municipalities also exist, with various : *communaut'es de communes, communaut'es de villes, communaut'es d'agglom'eration, m'etropoles*. We focus here on counties, munuicpalities and their various groupings because these can be located with certainty within a county using their ZIP code. These types of local governments account for some 90% of local public borrowings.

[14]The figure is based on *M-Contran* loan-level data, which is not available before 2012 as far as loans to local governments are concerned. However the difference in maturities at issuance across borrower types is stable enough to be extrapolated to the period before.

ically in 2008. As far as banks that are not considered affected by the Dexia failure are concerned, bank lending to local governments levels off rapidly after the Dexia shock.[15] in contrast, lending to municipalities by banks that we identify as treated by the Dexia shock keeps increasing at a high pace, growing by about 50% between the Fall of 2008 and the end of 2011.

So far, we know that banks that had to substitute locally for Dexia after September 2008 then increased their supply of long-term loans to municipalities. Did they really ration their supply of long-term loans to firms? Figure **??** provides a first qualitative answer. The figure again compares outcomes across the two types of banks, i.e. the Dexia-treated vs non-treated ones. However, for each bank grouping, we now compute the average maturity at issuance of all new investment loans to non-financial firms, using the same sample of individual loans as in section **??** above. As the figure shows, the average maturity of new loans broadly compared across bank groupings, before 2008 and again after 2012. However, the average maturity at issuance offered by Dexia-treated banks dropped after the near failure of Dexia and it remained well below the average maturity supplied by control banks, by about 6 months. We provide in table **??** a more formal assessment of this effect. The table shows the results of loan-level, difference-in-difference regressions where loan maturity at issuance is explained by the status of the lender (treated or not by Dexia), before and after the Dexia shock. Furthermore, the treatment is interacted further with the level of start-up costs. All regressions control for time, bank and industry fixed effects, while the last four columns also include standard observable firm-level covariates as controls. This econometric test provides support to our interpretation: Dexia-treated banks restricted more their supply of long maturity after the Dexia shock, by some 2.6 months on average. This friction hits more firms in high start-up costs, which are the ones that strive for long-term loans. Table **??** repeats the same exercise, but focuses on the sub-sample of loans to younger firms (aged less than three years). The sample is much reduced and results are less significant. However, the estimates shown in the last column, when controlling for observable firm characteristics, suggest that young firms in high start-up industries that borrowed from treated banks after the shock received shorter loan maturities by

[15]The sharp drop in the first quarter of 2008 is due to municipal elections in March of that year.

some 5 months on average.

4.2 Real effects of maturity rationing by constrained banks

In this last section, we investigate whether such a constrained access to long-term loans has any real consequences for young firms. As young firms are by definition opaque, and the creation of an initial lending relationship is costly for both the lender and the borrower, it is not likely that such firms would easily change banks and get better loan conditions by another lender. A first possible consequence of this friction that we cannot observe with our dataset is that young firms that faced high start-up costs could not borrow. A second testable consequence is that they were forced to scale down their investments or postpone some profitable investments, therefore reducing their future profitability.

We investigate this issue by again running difference-in-difference loan-level regressions, where we explain a given firm-level outcome two years after the loan was issued by the bank's exposure to the Dexia shock, controlling for loan and firm characteristics and a set of fixed effects. Table **??** shows the results when the regression sample is limited to loans received by young firms (i.e., aged less than 3 years when the loan was issued). We find evidence that facing a supply-driven constraint in the access to long maturities impinges on the firm's performance. Indeed, young firms with high start-up costs come out as less profitable and exhibit lower levels of fixed assets two years after they borrowed from a maturity constrained bank. This result however does not hold for young firms in industries where start-up costs are small. This confirms that being rationed in terms of the maturity of the investment loan borrowed has real consequences for young firms.

5 Conclusion

To be completed.

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Table 1 – Descriptive statistics – Start-up costs

This table provides descriptive statistics on the fixed cost to start up a firm, as defined in Section ??. FINISH CAPTION AFTER THE TABLE IS READY.

Panel A: Descriptive statistics

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

Panel B: Industries with low or high start-up costs

Top-15 lowest		Top-15 highest	
Construction of 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 articles of paper	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 articles of concrete	204.4
Business support service activities n.e.c.	1.1	Manufacture of bakery	192.7
Other postal and courier 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	Manufacture of dairy products	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: Correlation of tercile dummies

	PPE / Assets	Intangibles / Assets
INV_i	0.660	0.226

Table 2 – Loan-level dataset: descriptive statistics.

