Why Bank Business Models Matter for SME Credit Rationing*

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Abstract

This paper conducts the first empirical study analyzing the effects of bank business models on small and medium size enterprises (SMEs) finance. Using a micro data approach, I analyze a unique, supervisory dataset with different loan maturity applications from France that allows to account for time-varying firm heterogeneity in loan demand and bank's balance sheet strength. Whereas most studies ignore the bank's asset allocation strategy, I show that the firm's probability of being short-term credit rationed is higher with banks that exhibit trading abilities. Importantly, bank capital ratio turns out to have an opposite effect on short-term credit rationing according to bank business models. Well-capitalized trading banks (resp. non-trading-bank) are less (more) likely to grant cash credit to SMES. My results shed new light on a negative externality related to security investments of trading-banks involved in a zero lower bound universe.

JEL codes: D45, E51, G21, G24, G28.

Keywords: bank business model, trading, SME, credit supply, loan application, leverage, survey, short-term credit.

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1 Introduction

For the past thirty years, the unprecedented process of deregulation across regions and financial sectors has substantially shaped the banking sector. One consequence of this liberalization has been a global trend towards more diversification in banks' income sources. Within this competitive environment, traditional banking has progressively turn into a more market-oriented business model in which banks hold a significant amount of securities in their portfolios (European Systemic Risk Board, 2014). Coinciding with a strongly bank-based financial structure in Europe (Langfield and Pagano, 2016), this process has been much discussed owing to its procyclical nature in the wake of the great recession (Adrian and Shin, 2010; Shleifer and Vishny, 2010). While it is understandable that the public debate has focused on systemic risks coming from market-oriented banks, trading may have also diverted bank resources away from long term relationship banking activities such as SMEs finance (Berger and Udell, 1995; Boot and Ratnovski, 2016).

Looking at the bank's assets allocation strategy, this paper explores how bank business models and banks balance sheet strength relate to credit rationing. In particular, while a recent literature stresses the higher reduction in credit supply from trading-banks during a liquidity crisis (Abbassi et al., 2016; Vinas, 2016), I shade some light on a short-term credit rationing phenomenon coming from trading-banks involved in a zero lower bound universe. Importantly, I show that a substitution mechanism could be at play between assets with similar maturity (i.e. cash credit and trading securities) but different profitability.

To convincingly address both bank business models and credit rationing issues related to SMEs, my empirical analysis requires to tackle two identification challenges. First, the widespread "universal banking" model that is prevailing in France makes it difficult to contain clearly defined market-oriented banks according to the level of securities. Based on bank characteristics, the retained classification

strategy has to reflect strategic trading choices. Second, as economic conditions may affect banks' net worth and firms' net worth at the same time (Boivin et al, 2010; Gertler and kiyotaki, 2010), the study has to control for the changing composition of credit applicants over the business cycle. Consequently, to assess the effects of bank business models on loan granting, the supply of credit needs to be disentangled from its demand, thus avoiding the omitted variable problem (Jiménez et al., 2012; Popov, 2016).

This paper contributes to the literature by addressing these identification problems in a two-step micro-data approach. To identify bank business models, I first focus on key banking technologies. Building on bank trading abilities, I make use of trading securities to differentiate banks' business profiles according to the intensive and the extensive margin of trading. In my analysis, the intensive margin of trading refers to the outstanding amount of trading securities held by a bank whereas the extensive margin is a dummy variable taking the value 1 whether the bank holds trading securities or 0 otherwise. Although trading business models are of course not completely captured by only one variable (Roengpitya et al.,2014), Trading-banks differ substantially in terms of non-interest incomes structure and wholesale funding.

Thereafter, I take advantage of the french survey on the Acces to Finance for SMEs. Following the ECB's "Survey on the Access to Finance of Enterprises" (SAFE), the quarterly french survey started in 2012 after the financial crisis initially hit the euro area and aims at providing information on the SMEs' experience in attempting to access finance. Relying on firm-specific characteristics, the survey allows me to separate credit supply effects from credit demand effects. Most importantly for my research, the questionnaire is the first to focus on loan maturity distinguishing short-term loan applications from long-term ones. In the end, the final dataset consists of 5,005 independent SME representing 37,276 observations.

My key findings are as follows. First, Looking at the effects of bank business models on the lending behavior of banks, I find that trading expertise plays a substantial role: The more a bank holds trading securities (i.e the intensive margin of trading) the higher is the SME probability of being short-term credit constrained, everything else being equal. To put it differently, among trading banks, the asset reallocation hypothesis is confirmed: Given their maturity and trading-banks technologies, trading securities appears to be substitutes for cash credit. A one percentage point change in the trading securities ratio increases the probability a short-term loan application is constrained by 1.42 percentage point. Similarly, applying for a short-term loan coming from a trading-banks (i.e the extensive margin of trading) increases the likelihood a loan application is constrained by 1.16 percentage point.

Second, by adding interaction terms accounting for bank balance sheet strength to tackle bank heterogeneity within the same business model, I find that bank capital has an asymmetric effect on short-term loan granting according to trading abilities. Whereas more solvent non-trading banks have a lower probability of rationing, a one percentage point change in Trading-banks' capital ratio increases the SME probability to be short-term credit constrained by 90-basis point. Importantly, the results do not hold for investment credit. Controlling for unobserved firm-specific heterogeneity, they rely on a wide range of time-varying firm, bank and industry level characteristics and are robust to eliminating time and banking group fixed effects.

Third, I discuss potential channels at play and find that results are consistent with the fact that trading-banks are more able to profit from trading opportunities coming from securities whose prices rise with lower interest rates, thus acting as a hedge against drop in lending incomes. To compensate the negative impact of a flatter yield curve on net interest income, trading-banks may have reduced their

exposures to less profitable loan maturity.

My results contribute to the literature stressing that bank business models can affect credit supply. While the consequences of banking models regarding their risk-reduction benefits have been widely discussed in the literature (Cornett et al., 2002; Stiroh,2006; Geyfman and Yeager, 2009), the empirical literature about the microeconomic assessment of the impact of bank models on the real economy is quite sparse (Abbassi et al., 2016; Vinas, 2016). Following theoretical papers that emphasize the negative externality of trading-banks during a fire sales (Shleifer and Vishny, 2010; Diamond and Rajan, 2011), these papers are concerned with the great recession and do not focus on small businesses or short term loans. However, the argument that SMEs have fallen victim to the increasing size and complexity of banking organizations appears relevant (Berger and Udell, 1995).

My results also add to the accumulating empirical evidence that higher bank capital is associated with greater lending (Gambacorta and Shin, 2016; Michelangeli and Sette, 2016). Yet, my results suggest that the synergies between the assets and liabilities of banks may depend on bank business models. In addition, given my finding on bank capital and securities trading, my results are consistent with models of financial intermediation in which assets demand and trader funding liquidity are mutually reinforcing (Brunnermeier and Pedersen, 2009; Adrian and Shin, 2010; Brunnermeier and Sannikov, 2014).

In the light of the zero lower bound universe, my results offer insights into the bank profitability channel. Despite a positive relationship between the interest rate structure and bank profitability (Alessandri and Nelson, 2015; Borio et al., 2015), banks may leverage their strength to compensate the negative effect of a flatter yield curve on bank interest margins and returns from maturity transformation. Thus, trading-banks may invest more in securities whose prices rise with lower interest rates. The results support the growing concerns that the net benefits of

prolonged monetary accommodation might be declining due to its negative side effects (Rajan, 2013).

Finally, this paper contributes to the increasing literature that attempts to assess firm financial constraints in the aftermath of the crisis. One research strategy, for example, consists in exploiting experiments that provide a laboratory that allow to identify a pure credit supply effect (Khwaja and Mian 2008; Lin and Paravisini, 2013; Iyer et al., 2014). While these natural experiments allow for relatively easy identification of supply shocks, they suppose to restrict the sample to firms with multiple bank relationships. Yet, small businesses are not always dealing with several banks. By contrast, the chosen strategy takes advantages on the recent advances in data collection to use loan application outcomes as direct information as firm ability to obtain external funds (Rottmann and Wollmershäuser, 2010; Popov and Udell 2012; Popov, 2012; Jiménez et al., 2012; Ferrando and Mulier, 2015). I stand out from the above mentioned articles by distinguishing loan applications according to loan maturity.

