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Did the crisis induce credit rationing for French SMEs?

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Résumé : Cet article étudie l'accès des PME françaises indépendantes au crédit bancaire. Il vise notamment à déterminer si l'évolution observée du crédit bancaire pendant les années récentes a résulté d'une baisse de la demande de crédit consécutive au ralentissement de l'activité des entreprises et de leurs projets d'investissement ou plutôt d'une diminution de l'offre, traduisant alors un rationnement du crédit lié à un comportement plus prudent des banques en matière d'octroi de crédits. A partir de l'analyse d'un échantillon comportant environ 60,000 PME, nous aboutissons à la conclusion que, malgré un comportement plus restrictif des banques, les PME françaises n'ont pas souffert d'un rationnement marqué du crédit depuis 2008. La demande est la cause essentielle de la baisse observée des crédits aux PME. Ce résultat, qui va à l'encontre du discours selon lequel les PME auraient souffert d'un fort rationnement du crédit pendant la crise, est confirmé par les résultats de diverses enquêtes françaises et européennes menées récemment sur l'accès des PME au crédit bancaire.

Mots-clés : Rationnement du crédit, modèle de déséquilibre, PME.

Codes JEL : E51, G21

Abstract : This paper focuses on the access of independent French SMEs to bank lending and analyzes whether the observed evolution of credit to SMEs over the recent period was "demand driven" as a result of the decrease in firms' activity and investment projects or was "supply driven" with an increase in credit "rationing" stemming from a more cautious behavior of banks. Based on a sample of around 60,000 SMEs, we come to the conclusion that, despite the stronger standards used by banks when granting credit, French SMEs do not appear to have been strongly affected by credit rationing since 2008. This result goes against the common view that SMEs suffered from a strong credit restriction during the crisis but is perfectly in line with the results of several surveys about the access to finance of SMEs recently conducted in France.

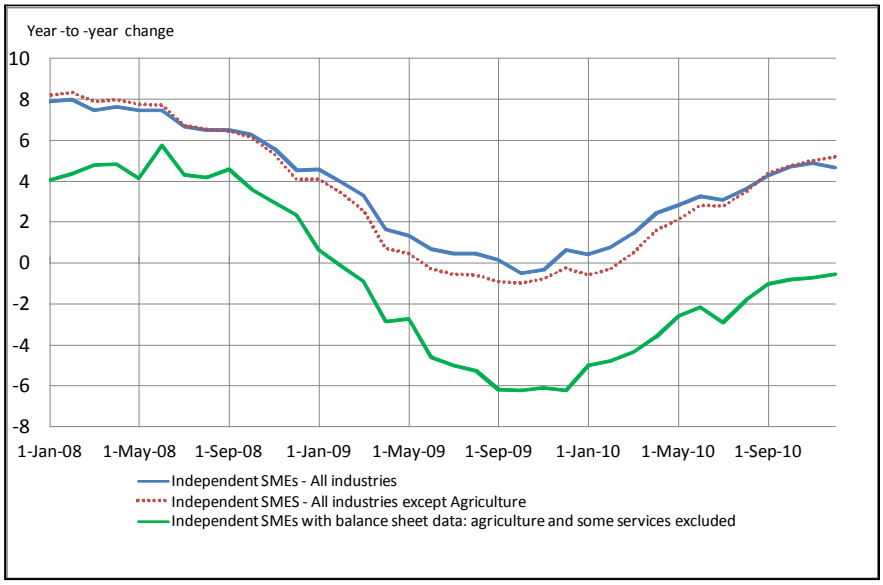
Keywords : Credit rationing, disequilibrium model, SME.

JEL Codes : E51, G21.

1 Introduction.

In December 2010, in France, the total outstanding stock of credit to non financial businesses amounted to 810 billion Euros, 1,6% more than it was just one year before. This evolution is to be compared with that observed the year before (-1.1% in 2009) after a quite long period during which the outstanding amount of credit increased by more than 10% per year. The decrease in the distribution of credit in 2009 was stronger for short term credit, with a year-to-year decrease as high as 18% in august 2009. However, one must keep in mind that short term credit accounts for only around 10% of the total outstanding stock of credit to non financial businesses (Observatoire des entreprises, 2011). There is a debate about the factors underlying this evolution of the distribution of credit to non financial firms in the recent period. This evolution can be explained by a restricted access to credit, banks being more selective in their credit granting, taking into account the increased risk they had to face. But it may also be explained by worse prospects for firms as a result of the crisis: investment and cash flow decreased. Thus firms claimed that banks became more restrictive while banks argue that this evolution of bank lending was essentially demand driven.

Figure 1: Bank loans to SMEs growth rate between 2008 and 2010.



Source: Banque de France FIBEN, Credit Register database.

In this paper, we precisely aim to assess whether the observed evolution of loans to French SMEs was driven by banks' loan supply or by firms' demand. For that purpose, we estimate a disequilibrium model on a sample of 60,000 firms observed over the year 2000 to 2010. Our supply and demand model specification essentially follows the models previously estimated by Ogawa and Suzuki (2000), Atanasova and Wilson (2004), Shikimi (2005), and more recently, by Carbo-Valverde, Rodriguez-Fernandez and Udell (2009). However, we add to this literature by paying a special attention to the consequences of the existence of firms with no loan. Indeed, no interest rate is observed in this case so that a demand function including a firm-specific interest rate cannot be estimated for these firms. To tackle this problem, Ogawa and Suzuki, (2000) and Atanasova and Wilson (2004) have considered that the impact of interest rates on loan demand can be accounted for by year dummies.[1] Shikimi (2005) and Carbo-Valverde et al. (2009) adopted a different approach: they explicitly included a firm-specific interest rate in their model and thus restricted their estimation sample to firms with loans. However, one cannot rule out that firms that obtained a loan are not necessarily representative of the whole universe of firms. In this paper, we address this potential sample selection problem by explicitly taking this selection process into account in our estimation procedure. Two main conclusions can be drawn from our estimates. First, even during the financial crisis, credit rationing remained quite limited for French SMEs. Even though banks decreased their loan supply by adopting more restrictive lending standards, especially regarding weaker firms, firms' demand for new loans decreased even more strongly due to the deterioration of the economic environment. This result is in line with the low rationing estimates obtained from surveys that have been implemented recently about firms' access to finance (e.g. the ECB SAFE survey, 2009, 2010a, 2010b, 2011). Second, allowing for the endogenous selection of firms does have an impact on the estimation results: the magnitude of most parameters in the model increase quite significantly. In particular, the estimated elasticity of demand to the interest rate strongly increases when selection is taken into account. These estimates changes lead to an increase in the estimated extent of credit rationing, which however remains at a low level.

[1] Although we could not find in those papers any explicit indication about whether firms with zero loan were kept in the sample used for estimation.

In the next section, we present our model and the econometric procedure and state how they relate to the existing literature. Our data are presented in Section 3. Section 4 is devoted to the presentation and discussion of our econometric results and Section 5 to our estimates of credit rationing. Finally, we assess the consequences of accounting or not for the likely endogenous selection of the sample in Section 6. Section 7 concludes.

2 Modelling and estimating the extent of credit rationing.

While the consequences of financial constraints on firms' real decisions regarding e.g. their physical investments or their engagement into R&D activities have been widely studied in the literature (e.g. see Fazzari, Hubbard and Petersen, 1988, Kaplan and Zingales, 1997, Bond, Harhoff and Van Reenen, 1999, Hall and Lerner, 2010, among many others), the empirical literature about the microeconomic assessment of these financial constraints and in particular of a possible firms' credit rationing is quite sparse. Ogawa and Suzuki (2000), Atanasova and Wilson (2004), Shikimi (2005), and more recently Carbo-Valverde et al. (2009) as well as Rottmann and Wollmershaüser (2010) are among the few papers that aimed at assessing the existence of a possible credit rationing at the microeconomic level.[2] Except for the last paper, these papers borrow from the disequilibrium literature that initially grew up in the 1980's for assessing the possible existence of credit rationing at the macroeconomic level (e.g. see Laffont and Garcia, 1977).

2.1 The demand and supply functions

Basically, a disequilibrium model is made of three equations (e.g. see Laffont and Garcia, 1977):

1) a demand equation for new loans (NL_d^*):

$$NL_d^* = f_d(X_d\ b_d; u_d)$$

[2] Two other recent studies by Steijvers (2008) and Alexandre and Buisson (2010) are also available. However, the econometric methodology on which they rely is inappropriate because they estimate the demand and supply functions assuming the market to be in equilibrium, i.e. as if the observed quantity was always equal to both the demand and supply of loans. Their results are then questionable.

2) a supply equation for new loans (NL_s^*), sometimes denominated as a "credit ceiling" equation :

$$NL_s^* = f_s(X_s\ b_s; u_s)$$

where X_d (resp. X_s) represent the explanatory factors of the demand for (resp. supply of) loans, b_d and b_s their coefficients and u_d and u_s the unobserved factors that may respectively affect the demand and supply of loans, which may be correlated with each other.

3) an equation linking the observed quantity of loans to the unobserved supply and demand. The most common approach assumes that the quantity observed is the minimum of supply and demand:

$$NL^{obs} = \min(NL_d^*, NL_s^*).$$

This system of equations can be estimated using the maximum likelihood principle (see Maddala and Nelson, 1974).

