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Bank leverage choices: A quantile analysis of French SMEs

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Abstract

Using a large sample of 24,825 firm-year observations of French non-listed SMEs from 2003 to 2016, we investigate the drivers of SMEs' bank leverage choices. To do so, we use a quantile regression modeling in distinguishing between different quantiles of the bank leverage distribution. Furthermore, we apply this approach for three different sub-periods in order to investigate the impact of the global financial crisis. The analysis leads to several interesting findings. In particular, they reveal that drivers of the bank leverage level vary in function of the bank leverage distribution and of time. These results contribute to clarify the mixed results of previous research in this field. They also show indicate that the pecking order theory is suitable to French SMEs for which the performance is the most important determinant of the banking leverage.

Highlights:

- The relationship between firm factors and bank leverage varies in function of the quantile.
- Future research should consider both time and distributional dimensions.
- The pecking order theory is suitable to French SMEs.
- The size of firms impacts bank leverage negatively.
- The performance is the most important criterion for banks.

Keywords: SMEs; Bank leverage; Quantile regressions; Nonlinearity; Crisis

JEL classification: G32, C21

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1. Introduction

The financing strategy has a strategic importance for the survival and development of small and medium-sized enterprises (SMEs). Because of their size, market power and limited resources, SMEs are fundamentally different from large corporations - they are more dependent on the economic context and have less choice regarding the access to various financing sources. For example, for the non-listed SMEs, the main source of external capital is often bank debt; therefore the amount of bank loans and the conditions required to obtain them represent strategic elements for the top management team of these firms.

In Europe, SMEs are defined as organizations less than 250 employees and a balance sheet value lower or equal to 43 million euros. They are extremely important for economic development, innovation and employment, as they represent 99% of all the business organizations in the European Union (European Commission, 2017). In France, they represent 99.8% of the total number of business organizations, employ 49% of the French working force, and account for 36% of the total business turnover (Resources, 2016). These figures confirm the central role of SMEs in the French economy, and the importance of understanding their financing strategy both in a normal economic situation and in the presence of market crises.

Because of their organizational and market profile, SMEs are particularly vulnerable to market crises that may affect both their internal and external financing sources. For these reasons, national governments often implement specific financial programs to help the SMEs obtain the necessary financial resources for their survival and development. A major challenge of these initiatives is their capacity to answer the needs of different categories of these organizations. Indeed, the SMEs represent a large variability in terms of profile, activity and resources, and therefore “policy measures should be more nuanced as it is unclear which firms are experiencing difficulties in accessing credit” (Mac an Bhaird, 2013, p. 11). This problem can only be solved by developing a finer grained research which permits to identify various categories of SMEs based on the relationship between their organizational profile and the level of bank debt. This relationship should also be investigated longitudinally, as economic turbulence has significantly increased in the 21s century. The 2008-2009 Global Financial Crisis (GFC hereafter), described as the worst economic downturn since the Great Depression (He and Ausloos, 2017), led many SMEs to stagnation or bankruptcy, as they were incapable to properly finance their activity and growth (Balios et al., 2016; Mac and Bhaird, 2013).

Considering the vulnerability of SMEs during crises and their high dependence on bank loans, in this study, we investigate the relationship between firm-related characteristics and the level of bank leverage before, during, and after the GFC. To achieve this, we analyze data collected from the Bureau van Dijk for French firms database (DIANE) for a sample of 24,825 firm-year observations of French non-listed SMEs from 2003 to 2016. Our research thus combines (1) a hypothetico-deductive approach expressed through the hypotheses developed regarding the relationships between firm-related variables and bank leverage before, during and after the GFC; and (2) an exploratory approach which applies quantile regression modeling to analyze the distribution of the investigated SMEs on different quartiles of bank leverage distribution. This way, we also account for the heterogeneity of the investigated SMEs in terms of organizational profile and financing strategy.

Our findings make an original contribution to the literature stream on SMEs' bank financing and capital structure, providing insights into the financing policy of various categories of SMEs. Although a series of extant studies already investigates the financing strategy of SMEs in different countries, these studies do not differentiate between different categories of firms, using an aggregated sample either at a national (Balios et al., 2016; Danso and Adomako, 2014; He and Ausloos, 2017; Proença et al., 2014) or at a multi-national level (Reddy et al., 2016). A better understanding of the relationship between firm's profile and activity and its level of bank leverage can benefit SMEs' managers, bank representatives and policy makers, who can select and apply the best methods to facilitate SMEs' financing and enhance their performance.