	Nb.Obs.	Mean	Std.Dev.	Min.	p25	Median	p75	Max.
Loan initial maturity (months)	252983	56.85	29.00	1.00	36.00	59.00	63.00	198.00
Firm's age	252861	17.16	18.68	0.00	4.00	12.00	24.00	306.00
0-1 year old	252983	0.15	0.36	0.00	0.00	0.00	0.00	1.00
2-4 year old	252983	0.12	0.32	0.00	0.00	0.00	0.00	1.00
5-9 year old	252983	0.16	0.37	0.00	0.00	0.00	0.00	1.00
10+ year old	252983	0.57	0.49	0.00	0.00	1.00	1.00	1.00
Loan amount (EUR)	252983	333068.99	2.43e+06	1005.00	20000.00	42000.00	130000.00	3.50e+08
Loan interest rate	252983	2.95	1.56	0.00	1.60	2.94	4.14	15.78
Other inv. loan	252983	0.93	0.25	0.00	1.00	1.00	1.00	1.00
Fixed rate loan	252983	0.90	0.30	0.00	1.00	1.00	1.00	1.00
Regulated loan	252983	0.10	0.30	0.00	0.00	0.00	0.00	1.00
Mutual bank	252983	0.53	0.50	0.00	0.00	1.00	1.00	1.00
Standalone SME	252983	0.68	0.47	0.00	0.00	1.00	1.00	1.00
Total assets	162122	59017.65	868255.76	1.00	395.23	1160.85	4223.23	1.51e+08
ln(Total assets)	162122	7.33	1.96	0.00	5.98	7.06	8.35	18.83
Investment ratio	125453	0.60	1425.54	-4.46e+05	0.01	0.24	0.66	139305.91
Leverage (D/D+E)	135854	0.46	0.25	0.00	0.26	0.45	0.66	1.00
Bank debt / TA	161646	0.27	0.20	0.00	0.10	0.22	0.38	1.00
Trade debt / TA	162021	0.18	0.14	0.00	0.08	0.15	0.26	1.00
ST debt / TA	141978	0.63	0.34	0.00	0.45	0.75	0.90	1.00
Tangible assets / TA	142772	0.24	0.22	0.00	0.08	0.17	0.34	1.00
ROA	135796	0.12	0.12	-1.00	0.05	0.11	0.18	0.98
Interest coverage	121575	0.19	0.54	0.00	0.03	0.07	0.16	9.90
Debt service burden	120725	6.22	9.58	0.00	1.80	3.62	6.86	99.98

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

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

	Dependent variable:							
	Bank debt / Assets				Maturity of total debt			
Age	-0.010***	-0.015***	-0.004***	-0.005***	-0.030***	-0.047***	-0.022***	-0.034***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)	(0.002)	(0.002)
Age·MidCost			-0.002***	-0.000			0.011***	0.010***
			(0.000)	(0.000)			(0.002)	(0.002)
Age·HighCost			-0.026***	-0.015***			-0.077***	-0.047***
			(0.000)	(0.000)			(0.002)	(0.002)
Size				0.021***				0.143***
				(0.001)				(0.005)
Tangibles / Assets				0.294***				0.995***
				(0.005)				(0.029)
Total debt / Assets				0.294***				0.596***
				(0.002)				(0.013)
R^2	0.022	0.073	0.118	0.388	0.007	0.032	0.060	0.173
Firm FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N. Obs	656,432	656,432	656,432	355,431	255,950	255,950	255,950	240,945

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

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

	Dependent variable: Maturity of total debt			
EBITDA / Assets	-0.317***	-0.137***		
	(0.031)	(0.012)		
EBITDA / Assets · Age 0			-0.245***	-0.313***
			(0.031)	(0.030)
EBITDA / Assets · Age 1			-0.197***	-0.214***
			(0.021)	(0.021)
EBITDA / Assets · Age 2			-0.067***	-0.084***
			(0.021)	(0.021)
EBITDA / Assets · Age 3			-0.087***	-0.070***
			(0.022)	(0.022)
EBITDA / Assets · Age 4			-0.107***	-0.070***
			(0.026)	(0.026)
EBITDA / Assets · Age 5			-0.176***	-0.118***
			(0.030)	(0.030)
EBITDA / Assets · Age 6			-0.123***	-0.067***
			(0.036)	(0.036)
EBITDA / Assets · Age 7			-0.156***	-0.129***
			(0.045)	(0.044)
EBITDA / Assets · Age 8			0.000	0.050
			(0.050)	(0.050)
EBITDA / Assets · Age 9			-0.087	-0.060
			(0.070)	(0.070)
EBITDA / Assets · Age 10			-0.038	-0.017
			(0.082)	(0.078)
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 – Maturity of new loans and firm age: the role of sector-specific start-up costs

Note: Dependent variable: maturity at issuance of new loans to non-financial corporations. Sectors with low (resp. high) start-up costs are 3-digit sectors in the bottom (resp. the top) tercile of the distribution across 259 sectors of estimated sector-specific start-up costs. Sector fixed effects defined at the 3-digit level. Standard errors are clustered at the firm level. Estimation period: 2006-2018.