We assume that the demand for new loans, NL_d^*, depends on the following factors:

- the size of the firm; smaller firms are indeed expected to rely more on bank loans than larger ones which may have an easier access to other external finance. While previous papers accounted for the size of the firm through the reciprocal of their total assets (Atanasova and Wilson, 2004; Shikimi, 2005, and Carbo-Valverde et al., 2009) or of their capital stock (Ogawa and Suzuki, 2000), we have taken a different approach here. To allow for more general non-linearities, we use four size dummies corresponding respectively to very small SMEs (total assets $\leq$ 0,5 Million €), small SMEs (0.5 Million € $<$ total assets $\leq$ 1 Million €), medium SMEs (1 Million €$<$total assets $\leq$ 2 Millions €) and large SMEs (total assets $>$2 Millions €).
- the financing needs; while previous papers used sales to account for the financing needs generated by the firm activity, we introduce two other variables: first, the amount of needs of working capital (over total assets, as measured in firms' accounts), to account for needs in short-term financing; and the amount of investment, over total assets, to account for needs in long-term financing. These two variables may clearly be endogenous so that we tackle this problem in the econometric estimation procedure (see below);

- the amount of internal resources. We follow previous papers and measure internal resources by the firm's cash-flow over its total assets;

- the amount of other sources of external finance available. These are taken into account through non-bank financial debt on the one hand, and accounts payable on the other hand, both divided by total assets. The former variable includes funds received from associates as well as market finance, though market finance is quite unlikely to be important for SMEs (in this respect, we slightly differ from Ogawa and Suzuki (2000) and Atanasova and Wilson (2004) who include a variable accounting for the firm access to financial markets). Accounts payable allow for the role of trade credit as a possible alternative source of short-term finance (Carbo-Valverde et al., 2012).

- the interest rate, as measured by the ratio of interest expenses over total debt. We differ here from the literature. Carbo-Valverde et al. (2009) use the spread with an interbank rate while Shikimi (2005) uses the difference with a prime rate. We prefer using the interest rate as we think that this is a better measure of the cost of borrowing for firms, especially in the crisis period that we consider when the ECB refinancing rate was subject to dramatic changes which were not necessarily fully transmitted to lending rates (see Avouyi-Dovi et al., 2012). This is also different from the approach in Ogawa and Suzuki (2000) and Atanasova and Wilson (2004) who account for interest rates by a set of year dummies, thus leaving away the heterogeneity in interest rates paid by firms for their loans.

- Nevertheless, our model also includes year dummies to account for macroeconomic evolutions in the demand for loans (rather than GDP as in most previous studies), as well as industry dummies to account for possible industry specific features.

Finally, a disturbance accounts for possible unobserved explanatory factors: u_d is a normal random variable, with mean zero and variance σ_d^2, possibly correlated with the disturbance in the supply/credit ceiling equation.

The loan supply/credit ceiling is supposed to depend on:

- the size of the firm: Here again, while most previous papers used the reciprocal of total assets as a size indicator, we use the four previously defined size dummies. The size indicator can reflect both

the likelihood to go bankrupt (smaller firms are more likely to do so than large ones) and/or the level of collateral that can be provided by firms as a guarantee for their loan.

- risk indicators: as compared to the existing literature, we include a larger set of both financial and non-financial risk indicators in our model :

a) the ratio of financial debt to net cash flow at period $t-1$, to account for banks being reluctant to lend to already strongly indebted firms, in comparison with their capacity to generate cash-flow;

b) the firm's profitability at period $t-1$, measured by cash flow over the sum of fixed and working capital, which can be seen as an indicator of the capacity of the firm to generate cash-flow and to reimburse its debt. These two indicators together are close in spirit to those used in Shikimi (2000). He introduced the firm ability to pay short term debt (defined as the ratio of current assets to current liabilities) and its ability to pay interest rates (defined as the ratio of its operating profit over interests paid). This latter variable is also used as a default risk indicator in Carbo-Valverde et al. (2009) and is close to the one used in Atanasova and Wilson (2004).

Besides these financial indicators, we also include in the model:

c) the age of the firm; accounted for by a dummy variable taking value one for less than five year old firms, and 0 for older firms; indeed, it is well-known that younger firms are more likely to default than mature ones (e.g. see Fougère et al., 2012);

d) the firm rating by the Bank of France, accounted for by a dummy variable taking value one whenever the firm is poorly rated. It is worth noticing that, in France, most firms (including SMEs), are rated by the Banque de France and that this rating is made available to private banks for their lending activity.

The other variable that has been shown to play an important role in banks' lending decisions is the firm ability to provide collateral. Ogawa and Suzuki (2000) use two types of collateral (capital stock and land) and interact them with a dummy variable accounting for firms being affiliated with a large bank. Atanasova and Wilson (2004) use total assets as a measure of the collateral.[3] Shikimi (2005) uses both total assets and tangible assets to account for the firm available collateral while Carbo-Valverde

[3] which paramter is estimated as the constant as they normalize all the variables in their model by total assets.

et al. (2009) use only the latter. We follow the latter here although our size dummy variables can be seen as providing a supplementary measure of the available collateral.

Finally, the supply equation also includes year and industry dummies to account for both macroeconomic conditions (including banks' refinancing cost with the ECB and other aggregate changes in banks' supply environment) and possible industry specific features[4] as well as a disturbance u_s, defined as a normal random variable, with mean zero and variance σ_s^2, possibly correlated with that appearing in the demand equation.

2.2 Extensive and intensive margins in rationing

Some aspects of credit rationing at the firm level do not perfectly fit in the "usual" disequilibrium econometric framework as considered in a macroeconomic context. In particular, in macroeconomic disequilibrium models, both supply and demand are strictly positive and the interest rate for loans is always observed. Things are different at the microeconomic level as rationed firms can be either fully rationed or only partially rationed. In the former case, firms have a positive demand for loans but the credit ceiling as set by the bank is zero: firms do not contract a loan and the interest rate taken into account by the firm when computing its demand is not observed.[5] This makes it impossible to evaluate in a simple way the extent of full rationing for those firms that appear to have no credit (the extensive margin of rationing). Indeed, one cannot consider that observing the absence of loans in the firm's accounts means that this firm is fully rationed. It may just be the case that its demand for credit is zero. According to the SAFE surveys conducted by the ECB, about 70% of French SMEs did not apply for a loan during the six months preceding the time of the surveys. And their vast majority

[4] Following Ogawa and Suzuki (2000), Atanasova and Wilson (2004) and Shikimi (2005), but opposite to Carbo-Valverde, Rodriguez-Fernandez and Udell (2009), we do not include the interest spread in the supply equation. Indeed, we consider that, in a credit rationing context, banks first decide how much (possibly nothing) they are willig to lend to a firm and then bargain with the firm about the interest rate. In other words, we consider that banks use other variables than the interest rate as a basis for their decision about how much to lend to a firm. We also differ from the supply esquation specification in Carbo-Valverde, Rodriguez-Fernandez and Udell (2009) in that we do not include bank specific variables in our equation. Such bank level variables were unfortunately not available to us.

[5] Unless the data provide information about rejected applications (see Jimenez et al., 2009).

(about two thirds) did not apply for any bank loan due to a sufficient level of internal funds (ECB, 2009, 2010a, 2010b, 2011).

Firms with zero loans and thus for which no interest rate is observed raise an estimation issue.[6] The solution adopted in some papers seems to have been to keep those firms with zero loans in the sample and to consider that the impact of interest rates on loans can be accounted for by incorporating year dummies in the model (e.g. Ogawa and Suzuki, 2000, Atanasova and Wilson, 2004[7]). But if one wants to use a firm-level measure of the interest rate, the sample really available for estimating the disequilibrium model is restricted to those firms which have applied for a loan and did obtain it, at least in part (Shikimi, 2005 and Carbo-Valverde et al., 2009). It is then important to account for the possible selection bias that can result from this sample restriction. To the best of our knowledge, this issue does not seem to have been considered in the previous literature about credit rationing at the firm level. In this respect, we improve over previous studies by modifying the likelihood of the "standard" disequilibrium model in order to account for the fact that observing an interest rate requires that both the demand and supply must be strictly positive.

The model we consider can then be summarized as follows:

$$\begin{aligned} NL &= \min(NL_d^*, NL_s^*) \text{ if } NL_d^* \text{ and } NL_s^* \text{ are both positive; } r_l \text{ is observed} \\ NL &= 0 \text{ in all other cases, } r_l \text{ is not observed.} \end{aligned}$$

Then, the contribution to the lilkelihood of an observation for which the observed amount of loans is positive and the interest rate observed is

$$l_{it} = \left[f_d(NL_{it})(1 - F_s(NL_{it})) + f_s(NL_{it})(1 - F_d(NL_{it})) \right] / pr(NL_{d,it}^* > 0, NL_{s,it}^* > 0)$$

where:

[6] However, a specific situation may occur when using an imputed interest rate, i.e. the ratio of interest expenses over the outstanding amount of loans. When firms have fully reimbursed their loans before the accounts are closed, they have interest payments for a few months during their fiscal year but have no more outstanding loans at the end of the fiscal year. Such particular cases are uncommon and have been withdrawn from our sample.

[7] Although, as already mentioned, we could not find any explicit indication in those papers about whether firms with zero loans were kept in the sample used for estimation.

- $f_d(NL_{it}) = \frac{1}{\sigma_d\sqrt{2\pi}} \exp[-\frac{1}{2\sigma_d^2}(NL_{it} - X_{d,it}\ b_d)^2]$ is the density function of loans if demand is observed,

- $F_d = \Phi(\frac{NL_{it} - X_{d,it}\ b_d\ - \rho(\sigma_d/\sigma_s)(NL_{it} - X_{s,it}b_s)}{\sigma_d^2\sqrt{1-\rho^2}})$, is the corresponding cumulative function, accounting for a possible correlation with the supply equation,

- $f_s(NL_{it}) = \frac{1}{\sigma_s\sqrt{2\pi}} \exp[-\frac{1}{2\sigma_s^2}(NL_{it} - X_{s,it}\ b_s)^2]$ is the density function of loans if supply is observed

- $F_s = \Phi(\frac{NL_{it} - X_{s,it}\ b_s - \rho(\sigma_s/\sigma_d)(NL_{it} - X_{d,it}b_d)}{\sigma_s^2\sqrt{1-\rho^2}})$ is the corresponding cumulative function,

and $pr(NL^*_{d,i} > 0, NL^*_{s,i} > 0)$ is the joint probability that both the demand and the credit ceiling are strictly positive.