The remainder of the paper is structured as follows. Section 2 presents the data an the testable hypothesis. Section 3 presents the empirical strategy. Section 4 discusses the results. Section 5 concludes.

2 Hypotheses and Data

2.1 Research Hypotheses

The argument that the supply of banking services to SMEs depends on bank business models can be first synthesized through the growing literature based on relationship lending (Sharpe, 1990; Boot and Thakor, 1994; Berger and Udell, 1995; Boot, 2000). Delivering services to SMEs is a fundamentally different activity from securities underwriting and proprietary trading. Lending to small busi-

nesses tends to be more information intensive and relationship-driven, whereas non-traditional banking activities are more transaction driven and require hard information. Hence, short-term trading might undermine long-term relationship banking that allows banks to screen informationally opaque borrowers. Although some trading by banks may be profitable, the deepening of financial markets might lead to time-inconsistency problems in capital allocation, where banks engage in too much trading at the expense of relationship banking (Boot and Ratnovski, 2016).

Considering the bank profitability channel (Alessandri and Nelson, 2015; Borio et al., 2015), trading-banks may also take advantage of their market abilities to offset the negative effect of a flatter yield curve on bank interest margins. At the zero lower bound, trading-banks may invest more in securities whose prices rise with lower interest rates, thus diverting bank capital away from risky SME finance.

As trading require capital to finance haircuts (i.e. the difference between the security's price and collateral value), bank's net worth might have an asymmetric effect on SME lending according to bank business models. In this regard, Abbassi, Iyer, Peydró and Tous (2016), find that during the great recession, german trading-banks with higher capital increase their overall investment in securities to the detriment of corporate lending. Accordingly, bank trading strategy might be determined by bank balance sheet strength such as leverage (Brunnermeier and Pedersen, 2009; Adrian and Shin, 2013).

Based on this literature focusing on how bank business models affect credit constraints, three key testable hypotheses can be formulated:

- (H1) Trading-banks tend to exhibit a higher credit rationing for SMEs.
- (H2) The negative impact of trading-banks on credit availability is stronger for banks with higher trading securities.

- (H3) Bank capital ratio has an asymmetric effect on loan granting according to bank business models.

To convincingly address these issues, I use a two-step micro-data approach based on an assessment of credit constraints according to bank business model and bank balance sheet strength. In this section, I first describe the various sources of data I merged, the variables involved and the empirical strategy I employ.

2.2 Data

Combining four different supervisory databases available at the Banque de France, this study relies on a unique dataset of independant SMEs covering the period 2012-2014. The loan application outcomes stem from the survey on the access to credit for SMEs gathered by the Banque de France. The firm level data comes from the Banque de France database on non-financial firms. The loan level data comes from the french national credit registry. Finally, the bank level database comes from the Banque de France Unified financial reporting system.

2.2.1 Measures of financial constraints

The core firm-level data comes from the Survey on the Acces to Finance for SMEs. Following the ECB's "Survey on the Access to Finance of Enterprises" (SAFE), the quarterly french survey started in 2012 after the financial crisis initially hit the euro area and aims at providing information on the financing needs of SMEs and their experience in attempting to access finance. Unlike the SAFE survey which contains information on a respondent firm's characteristics (size, sector, firm autonomy, turnover, firm age and ownership), the survey focuses on the assessment of recent short-term developments regarding its financing including information on its access to finance. Most importantly, the questionnaire is the first

to focus on loan maturity distinguishing short-term loan applications from long-term ones. Composed of 5,005 independent SME representing 37,276 observations, the sample contains only non-financial firms and excludes firms in agriculture, public administration and financial services[1]. Around 40% of the firms are present in each of the twelve quarters of the sample period.

In the first question of the questionnaire, firms are asked whether they belong to a holding company or not. If so, non independent SMEs are ruled out from the sample, thereby avoiding the difficulty relating to financial flows between holdings and SME subsidiaries of a corporate group (Cayssials and Kremp, 2010b; Kremp and Sevestre, 2000). To define measures of credit access, I rely on the firms itself-reported credit experience. The main benefit of this qualitative assessment is to control for time-varying firm heterogeneity in loan demand.

According to the standard definition of financial constraints, I'm able to define a firm as "constrained" when it does not obtain the credit it has applied for. More precisely, short/long term Credit constrained, my main dependent variable, is a dummy variable equal to 1 in three different cases:

A) the firm's application for a liquidity loan or or an investment loan in the past 3 months was denied;

B) The firm received less than 75% of the loan amount it requested;

C) The firm refused the loan offer because the rate was too high.

The classification is in line with how studies using the SAFE survey define the loan supply (Holton et al.,2012; Udell et al., 2012; Ferrando et al., 2015). More generally, this approach is common to the literature that uses survey data to study credit access (Cox and Japelli, 1993; Duca and Rosenthal, 1993; Popov

[1]One should keep in mind that the manufacturing sector is over-represented in the sample (50%)so that the survey cannot be interpreted as a representative estimate of the opinion french firms have on their credit conditions

and Udell, 2012; Jiménez et al., 2012), and it captures both formal and informal credit constraints.

Overall, short-term credit constraints turn out to be more salient in France. Table 1 reports the dependent variable Credit constrained for the two different loan maturity. Out of the 2,735 cash loan applications (resp. 8,226 investment loan applications), 19.6% (5.9%) are on average constrained. Out of these applications, 36% (38%) were denied, 30% (31%) were rationed, and 32% (30%) refused the loan due to its high cost.

2.2.2 Firm-level determinants of financial constraints

To account for the observable firm heterogeneity driving credit rationing, I first match the survey with firm's balance sheet information as well as bank-firm relationships coming respectively from the FIBEN database and the french national credit register. Whereas the FIBEN database gathers accounting and financial data from the balance sheet on all companies with a turnover of at least 750,000 euros since 1990, the french credit registry allows me to collect credit exposures of all banks operating in France to all firms whose total credit exposure is larger than 25,000 euros since 2006. To perform the analysis, I rely on a traditional set of measures that potentially affect the bank loan supply, comprising profitability ratios, liquidity ratios, solvency ratios and variables that typically proxy the presence of asymmetric information.

Balance sheet strength.—A first set of variables defined in table 1 is based on the firm's operational performance. The firm's ability to transform its current activity into cash-flow tends to ease the access to external finance and therefore increases the likelihood that it will be able to repay its debt service payment. At the same time, more profitable firms have more internal funds at their disposal which might decrease their actual demand for external funds (Almeida et al., 2004). To capture

the economic performance of a company, I use its potential cash flow ratio (defined as the ratio of cash-flow over total asset of the firm). This indicator is close in spirit to those used in Carbo-Valverde et al.(2009), Kremp and Sevestre (2013) and Ferrando et al.(2015).

Following Holmström and Tirole (2000) and investment smoothing theories (see Fazzari and Petersen for a review, 1993), my second financial indicator hinges on liquidity management, that is, the way firms manage their liquidity balances to be able to undertake projects with high marginal value. To smooth their investment and production plans, firms are supposed to optimally allocate their reversible working capital need to mitigate a negative liquidity shock. Otherwise, firms run the risk to lower their expected future profits which in turn increases their likelihood of default. Considering short term loans and the potential endogeneity of working capital requirement, I use current assets as the sum of the firm's inventories, accounts receivable and cash scaled by total assets, to assess the firm's liquidity resilience.

Dealing with solvent firms is another widespread concern for banks. In the fundamental balance sheet assessment, a sufficient stable funding is required to finance both fixed and current assets. However, solvency is even more restrictive and relies on the firm's power to repay all its debts. As pointed out by Holmstrom and Tirole (1997), a firm net worth determines its debt capacity given that over-leveraged firms might not behave diligently. Despite the "agency costs hypothesis" relating high leveraging to firm performance (Jensen and Meckling,1976; Udell and Di Patti,2006), I focus on the negative relationship between firm capital ratio and default probability assuming that firms with a lower ratio of own funds over total assets are more likely to default.