	Dep. variable: loan maturity at issuance							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All	Low SC	High SC	All	All	Low SC	High SC	All
0-1 year old	16.611***	11.098***	16.899***	10.854***	10.795***	7.179***	11.635***	7.231***
	[0.244]	[0.397]	[0.423]	[0.409]	[0.580]	[1.004]	[0.924]	[0.914]
2-4 year old	3.418***	1.407***	4.001***	1.772***	3.099***	0.391	4.841***	0.569
	[0.303]	[0.434]	[0.549]	[0.458]	[0.527]	[0.857]	[0.957]	[0.733]
5-9 year old	1.505***	0.235	2.283***	-0.021	2.075***	0.819*	3.106***	0.438
	[0.252]	[0.313]	[0.460]	[0.367]	[0.344]	[0.468]	[0.627]	[0.463]
0-1 year * high start-up cost				6.561***				7.691***
				[0.632]				[1.182]
2-4 year * high start-up cost				2.582***				6.338***
				[0.744]				[1.219]
5-9 year * high start-up cost				2.699***				4.558***
				[0.636]				[0.890]
0-1 year * mid start-up cost				-0.497				-0.288
				[0.638]				[1.175]
2-4 year * mid start-up cost				-0.951				0.151
				[0.617]				[0.891]
5-9 year * mid start-up cost				-0.339				-0.065
				[0.536]				[0.715]
high_startcost_diane				5.080***				0.818
				[0.472]				[0.582]
Mid start-up cost				-0.810***				-1.658***
				[0.298]				[0.399]
Other inv. loan	-3.317***	-2.434***	-4.974***	-3.545***	-3.826***	-3.078***	-5.341***	-3.871***
	[0.338]	[0.518]	[0.591]	[0.343]	[0.455]	[0.648]	[0.970]	[0.456]
Fixed rate loan	2.223***	1.529*	4.046***	2.567***	6.290***	5.799***	7.414***	6.383***
	[0.628]	[0.878]	[1.043]	[0.650]	[0.891]	[1.050]	[1.544]	[0.892]
Regulated loan	1.162***	-0.538	1.288**	0.449	0.237	-0.983*	1.088	0.278
	[0.299]	[0.482]	[0.511]	[0.307]	[0.431]	[0.572]	[0.972]	[0.430]
Standalone SME					-0.219	0.241	0.100	-0.280
					[0.515]	[0.437]	[0.977]	[0.516]
ln(Total assets)					1.064***	2.308***	0.524	1.082***
					[0.303]	[0.242]	[0.515]	[0.303]
Leverage (D/D+E)					9.465***	9.561***	7.400***	7.917***
					[0.787]	[0.937]	[1.326]	[0.746]
ST debt / TA					-6.623***	-4.369***	-8.818***	-6.189***
					[0.486]	[0.554]	[0.949]	[0.490]
Tangible assets / TA					11.986***	26.154***	8.060***	11.728***
					[1.811]	[3.242]	[2.236]	[1.827]
EBITDA / A					-36.516***	-11.551***	-58.020***	-36.233***
					[2.230]	[2.082]	[3.948]	[2.194]
Debt service burden					-0.035	0.013	-0.042	-0.033
					[0.028]	[0.029]	[0.058]	[0.028]
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	No	No	No	No	No	No	No	No
Firm controls	No	No	No	No	Yes	Yes	Yes	Yes
Observations	252,977	72,978	111,735	252,977	117,301	38,719	40,875	117,301
Adj. R2	0.14	0.09	0.19	0.16	0.18	0.15	0.26	0.19

Table 6 – Maturity of new loans and cash flows: within-industry regressions

Note: Dependent variable: maturity at issuance of new loans to non-financial corporations. Sectors with low (resp. high) start-up costs are 3-digit sectors in the bottom (resp. the top) tercile of the distribution across 259 sectors of estimated sector-specific start-up costs. Sector fixed effects defined at the 3-digit level. Firms with age below 20 years only. Standard errors are clustered at the firm level. Estimation period: 2006-2018.

	Dep. variable: maturity at issuance			
	(1)	(2)	(3)	(4)
	$< 1y$	All	All	All
EBITDA / A	-24.070***	-18.426***	-16.592***	-16.730***
	[2.868]	[1.156]	[1.321]	[1.292]
0-1 year * EBITDA/A			-9.025***	-5.911**
			[3.108]	[2.946]
2-4 year * EBITDA/A			-3.233	-2.697
			[2.864]	[2.711]
Other inv. loan	-2.827**	-4.190***	-4.192***	-4.039***
	[1.413]	[0.488]	[0.488]	[0.483]
Fixed rate loan	10.079***	8.537***	8.513***	8.141***
	[2.222]	[0.768]	[0.770]	[0.725]
Regulated loan	-1.540	-0.317	-0.328	-0.261
	[1.522]	[0.485]	[0.484]	[0.477]
Standalone SME	-1.232	0.938**	0.911**	0.802**
	[4.148]	[0.410]	[0.409]	[0.384]
ln(Total assets)	2.685***	1.952***	1.941***	1.957***
	[0.644]	[0.231]	[0.231]	[0.211]
Leverage (D/D+E)	9.152***	9.984***	9.991***	10.152***
	[2.336]	[0.646]	[0.647]	[0.638]
ST debt / TA	-10.451***	-6.359***	-6.367***	-6.255***
	[1.476]	[0.398]	[0.398]	[0.384]
Tangible assets / TA	1.071	18.269***	18.118***	18.473***
	[2.832]	[1.506]	[1.502]	[1.324]
Quarter FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes
Age FE	No	Yes	Yes	Yes
Sector*Age FE	No	No	No	Yes
Observations	6,638	72,432	72,432	72,363
Adj. R2	0.30	0.26	0.26	0.27

Table 7 – Maturity of new loans and constrained bank supply: using the Dexia shock as instrument at the bank level

Note: Dependent variable: maturity at issuance of new loans to non-financial corporations. Sectors with low (resp. high) start-up costs are 3-digit sectors in the bottom (resp. the top) tercile of the distribution across 259 sectors of estimated sector-specific start-up costs. Treated banks are banks which had to increase their supply to long-term loans to municipalities after the failure of Dexia, as explained in the text. Sector fixed effects defined at the 3-digit level. Standard errors are clustered at the bank level. Estimation period: 2006-2018.