The numerator of the expression corresponds to the usual likelihood contribution in disequilibrium models where there is no issue regarding the positivity of supply and demand (Maddala and Nelson, 1974, Laffont and Garcia, 1977, Maddala, 1983). The denominator corresponds to the correction for having selected firms for which both the demand and the credit ceiling are strictly positive and the interest rate is thus observed.

Once the model has been estimated, it is easy to use the information available in the sample to assess whether a firm with a positive amount of loans has nevertheless faced obstacles which induced a partial rationing of its demand, which can be considered to be the intensive margin of credit rationing. One can compute the unconditional probability of a partial credit rationing as:

$$\begin{aligned}
\Pr(\textit{Partial rationing}) &= \Pr(X_d\ b_d + u_d > X_s\ b_s + u_s) \\
&= \Pr(X_d\ b_d - X_s\ b_s > u_s - u_d) \\
&= \Pr(\frac{X_d\ b_d - X_s\ b_s}{\sigma} > \frac{u_s - u_d}{\sigma}) \\
&= \Phi(\frac{X_d\ b_d - X_s\ b_s}{\sigma})
\end{aligned}$$

where $\sigma^2 = var(u_s - u_d)$. However, as shown by Gersovitz (1980), the conditional probability, i.e. the probability of (partial) rationing, conditional on the observed amount of loans, seems more appropriate and differs from the above, at least when the variances of the disturbances of the supply and demand equations significantly differ from each other. This conditional probability is given by:

$$\Pr(\textit{Partial rationing / } NL_{it}) = \frac{f_s(NL_{it})(1 - F_d(NL_{it}))}{f_d(NL_{it})(1 - F_s(NL_{it})) + f_s(NL_{it})(1 - F_d(NL_{it}))}.$$

We compute this probability and consider that a firm was credit rationed whenever this probability is greater than 0.5.

Things are more complicated for assessing the extensive margin of credit rationing, i.e. whether firms with no loan have been fully rationed or whether they have a zero latent demand. Indeed, this requires the availability of an estimate of the unobserved interest rate which contributed to the determination of their latent demand. An estimate of this unobserved interest rate has been obtained as follows:

1) For firms which have credit for some years (and thus, for which a measure of the corresponding interest rate is available for these years), we have estimated the unobserved interest rate from the last previously observed interest rate as :

$$\widehat{r}_{it}^{l} \quad (if \ unobserved) = r_{i,t-1}^{l,observed}(1 + \Delta r_{j,t}^{l})$$

where $\Delta r_{j,t}^{l}$ is the evolution (between $t-1$ and t) of the average loan rate for similar firms (by size and industry).

2) For firms which do not have any bank loans over the sample period, we have estimated the unobserved interest rate as the average interest on bank loans paid by firms of the same size within the same industry. This seems to be a reasonable estimate because we do not know whether firms have no bank loan because they have other ways to finance their activity and investment projects or because they are continuously fully rationed.

In order to assess whether those firms having no loan were fully rationed or just did not apply for a loan, we plugged the estimated interest rate into the latent demand equation and computed the conditional probability of full rationing as stated above.

2.3 Other econometric issues

2.3.1 New loans versus outstanding loans

Another econometric issue relates to the fact that we do not observe new loans but only the outstanding amounts as they appear in firms' balance sheets. This is a common feature of the literature that

considers credit rationing at the firm level: the dependent variable is most often the outstanding amount of loans[8] (Ogawa and Suzuki, 2000; Atanasova and Wilson, 2004 and Carbo-Valverde et al., 2009; although Shikimi, 2005, estimates his model in first differences). However, what we aim at explaining is the amount of *new loans* obtained by firms. What we do here is using the accounting equality between the observed outstanding amounts (L), reimbursements (RL) and new loans (NL):

$$L_{it} = L_{i,t-1} - RL_{it} + NL_{it}.$$

Assuming a constant reimbursement rate of loans over specific groups of firms defined according to their size and industry ($RL_{it} = \delta_g \; L_{i,t-1}$), we get

$$NL_{it} = L_{it} - (1 - \delta_g)L_{i,t-1}$$

where δ_g is the reimbursement rate of firms within group g. Then, explaining new loans can be done by replacing NL_{it} by $L_{it}-(1-\delta_g)L_{i,t-1}$ in the above models. This in turns amounts to use the outstanding amount of loans as the dependent variable *and* to add its lagged value as a supplementary regressor in the supply and demand equations, *imposing the same parameter value in both the supply and demand equations*. In order to fit the data as well as possible, it was checked on a specific sample of firms for which both new loans and the outstanding amounts were observed that allowing the reimbursement rates δ to vary both across size and industries leads to a satisfactory approximation of new loans by the above equation.[9][10]

2.3.2 Endogeneity and unobserved heterogeneity

We allow for a possible endogeneity of some of the explanatory variables in our model: the ratio of collateral over total assets in the supply equation, that of investment, needs of working capital, accounts payable (all over total assets) and the interest rate in the demand equation. Indeed, the amount of investment realized by a firm is quite likely to depend on that of the loan it was granted; moreover, this investment may comprise tangible assets which the firm can use as collateral. Needs

[8] divided by total assets.

[9] The so-called "Centrale des Bilans" of the Banque de France, which is no more maintained.

[10] We consider 12 different groups of firms, defined as small and large SMEs within six industries.

of working capital as well as accounts payable might also be endogenous as they depend on the firm activity which in turn may depend on its access to short-term bank loans. Finally, the interest rate is also likely to be endogenous : first, because firms bargain with banks over the loan amount as well as over the interest rate; second because we have computed an imputed interest rate which is probably not exempted from measurement errors. The endogeneity of these variables is tackled "à la Rivers-Vuong (1988)", by introducing as a supplementary regressor in the model, the estimated residual of a regression of each of these variables on a set of instrumental variables. These instrumental variables are taken to be the first and second lags of the first differences of the regressors of the model.

Finally, unobserved heterogeneity also raises an issue. It is likely that some firms unobserved characteristics affect both their demand for loans and their credit ceiling set by banks. These characteristics are unfortunately likely not to be independent of some regressors in the model and, if present, they are certainly correlated with $L_{i,t-1}$. In order to control for the possible biases induced by these correlations we resort to a combination of Mundlak's and Wooldridge's approaches and include the individual averages of the regressors as well as the first available observation about a firm's loans as supplementary regressors.

3 The econometric dataset

Combining information from two databases available at the Banque de France, the FIBEN individual company database and the financial linkage database, we built a sample of independent SMEs covering the period 2000-2010. We voluntarily restrict our study to independent SMEs because bank loans are their main financial external support. This restriction avoids the difficulty associated with the modeling of financial flows between holdings and SME subsidiaries of a corporate group (Cayssials and Kremp, 2010b; Kremp and Sevestre, 2000).

The estimation period starts in 2004 because we impose firms to be present at least four consecutive years in the sample due to the use of lagged first differences as instruments for endogenous regressors. To limit the presence of outliers, all ratios defined as a percentage of total assets are constrained to

be either between [0, 1] or [-1, 1] depending on their definition. One exception is the financial debt to cash flow ratio, which, given its distribution, is constrained to be between [-20, 20].

The whole sample contains 205,154 observations, of which 178,236 observations (representing 52,982 firms) with positive bank loans and observed interest rates are used for estimating the model. The remaining 26,928 observations, representing 11,599 firms, are cases with no loan, and consequently no interest rate. This latter sample is used for assessing the extent of full credit rationing. The respective sizes of these two samples show that a significant fraction of firms do not have any bank loan (see Cayssials and Kremp, 2010a). Tables 1 and 2 below provide descriptive statistics for these two sub-samples.

Firms with bank loans have different characteristics than those with no bank loan. Some of the differences between these two groups are compatible with the idea that they correspond to "non credit constrained firms" and to "credit constrained firms", respectively: on average, firms with bank loans are larger (in terms of total assets); they already contracted more financial debt in previous years and they have more collateral. But, some other differences point to the opposite conclusion: the proportions of young firms and of badly rated firms are slightly larger among those firms with loans while, on the contrary, firms with no loan appear to be slightly more profitable, to have more cash-holdings but less accounts payable than firms with loans. These latter features do not point to the fact that firms with no bank loan are essentially strongly credit constrained firms. Indeed, the first (resp. the third) quartile of profitability is lower (resp. larger) for firms with no loan than what it is for firms with loans. This shows that firms with no loan include both "bad" firms (which are likely to be credit constrained) and "good" firms (which do not need bank loans). By the way, the ratio of cash holdings to total assets has increased between 2004 and 2010 for both subpopulations. This may be an indication that the extent of financial constraints did not strongly increase during the crisis (Kahle and Stulz, 2010).