In this context, our empirical findings show that considering the quantiles of bank leverage in the analysis is important because the firms in the medium and high quantiles behave differently. This quantile analysis also reveals that small SMEs have more difficulties to obtain bank loans than medium and large SMEs. However, for all firms, the pecking order theory is the most suitable to explain the bank leverage choice of French SMEs because they always prefer internal funding, generated by cash holding, liquidity, performance, non-debt tax shield or sales' growth, to external funding in order to preserve the control. The time-varying analysis indicates that the global financial crisis had significant impacts on the financing of SMEs for which obtaining bank loans became more difficult. The aid programs of the government however helps SMEs and improve the situation after the crisis.

The paper is structured as follows. In Section 2, after formulating the hypotheses that explain the relationship between various firm-related characteristics and bank leverage, we

discuss the impact of the financial crisis on the financing policy of SMEs. In Section 3, we outline the empirical methodology applied and collected data, followed by a presentation and discussion of the obtained results in Section 4. Section 5 concludes the paper with a summary of the main findings, its implications and propositions for future research.

2. Literature review and hypotheses

The objective of this section is to formulate research hypotheses on the relationship between firm factors and the bank leverage levels of French SMEs. For that, we will base on both the theoretical approach offered by academic works and on the specific characters of SMEs in France. That is why the first sub-section will focus on the theories that help explaining the financing choices of firms while the second section will explain the foundation of our research hypotheses. The third sub-section will analyze the potential effect of the GFC on the formulated hypotheses.

2.1. Theories explaining the financing choices and the capital structure of SMEs

The choice of firm's capital structure represents one of the most important decisions of the top management team. Several theories explain the factors that determine and influence the financing strategy, but the majority of studies focus on large listed companies that often trade several types of securities (Degryse et al., 2012). These theories can be also applied in the case of SMEs, although the characteristics of these organizations create a series of specificities in terms of management decision and access to external funding.

The *trade-off theory* (Modigliani and Miller 1963) suggests that a firm chooses the *optimal* capital structure by balancing the tax benefits of debt and the costs of financial distress – which increase proportionally with the level of incurred debt (Brennan and Schwartz, 1978; DeAngelo and Masulis, 1980; Bradley et al., 1984). On the other hand, according to the *pecking order theory*, firms prefer funding sources with the lowest degree of asymmetric information in order to minimize the borrowing costs (Myers and Majluf, 1984; Myers, 1977, 1984). Therefore, firms will use *first* internally generated funds, *then* debt, and only as a *last* resort, outside equity. In the case of unlisted SMEs, the choice of financing sources is highly simplified, as the management can only choose between internal financing or external debt, which often represents bank leverage (Berger and Udell, 1998; Beck et al., 2008; Degryse et al., 2012). The pecking-order theory also states that there is *no optimal* debt-to-equity ratio,

the best financing policy being determined by the specific characteristics and circumstances of each firm.

Empirical studies suggested that the agency costs theory (Jensen and Meckling, 1976) has a partial relevance for the capital structure of SMEs. Indeed, in a small firm, the manager is also the owner in most cases. Thus, the agency problems of equity between shareholders/stakeholders and managers are non-existent or limited (Daskalakis and Thanou, 2010; Proença et al., 2014). However, these problems may become manifest in medium-sized firms. On the other hand, the agency costs of debt can represent an important issue (Ang, 1992; Van de Wijst, 1989) as high information asymmetry may determine lenders to require collateral guarantees (Daskalakis and Thanou, 2010; Myers, 1977).

Another approach to explain the financing strategy of SMEs is related to the phenomenon of *credit rationing* which is explained through the information asymmetry between lenders and borrowers (Myers and Majluf, 1984; Greenwald et al., 1984), and agency problems (Jensen and Meckling, 1976; Hart and Moore, 1995). The SMEs are particularly prone to these problems, as the information regarding their investment projects and their capacity to provide collateral guarantees is often limited, forcing the bank to increase the cost of leverage to compensate for the valuation and expropriation of risks. In this situation, the offer and demand for bank debt is determined by a series of factors, which attempt to reduce the cost and risk of leverage for both lenders and borrowers (Alexandre and Buisson-Stéphan, 2014).

These theories are complementary in their approach, providing a complex image of the various parties involved in financing decisions and of their interests. For example, the SMEs cannot be considered as passive victims of credit rationing because the owner-managers are often reluctant to require bank loans in order to preserve full control on their firms' operation and management. In addition, when the cost of bank leverage is perceived to be too high, the firm may hold cash to finance current operations or small investments.