In addition, as an industry time varying characteristic, I include a quarterly business climate composite indicator computed by the french National Institute

of Statistics and Economic Studies (INSEE). The business climate indicator describes the common component of the selected balances of opinion in a single variable. According to four sectors (industry, retail, construction and services), it is constructed using dynamic factor analysis techniques and enables to summarize the concomitant trends of several variables whose movements are highly correlated. Changes in the business climate composite indicator therefore summarize the cyclical phase affecting the different balances of opinion from the tendency surveys: the higher its value, the more business managers consider the outlook to be favorable which is supposed to lower the firm probability of being credit constrained. Slightly lower than its average long term value(100), the indicator has an average value of 93.28 over the sample period.

Asymmetric information and Bank-firm relationships.— The last set of firm variables refer to uncertainty and predictors of potential asymmetric and contracting problems. As smaller and less mature firms seem to be more likely credit constrained (Oliner and Rudebush, 1992; Berger and Udell, 2006; Jimenez et al., 2012; Cenni et al.,2015), I consider both the logarithm of age and the logarithm of total assets to control the relevance of the financial ratios derived above. In this regard, 26% of firms in the sample are very small,with less than 2000K euros total assets, 62% are small, with totals assets comprised between 2000K euros and 43000K euros, and 11% are medium, with more than 43000K euros total assets.

Lending relationships issue is also of significant importance. The main benefits from a single banking relationship is based on the informational advantage the bank manage to build over time. By mitigating agency problems, lending relationships help to reduce credit rationing for SMEs (Boot, 2000). yet, firms that would benefit from a single banking relationship may still borrow from multiple banks in order to avoid the "hold-up" problem in which a single bank may exploit its market power and extract excessive rents. Like a number of other studies which document

that single-bank relationships are relatively uncommon and that many firms maintain relationships with many banks (Ongena and Smith, 2001), only 20% of firms in my sample have only one bank. To test the effect of multiple bank relationships, the "main bank market power" is used to test whether multiple-bank relationships makes rationing more likely (Bhattacharya and Chiesa, 1995; von Rheinbaben and Ruckes, 2004) or whether it contributes to spur bank competition forcing banks to adapt to the firm's requirements (Sharpe, 1990; Rajan, 1992; Detragiache et al., 2000). To be more precise, this categorical variable measures the relative importance of the main bank credit exposures in the total amount of outstanding credit of a firm.

Finally, the other variable that has been shown to play an important role in loan granting is the firm ability to provide collateral. Following Carbo-valverde et al.(2009) and Kremp and Sevestre (2013), I use tangible assets over total assets of the firm to proxy its available collateral.Tangible assets may reduce credit rationing because tangibility helps in mitigating agency problems (Almeida and Campello, 2007).

To minimize the impact of gross outlier, I winsorise variables at the top and bottom first percentile[2].Table 2 reports their respective descriptive statistics according to financial constraints and tests the equality of the median of both groups. Overall, it shows that firms with financial constraints tend to be less profitable, less liquid, less capitalized, younger and smaller than firms without financing constraints, which is in line with expectations.

2.2.3 Bank Balance Sheet and bank business models

The main drawback of the Banque de France survey is that it does not identify the bank that granted or refused to grant the loan. However, the french national

[2]Firm data related to the annual balance sheet is interpolated from a quarterly basis

credit register contains information on credit exposures of all banks operating in France to all firms. In the same vein as Udell and Popov(2012) who use the number a branches a bank has in the locality of the firm, I then take advantage of this criterion to construct a unique dataset by averaging Bank ratios of bank i on the extent of outstanding amount of credit granted by bank i to firm j. Consequently, in my analysis, I weight the probability of firm i doing business with each bank present in its credit register by the relative importance of each bank credit exposures in its total amount of outstanding credit. Depending on the effective amount of credit granted, my approach is definitely more accurate to weight the bank-firm relationship.

In the end, I match the firm level database with the french unified financial reporting system (SURFI) to evaluate how bank business models and banks balance sheet strength relate to credit rationing. The bank level database contains financial statements at non-consolidated level. The sample covers all commercial and cooperative banks operating in France over 2012Q1-2014Q4 and gives detailed information on balance sheets and financial statements. All in all, the 333 banks from which "composite banks" are created in the study cover almost 70% of credit volume to NFI reported in SURFI over the sample period.

Bank Characteristics—The relevant bank balance-sheet variables susceptible to affect firm's likelihood of being credit constrained have to do with bank's financial solidity. According to bank business models, I'm particularly interested in knowing whether this process is driven by cross-sectional differences. Following the literature, I first add the bank capital ratio, as a measure of a bank net worth, defined as "informed" capital over total assets of the bank (Holmstrom and Tirole, 1997; Jiménez et al., 2012). When monitoring capital decreases, poor-capitalized firms, that is SMEs, are the first to get squeezed. Given that a bank is both a lender and a borrower, a capital squeeze bears on the bank as a lender. In this

regard, Adrian and Shin (2010) note that banks finance new projects mainly by issuing new debt, and shrink lending by reducing debt, rather than through fluctuations of its leverage. Hence, Well-capitalised banks, considered as more solvent by depositors and investors, might ease their financial constraints to finance in return SMEs. In the data, as bank capital ratio is not risk adjusted, it is similar to a pure leverage ratio.Thus defined it has an average value of 8.9%.

Since the seminal paper of Diamond and Dybvig (1983), the fundamental bank's fragility lies in the maturity mismatch between assets and liabilities that makes banks inherently unstable and expose them to the possibility of bank runs. Traditionally, banks hold cash and other liquid assets as part of their overall strategy to manage liquidity risk. On the one hand, banks rationally protected themselves by hoarding liquidity because of concerns about the liquidity of its assets. For instance, banks may decide to hoard liquidity for precautionary reasons in anticipation of future liquidation of assets (Diamond and Rajan, 2011). On the other hand, turning to the liability side, banks choose the level of liquid assets corresponding either to an expected deposit withdrawal or an anticipated liquidity shortage coming from the interbank lending market (Gale and Yorulmazer, 2013). To take into account the effect of bank liquidity on financial constraints, I compute a liquidity ratio in the spirit of Jiménez et al.(2012). The latter is the sum of liquid assets (cash, balance with central bank, loans and advance to credit institutions and repurchase agreements) held by the bank over total assets of the bank. On average, this liquidity ratio is equal to 17%.

Lending behavior may also vary across other banks features. Thus, I control for bank variables that may affect bank lending within the same business model. I therefore include: ln(total assets), the log of the total assets of the bank; ROA, the return on assets of the bank and NPLR, the non performing loan ratio of the bank.

Bank business models—The current french banking sector incorporates a rich array of banks with diverse business models and ownership structures[3]. To convincingly identify bank business models, the definition that I use distinguishes primarily between key banking technologies. Building on bank trading abilities, I make use of trading securities to differentiate banks' business profiles according to the intensive and the extensive margin of trading. A held-for-trading security refers to debt and equity investments that are purchased with the intent of selling them within a short period of time (i.e less than 6 month in the french classification). Generating profit from increases in their price, trading securities are not held by every financial institution. On the contrary, proprietary trading and market making operations are usually done through specialized trading technologies that constitute asymmetric information. In my analysis, the intensive margin of trading refers to the outstanding amount of trading securities held by a bank whereas the extensive margin is a dummy variable taking the value 1 whether the bank holds trading securities or 0 otherwise. Henceforth, a bank is considered as a "trading-Bank" (T-bank) whenever its extensive margin equals to 1. Among the 187 banks that report exhaustively their financial accounts since the creation of SURFI in 2003, 85 trading banks (45% of the banks) provide 82% and 75% of cash credit and investment credit volume, respectively. Hence, they are associated with 62% of loan applications in my sample.

Figure 1 and 2 illustrate the year-to-year investment and cash credit growth rate provided by Trading banks and Non-trading banks in France over the 2004Q1-2015Q4 period. Figure 1 shows that since 2009Q4 and 2010Q4 the investment and cash credit dynamics of T-banks are strongly lower than the ones associated with Non-T-banks, respectively.

Because of the multi-faceted, ever changing nature of banks, identification is

[3]In France, the liberalization started with the separation of banking activities through the "Debré-Haberer Law" of 1966-1967 and the "Bank Act" ("Loi Bancaire") of 1984

not trivial. Business models are of course not completely captured by only one variable. A T-bank typically has a higher share of wholesale funding, and its non-loan business covers a range of banking services. Nevertheless, trading securities holdings seem to be a good proxy for banks' business models, broadly defined.