Table 1: Descriptive statistics in 2004 and 2010 - Firms with bank loans

Year 2004 (n=23,195)	Mean	1st quartile	Median	3rd quartile
Total assets	1526	629	982	1677
Loans / total assets	0,18	0,06	0,13	0,25
Gross operating income / total assets	0,12	0,06	0,11	0,17
Interest rate	0,07	0,04	0,06	0,08
Investment / total assets	0,05	0,01	0,02	0,06
Working capital needs / total assets	0,2	0,06	0,2	0,35
Account payable / total assets	0,27	0,16	0,25	0,36
Cash holdings / total assets	0,15	0,02	0,1	0,23
Collateral / total assets	0,37	0,18	0,33	0,53
Other debt / total assets	0,06	0	0,03	0,08
(Financial debt / net cash flow) $_{t-1}$	2,62	0,84	1,9	3,84
Profitability $_{t-1}$	0,2	0,1	0,17	0,28
Very small SME (Total assets <= 500k€)	0,15			
Small SME (500 k€ < Total assets <= 1000 k€)	0,36			
Medium SME (1000 k€ < Total assets <= 2000 k€)	0,3			
Large SME (Total assets > 2000 k€)	0,19			
Bad BdF rating	0,02			
Young SME	0,04			
Construction	0,21			
Manufacturing industry	0,25			
Retail	0,49			
Hotels and restaurants	0,01			
Information and communication	0,01			
Firms services	0,03			
Year 2010 (n=26,057)				
Total assets	1694	668	1067	1855
Loans / total assets	0,18	0,05	0,13	0,26
Gross operating income / total assets	0,11	0,06	0,1	0,16
Interest rate	0,06	0,03	0,05	0,07
Investment / total assets	0,04	0	0,02	0,05
Working capital needs / total assets	0,2	0,05	0,19	0,34
Account payable / total assets	0,22	0,12	0,2	0,3
Cash holdings / total assets	0,18	0,04	0,13	0,28
Collateral / total assets	0,36	0,17	0,31	0,52
Other debt / total assets	0,06	0	0,02	0,07
(Financial debt / net cash flow) $_{t-1}$	2,64	0,76	1,79	3,88
Profitability $_{t-1}$	0,19	0,09	0,16	0,27
Very small SME (Total assets <= 500k€)	0,13			
Small SME (500 k€ < Total assets <= 1000 k€)	0,34			
Medium SME (1000 k€ < Total assets <= 2000 k€)	0,31			
Large SME (Total assets > 2000 k€)	0,22			
Bad BdF rating	0,01			
Young SME	0,05			
Construction	0,26			
Manufacturing industry	0,2			
Retail	0,47			
Hotels and restaurants	0,02			
Information and communication	0,01			
Firms services	0,04			

Table 2: Descriptive statistics in 2004 and 2010 - Firms with no bank loan

Year 2004 (n=3,259)	Mean	Lower Quartile	Median	Upper quartile
Total assets	1459	594	927	1563
Gross operating income / total assets	0,11	0,04	0,09	0,16
Imputed interest rate	0,08	0,07	0,07	0,07
Investment / total assets	0,02	0	0,01	0,02
Working capital needs / total assets	0,16	0,02	0,17	0,32
Account payable / total assets	0,23	0,1	0,19	0,32
Cash holdings / total assets	0,33	0,17	0,31	0,46
Collateral / total assets	0,28	0,1	0,21	0,4
Other debt / total assets	0,07	0	0,02	0,09
(Financial debt / net cash flow) $_{t-1}$	1,04	0	0,3	1,23
Profitability $_{t-1}$	0,22	0,06	0,18	0,34
Very small SME (Total assets <= 500k€)	0,18			
Small SME (500 k€ < Total assets <= 1000 k€)	0,36			
Medium SME (1000 k€ < Total assets <= 2000 k€)	0,28			
Large SME (Total assets > 2000 k€)	0,18			
Bad BdF rating	0,01			
Young SME	0,02			
Construction	0,15			
Manufacturing industry	0,2			
Retail	0,57			
Hotel and restaurant	0,01			
Information and communication	0,02			
Firms services	0,05			
Year 2010 (n=4244)				
Total assets	1534	604	968	1663
Gross operating income / total assets	0,1	0,04	0,09	0,16
Imputed interest rate	0,06	0,05	0,05	0,06
Investment / total assets	0,02	0	0,01	0,02
Working capital needs / total assets	0,15	0	0,15	0,3
Account payable / total assets	0,19	0,08	0,15	0,26
Cash holdings / total assets	0,37	0,21	0,36	0,52
Collateral / total assets	0,27	0,09	0,21	0,4
Other debt / total assets	0,06	0	0,01	0,08
(Financial debt / net cash flow) $_{t-1}$	0,86	0	0,2	0,98
Profitability $_{t-1}$	0,2	0,04	0,16	0,32
Very small SME (Total assets <= 500k€)	0,17			
Small SME (500 k€ < Total assets <= 1000 k€)	0,35			
Medium SME (1000 k€ < Total assets <= 2000 k€)	0,29			
Large SME (Total assets > 2000 k€)	0,19			
Bad BdF rating	0,01			
Young SME	0,02			
Construction	0,16			
Manufacturing industry	0,15			
Retail	0,56			
Hotel and restaurant	0,02			
Information and communication	0,03			
Firms services	0,08			

4 Estimation results

4.1 Assessing the loan demand and credit ceiling determinants

Table 3 below provides the main supply and demand parameter estimates of our disequilibrium model for both the pre-crisis period (2004-2006) and the crisis period (2007-2010).[11][12] All these parameters are significantly different from zero and have the expected sign.

Table 3 - Estimation results.

All industries	2004-2006			2007-2010		
Supply equation	Coeff	Std. Err.	Pr > |t|	Coeff	Std. Err.	Pr > |t|
Very small SME	-0,065	0,013	<,0001	-0,088	0,013	<,0001
Small SME	-0,022	0,011	0,036	-0,043	0,011	<,0001
Medium SME	-0,017	0,009	0,068	-0,025	0,009	0,008
Large SME	ref.	ref.	ref.	ref.	ref.	ref.
Collateral / Total assets	0,365	0,08	<,0001	0,429	0,073	<,0001
(Financial debt/ Net cash-flow) $_{t-1}$	-0,013	0,001	<,0001	-0,013	0,001	<,0001
Profitability $_{t-1}$	0,57	0,044	<,0001	0,506	0,037	<,0001
Young SME	0,009	0,028	0,752	-0,076	0,024	0,001
Bad BdF rating	-0,058	0,03	0,048	-0,087	0,03	0,003
Demand equation						
Very small SME	0,029	0,002	<,0001	0,021	0,002	<,0001
Small SME	0,021	0,002	<,0001	0,02	0,001	<,0001
Medium SME	0,011	0,001	<,0001	0,011	0,001	<,0001
Large SME	ref.	ref.	ref.	ref.	ref.	ref.
Other debt / Total assets	-0,692	0,018	<,0001	-0,548	0,013	<,0001
Profit / Total assets	-0,259	0,011	<,0001	-0,228	0,007	<,0001
Interest rate	-1,546	0,055	<,0001	-0,979	0,043	<,0001
Investment / Total assets	0,958	0,04	<,0001	1,363	0,032	<,0001
Working capital needs /Total assets	0,265	0,011	<,0001	0,201	0,008	<,0001
accounts payable / Total assets	-0,082	0,02	<,0001	-0,017	0,016	0,275
Log likelihood	-101095,9			-151882.83		
Number of observations	72094			106142		

Whatever the period, the smaller the SMEs are, the lower their credit ceiling, everything else being equal. This result is in line with the usual argument that information asymmetries with potential lenders affect smaller firms more strongly than larger ones. The information about economic and financial small firms' performances is less accessible than for larger ones (cf. Diamond and Verrechia, 1991, Ozkan and Ozkan, 2004, Bigelli and Sanchez-Vidal, 2012). Another explanation could be that

[11] Remember that we use balance-sheet data of which the date of statement is most often December 31st. This is why it is more natural to include the year 2007 in the crisis period than in the pre-crisis period.

[12] The full set of estimation results is provided in Appendux 3.

firm's size is a proxy for their default risk as smaller firms are statistically more prone to default than larger ones (Fougère et al., 2012). However, this complementary interpretation may be irrelevant here since default risk is already taken into account in our model through the Banque de France firm's rating. Indeed, the coefficient associated with this rating is negative and significant, indicating lower credit ceilings for badly rated firms. Young firms also appear to be possibly more credit constrained, at least over the crisis period.

The impact of collateral on the credit ceiling is quite important: firms which are able to provide banks with better guarantees can borrow significantly more from banks (Angelini et al., 1998; Berger and Udell, 1995). Our estimates also show that firms with a good profitability can borrow more, as they are in a better position to reimburse what they have borrowed. These results are in line with Ogawa and Suzuki (2000), Atanasova and Wilson (2004), Shikimi (2005) and Carbo-Valverde et al. (2009). On the contrary, firms already quite heavily indebted are restricted in the amount of new loans granted by banks.

Regarding demand, the interest rate is a strong driver of SMEs demand for bank loans; a result also similar to that of previous studies. The demand for bank loans also strongly depends on investment projects, explaining the demand for long-term loans and on working capital needs, explaining the demand for short-term loans.[13] Small SMEs have a slightly higher demand for bank loans than larger ones. This is a rather standard result: smaller firms rely much more on banks credit for their external finance than large ones (e.g. Gertler and Gilchrist, 1994). More importantly, the higher the cash-flow and other debts are, the lower is the demand for bank loans. Thus,the pecking order theory cannot be rejected regarding the financing of SMEs (Drobetz and al., 2009). Moreover, the negative sign of the coefficient of accounts payable suggests that French SMEs use trade credit as a substitute for other sources of financing (Carbo-Valverde et al., 2012). Nevertheless, the impact is much less important

[13] As explained in Section 2, the likely endogeneity of these two variables was taken into account in the estimation procedure.

than that of cash-flow and other types of non-bank debts.[14] [15]

4.2 The impact of the crisis

The observed evolution of bank lending results from changes in the environment, such as decreases in firms' activity and in their investment projects, increases in firms default risk or the extremely low interest rates observed since 2009. These drastic changes may also have led banks and firms to alter their behavior. For example, Chai and Nguyen (2011) have examined the financing conditions for SMEs from 2006 to 2011. They show that independent SMEs are generally charged higher rates than larger firms, and that lending standards have changed during the crisis. Due to a readjustment of credit pricing policies, lending and credit conditions now depend more on the level of risk than earlier; the spread between rates on loans by firm category has increased for younger firms and low rated firms. These findings are confirmed by Avouyi-Dovi et al. (2012).