	Dep. variable: maturity at issuance							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All	Low SC	High SC	All	All	Low SC	High SC	All
Treated bank X Post	-2.660**	-1.871	-3.308**	-1.851	-3.440**	-2.076	-5.082***	-2.265
	[1.222]	[1.397]	[1.282]	[1.418]	[1.326]	[1.565]	[1.594]	[1.489]
Treated bank X High SUC				0.908				2.264
				[1.279]				[1.596]
Post X High SUC				0.288				1.086
				[0.577]				[0.759]
Treated bank X Post X High SUC				-1.878*				-3.310**
				[1.130]				[1.405]
0-1 year old	13.518***	11.197***	15.509***	13.516***	8.785***	6.715***	10.072***	8.775***
	[0.590]	[0.533]	[0.844]	[0.591]	[0.620]	[1.126]	[1.018]	[0.620]
2-4 year old	2.144***	2.031***	2.952***	2.145***	1.881***	0.751	2.995*	1.879***
	[0.542]	[0.690]	[0.958]	[0.541]	[0.546]	[0.841]	[1.569]	[0.546]
5-9 year old	0.995**	0.824*	1.843**	0.994**	1.370***	0.960*	2.341***	1.365***
	[0.469]	[0.457]	[0.796]	[0.470]	[0.379]	[0.558]	[0.784]	[0.379]
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Firm controls	Yes	No	No	No	Yes	Yes	Yes	Yes
Observations	127,849	35,692	56,699	127,849	71,047	22,626	25,312	71,047
Adj. R2	0.23	0.10	0.29	0.23	0.25	0.14	0.33	0.25

Table 8 – Maturity of new loans and constrained bank supply: using the Dexia shock as instrument at the bank level, young firms only

Note: Dependent variable: maturity at issuance of new loans to non-financial corporations. Sectors with low (resp. high) start-up costs are 3-digit sectors in the bottom (resp. the top) tercile of the distribution across 259 sectors of estimated sector-specific start-up costs. Treated banks are banks which had to increase their supply to long-term loans to municipalities after the failure of Dexia, as explained in the text. Sector fixed effects defined at the 3-digit level. Firms with age below 3 years only. Standard errors are clustered at the bank level. Estimation period: 2006-2018.

	Dep. variable: maturity at issuance							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All	Low SC	High SC	All	All	Low SC	High SC	All
Treated bank X Post	-1.476	-2.797	-2.133	-0.158	-0.800	-0.036	-4.219	2.629
	[1.212]	[1.968]	[1.608]	[1.505]	[1.449]	[2.412]	[2.629]	[1.649]
Treated bank X High SUC				-0.768				-1.123
				[1.528]				[2.576]
Post X High SUC				-0.379				2.604*
				[0.951]				[1.519]
Treated bank X Post X High SUC				-2.207				-7.306**
				[1.912]				[3.061]
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Firm controls	Yes	No	No	No	Yes	Yes	Yes	Yes
Observations	31,048	7,208	18,021	31,048	8,440	2,620	3,847	8,440
Adj. R2	0.22	0.08	0.23	0.22	0.28	0.16	0.34	0.28

Table 9 – Real effects of constrained loan maturity supply: using the Dexia shock as instrument at the bank level

Note: Dependent variable: log assets, tangible to total assets and EBITDA to assets two years ahead. Observations at loan level. Sectors with low (resp. high) start-up costs are 3-digit sectors in the bottom (resp. the top) tercile of the distribution across 259 sectors of estimated sector-specific start-up costs. Treated banks are banks which had to increase their supply to long-term loans to municipalities after the failure of Dexia, as explained in the text. Sector fixed effects defined at the 3-digit level. Firms with age below 3 years only. Standard errors are clustered at the bank level. Estimation period: 2006-2018.

	Size(+2)		Tang./A (+2)		EBITDA/A (+2)	
	(1)	(2)	(3)	(4)	(5)	(6)
	Low SC	High SC	Low SC	High SC	Low SC	High SC
Treated bank X Post	0.007	-0.001	0.004	-0.015**	-0.004	-0.041**
	[0.014]	[0.012]	[0.003]	[0.006]	[0.005]	[0.019]
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	yes	Yes	Yes
Observations	20,598	23,104	20,380	22,561	20,365	22,550
Adj. R2	0.97	0.98	0.76	0.87	0.25	0.46

Figure 1 – 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. The maturity is the residual maturity of total debt, approximated using the breakdown available in Diane. See Section **??** for details on the data.