Table 3 and 4 give some descriptive statistics on the two business model profiles during the sample period. As expected, the T-bank model is consistent with banks which are typically thought to rely more on financial markets. On the asset side, on average T-banks have a lower share of credit (37% vs 50%). In particular, those banks have a higher share of financial securities (9% vs 5%) compared to non-T-bank which do not hold (by definition) trading securities. In this regard, T-banks' trading securities ratio is on average equal to 4%. On the liability side, T-banks have a higher share of wholesale funding over total asset (46% vs 44%), and a lower share of capital (8.5% vs 9.5%) and deposit (26% vs 37%). Finally, T-banks are larger, rely more on non-interest incomes (3.5% vs 2.5%) and off balance sheet incomes (28% vs 5%) and have an excessive off balance sheet exposure (9 vs 0.33).

As stated above, "non-trading-banks" are typically thought to have a narrower retail focus: they collect deposits, grant loans to the real economy and are not involved in trading activities. Although T-banks are also major lenders to the real economy, their business model is strongly engaged in other activities than traditional lending.

3 Empirical Strategy

The goal of this paper is to assess how bank business models and banks balance sheet strength relate to credit rationing. To show that "trading-banks" have a different credit supply over time, I exploit the cross-sectional implications of

the sensitivity of credit rationing to bank business models and bank balance sheet strength. As I have the loan applications, I'm able to better disentangle the supply from the demand for loans, which is the key identification problem. Through loan applications, loan demand for each bank is in a sense given and observed, and each bank has to decide only on the granting of each loan "its loan supply" knowing the firm (Jiménez et al, 2012; Popov, 2016).

As in previous studies I model the probability of firms facing financing obstacles as a linear function of banks and firms characteristics. Indeed, since the incidental parameter problem leads to inconsistent estimates in non-linear panel with small T and large N (Lancaster, 2000) , one method of consistent estimation is the conditional maximum likelihood estimator. Nonetheless, the inclusion of firm fixed effects in a logit (or probit) model naturally restricts the sample to those firms that filed at least one application that did result in a loan granted and one application that did not during the sample period. To avoid this selection problem I employ linear probability models in the main regressions, but study logit models in robustness. In addition, one other benefit of employing linear probability models is that for the interaction terms, the main focus of the analysis, the estimated coefficients are directly interpretable and the standard errors require no corrections.'

The specifications I estimate are at the loan application level and I match the loan application outcomes (whether the loan is constrained or not) with the associated bank/firm information. My empirical specifications assessing the probability a loan application is rationed are broadly structured as follows:

$$(1)\ Constrained_{ibt} = \beta_1 X_{it} + \beta_2 B_{bt} + \beta_3 \text{T-bank}_b + \beta_4 CAP_{bt} \times \text{T-bank}_b + \beta_5 TS_{bt} + \beta_6 OTHER_{bt} \times \text{T-bank}_b + \alpha_i + \sigma_t + \gamma_t + \epsilon_{ibt}$$

Where Constrained$_{ibt}$ is a dummy variable equal to 1 if firm i is constrained by bank b in quarter t (according to the criteria outline before); X_{it} is a matrix of firm characteristics; B_{bt} is a matrix of bank characteristics; T-bank$_b$ is a dummy variable equals to 1 if bank b of firm i is considered as a Trading-bank (i.e the extensive margin of trading); CAP$_{bt}$ is the bank capital ratio; TS$_b$ is the outstanding amount of trading securities held by bank b of firm i (i.e the intensive margin of trading). $OTHER_{bt}$ control for bank characteristics included in B_{bt} that might interact with T-bank$_b$. The coefficients on T-bank, TS, and T-bank$\times CAP$ comprise my three hypotheses. H1 implies that $\beta_3 > 0$. H2 implies that $\beta_5 > 0$. H3 implies that $\beta_4 > 0$. I finally introduce firm fixed effects α_i to control for time-unvarying heterogeneity among firms and add quarter fixed effects σ_t to capture firms macroeconomic environment. In additional regression, I also interact bank holding company dummies with(without) time dummies to eliminate the effect of unobservable time-varying(unvarying) banking group heterogeneity.

In this class of models the estimated coefficients on the variables are percentage points contributions to the probability that a firm perceives the current willingness of banks to extend credit to businesses as restrictive, everything else being equal.

4 Empirical Results

In this section, I first discuss the estimated effect of firm and bank characteristics on the firm likelihood to be credit constrained. Importantly, I make out loan maturity applications to assess the potential asymmetric impact of Bank business models according to bank balance sheet strength.

Tables 5 and 7 report for the linear probability models the estimated coefficients according to loan maturity. I cluster the standard errors at the bank-quarter

level, thus allowing for errors to be correlated across firms within a bank reflecting possible bank specific unobserved shocks. (Moulton, 1986; Jimenez et al., 2012; Popov, 2016). thus allowing for errors to be correlated across firms within a bank reflecting possible bank specific unobserved shocks. Fixed effects regressions include a wide range of time-varying firm, bank and industry level characteristics and further control for time and banking group fixed effects.[4]

4.1 Short-term credit constraints

Firm and bank characteristic— I start by examining short term credit constraints in table 5. The empirical analysis is performed on a sample of 635 firms that formally applied at least twice for cash credit, out of which 199 (about 30%) declare themselves as credit constrained. The estimated coefficients on a number of bank and firm characteristics are across all specifications statistically significant, economically relevant and in line with straightforward priors.

Focusing first on firm and bank variables, model (1) indicates that more solvent and liquid firms are less likely to be short term credit constrained. Thus, a one percentage point change in the solvency or liquidity ratio decreases the probability a loan application is rationed by 90-basis point and 68 basis-point, respectively. Switching to relative change, as the average probability a cash credit application is constrained equals 19.6%, the estimated semi-elasticities equal 4.6% and 3.5%, respectively.

At the bank level, bank solvency turns out to be the only significant variable. More solvent banks are more prone to grant short-term credit. Indeed, a one percentage point change in the bank solvency ratio decreases the probability a loan application is constrained by 74-basis point(i.e. a semi-elasticity of 3.8%).

[4]The conjecture that allows for correlation between unobserved heterogeneity and the regressors is supported by the Haussman test

Interestingly, contrary to Jiménez, Ongena, Peydro, and Saurina (2012) who find that more solvent and liquid banks have a lower probability of granting loan to new borrowers, this result suggests that bank capital has a positive impact on short-term loan granting. Following Gambacorta and Shin (2016), bank capital can be perceived as a considerable cost advantage for the bank by lowering its refinancing costs (deposits, bonds, interbank borrowing...). This bank credit channel based on solvency suppose that Well-capitalised banks are considered as "less risky" by depositors and investors and have therefore cheaper access to external finance. In addition, as pointed out previously, a higher bank capital ratio seems to mitigate SME's agency problems related to short-term credit (Holmstrom and Tirole, 1997).

Looking now at the effects of bank business models on the lending behavior of banks, model(1) reveals that trading expertise plays a substantial role: The more a bank holds trading securities (i.e the intensive margin of trading) the higher is the firm probability of being credit constrained, everything else being equal. To put it differently, among trading banks, the asset reallocation hypothesis (H2) is confirmed: Given their maturity and trading-banks technologies, trading securities appears to be substitutes for cash credit. A one percentage point change in the trading securities ratio increases the probability a loan application is constrained by 1.42 percentage point(i.e a semi-elasticity of 7.2%). However, although marginal, the coefficient associated to the extensive margin of trading (i.e whether the banks is a trading bank or no) goes surprisingly in the opposite direction. The introduction of interactions of bank balance sheet strength with the extensive margin reverses thereafter the sign of this coefficient.