In order to take these changes into account, we have estimated our model on two sub-periods, 2004-2006 and 2007-2010. First, several estimated coefficients of the supply equation have increased in magnitude over the crisis period with respect to what they were before. Smaller firms, young firms and firms with a bad rating are more penalized now than they were before the crisis. The impact of the collateral has also slightly increased though the difference is not statistically significant. Overall, these differences are consistent with the observations from the Bank Lending Survey stating that banks have, during the crisis, adopted a more severe policy regarding their loans to SMEs.

[14] This variable is likely to be endogenous and this endogeneity was also taken into account in the estimation procedure. Moreover, some robustness checks have been made about the best way to introduce trade credit in the model. Instead of including the net trade credit (accounts payable less accounts receivable) as a component of the working capital needs, an alternative approach has been tested, netting the working capital needs variable from the net trade credit, and including the net trade credit as a variable by itself; the distinction neither significantly changes the sign and magnitude of the working capital needs variable coefficient, nor the sign or magnitude of the coefficient of the account receivable variable or others variables in the model.

[15] For the sake of checking the robustness of all our results, we also estimated the model on a sub-sample restricted to firms of the manufacturing industry. The results, provided in Appendix 4, show that indeed, the conclusions obtained from the above presented results are robust.

Some parameter estimates of the demand function also appear to be different across the two sub-periods: the impact of other sources of finance as well as the influence of investment projects have increased during the crisis, while the impact of the interest rate and the influence of workings capital needs on firm's demand for bank loans are smaller. The coefficient of accounts payable is not anymore significant and this occurs while a new law (the Economic Modernisation Act, passed in 2008) has harmonized payment practices between companies, with a significant reduction of payment periods, both days sales outstanding (DSO) and days payable outstanding (DPO).

Such changes in both the supply and demand equations make it difficult to predict, a priori, how credit rationing evolved, according to our model, during the crisis. This is the question we consider in the next section.

5 Assessing the extent of credit rationing

Table 4 below provides our estimates of the extent of credit rationing that may have affected SMEs in France. As explained above, we distinguish between partially rationed firms, i.e. firms that obtained a loan but not the full amount they applied for (the intensive margin of rationing), and fully rationed firms, i.e. firms that did not obtained any loan (the extensive margin).

According to our estimates, partial rationing appears to be more frequent than full rationing. Based on the conditional probability of partial rationing (cf. Gersovitz, 1980), the proportion of firms being partially credit rationed is quite low for both sub-periods: 6.0% of firms over the 2004-2006 period and 6.9% of firms over the 2007-2010 period. The estimate of partial rationing year by year, whatever year is considered, indicates that rationing has been higher over the second period, the year 2007 being the peak year while 2009 also witnessed an increase in credit rationing.

Table 4 Credit rationing estimates

	Partial rationing (in percentage of firms with loans)		Full rationing (in percentage of firms with no loan)	
	2004-2006	2007-2010	2004-2006	2007-2010
All SMEs	6,00%	6,90%	1,30%	1,90%
2004	7,80%		1,00%	
2005	5,70%		1,40%	
2006	4,70%		1,30%	
2007		8,40%		2,30%
2008		6,20%		1,60%
2009		6,80%		2,00%
2010		6,40%		1,90%
Very small SMEs	7,20%	9,00%	2,60%	3,50%
Small SMEs	6,10%	7,10%	0,90%	1,80%
Medium SMEs	5,90%	6,60%	1,10%	1,80%
Large SMEs	5,30%	6,00%	1,00%	1,10%
Young SMEs	10,30%	10,30%	1,30%	4,10%
Mature SMEs	5,80%	6,80%	1,30%	1,90%
Bad BdF rating	21,20%	25,80%	16,00%	23,50%
Others	5,80%	6,70%	1,10%	1,80%

These results also point to significant differences in the likelihood of rationing, depending on firms' characteristics. As no surprise, small firms, young firms, as well as firms with a bad rating are more affected by credit rationing than other firms. The impact of a bad rating is particularly high, multiplying by more than three the likelihood of being partially rationed and by more than ten that of being fully rationed. Being a young firm as well as being a small firm also appear to be quite penalizing, with a stronger effect, in relative terms, on full rationing than on partial rationing.

In order to assess the reliability of our estimates, we compare our estimates of credit rationing with those given by surveys. Unfortunately, this comparison cannot be made directly. Indeed, our estimate of the extent of partial credit rationing (obtained through the estimation of a disequilibrium model) provides the proportion of firms that were partially rationed among those which *obtained* a loan (since having obtained a loan is a necessary condition for the interest rate to be observed and thus for the firm to be included in the estimation sample). However, in surveys, one generally gets an estimate of the proportion of firms which were denied part or all of their loan demand among those which *applied* for a loan. Then, the reference population in the latter case is larger than the one used in econometric

studies. The link between these two evaluations of the extent of credit rationing is as follows:

$$
\begin{aligned}
& \text{Survey based partial rationing} \\
= \; & \frac{\text{Number of partially rationed firms}}{\text{Number of firms which applied for a loan}} \\
= \; & \frac{\text{Number of partially rationed firms}}{\text{Number of firms with positive loans + number of fully rationed firms}} \\
= \; & \frac{\text{Number of partially rationed firms}}{\text{Number of firms with positive loans}} \\
& \times \frac{\text{Number of firms with positive loans}}{\text{Number of firms with positive loans + number of fully rationed firms}} \\
= \; & \text{Model based partial rationing} \times \text{CF\_Partial}
\end{aligned}
$$

$$
\text{with CF\_Partial} = \quad (1 - \text{proportion of fully rationed firms among applicants}),
$$

where CF_Partial, the correction factor for partial rationing, can be either estimated using our model together with statistics from the econometric sample (i.e. based on outstanding loans recorded in firms' balance sheets) or together with survey estimates (based on answers regarding the outcome of applications for new loans).

This shows that the "econometric" and "survey" measures of partial rationing cannot be directly compared with each other without knowing the extent of full rationing, i.e. the number (or proportion) of firms that do not have any loan due to the refusal of their application by their bank.

However, we are here in a situation where both our econometric estimate and the survey estimate of full rationing are quite low (less than 0.01 for our lowest econometric estimate and around 0.08 for the average of surveys estimates, respectively; see below). Then, our econometric estimate of partial rationing provides a satisfactory estimate of the extent of partial rationing among loans applicants, whatever measure of full rationing we use (see Table 5 below).

Along the same lines, one can also derive a "survey comparable" estimate of full rationing as:

$$
\begin{aligned}
& \text{Survey based full rationing} \\
= \quad & \frac{\text{Number of fully rationed firms}}{\text{Number of firms which applied for a loan}} \\
= \quad & \frac{\text{Number of fully rationed firms}}{\text{Number of firms with positive loans + number of fully rationed firms}} \\
= \quad & \frac{\text{Number of fully rationed firms}}{\text{Number of firms with no loan}} \\
& \times \frac{\text{Number of firms with no loan}}{\text{Number of firms with positive loans + number of fully rationed firms}} \\
= \quad & \text{Model based full rationing } \times \text{CF\_full} \\
\text{with} \quad & \text{CF\_full} = \frac{\text{Number of firms with no loan}}{\text{Number of firms with positive loans + number of fully rationed firms}}
\end{aligned}
$$

where CF_full, the correction factor for full rationing, can be estimated either using our model and balance sheet data sample statistics or using survey estimates. In this case, using balance sheet data on outstanding loans or using survey estimates provide quite different figures. Indeed, the correcting factor (i.e. the ratio of firms with no outstanding loan to those with loans or having been fully rationed) is equal to 0.15[16] in our dataset while it is it is equal to 2.41[17] using the SAFE survey figures. This discrepancy comes from the fact that in our sample, we observe the outstanding amount of loans (and more than 85% of firms have outstanding loans) while surveys provide figures about new loan applications (only about 30% of SMEs apply for a loan during a given semester according to the SAFE and other surveys).

Table 5 below provides our econometric estimates of partial and full rationing as a percentage of firms which applied for a loan, together with several estimates obtained from surveys as well as their average. The first line provides the estimates obtained using our econometric estimates of rationing together with the proportion of firms with no loan in our dataset. The second line provides another set of estimates, also based on our econometric estimates but where the proportion of firms with no loan is obtained from the SAFE survey. Then, for the sake of comparison, the last lines provide five

[16] =16636 (firms with no outstanding loan) divided by the sum of 106342 (firms with loans) and 316 (strictly rationed firms) in our dataset.

[17] =0.70 (firms that did not apply for a loan) + 0.30 x 0.08 (firms that applied but were fully rationed) divided by 0.30 (firms that applied for a loan)

evaluations of rationing obtained from several surveys which have been recently conducted in France as well as their average.

Table 5 A comparison of econometric and survey estimates of credit rationing.

	Partial rationing	Full rationing
	(in % of applicants)	
Econometric estimates with correction factors based on balance sheet data	6,9%	0,3%
Econometric estimates with correction factors based on surveys average	6,4%	4,6%
CAPEB survey	4,3%	6,0%
OSEO survey	14,0%	7,0%
INSEE survey	10,0%	7,0%
SAFE 2009 survey	5,2%	9,3%
SAFE 2010 survey	9,0%	10,0%
surveys average	8,5%	7,9%

Our estimates of partial rationing are close, although a bit lower, to those obtained through surveys. The discrepancy is larger regarding full rationing, which we underestimate more significantly, especially when using statistics from the econometric sample to compute our estimate. Nevertheless, the bottom line is that the order of magnitude of our estimates are overall quite close to those obtained from surveys.

The extent to which French SMEs may have been credit rationed during the crisis is thus quite limited. The assessment of a low level of credit rationing obtained from firm surveys seems rather general, both across countries and across periods. Indeed, even though the SAFE surveys indicate that Spanish firms have suffered, since 2009, of a non-negligible credit rationing (and Italian firms as well, but more recently), these surveys also show that German firms did not experience any strong rationing during the crisis. Other surveys, such as the ENSR survey conducted in 2002 by the European Commission among almost 8,000 SMEs from 19 European countries, the survey about SMEs credit conditions, run since 2008 in Italy by ISAE (Costa and Margani, 2009) or the US National Survey of Small Business Finances (Levenson and Willard, 2000; Cole, 2008) come to the same conclusion.