2.2. Determinants of bank leverage

The empirical studies based on these theories are using several firm-related variables to predict the financial choices adopted by the firm management. Considering various elements of SMEs' profile and financial activity, we consider in this study a mix of variables which are relevant both for the offer and the demand of bank debt: size, liquidity, tangibility, cash holding, performance – measured as return on assets (ROA), non-debt tax shield, and growth – calculated as the logarithm of sales. Taking into account the predictions of the three theories

presented above (trade-off, pecking order and credit rationing), and extant empirical studies, we develop a series of hypotheses regarding the relationships between these firm-related factors and bank leverage levels of French unlisted SMEs.

Size. Larger firms are usually more diversified and have lower earnings volatility. From the point of view of the trade-off theory, this reduces the indirect costs of bankruptcy, permitting the firm to take more debt. The predictions of the pecking-order theory are similar, because larger firms are more stable, which reduces information asymmetry, and therefore, the cost of debt. The extant empirical studies also confirm a positive relationship between SMEs' size and the level of bank leverage (Cassar and Holmes 2003; Degryse et al., 2012; Fama and French 2002; Hall et al. 2004; Michaelas et al. 1999; Sogorb-Mira 2005). On this basis, we formulate the following hypothesis:

H1. Size is positively related with bank leverage.

Liquidity. A high level of asset liquidity can induce either positive and negative effects on the level of bank leverage (Mouamer, 2011). On the one hand, firms may use the asset liquidity to guarantee and meet their debt obligations, making them more attractive borrowers. On the other hand, these liquid assets can be used to finance future investment opportunities, leading to a lower need for bank debt. Considering, however, the specific situation of SMEs, we consider that asset liquidity may not be sufficient to eliminate the information asymmetry problem and reassure potential lenders. This interpretation is also in line with the pecking-order theory which suggests that SMEs' managers will first use the available internal funds before accessing external finance. Following the recent study of He and Ausloos (2017), we opt for the second interpretation, formulating the following hypothesis:

H2. Liquidity is negatively related with bank leverage.

Tangibility. Considering the information asymmetry problem, tangibility can significantly influence the capital structure of SMEs. This is because tangible assets can be used as collateral which reduces credit risk and banks will favor the firms with a high ratio of tangible assets. From this perspective, we hypothesize that:

H3. Tangibility is positively related with bank leverage.

Cash holding. The existence of market imperfections, information asymmetry and debt agency costs, particularly prevalent in the case of SMEs, determine these firms to make cash holdings in order to avoid the high costs of acquiring new debt, to meet unanticipated contingencies that may arise, to finance investments if debt financing is unavailable or too costly, or to keep control over the firm (Steijvers and Niskanen, 2009). According to the pecking-order theory, we hypothesize that:

H4. Cash holdings are negatively related with bank leverage.

Performance. Firms' performance can have contradictory effects on the level of bank leverage. On the one hand, high performance can reduce the credit risk, allowing the SMEs to have an easier access to bank debt. On the other hand, a good and consistent performance will provide internal sources of financing. Thus, according to the pecking-order theory, internal financing sources will be accessed first by firms' managers in case of need. Following the assumption of He and Ausloos (2017), we consider the second alternative as more plausible in the case of SMEs:

H5. Performance is negatively related with bank leverage.

Non-debt tax shield. Besides the debt tax shields, the literature indicates that other expenses – such as depreciation and investment tax credits, can also provide tax benefits (De Angelo and Masulis, 1980). However, extant studies provide contradictory evidence regarding the relationship between non-debt tax shields and bank leverage: Titman and Wessels (1988) and Song (2005) obtained a non-significant statistical relationship between non-debt tax shields and leverage, while Shahjahanpour et al. (2010) demonstrate a negative relationship between these variables. Considering that the deduction of a high depreciation can increase the SMEs' internal financing capabilities, we hypothesize, according to the pecking-order theory, that:

H6: Non-debt tax shields are negatively related with bank leverage.

Growth. In conditions of asymmetric information, high-growth firms have a lower probability to default on debt, increasing their capacity to obtain bank leverage. On the other hand, these organizations may need bank debt to finance their present and future growth, as internal financing sources may be insufficient for this purpose. The extant literature confirms that fast-growing SMEs tend to have higher leverage (Forte et al., 2013; Heshmati, 2001). On this basis we formulate the following hypothesis:

H7. Growth is positively related with leverage.

To sum up, the above formulated hypotheses are summarized in the Table 2.

Table 1: Formulated hypotheses about the impact of firm-factors on bank leverage level

Variables	Hypothesis of the impact on bank leverage
Size	Positive
Liquidity	Negative
Tangibility	Positive
Cash holding	Negative
Performance	Negative
Non-debt tax shield	Negative
Growth	Positive

With the objective to investigate the impact of the GFC on the relationship between firm factors and the level of bank leverage, we will analyze in the next sub-section the potential impact of the GFC on the above formulated hypotheses. In this context, the relationships defined above will be considered as the default situation characterizing the situation before the GFC (2003-2007).