Business models heterogeneity— Model(2) analyses the impact of bank business model through the bank balance sheet channel. In particular, I'm interesting in knowing whether the credit rationing process uncovered in model(1) is affected by the strength of bank balance sheet. The specification therefore includes inter-

actions of bank controls already used in model(1) with the extensive margin of trading. In doing so, model(2) allows me to test H2 at the same time in order to assess the effect of bank capital on credit supply depending on trading abilities. Whereas firm liquidity and solvency ratios remain stable, the effect of bank capital becomes more significant and almost twice as strong as in model(1). Most importantly, the intensive margin of trading is stronger and the extensive margin of trading credit is now associated to a positive coefficient (H1). In this regard, descriptive statistics presented in tables 3 and 6, shade some light on this result. On average, Firms dealing with trading-banks declare to have less difficulties to access to short-term loans (18% vs 24%). Yet, in cross section, tradings banks take on less risks and are financially stronger than non-trading-bank. Smaller,riskier (i.e with a higher NPLR) and less liquid, non-trading-banks turn out to have a higher number of speculative-grade firms in their pool of borrowers (47% vs 32%). Their firm borrowers are smaller, younger and have a lower collateral ability. Based on these significant differences, interaction terms control for bank heterogeneity to highlight the real effect of the extensive margin of trading. Accordingly, applying for a short-term loan coming from a trading-banks increases the likelihood a loan application is constrained by 1.16 percentage point(i.e a semi-elasticity of 5.9%).

For banks with higher trading expertise, I find that higher capital is associated with a higher probability a short-term loan application is constrained (a one percentage point change in bank capital ratio increases the probability by 90-basis point). Hence, H3 is corroborated and trading banks with higher capital invest more in trading securities by reducing loan granting to SMEs. However, one important result of table 4 is to show that bank business models matter during non-liquidity-crisis situations for a specific loan maturity. Note that the (unreported) coefficients of non-trading banks and capital has the opposite sign than that for trading banks (higher capital implies more lending). Furthermore, the bigger and

the more profitable trading banks are, the less loan granting is restrictive.

In model (3), I now introduce time fixed effects to account for changes in macroeconomic conditions, such as current and future expectations of GDP growth, inflation and general shocks affecting the economy. The quarter fixed effects include a fixed effect for every quarter during the sample period. Overall, I find that coefficients reported in model(2) are almost identical and still remain statistically significant.

Finally, I introduce banking group fixed effects in model(4), my benchmark specification, to compare the change in the probability a short-term loan application is constrained for the same time-varying borrower risk profile, in the same time period, in the same group and across banks with different levels of trading expertise. Thereby, I want to test whether time-invariant banking group heterogeneity such as liquidity management or even trading culture can drive my findings. In model(4), the effect of bank liquidity becomes significant with an economic importance that is close to the firm liquidity. For the remaining variables, the estimated coefficients are similar to those in model(3). Similarly, the use of banking group*time fixed effects to control for time-varying banking group heterogeneity leads to the same result (unreported).

Overall, models (2), (3) and (4) in table 5 confirmed the first two hypothesis: *Ceteris paribus*, not only Trading-bank tend to exhibit a higher short-term credit rationing for SMEs, but the negative impact of trading-banks on credit availability is also stronger for banks with higher capital and trading securities. Interestingly, the introduction of interaction terms accounting for bank balance sheet strength tackles bank heterogeneity within the same bank business model and results are robust to the inclusion of time and banking group fixed effects. It should therefore be checked whether the same effects hold for longer credit maturity.

4.2 Long-term credit constraints

Firm and bank characteristic—Let's now consider investment credit constraints displayed in table 7. This time, the empirical analysis is performed on a sample of 1,869 firms that formally applied at least twice for investment credit, out of which 69 (about 4%) declare themselves as credit constrained. Starting with firm and bank variables, model (1) shows that more solvent firms are less likely to be long-term credit constrained. A one percentage point change in the solvency ratio decreases the probability a loan application is rationed by 50-basis point. Given the average probability an investment loan application is constrained equals 5.9%, the estimated semi-elasticity equals 8%. Note that firm solvency has a weaker effect on loan granting than in table 4 (in absolute change). In addition, while firm liquidity is not relevant anymore, the size of the firm is found to be significant. Consistent with studies based on the SAFE survey(Udell et al., 2012; Holton et al., 2012), this result points out the important role of capital market imperfections (Berger et al., 2005). It is however, remarkable that, in contrast to these authors, I do not find such evidence for short-term loan applications. It should be also mentioned that the coefficient related to firm age is only marginal and becomes subsequently not significant.

Examining relationship lending, model(1) suggests that market power of the main bank matters. The more a firm is exposed to its main bank, the higher is the firm probability of being credit constrained. Despite the value added hypothesis based on information acquisition (Boot,2000), single banking relationship turns out to make rationing more likely. Hence, contrary to Ongena and Smith (2000) who show that opting for multiple bank relationships may reduce the hold-up problem , but can worsen at the same time the availability of credit, I find that, for investment credit, being able to get loans from different banks could be desirable. In others words, following Hoshi et al.(1990), the interest of multiple banking relationships

substantially depends on funding needs. Assuming that large funding needs(i.e. investment credit) are anticipated, being with a single bank may consequently be a disadvantage.

Unlike short-term credit estimates, model(1) do not support any evidence on the effects of bank solvency and liquidity. This very important result implies that the probability of being long-term credit constrained does not depend on bank balance strength. Only the bank return on assets has a significant impact on loan granting. A one percentage point change in the ROA decreases the probability a long-term loan application is constrained by 3.48 percentage point(i.e a semi-elasticity of 59%). Importantly, my two margins of trading are not relevant anymore which reveals that trading business model has an asymmetric effect on credit availability according to loan maturity.

Business models heterogeneity—Turning to the effect of bank balance sheet strength across bank business models, model(2) confirms estimates of model(1). Regarding interaction terms, bank capital is found to have the opposite sign as for short-term credit: Firms dealing with well-capitalized trading banks have experienced a lower long-term-credit constraints (a one percentage point change in bank capital ratio decreases the probability by 50-basis point). In particular, this asymmetric effect stresses that low leverage can be associated to higher trading positions and lower short-term credit exposures for trading banks. In this case, One should not consider the level of leverage (that can be low) but rather the potential variation in bank leverage allowed by markets that might be used to trade short-term assets. Finally, I reproduce the two previous regressions adding time and banking group fixed effects in model (3) and (4) and results remain the same.

4.3 Further developments and robustness

While the results above indicate that T-banks have increased their investment in trading securities to profit from trading opportunities, thus tightening the access to credit, I look at several other alternative explanations. The first one hinges on liquidity preference. That is, trading banks would have a preference for liquid assets like securities as compared to loans, even short-terms loans. As pointed out by Gale and Yorumalzer(2013), a liquid banker has two reasons for hoarding liquid assets. On the one hand, there is a precautionary motive: The banker uses his liquid assets today to protect itself from a liquidity shock tomorrow; on the other, there is a speculative motive: Hoarding may profit from buying assets at fire sale prices if the future demand for cash is very high owing to expected liquidity shocks. Hence, if uncertainty increases liquidity preference will rise and asset demands will be biased toward more liquid but less profitable assets (Allen and Gale, 2004). In this case, the supply of credit advanced to customers should decline. Although T-banks are more likely to be affected by liquidity shocks given their money-market dependence, this explanation is difficult to reconcile with the fact that France has not experienced such uncertainty over the sample period 2012-2014. Above all, this does not explain why long-term loans are not affected by bank business models and why well-capitalized T-banks tend to reduce more loan granting.

In the same vein, liquidity needs that stem from Basel III liquidity requirements (i.g LCR or NSFR) could also affect corporate loan distribution to SMEs (De Bandt and Chahad, 2015). In particular, the objective of the LCR is to promote the short-term resilience of banks by ensuring that they have an adequate stock of unencumbered high-quality liquid assets (HQLA) that can be converted easily into cash to meet their liquidity needs for a 30 calendar day liquidity stress scenario. But again, the fact that long-term credit does not contribute to this effort makes this hypothesis unlikely.

In light of the zero lower bounds universe coupled with unconventional monetary policy, I Investigate the bank profitability channel that could cause T-banks disinterest for short-term loans to SMEs. Given the positive correlation between the level of interest rates and bank profitability (Borio and al., 2015), trading-banks may invest more in securities whose prices rise with lower interest rates, thus acting as a hedge against drop in lending income. To analyze this channel, I take advantage of data on return on interest-income and return on trading income at the bank level from 2003 and find that they are negatively correlated. This reveals that trading incomes from short-term securities may provide a hedge against lending income declines. However, one might be concerned by the asymmetric effect of bank business model as discussed previously: why trading-banks do not substitute long-term credit for trading assets as well? Looking at the annual growth rate of investment and cash credit incomes since 2003, figure 3 shows that, over the sample period, the growth rate of investment credit incomes turns out to be higher than for cash credit. In this regard, note that both incomes suffer from a decline. Thus, to compensate the negative impact of a flatter yield curve on net interest income, trading-banks may have reduced their exposures to less profitable loan maturity.