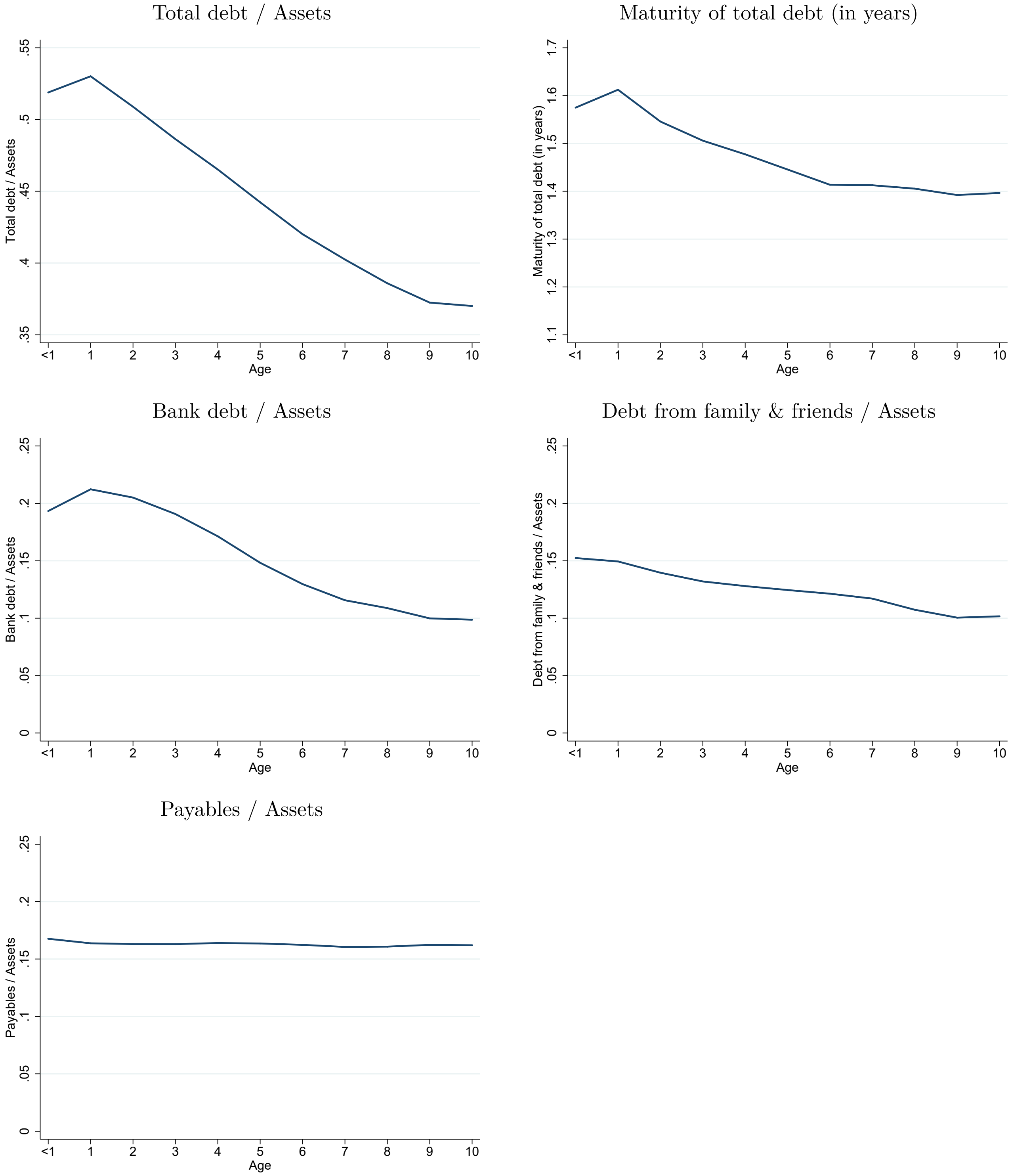


Figure 2 – Stylized facts – By start-up cost terciles: balance sheet structure

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 start-up cost. Start-up costs are computed at the 3-digit industry level using the procedure described in Section ??. Total debt is defined to include both financial debt (from banks or other lenders, including family and friends) and payables. The maturity is the residual maturity of total debt, approximated using the breakdown available in Diane. See Section ?? for details on the data.