6 How important is the selection bias?

As already emphasized, a major difference between the present study and those by Ogawa and Suzuki (2000), Atanasova and Wilson (2004), Shikimi (2005) and Carbo-Valverde et al. (2009) is that our econometric estimation procedure accounts for a possible selection bias. In order to assess the consequences of this difference in the econometric methodology, we have also estimated our model using the "standard" disequilibrium model likelihood, i.e. ignoring the sample selection issue. The corresponding estimation results for the period 2007-2010 are provided in Tables 6 and 7 below, together with our preferred estimate, accounting for selection.

Table 6 "Standard" and "Tobit-like" disequilibrium model estimates: Supply equation (2007-2010)

Supply equation	Simple diseq. model			Tobit diseq. model		
	Coeff	Std. Err.	Pr > |t|	Coeff	Std. Err.	Pr > |t|
Very small SME	-0,046	0,010	<,0001	-0,088	0,013	<,0001
small SME	-0,023	0,008	0,003	-0,043	0,011	<,0001
medium SME	-0,015	0,007	0,044	-0,025	0,009	0,008
large SME	ref.	ref.	ref.	ref.	ref.	ref.
Collateral / Total assets	0,187	0,058	0,001	0,429	0,073	<,0001
Total debt/ Net cash-flow $_{t-1}$	-0,010	0,001	<,0001	-0,013	0,001	<,0001
Profitability $_{t-1}$	0,292	0,025	<,0001	0,506	0,037	<,0001
Young SME	-0,075	0,020	0,000	-0,076	0,024	0,001
Bad BdF rating	-0,089	0,022	<,0001	-0,087	0,030	0,003
dummy for 2007	0,467	0,025	<,0001	0,371	0,027	<,0001
dummy for 2008	0,496	0,025	<,0001	0,432	0,028	<,0001
dummy for 2009	0,469	0,025	<,0001	0,397	0,028	<,0001
dummy for 2010	0,482	0,026	<,0001	0,402	0,028	<,0001
sigma_s	0,182	0,004	<,0001	0,239	0,006	<,0001

Table 7 "Standard" and "Tobit-like" disequilibrium model estimates: Demand equation (2007-2010)

Demand equation	Simple diseq. model			Tobit diseq. model		
	Coeff	Std. Err.	Pr > |t|	Coeff	Std. Err.	Pr > |t|
Very small SME	0,004	0,001	0,000	0,021	0,002	<,0001
small SME	0,007	0,001	<,0001	0,020	0,001	<,0001
medium SME	0,004	0,001	<,0001	0,011	0,001	<,0001
large SME	ref.	ref.	ref.	ref.	ref.	ref.
Other debt / Total assets	-0,356	0,009	<,0001	-0,548	0,013	<,0001
Profit / Total assets	-0,181	0,005	<,0001	-0,228	0,007	<,0001
Interest rate	-0,144	0,028	<,0001	-0,979	0,043	<,0001
Investment / Total assets	1,097	0,023	<,0001	1,363	0,032	<,0001
Working capital needs /Total assets	0,138	0,005	<,0001	0,201	0,008	<,0001
accounts payable / Total assets	-0,060	0,011	<,0001	-0,017	0,016	0,275
dummy for 2007	-0,067	0,003	<,0001	-0,167	0,005	<,0001
dummy for 2008	-0,065	0,003	<,0001	-0,164	0,005	<,0001
dummy for 2009	-0,068	0,003	<,0001	-0,169	0,004	<,0001
dummy for 2010	-0,074	0,003	<,0001	-0,178	0,004	<,0001
sigma_d	0,070	0,000	<,0001	0,077	0,000	<,0001
rho	0,503	0,029	<,0001	0,299	0,020	<,0001
Log likelihood	-127353.36			-151882.83		
Number of observations	106142			106 142		

The main conclusion is that allowing for selection makes significant differences. Taking selection into account almost systematically increases the magnitude of the main parameter estimates; those of the supply equation increase by about 50% (the size dummy coefficients as well as the collateral parameter are even doubled). The coefficients of the demand equation are often doubled but some parameters exhibit stronger variations: the elasticity of demand to the interest rate rises from -0.14 when selection is ignored to -0.98 when it is taken into account.

While it was difficult to predict a priori the consequences of these parameter increases on the estimated credit rationing, the changes in credit rationing are of the same sign and magnitude: ignoring the selection lowers the estimated proportion of firms being credit rationed. While our econometric estimate of partial rationing is about 6.9% between 2007 and 2010 (resp. 6.0% between 2004 and 2006), ignoring selection leads to an estimate of 4.9% (resp. 3.9% between 2004 and 2006). Then, though they are not, in relative terms, negligible, the somehow noticeable variations in some parameter estimates do not induce tremendous changes in the estimation of rationing. However, would we consider countries where rationing is more important (as Spain and Italy for example; see the SAFE surveys), the discrepancy might there appear to be less anecdotic.

7 Conclusion

In this paper, we focus on the access of independent SMEs to bank lending and analyze whether the observed evolution of credit over the recent period was "demand driven" as a result of the decrease in firms' activity and investment projects or was "supply driven" with an increase in credit "rationing" stemming from a more cautious behavior of banks.

Our main conclusion is that, despite a more cautious lending behavior of banks, SMEs have not been strongly affected by credit rationing, even since 2008. The major part of the observed decrease in loans outstandings is explained by the decrease in firms' demand for credit, stemming from the strong decrease of their activity and investment projects. This result goes against the common view that SMEs suffered from a strong credit restriction during the crisis. Our conclusion is also reached by Rottmann and Wollmershaüser (2012) regarding German SMEs (See their figure 2) and is perfectly in line with the results of several surveys recently conducted in France about the access of small and medium-sized enterprises to bank loans.

8 References

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9 Appendix 1: Data sources

In France, companies ("Sociétés": legal units) are required to report individual accounts on a yearly basis (fiscal requirement). For this study, we bring together several firm-level datasets, all coming from FIBEN, a large French firm level data database constructed by the Company Directory of the Banque de France.

FIBEN individual company database

FIBEN accounting data are extracted from the individual company accounts collected yearly through the branch network of the Banque de France (balance sheet and income statements). They are based on fiscal documents. The data collection covers all companies conducting business in France whose annual turnover exceeds EUR 0.75 million or whose bank debt exceeds EUR 0.38 million. In 2009, this dataset contains individual company accounts for 250,000 firms. These firms represent a third of all companies taxed under the «bénéfice industriel et commercial» or «bénéfice réel normal» regimes (BIC-BRN). Because of the thresholds applied in the data collection, micro-enterprises are heavily under-represented. The rate of representativeness of the other enterprise size categories, in terms of the number of enterprises compared with the number of firms in INSEE's ALISSE database, is on the order of 70%.

Financial linkages

The Banque de France identifies financial linkages (first level owners) and monitors the percentage of capital held by other companies (stakes), noting whether the holder of a firm is a non-financial company (including holding companies), a financial institution (bank, mutual fund, or insurance company), a person (individual or employee), the State, or a foreign company. Independent enterprises are distinguished from those that belong to small or large groups. Here, this dataset allows isolating the legal units that do not belong to a group, i.e. independent firms.

The Fiben Central Credit Register

Data on outstanding loans (drawn and undrawn) come from the information gathered by the Central Credit Register (CCR) of the Banque de France on behalf of the entire banking profession. These bank loans are reported on a monthly basis by the credit institutions. The unit of collect is the

enterprise, which allows distinguishing loans according to the size of the company. The minimum reporting threshold was lowered from EUR 0.076 million to 0.025 million in January 2006.

The lowering of the threshold had for consequence a large increase of the number of reporting firms, mainly of course micro enterprises. In July 2010, 1,8 million resident companies were reporting the CCR, for an amount of EUR 800 billion of drawn outstanding loans (EUR 0.25 million threshold. As a comparison, with the previous threshold of EUR 0.76 million, there would be only 1,1 million resident companies reporting for EUR 768 billion.

Credit rating

The Banque de France assigns a full-scale rating to about 220,000 non financial companies on a yearly basis, among which SMEs constitute the largest group. The rating reflects the overall assessment of companies' ability to meet their financial commitments at a three-year horizon. Ratings are assigned by analysts in the "Company Division" of the Banque de France branches. They are based on descriptive data, accounting and financial figures related to trade bill payment incidents and bank loans reported by credit institutions, legal information, data relating to companies' micro and macro-environment, and data on the environment of players with which the company maintains close trade relations. The rating has two components: a turnover rating and a credit rating. The credit rating has 13 positions, from 3++ (excellent) to 9 (severe cash flows difficulties). This credit rating allows us to look at the perceived credit quality of each firm, before and after ownership changes.

10 Appendix 2 Definition of a SME and Accounting concepts

The definition of SME used in this study is based on the four criteria established by the European Commission: number of employees, annual turnover, and balance sheet assets, independence (mono legal unit). An independent SME (small or medium sized enterprise): 0 to 249 employees, with annual turnover less than EUR 50 million and balance sheet assets totaling less than EUR 43 million; and does not belong to a group.

Compared to the new statistical definition of an enterprise, published in the December decree following the 2008 MEA (Modernization of the Economy Act)[18], we focus on the behavior of independent SMEs and not on that of all SMEs. .

The reason is that we are using individual accounts data not only for the information about bank credits, but also to define all the ratios we will be using in our econometric model to estimate the supply and demand for loans. To study correctly the credit distribution of SMEs defined with the new definition of an enterprise, this should have required consolidating individual accounts for each combination of legal units and to deal with all the issues about double counting (for the importance of bank financing through the channels of holdings, see for example Observatoire des entreprises 2009c). This was beyond the scope of this first study.