Finally, the Banque de France survey allows me to isolate supply shocks satisfactorily but my strategy does not account for the changing composition of firms that demand bank credit insofar as I do not observe firms that do not ask for a loan (Udell and Popov,2010). Even though SMEs depend crucially on bank credit to finance their activity, one should be aware that my results hold for SMEs that do ask at least twice for investment or cash credit over the sample period (representing 37% and 13% of the firms in my sample, respectively). For instance, non parametric median tests of table 8 indicate that firms that exhibit a positive demand for investment loan are globally bigger, older, more efficient and have a

greater collateral ability. As for cash-credit, firms that apply for a loan are smaller and less efficient, liquid and capitalized.

In sum, using loan level applications according to loan maturity, I find that financial characteristics as well as asymmetric information and bank relationship can explain self-reported financial constraints by firms. This finding is consistent with a potent balance sheet channel in loan granting. Tackling bank business models, I find that dealing with a trading bank increases significantly the firm probability of being short-term credit constrained. Besides, the negative impact of trading-banks on credit availability is even stronger for banks with higher capital and trading securities. Importantly, these results do not apply in the case of investment credit. While I'm not able to assess whether firms manage to compensate for the reduction in bank credit, I assume that, given both the french bank-dominated system and the very specific features of SMEs, there could be real effects.

Especially, given the SMEs reliance on bank credit and the importance of internal funds in their investment decision (Myers and Majluf, 1984), the real effect of short term financial constraints may arises when firms with opportunities to invest may be blocked from doing so because rationing may force them to allocate additional cash-flow to finance their working capital needs.

5 Conclusion and policy implication

In this paper I conduct the first empirical study analyzing the effects of bank business models on SME credit rationing. Using loan level applications from France that allow me to account for time-varying firm heterogeneity in loan demand, I take advantage of a unique breakdown by loan maturity to assess the firm probability to be credit constrained.

Tackling bank business models using the extensive and the intensive margin

of trading, I find that dealing with a trading bank increases significantly the firm probability of being short-term credit constrained. Besides, the negative impact of trading-banks on credit availability is even stronger for banks with higher capital and trading securities. Importantly, while the existing literature stresses a negative externality of securities trading by banks during a liquidity crisis, I shade some light on a credit rationing phenomenon coming from trading-banks involved in a zero lower bound universe.

While the role of securities trading by banks has received considerable attention in the aftermath of the crisis (i.e. the Volcker rule in the USA, the Liikanen report in the EU and the Vickers report in the UK), my findings question the European universal banking model in view of SMEs finance. Althought the scope of this paper is not to assess the net benefit related to trading-banks, it suggests that prudential regulation should take more into account bank's assets allocation strategy instead of focusing primarily on risk weighed assets and solvency.

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Table 1: Summary statistics

Variable	Units	Definition	Mean	SD	Min	Median	Max
Dependent variables							
Short term loan application is constrained	0/1	=1 if the short-term loan application is denied, refused due to high costs or if less than 75% of the loan is granted	0.19	0.39	0	0	1
Long term loan application is constrained	0/1	=1 if the long-term loan application is denied, refused due to high costs or if less than 75% of the loan is granted	0.06	0.23	0	0	1
Independent variables							
Bank characteristics							
Bank capital ratio	%	The ratio of bank equity over total assets of the bank	8.93	4	0.02	8.33	95.33
Bank liquidity ratio	%	The ratio of liquid assets (central bank , interbank, repo cash and balance) over total assets of the bank	17.03	90	0.01	15.17	73.20
Bank ROA	%	The total net income over total assets of the bank	0.17	1	-1.03	0.15	7.12
NPLR	%	The non performing loan Ratio of the bank	6.07	13	0.01	18.44	1
LTA	%	The loan to asset of the firm	41.69	22	0.01	42.61	94.03
Deposit ratio	%	The ratio of deposit over total assets of the bank	30.51	18	0.01	27.72	92
Bank securities ratio	%	The ratio of securitities over total assets of the bank	7.31	3	0	6.09	62.84
Trading securities ratio	%	The ratio of trading securities over total assets of the bank	2.46	3	0	0	23.22
Bank total assets	M€	The total assets of the bank	176879	287	141	40840	1045234
Ln(total assets)	-	The log of the total assets of the bank	17.73	1.74	11.85	17.52	20.76
Firms characteristics							
Firm capital ratio	%	The ratio of own funds over total assets of the firm	26.89	14	0	25.74	66.73
Firm liquidity ratio	%	The ratio of current assets over total assets of the firms	52.73	21	5.51	52.85	94.12
Firm total assets	K€	The total assets of the firm	31,387	79,420	586	7,220	556,508
Ln(total firm assets)	-	The log of the total assets of the firm	9.04	1.51	6.41	8.88	14.65
Profitability	%	The ratio of potential cash flow over total assets of the firm	1.46	1.6	-4.22	1.4	6.37
Age	years	The age of the firm	34.17	22.85	3	28	126
Collateral ability	%	The ratio of tangible assets over total assets of the firm	36	21	1.22	34.29	88.82
Sector-specific business climate	-	Indicator of sector-specific outlook	93.28	3.95	84	93	100.33
Bank market power index	%	The market share of the main bank of the firm	64				
Construction	%	The proportion of construction firm	14.44				
Manufacturing industry	%	The proportion manufacturing firm	51.33				
Retail	%	The proportion of retail firm	11.53				
Services	%	The proportion services firms	22.70				

Notes: The number of observations equals 37,276 with 5005 different firms

Table 2: Firm Characteristics by Constraint-group: median test

	Short term credit			Long term credit		
	Constrained	*Unconstrained*	*Median-test*	*Constrained*	*Unconstrained*	*Median-test*
Profitability	0.5%	1.20%	0.00***	1%	1.64%	0.00***
Capital ratio	13.41%	22.63%	0.00***	16.92%	26.25%	0.00***
Liquidity ratio	52.03%	51.91%	0.89	49%	50.54%	0.28
Log(total assets)	8.92	9.22	0.00***	9.23	9.18	0.67
Collateral ability	32.79%	34.50%	0.57	39%	39%	0.92
Age	25	29	0.00***	27	30	0.00***
Observations	536	2,199		486	7,740	

Notes: Table 2 gives the mean values of the variables split by,constraint-group and the p-value of the corresponding median test on the,equality of the median between the constrained observations and the,unconstrained observations. Significance levels:*** p<0.01, ** p<0.05, * p<0.1.

Table 3: Descriptive statistics of trading-banks

Variables	Units	Definition	Min	Q1	Mean	Median	Q3	Max	SD
Asset									
LTA	%	The ratio of the total amount of loans over total assets of the bank	0.01	18.8	37	36.8	52.3	92.9	19
NPLR	%	The non performing loan Ratio of the bank	0.01	1.3	5.7	1.8	2.6	99.5	11
Liquidity ratio	%	The ratio of liquid assets (central bank, interbank, repo cash and balance)over total assets of the bank	0.01	12	19.2	17.6	24.5	66	9
Securities ratio	%	The ratio of securitities over total assets of the bank	0.01	4.5	8.8	7.8	12.5	62.8	5
Trading securities ratio	%	The ratio of trading securitities over total assets of the bank	0.01	0.36	3.9	2.37	6	23.22	4
Ln(total assets)	-	The log of the total assets of the bank	12.76	17.45	18.6	18.7	19.8	20.76	149
Liability									
Deposit ratio	%	The ratio of deposit over total assets of the bank	0.01	13.6	26.1	24.2	36.6	80.6	15
Wholesale funding ratio	%	The ratio of wholesale funding (Repo, interbank debt and CD) over total assets of the bank	0.1	36.1	45.5	44.1	53.4	97.9	13
Capital ratio	%	The ratio of bank equity over total assets of the bank	0.02	5.5	8.6	7.8	10.8	95.4	4
Banking incomes									
ROA	%	The total net income on securities over total assets of the bank	-0.02	0	0.1	0.1	0.2	2.3	0.1
Non-interest income ratio	%	The non-interest incomes over total incomes of the bank	0	1.41	3.35	2.65	4.1	58.46	3
Off balance sheet income ratio	%	The off-balance sheet incomes over total incomes of the bank	0.01	7.5	28.31	20.05	42.17	98.39	25
Off-balance sheet									
Derivatives ratio	-	The notional commitment on derivatives over total assets of the bank	0	95	900	478	1297	4807	10.9
N			22,742	22,742	22,742	22,742	22,742	22,742	22,742