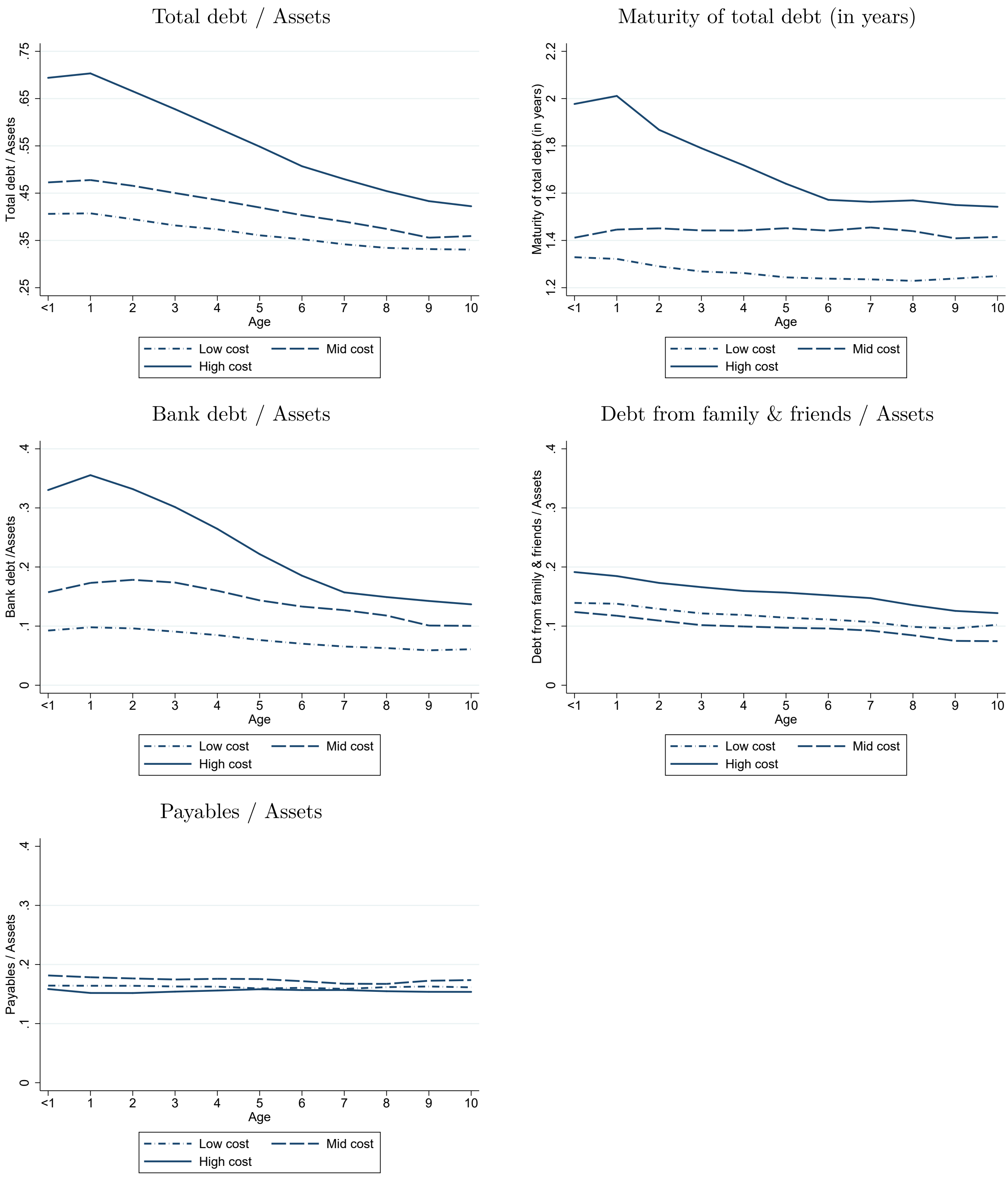


Figure 3 – Stylized facts: loan maturity at issuance and the age of firms

Note: Period: 2006-2018. Sample of 252,983 new loans to non-financial corporations granted by a representative sample of bank branches located in France. Source: M-Contran, Banque de France.

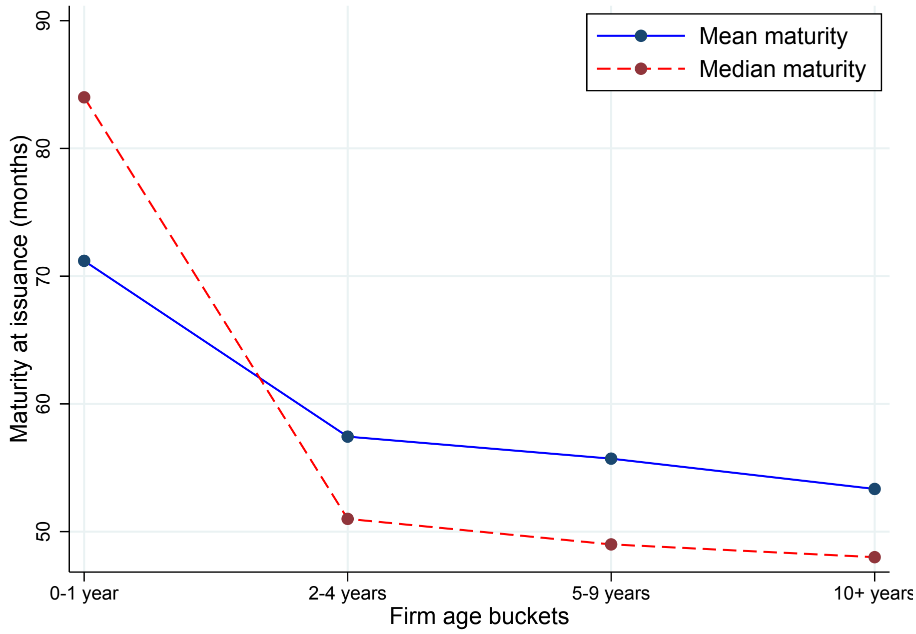


Figure 4 – Stylized facts: number of borrowers and the age of firms, comparing by size of start-up costs

Note: Firms with age of less than one year included in bucket of 1-year old firms. Period: 2006-2018. Sample of 172,157 new loans to non-financial corporations aged less than 20 years, granted by a representative sample of bank branches located in France. Sectors with low (resp. high) start-up costs are 3-digit sectors in the bottom (resp. the top) tercile of the distribution across 259 sectors of estimated sector-specific start-up costs. Source: M-Contran, Banque de France and DIANE.

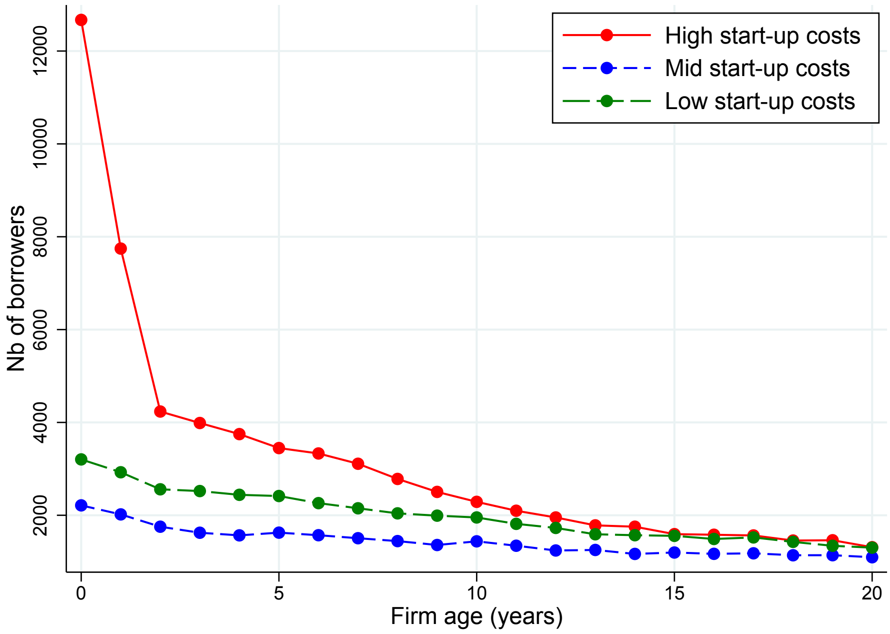


Figure 5 – Stylized facts: number of loans and the age of firms, comparing by size of start-up costs