By focusing on independent SMEs, we are aware to refull our study on only a part of the SMEs, but these SMEs have probably very different behavior from that of SMEs with holding affiliates being in charge of the relationships with the bank and carrying part of firm's debt or SMEs with a real estate affiliate, bearing part of the collaterals.

Bank debt: short term bank credit + bank loans + leasing

Financial debt: all long-, medium- and short-term resources, lent to the company by its banks, its group and associated companies, or raised on financial markets

Gross operating income: value added + other income and operating costs – payroll costs – taxes and related payments.

[18] LME: Loi de Modernisation de l'Economie

Interest rate: Interest expenses divided by financial debt

Net operating income: gross operating income + transfers of operating costs – charges to provisions, depreciation and amortization (net provisions). The net operating income to operating capital ratio gives the net return on operating capital (ROOC).

Net cash flow: value added + other income and operating costs + non-operating income – payroll costs – taxes and related payments – interest and related expenses – charges to provisions, depreciation and amortization – corporate tax

Net cash flow can be used to assess a company's ability to self-finance its growth. The net cash flow to shareholders' equity ratio provides an indicator of financial profitability.

Operating investment: acquisition of tangible fixed assets + new fixed assets acquired under finance leases – lease-back transactions + acquisitions of intangible fixed assets

Operating capital: operating fixed assets + operating working capital requirement

Size: total assets

Size indicators: very small SME(total assets $<$ 0,5 M€), small SME (0.5 M€ $<$total assets $<$ 1 M€), medium SME (1 M€$<$total assets $<$ 2M€), large SMEs (total assets $>$2 M€),

11 Appendix 3: Full estimation results, period 2004-2006

Table A1: Supply equation main parameter estimates, 2004-2006

Supply equation	**Simple diseq. model**			**Tobit diseq. model**		
	Coeff	**Std. Err.**	**Pr > |t|**	**Coeff**	**Std. Err.**	**Pr > |t|**
Very small SME	-0,043	0,011	<,0001	-0,065	0,013	<,0001
small SME	-0,016	0,009	0,065	-0,022	0,011	0,036
medium SME	-0,011	0,008	0,188	-0,017	0,009	0,068
large SME	ref,	ref,	ref,	ref.	ref.	ref.
Collateral / Total assets	0,288	0,076	0,000	0,365	0,080	<,0001
Total debt/ Net cash-flow $_{t-1}$	-0,010	0,001	<,0001	-0,013	0,001	<,0001
Profitability $_{t-1}$	0,353	0,032	<,0001	0,570	0,044	<,0001
Young SME	0,012	0,026	0,645	0,009	0,028	0,752
Bad BdF rating	-0,070	0,026	0,007	-0,058	0,030	0,048
dummy for 2004	0,364	0,025	<,0001	0,294	0,026	<,0001
dummy for 2005	0,385	0,026	<,0001	0,331	0,026	<,0001
dummy for 2006	0,414	0,026	<,0001	0,369	0,026	<,0001
Initial value y(0)	-0,355	0,016	<,0001	-0,358	0,016	<,0001
firm average of *Collateral / Total assets*	-0,306	0,066	<,0001	-0,350	0,068	<,0001
firm average of *Total debt/Net cash Flow* $_{t-1}$	0,014	0,001	<,0001	0,019	0,002	<,0001
firm average of *Profit ratio* $_{t-1}$	-0,401	0,036	<,0001	-0,633	0,049	<,0001
firm average of *Bad new BdF rating*	-0,052	0,031	0,089	-0,037	0,035	0,294
firm average of *Young SME*	-0,024	0,028	0,407	-0,010	0,031	0,759
collateral instr, equation residual	0,075	0,042	0,073	0,052	0,044	0,237
sigma_s	0,169	0,004	<,0001	0,203	0,005	<,0001

Table A2: Demand equation main parameter estimates, 2004-2006

Demand equation	**Simple diseq. model**			**Tobit diseq. model**		
	Coeff	**Std, Err,**	**Pr > |t|**	**Coeff**	**Std. Err.**	**Pr > |t|**
Very small SME	0,007	0,001	<,0001	0,029	0,002	<,0001
small SME	0,007	0,001	<,0001	0,021	0,002	<,0001
medium SME	0,003	0,001	<,0001	0,011	0,001	<,0001
large SME	ref,	ref,	ref,	ref.	ref.	ref.
Other debt / Total assets	-0,433	0,012	<,0001	-0,692	0,018	<,0001
Profit / Total assets	-0,200	0,007	<,0001	-0,259	0,011	<,0001
accounts payable / Total assets	-0,098	0,013	<,0001	-0,082	0,020	<,0001
Interest rate	-0,407	0,034	<,0001	-1,546	0,055	<,0001
Investment / Total assets	0,812	0,026	<,0001	0,958	0,040	<,0001
Working capital needs /Total assets	0,188	0,008	<,0001	0,265	0,011	<,0001
dummy for 2004	-0,042	0,004	<,0001	-0,124	0,007	<,0001
dummy for 2005	-0,044	0,004	<,0001	-0,130	0,006	<,0001
dummy for 2006	-0,043	0,004	<,0001	-0,130	0,006	<,0001
Initial value y(0)	0,089	0,003	<,0001	0,134	0,004	<,0001
firm average of *Other debt / Total assets*	0,345	0,013	<,0001	0,560	0,019	<,0001
firm average of *Profit ratio*	0,113	0,008	<,0001	0,137	0,012	<,0001
firm average of *Interest rate*	0,426	0,014	<,0001	1,233	0,025	<,0001
firm average of *Investment / Total assets*	0,010	0,009	0,302	0,145	0,013	<,0001
firm average of *Capital needs / Total assets*	-0,163	0,006	<,0001	-0,196	0,009	<,0001
firm average of accounts payable / Total assets	0,230	0,009	<,0001	0,328	0,013	<,0001
Interest rate instr, equation residual	-0,296	0,032	<,0001	-0,282	0,049	<,0001
Investment instr, equation residual	-0,361	0,026	<,0001	-0,433	0,039	<,0001
Working capital needs instr. Equation residual	0,034	0,006	<,0001	0,025	0,008	0,0023
accounts payable instr. Equation residual	-0,097	0,010	<,0001	-0,162	0,015	<,0001
sigma_d	0,072	0,000	<,0001	0,081	0,000	<,0001
rho	0,608	0,046	<,0001	0,383	0,023	<,0001
Log likelihood	-84189,0			-101095,9		
Number of observations	72094					

Table A3: Other parameter estimates, 2004-2006

other parameters	Simple diseq. model			Tobit diseq. model		
	Coeff	Std, Err,	Pr > |t|	Coeff	Std. Err.	Pr > |t|
s_fz : supply - dummy construction	0,024	0,010	0,015	-0,058	0,013	<,0001
s_gz : supply - dummy trade	0,074	0,010	<,0001	0,050	0,012	<,0001
s_iz : supply - dummy Hotel restaurant	0,044	0,021	0,039	0,024	0,027	0,367
s_jz : supply - dummy info,, communic,	-0,034	0,025	0,185	-0,233	0,052	<,0001
s_mn :supply - dummy business services	0,032	0,021	0,121	-0,071	0,028	0,013
d_fz : demand - dummy construction	-0,005	0,001	0,000	-0,030	0,002	<,0001
d_gz : demand - dummy trade	-0,005	0,001	0,000	-0,024	0,002	<,0001
d_iz : demand - dummy Hotel restaurant	-0,002	0,005	0,663	0,013	0,007	0,077
d_jz : demand - dummy infor, commmunic,	0,009	0,004	0,029	-0,024	0,009	0,005
d_mn :demand - dummy business services	0,016	0,003	<,0001	-0,006	0,005	0,169
d_pte_be : lagged loans of small manufact,	0,805	0,005	<,0001	0,903	0,007	<,0001
d_gde_be : lagged loans of large manufact,	0,798	0,005	<,0001	0,901	0,006	<,0001
d_pte_fz: lagged loans of small construction	0,757	0,006	<,0001	0,987	0,010	<,0001
d_gde_fz: lagged loans of large construction	0,776	0,006	<,0001	1,002	0,010	<,0001
d_pte_gz: lagged loans of small trade	0,770	0,004	<,0001	0,938	0,006	<,0001
d_gde_gz: lagged loans of large trade	0,812	0,004	<,0001	0,979	0,006	<,0001
d_pte_iz: lagged loans of small hotel, resto,	0,792	0,017	<,0001	0,913	0,023	<,0001
d_gde_iz: lagged loans of large hotel resto,	0,822	0,015	<,0001	0,952	0,020	<,0001
d_pte_jz: lagged loans of small info,	0,750	0,029	<,0001	1,143	0,080	<,0001
d_gde_jz: lagged loans of large info, Comm,	0,761	0,027	<,0001	1,197	0,079	<,0001
d_pte_mn: lagged loans of small business	0,743	0,014	<,0001	0,972	0,027	<,0001
d_gde_mn: lagged loans of large business	0,754	0,014	<,0001	1,035	0,024	<,0001