Table 4: Descriptive statistics of non-trading-banks

Variables	Units	Definition	Min	Q1	Mean	Median	Q3	Max	SD
Asset									
LTA	%	The ratio of the total amount of loans over total assets of the bank	0.01	32.75	50.53	56.96	70.82	94	24
NPLR	%	The non performing loan Ratio of the bank	0.01	1.14	6.60	1.95	3.12	99.8	15
Liquidity ratio	%	The ratio of liquid assets (central bank, interbank, repo cash and balance)over total assets of the bank	0.01	7.84	13.6	11.77	17.21	73.21	8
Securities ratio	%	The ratio of securitities over total assets of the bank	0	0.5	4.78	3.15	6.95	33.22	5
Trading securities ratio	%	The ratio of trading securitities over total assets of the bank	0	0	0	0	0	0	0
Ln(total assets)	-	The log of the total assets of the bank	11.85	15.71	16.3	16.34	16.84	18.83	101
Liability									
Deposit ratio	%	The ratio of deposit over total assets of the bank	0.01	19.37	37.4	38.28	58.43	92	5
Wholesale funding ratio	%	The ratio of wholesale funding (Repo, interbank debt and CD) over total assets of the bank	0.01	27.19	43.08	38.52	56.19	98	2
Capital ratio	%	The ratio of bank equity over total assets of the bank	0.04	5.7	9.47	9.37	12.18	87.59	5
Banking incomes									
ROA	%	The total net income on securities over total assets of the bank	-1	0.1	0.19	0.16	0.25	7.12	2
Non-interest income ratio	%	The non-interest incomes over total incomes of the bank	0	0.3	2.67	1.45	3.87	58.45	4
Off balance sheet income ratio	%	The off-balance sheet incomes over total incomes of the bank	0	1.58	4.77	3.3	5.8	46.62	5
Off-balance sheet									
Derivatives ratio	-	The notional commitment on derivatives over total assets of the bank	0	13.41	33.12	23.43	37.71	459	38
N			14,414	14,414	14,414	14,414	14,414	14,414	14,414

Figure 1: Cash credit growth rate according to bank business models

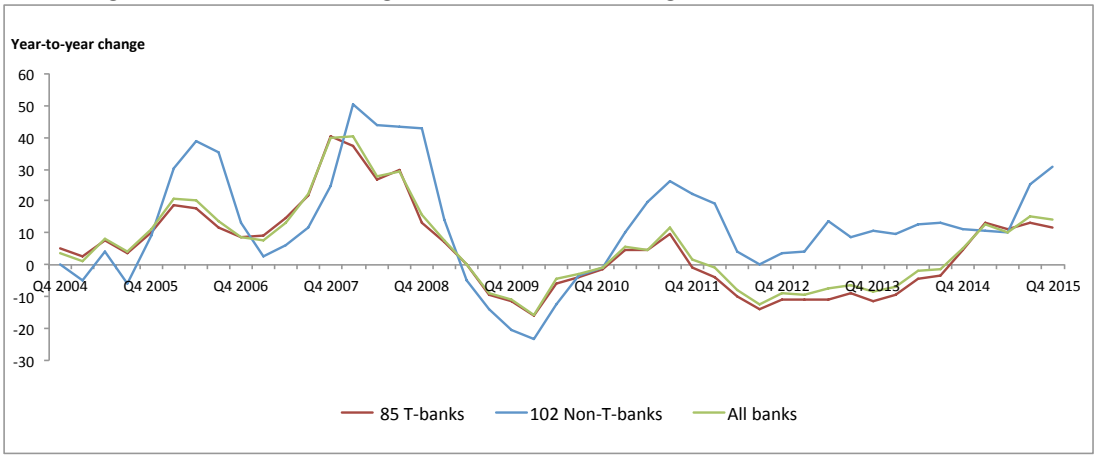

Figure 2: Investment credit growth rate according to bank business models

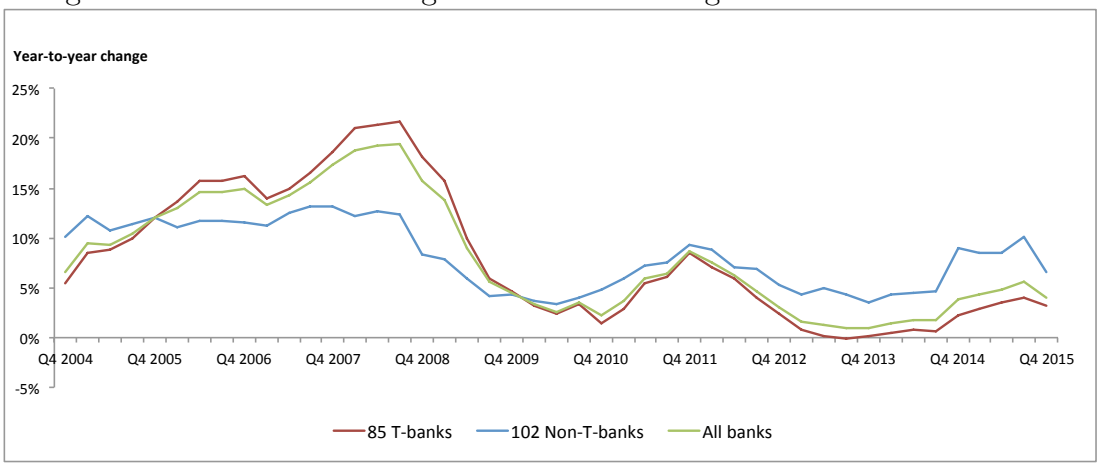

Table 5: Regression results: Short-term loan applications

Model	(1)	(2)	(3)	(4)
Bank characteristics (b)				
Bank capital ratio	-0.739*	-1.343***	-1.310***	-1.209**
	(0.389)	(0.500)	(0.509)	(0.549)
Bank liquidity ratio	-0.223	-0.440	-0.442	-0.603*
	(0.258)	(0.310)	(0.232)	(0.245)
NPLR	-0.262**	-0.154	-0.159	-0.084
	(0.540)	(0.116)	(0.117)	(0.124)
Bank ROA	-3.731	3.996	5.084	5.747
	(4.198)	(4.470)	(4.601)	(4.600)
Ln(Bank total assets)	-0.021	-0.034	-0.033	-0.037
	(0.018)	(0.029)	(0.029)	(0.030)
Firms characteristics (i)				
Firm capital ratio	-0.901***	-0.905***	-0.894***	-0.857***
	(0.247)	(0.253)	(0.251)	(0.250)
Firm liquidity ratio	-0.686*	-0.731*	-0.655*	-0.642*
	(0.383)	(0.392)	(0.386)	(0.385)
Ln(total firm assets)	-0.156	-0.156	-0.175*	-0.160
	(0.098)	(0.099)	(0.077)	(0.077)
Profitability	-0.713	-0.634	-0.566	-0.567
	(1.109)	(1.107)	(1.098)	(1.106)
Age	0.003	0.001	-0.021	-0.003
	(0.012)	(0.012)	(0.048)	(0.047)
Market power index	-0.059	-0.068	-0.049	-0.056
	(0.079)	(0.079)	(0.080)	(0.079)
Collateral ability	-0.416	-0.472	-0.478	-0.506
	(0.470)	(0.475)	(0.478)	(0.480)
Industry business climate	-0.001	-0.001	-0.001	-0.001
	(0.002)	(0.002)	(0.004)	(0.004)
Bank business model (b)				
Securities trading ratio	1.424***	1.745***	1.653***	1.705***
	(0.540)	(0.539)	(0.562)	(0.599)
T-bank	-0.063*	1.165***	1.093***	1.084***
	(0.036)	(0.511)	(0.519)	(0.524)
T-bank x Bank capital ratio		0.969*	0.901*	0.910*
		(0.501)	(0.503)	(0.509)
T-bank x Bank liquidity ratio		0.327	0.278	0.302
		(0.286)	(0.284)	(0.282)
T-bank x NPLR		-0.191	-0.194	-0.198
		(0.128)	(0.128)	(0.126)
T-bank x ROA		-18.31**	-20.34**	-21.33**
		(8.390)	(8.601)	(8.592)
MO-bank x Ln(Bank total assets)		-0.079**	-0.073**	-0.073**
		(0.031)	(0.032)	(0.032)
Firm fixed effect	Yes	Yes	Yes	Yes
Quarter fixed effect	No	No	Yes	Yes
Banking group fixed effect	No	No	No	Yes
Observations	1942	1942	1942	1942
Number of firms	635	635	635	635
Number of bank-quarter cluster	872	872	872	872