Firms with age of less than one year included in bucket of 1-year old firms. Period: 2006-2018. Sample of 172,157 new loans to non-financial corporations aged less than 20 years, granted by a representative sample of bank branches located in France. Sectors with low (resp. high) start-up costs are 3-digit sectors in the bottom (resp. the top) tercile of the distribution across 259 sectors of estimated sector-specific start-up costs. Source: M-Contran, Banque de France, and DIANE.

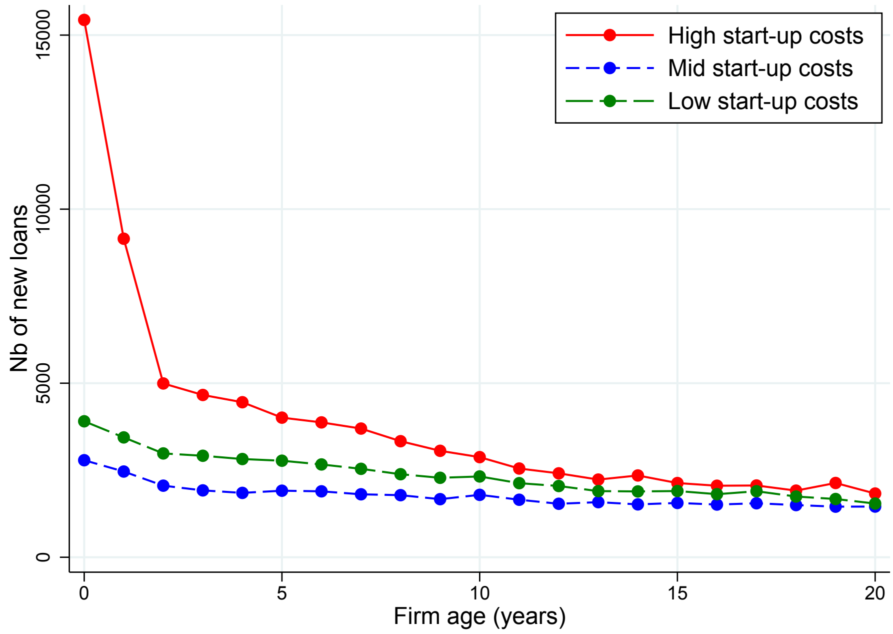


Figure 6 – Comparing the maturity at issuance of new investment loans to municipalities vs non-financial corporations

Note: Municipalities are here defined as all forms of local/regional government and associated public entities. Only investment loans are considered here. Maturities at issuance are weighted by loan amount. Source: M-Contran, Banque de France.

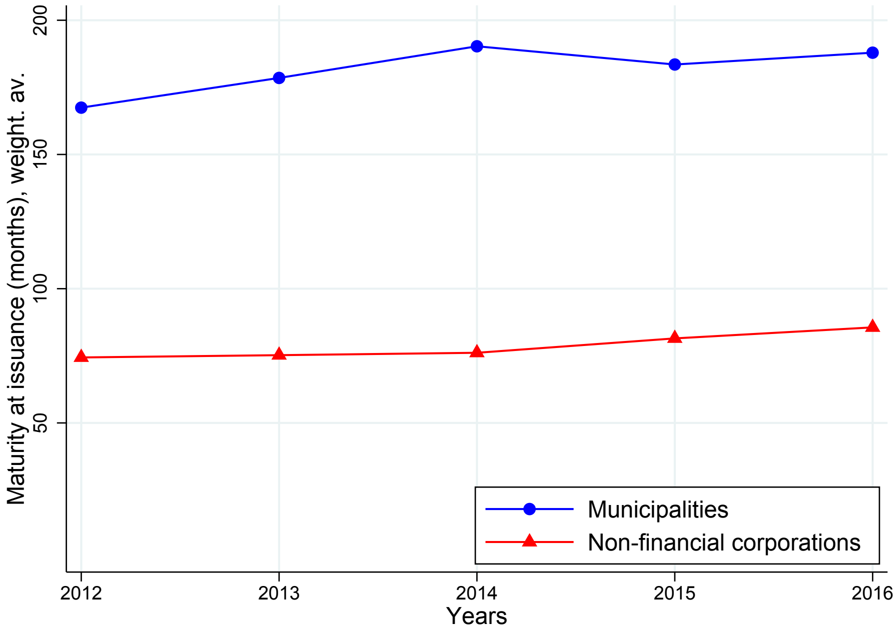


Figure 7 – Lending to municipalities: bank-level effect of the Dexia failure

Note: Municipalities are here defined as *Communes, Communautés de communes/villes/agglomérations* and *départements*. A municipality is defined as treated by the Dexia failure according to the share of Dexia in bank credit borrowed by this municipality as of September 2008. The threshold market share of Dexia is 58%, which corresponds to the 75th percentile of the distribution of Dexia market shares across municipalities at this date. Banks are then defined as more or less treated by the Dexia shock depending on the share of their lending to Dexia-treated municipalities in their nation-wide municipal lending as of September 2008. A bank is defined as Dexia-treated whenever this share is above the median of the distribution across banks.