12 Appendix 4: Full estimation results, period 2007-2010

Table A4: Supply equation main parameter estimates, 2007-2010

Supply equation	**Simple diseq. model**			**Tobit diseq. model**		
	Coeff	**Std. Err.**	**Pr > |t|**	**Coeff**	**Std. Err.**	**Pr > |t|**
Very small SME	-0,046	0,010	<,0001	-0,088	0,013	<,0001
small SME	-0,023	0,008	0,003	-0,043	0,011	<,0001
medium SME	-0,015	0,007	0,044	-0,025	0,009	0,008
large SME	ref.	ref.	ref.	ref.	ref.	ref.
Collateral / Total assets	0,187	0,058	0,001	0,429	0,073	<,0001
Total debt/ Net cash-flow $_{t-1}$	-0,010	0,001	<,0001	-0,013	0,001	<,0001
Profitability $_{t-1}$	0,292	0,025	<,0001	0,506	0,037	<,0001
Young SME	-0,075	0,020	0,000	-0,076	0,024	0,001
Bad new BdF rating	-0,089	0,022	<,0001	-0,087	0,030	0,003
dummy for 2007	0,467	0,025	<,0001	0,371	0,027	<,0001
dummy for 2008	0,496	0,025	<,0001	0,432	0,028	<,0001
dummy for 2009	0,469	0,025	<,0001	0,397	0,028	<,0001
dummy for 2010	0,482	0,026	<,0001	0,402	0,028	<,0001
Initial value y(0)	-0,317	0,013	<,0001	-0,303	0,015	<,0001
firm average of *Collateral / Total assets*	-0,396	0,048	<,0001	-0,579	0,061	<,0001
firm average of *Total debt/Net cash Flow* $_{t-1}$	0,011	0,001	<,0001	0,019	0,002	<,0001
firm average of *Profit ratio* $_{t-1}$	-0,266	0,030	<,0001	-0,498	0,043	<,0001
firm average of *Bad new BdF rating*	-0,071	0,027	0,009	-0,053	0,036	0,137
firm average of *Young SME*	0,054	0,024	0,023	0,078	0,028	0,005
collateral instr, equation residual	0,251	0,041	<,0001	0,232	0,048	<,0001
sigma_s	0,182	0,004	<,0001	0,239	0,006	<,0001

Table A5: Demand equation main parameter estimates, 2007-2010

Demand equation	**Simple diseq. model**			**Tobit diseq. model**		
	Coeff	**Std. Err.**	**Pr > |t|**	**Coeff**	**Std. Err.**	**Pr > |t|**
Very small SME	0,004	0,001	0,000	0,021	0,002	<,0001
small SME	0,007	0,001	<,0001	0,020	0,001	<,0001
medium SME	0,004	0,001	<,0001	0,011	0,001	<,0001
large SME	ref.	ref.	ref.	ref.	ref.	ref.
Other debt / Total assets	-0,356	0,009	<,0001	-0,548	0,013	<,0001
Profit / Total assets	-0,181	0,005	<,0001	-0,228	0,007	<,0001
Interest rate	-0,144	0,028	<,0001	-0,979	0,043	<,0001
Investment / Total assets	1,097	0,023	<,0001	1,363	0,032	<,0001
Working capital needs /Total assets	0,138	0,005	<,0001	0,201	0,008	<,0001
accounts payable / Total assets	-0,060	0,011	<,0001	-0,017	0,016	0,275
dummy for 2007	-0,067	0,003	<,0001	-0,167	0,005	<,0001
dummy for 2008	-0,065	0,003	<,0001	-0,164	0,005	<,0001
dummy for 2009	-0,068	0,003	<,0001	-0,169	0,004	<,0001
dummy for 2010	-0,074	0,003	<,0001	-0,178	0,004	<,0001
Initial value y(0)	0,058	0,002	<,0001	0,083	0,002	<,0001
firm average of *Other debt / Total assets*	0,291	0,010	<,0001	0,460	0,014	<,0001
firm average of *Profit ratio*	0,086	0,006	<,0001	0,101	0,008	<,0001
firm average of *Interest rate*	0,420	0,011	<,0001	1,159	0,019	<,0001
firm average of *Investment / Total assets*	-0,006	0,008	0,446	0,119	0,011	<,0001
firm average of *Capital needs / Total assets*	-0,142	0,004	<,0001	-0,176	0,006	<,0001
firm average of accounts payable / Total asset	0,227	0,006	<,0001	0,327	0,009	<,0001
Interest rate instr, equation residual	-0,547	0,026	<,0001	-0,724	0,039	<,0001
Investment instr, equation residual	-0,612	0,022	<,0001	-0,803	0,031	<,0001
Working capital needs instr. Equation residua	0,05731	0,004162	<,0001	0,05909	0,00584	<,0001
accounts payable instr. Equation residual	-0,1216	0,009706	<,0001	-0,2137	0,01346	<,0001
sigma_d	0,070	0,000	<,0001	0,077	0,000	<,0001
rho	0,503	0,029	<,0001	0,299	0,020	<,0001
Log likelihood	-127353.36			-151882.83		
Number of observations	106142					

Table A6: Other parameter estimates, 2007-2010

other parameters	Simple diseq. model			Tobit diseq. model		
	Coeff	Std. Err.	Pr > |t|	Coeff	Std. Err.	Pr > |t|
s_fz : supply - dummy construction	0,014	0,009	0,127	-0,038	0,012	0,002
s_gz : supply - dummy trade	0,074	0,009	<,0001	0,086	0,012	<,0001
s_iz : supply - dummy Hotel restaurant	0,087	0,017	<,0001	0,094	0,023	<,0001
s_jz : supply - dummy info,, communic,	-0,091	0,021	<,0001	-0,218	0,034	<,0001
s_mn :supply - dummy business services	-0,003	0,018	0,856	-0,059	0,026	0,021
d_fz : demand - dummy construction	-0,004	0,001	0,000	-0,023	0,002	<,0001
d_gz : demand - dummy trade	-0,004	0,001	<,0001	-0,022	0,002	<,0001
d_iz : demand - dummy Hotel restaurant	-0,009	0,003	0,007	0,007	0,005	0,146
d_jz : demand - dummy infor, commmunic,	0,004	0,003	0,171	-0,018	0,006	0,001
d_mn :demand - dummy business services	0,019	0,002	<,0001	0,004	0,003	0,249
d_pte_be : lagged loans of small manufact,	0,840	0,004	<,0001	0,948	0,006	<,0001
d_gde_be : lagged loans of large manufact,	0,833	0,004	<,0001	0,950	0,005	<,0001
d_pte_fz: lagged loans of small construction	0,827	0,005	<,0001	1,035	0,007	<,0001
d_gde_fz: lagged loans of large construction	0,825	0,004	<,0001	1,029	0,007	<,0001
d_pte_gz: lagged loans of small trade	0,808	0,003	<,0001	0,973	0,004	<,0001
d_gde_gz: lagged loans of large trade	0,860	0,003	<,0001	1,022	0,004	<,0001
d_pte_iz: lagged loans of small hotel, resto,	0,777	0,011	<,0001	0,880	0,015	<,0001
d_gde_iz: lagged loans of large hotel resto,	0,859	0,011	<,0001	0,986	0,014	<,0001
d_pte_jz: lagged loans of small info,	0,793	0,025	<,0001	1,116	0,040	<,0001
d_gde_jz: lagged loans of large info, Comm,	0,786	0,019	<,0001	1,074	0,031	<,0001
d_pte_mn: lagged loans of small business	0,791	0,012	<,0001	1,033	0,019	<,0001
d_gde_mn: lagged loans of large business	0,814	0,010	<,0001	1,074	0,015	<,0001

13 Appendix 5: Main parameter estimates, manufacturing industry.

Table A7: Main parameter estimates, manufacturing industry

Manufacturing industry	2004-2006			2007-2010		
Supply equation	Coeff	Std. Err.	Pr > |t|	Coeff	Std. Err.	Pr > |t|
Very small SME	-0,056	0,024	0,0206	-0,099	0,029	0,0005
Small SME	-0,004	0,019	0,8389	-0,031	0,021	0,1402
Medium SME	-0,009	0,015	0,5394	-0,048	0,017	0,0042
Large SME						
Collateral / Total assets	0,539	0,137	<,0001	0,601	0,135	<,0001
(Financial debt/ Net cash-flow) $_{t-1}$	-0,016	0,002	<,0001	-0,014	0,002	<,0001
Profitability $_{t-1}$	0,773	0,091	<,0001	0,694	0,086	<,0001
Young SME	0,012	0,058	0,8283	0,072	0,055	0,0455
Bad BdF rating	-0,076	0,067	0,2565	-0,11	0,085	0,3949
Demand equation						
Very small SME	0,078	0,007	<,0001	0,053	0,006	<,0001
Small SME	0,038	0,004	<,0001	0,031	0,004	<,0001
Medium SME	0,02	0,003	<,0001	0,015	0,002	<,0001
Large SME						
Other debt / Total assets	-0,663	0,049	<,0001	-0,547	0,036	<,0001
Profit / Total assets	-0,135	0,027	<,0001	-0,185	0,017	<,0001
Interest rate	-2,593	0,095	<,0001	-1,655	0,115	<,0001
Investment / Total assets	1,338	0,099	<,0001	1,299	0,094	<,0001
Working capital needs /Total assets	0,381	0,029	<,0001	0,253	0,023	<,0001
accounts payable / Total assets	-0,109	0,058	0,0624	-0,023	0,051	0,6496
Log likelihood	-20315.814			-28031.092		
Number of observations	16925			22507		

Table A8 : Rationing estimates, manufacturing industry.

	Partial rationing (in percentage of firms with loans)		Full rationing (in percentage of firms with no loan)	
	2004-2006	2007-2010	2004-2006	2007-2010
All SMEs	9,90%	7,70%	1,40%	1,80%
2004	12,40%		1,20%	
2005	9,50%		1,40%	
2006	7,80%		1,60%	
2007		8,80%		2,10%
2008		6,80%		1,40%
2009		8,00%		2,40%
2010		6,90%		1,20%
Very small SMEs	16,70%	12,30%	3,50%	3,80%
Small SMEs	9,70%	7,80%	1,70%	1,90%
Medium SMEs	10,20%	8,30%	1,20%	1,50%
Large SMEs	8,30%	5,90%	0,60%	1,40%
Young SMEs	18,50%	15,30%	0,00%	0,00%
Mature SMEs	9,60%	7,40%	1,40%	1,80%
Bad BdF rating	17,00%	13,00%	12,50%	11,80%
Others	9,80%	7,60%	1,30%	1,70%

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