2.3. The effect of the global financial crisis (GFC)

The 2008-2009 GFC had a negative impact on both internal and external financing sources of SMEs. On the one hand, the GFC determined an increased level of competition and market turbulence that reduced the volume of sales and the profitability of many SMEs. On the other hand, the higher level of market unpredictability increased the credit risk, forcing banks to raise the cost of debt or to apply strict measures of credit rationing that were directed mainly towards the SMEs due to information asymmetry problems. In these conditions, we expect that the hypothesized relationships were reinforced by the onset of the GFC, which exacerbated the SMEs financing problems.

Several studies focused on the effect of the GFC on the financing choices of SMEs, providing a comparison of the situation before and after the crisis (Balios et al., 2016; Danso and Adomako, 2014; He and Ausloos, 2017; Reddy et al., 2016). Regarding the firm-related determinants of bank leverage considered in this study, their findings are often different and can be summarized in seven different points. First, the relationship between size and bank leverage is positive and non-significant both before and after the crisis (Danso and Adomako, 2014). It is positive and significant both before and after the crisis (He and Ausloos, 2017). It is negative and statistically significant before and during the crisis, but positive and non-significant after the crisis (Reddy et al., 2016). The relationship is positive and significant during the crisis (Balios et al., 2016; Proença et al., 2014). Second, the relationship between

liquidity and bank leverage is negative and statistically significant both before and after the crisis (Danso and Adomako, 2014; He and Ausloos, 2017), as well as during the crisis (Proença et al., 2014). Third, the relationship between tangibility and bank leverage is positive and statistically significant both before and after the crisis (Danso and Adomako, 2014; He and Ausloos, 2017). It is positive and significant before and during the crisis, but positive and non-significant after the crisis (Reddy et al., 2016). It is negative and statistically significant during the crisis (Balios et al., 2016; Proença et al., 2014).

Fourth, there is no result concerning the relationship between cash holdings and bank leverage in the identified studies. Fifth, the relationship between ROA and bank leverage is negative and significant both before and after the crisis (He and Ausloos, 2017), as well as during the crisis (Proença et al., 2014). Sixth, according to Danso and Adomako (2014), the relationship between non-debt tax shields and bank leverage is positive and statistically significant before the crisis, but negative and non-significant after the crisis. He and Ausloos (2017) report a negative and significant relationship both before and after the crisis. During the crisis, the relationship is also negative and statistically significant (Proença et al., 2014). Seventh, the relationship between growth and bank leverage is negative and statistically significant before the crisis, but positive and significant after the crisis (He and Ausloos, 2017). It is positive and non-significant before, during and after the crisis (Reddy et al., 2016). It is positive and significant during the crisis (Balios et al., 2016; Proença et al., 2014).

The large variability of findings can be explained by the specific conditions of the investigated countries. The study of Danso and Adomako (2014) analyzes the financing strategy of South African SMEs. The paper of Proença et al. (2014) studies the capital structure of Portuguese SMEs. He and Ausloos (2017) assess the situation of Chinese SMEs, Balios et al. (2016) focus on Greek SMEs while Reddy et al. (2016) aggregate a sample of SMEs from ten European countries. For our study we expect that the signs of the investigated relationships remain the same before, during and after the GFC.

However, the financial and economic situation in Europe after the GFC requires further explanations. Even after 2009, when the GFC officially ended, the financial problems related with the level of national indebtedness of several European countries (Greece, Portugal, Spain, Ireland) created additional shocks, worsening and prolonging the economic recession of the EU zone (Muijs, 2015). For example, France reached the pre-crisis level of its GDP only in the second part of 2011 (De Calignon, 2014). In these conditions, in the aftermath of the GFC, we hypothesize that the sign and the significance of the relationships remain as

before and during the crisis. However, we expect some differences in the analysis of the quantile distribution of bank leverage, with a larger proportion of French SMEs having access to bank leverage than during the crisis, but with a lower proportion in comparison with the pre-crisis period.