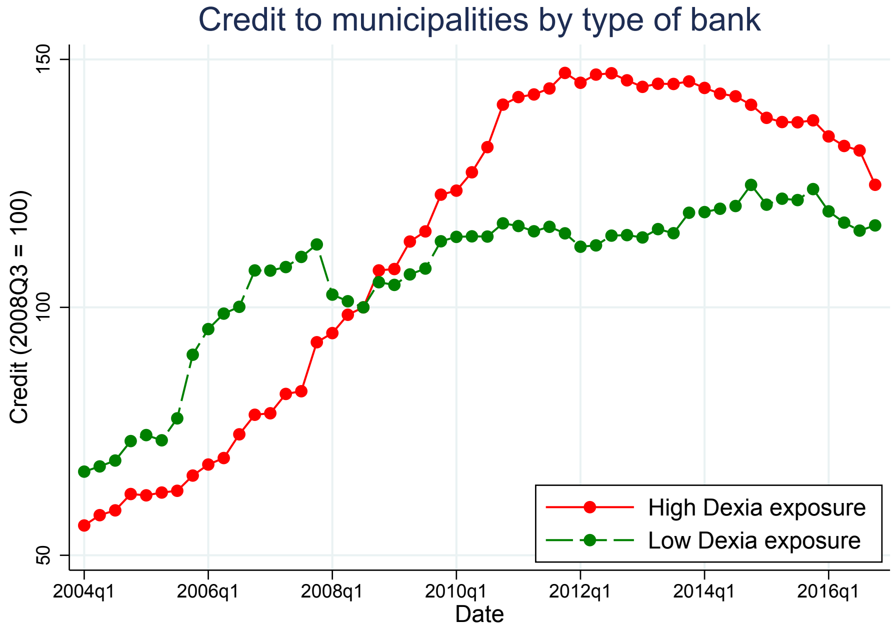
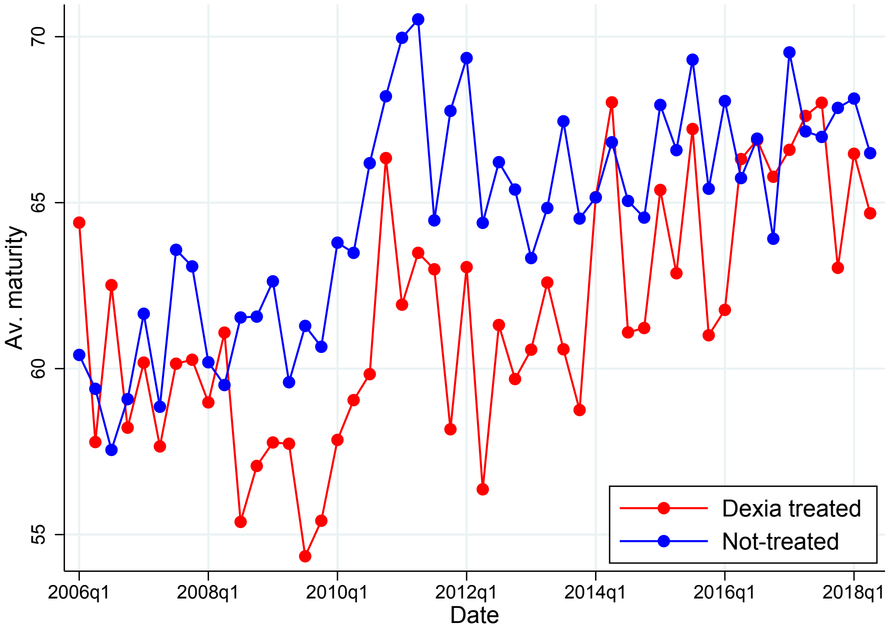


Figure 8 – Loan maturity at issuance: bank-level effect of the Dexia failure

Note: Municipalities are here defined as *Communes, Communautés de communes/villes/agglomérations* and *départements*. A municipality is defined as treated by the Dexia failure according to the share of Dexia in total bank credit borrowed by this municipality as of September 2008. The threshold market share of Dexia is 58%, which corresponds to the 75th percentile of the distribution of Dexia market shares across municipalities at this date. Banks are then defined as more or less treated by the Dexia shock depending on the share of their lending to Dexia-treated municipalities in their nation-wide municipal lending as of September 2008. A bank is defined as Dexia-treated whenever this share is above the median of the distribution across banks.



A Model calculations

To derive predictions about the average leverage for operating firms within a given industry, we make the assumption that $I > A$ for all industries and firms. We define leverage as the ratio I/A. Intuitively, two opposing effects are at play when we compare industries across themselves. First, for a given A, firms in high fixed cost industries have higher leverage. Second, only firms with sufficiently large A operate in industries with high fixed costs.

The average leverage across operating firms is

$$\ell(I) = \frac{\int_{A^*(I,r)}^{\bar{A}} g(A)\frac{I}{A}\mathrm{d}A}{1 - G(A^*(I,r))}. \tag{12}$$

We are interested in the sign of the derivative of $\ell(I)$ with respect to I.

SEE IF WE CAN SOLVE FOR THAT IN CLOSED FORM.

SEE IF WE CAN DO THE SAME FOR THE MATURITY STRUCTURE.

B Measurement of start-up costs