Notes: The table reports the estimated coefficients and robust standard error (in parentheses) are clustered at the quaterly level from linear probability models estimated using least squares. *** indicates significance at the 1% level, ,** at the 5% level, and * at the 10% level.

Table 6: Credit risk according to bank business models

	Short term credit			Long term credit		
	T-banks	*Non-T-banks*	*Median-test*	*T-banks*	*Non-T-banks*	*Median-test*
Profitability	1.09%	1.01%	0.12	1.61%	1.69%	0.06*
Collateral ability	37.14%	32.72%	0.03**	41.65%	36.40%	0.00***
Capital ratio	20.48%	19%	0.21	25.17%	27.27%	0.00***
Liquidity ratio	49.41%	54.48%	0.00***	48.11%	55.55%	0.00***
Log(total assets)	9.56	8.45	0.00***	9.50	8.55	0.00***
Age	30	25	0.00***	32	27	0.00***
Investment grade	68.13%	53.23%		87.22%	84.08%	
Speculative grade	31.87%	46.77%		12.78%	15.92%	
Observations	1,358	584		2,241	5,043	

Notes: Table 2 gives the mean values of the variables split by constraint-group and the p-value of the corresponding median test on the equality of the median between the constrained observations and the unconstrained observations. Significance levels:*** p<0.01, **,p<0.05, * p<0.1.

Table 7: Regression results: Long-term loan applications

Model	(1)	(2)	(3)	(4)
Bank characteristics (b)				
Bank capital ratio	0.128	0.243*	0.252*	0.224
	(0.099)	(0.129)	(0.129)	(0.138)
Bank liquidity ratio	-0.006	0.079	-0.080	-0.059
	(0.080)	(0.105)	(0.105)	(0.109)
NPLR	-0.032	-0.012	-0.009	-0.006
	(0.076)	(0.098)	(0.100)	(0.101)
Bank ROA	-3.485**	-4.175**	-4.322**	-4.347**
	(1.639)	(2.066)	(2.074)	(2.093)
Ln(Bank total assets)	0.005	-0.001	-0.001	-0.001
	(0.005)	(0.009)	(0.009)	(0.009)
Firms characteristics (i)				
Firm capital ratio	-0.502***	-0.498***	-0.487***	-0.481***
	(0.141)	(0.141)	(0.142)	(0.140)
Firm liquidity ratio	0.137	0.144	0.148	0.151
	(0.133)	(0.133)	(0.131)	(0.131)
Ln(total firm assets)	-0.082**	-0.083**	-0.079*	-0.076**
	(0.033)	(0.033)	(0.034)	(0.034)
Profitability	0.603	0.599	0.565	0.563
	(0.519)	(0.518)	(0.518)	(0.519)
Age	0.009**	0.009**	-0.004	-0.001
	(0.004)	(0.004)	(0.024)	(0.024)
Market power index	0.045**	0.048**	-0.049**	-0.052**
	(0.022)	(0.023)	(0.022)	(0.022)
Collateral ability	0.144	0.155	0.149	0.150
	(0.128)	(0.128)	(0.129)	(0.129)
Industry business climate	-0.001	-0.001	-0.002	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)
Bank business model (b)				
Securities trading ratio	-0.055	-0.062	-0.077	-0.058
	(0.180)	(0.188)	(0.562)	(0.213)
T-bank	-0.004	-0.094	-0.119	-0.115
	(0.010)	(0.177)	(0.179)	(0.178)
T-bank x Bank capital ratio		-0.230	-0.248*	-0.238*
		(0.141)	(0.141)	(0.142)
T-bank x Bank liquidity ratio		-0.163	-0.169	-0.169
		(0.122)	(0.122)	(0.123)
T-bank x NPLR		-0.037	-0.040	-0.038
		(0.082)	(0.083)	(0.083)
T-bank x ROA		2.136	1.850	1.870
		(3.232)	(3.225)	(3.238)
MO-bank x Ln(Bank total assets)		-0.007	-0.009	-0.009
		(0.010)	(0.010)	(0.010)
Firm fixed effect	Yes	Yes	Yes	Yes
Quarter fixed effect	No	No	Yes	Yes
Banking group fixed effect	No	No	No	Yes
Observations	7,284	7,284	7,284	7,284
Number of firms	1,869	1,869	1,869	1,869
Number of bank-quarter cluster	1,558	1,558	1,558	1,558

Notes: The table reports the estimated coefficients and robust standard error (in parentheses) are clustered at the quaterly level from linear probability models estimated using least squares. *** indicates significance at the 1% level, ,** at the 5% level, and * at the 10% level.

Figure 3: Trading-banks: Interest incomes growth rate

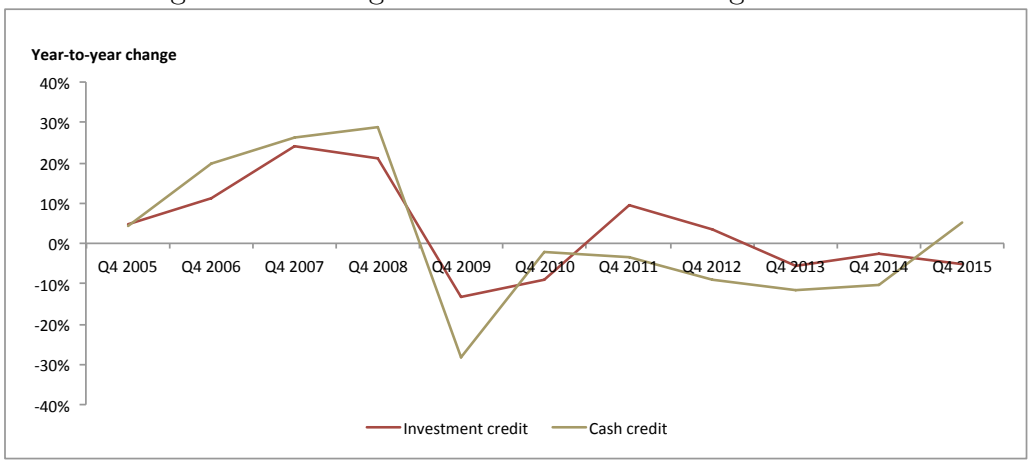

Table 8: Sample selection: median test

	Short term credit			Long term credit		
	Applicants	*Non-applicant*	*Median-test*	*Applicant*	*Non-applicant*	*Median-test*
Profitability	1.10	1.43	0.00***	1.60	1.33	0.00***
Capital ratio	20.83	26.19	0.00***	25.77	25.71	0.69
Liquidity ratio	51.79	53.03	0.00***	50.44	53.83	0.00***
Log(total assets)	9.17	8.86	0.00***	9.19	8.78	0.00***
Collateral ability	34.58	34.25	0.80	39.06	32.63	0.00***
Age	28	28	0.64	30	28	0.00***
Observations	2,735	26,483		8,226	26,483	

Notes: Table 2 gives the mean values of the variables split by constraint-group and the p-value of the corresponding median on the equality of the median between the constrained observations and the unconstrained observations. Significance levels:*** p<0.01, ** p<0.05, * p<0.1.