3. Data and methodology

3.1. Data

In order to understand the determinants of the level of bank leverage of SMEs in France, we will base on data collected from the balance sheet and income statement of French firms that are provided by Diane, the French branch of Bureau van Dijk. This latter provides company data and business intelligence for individual countries, regions and the world¹. In order to identify SMEs in this database, we apply the definition of SMEs following the [European Commission](#): less than 250 employees and a total asset below or equal to 43 million euros². With these two criteria applied to all the available years, from 2003 to 2016, we obtain a sample of 2,820 French SMEs that are not listed. Indeed, the proportion of listed firms is too small in order to be taken into account (only 380 listed SMEs are available). We then decided to focus only on non-listed SMEs which have more difficulties to acquired external financing than listed ones. Thus, understanding the factors that determine the bank leverage level of these firms should provide important information to banks and the government. As it is usually the case in the studies about capital structure, the firms in the financial sector are excluded from the sample because they have specific financing methods. After the cleaning process, which consists of deleting all missing values, we obtain an unbalanced panel of 24,825 firm-year observations. As we explained in Section 2, the firm factors that are the most relevant determinants of bank leverage indicated in the literature are size, liquidity, cash holding, performance, non-debt tax shield and growth as defined in Table 2.

The principal descriptive statistics of these variables are presented in Table 3. It shows that the average banking leverage level of SMEs over the sample period is 22.68% of the total asset. There are 10% of firms that have less than 1.26% bank leverage in proportion of the total asset, 25% of firms that have less than 5.86% of bank leverage in proportion of the total asset, and so on for the other quantiles. As for the size, the log of the total asset has an average of 7.53, and again the same principles are applied for different quantiles. The average level of

¹ More details can be found at <http://www.bvdinfo.com/en-gb/home>.

² It is worth noting that the second criterion can be also substituted by a turnover under or equal to 50 million euros. In this study, we apply the criterion on total asset.

liquidity is 3.1725. It means that the current asset is three times higher than the current liability. The part of tangible assets is 25.18% of the total asset on average. The proportion of cash is 13.71% of the total asset on average.

Table 2: Variables' definition

Variables' name	Variables' definition
1. Leverage	Bank leverage / Total asset
2. Size	Log of Total asset
3. Liquidity	Current ratio = Current asset / Current liability
4. Tangibility	Total fixed asset / Total asset
5. Cash holding	Cash / Total asset
6. Performance	ROA = Net income / Total asset
7. Non-debt TS	Non-debt Tax Shield = Depreciation / Total asset
8. Growth	Log of sales

Table 3: Descriptive statistics

	Average	St. Dev.	Quantiles				
			0.1	0.25	0.50	0.75	0.90
Leverage	0.2268	0.2261	0.0126	0.0586	0.1648	0.3326	0.5241
Size	7.5312	1.2537	5.9619	6.5990	7.4423	8.4782	9.2690
Liquidity	3.1725	21.5392	1.1717	1.5165	2.0537	3.0158	4.7896
Tangibility	0.2518	0.2220	0.0308	0.0773	0.1848	0.3702	0.5871
Cash Holding	0.1371	0.1568	0.0029	0.0241	0.0833	0.1943	0.3479
Performance	0.0849	0.1457	-0.0249	0.0193	0.0681	0.1375	0.2339
Non Debt TS	0.0524	0.0643	0.0076	0.0188	0.0385	0.0678	0.1104
Growth	8.0639	1.2046	6.7071	7.1615	7.8943	8.9307	9.7475

Notes: This table reports the principal descriptive statistics of the considered variables. The first column presents the average value calculated on the whole series and the second column presents the standard deviation. The next columns present the values of the quantiles. For example, the quantile of 0.1 is the value below which there are 10% of the total population. So, the value of "0.0126" corresponding to the leverage variable (the 1st line) means that there are 10% of the population which have a banking leverage level under 1.26% of the total asset.

The performance, or the part of net income in the total asset is 8.49%. The non-debt tax shield shows that the part of depreciation is 5.24% of the total asset on average. As for the growth, the log of sales is 8.06 on average. Overall, we notice that the bank leverage level of French SMEs is high (22.68% of the total asset), with a high level of liquidity (the current ratio is more than 3). The part of tangible assets is relatively low (only 25% of the total asset). The performance (or the return on asset) over the whole period is relatively high because the

net income is more than 8% of the total asset. The part of the depreciation that help reduce the taxable amount of the firms (non-debt tax shield) is relatively low, only 5.24%.

According to these descriptive statistics, we can describe our sample as follows. Overall, there are three main categories of SMEs in the sample. The first category includes small firms with a low performance that have almost no bank leverage (firms in the lowest quantiles, 0.1 and 0.25). These firms are representatives of the small firms experiencing difficulties, as shown by their size, turnover and the other indicators which are much lower than average. The management of their working capital requirement (WCR) is important as their current assets are only slightly higher than their current liabilities (a ratio of 1.5 in comparison with an average ratio of 3.1). In terms of cash holding, these firms have little leeway (only 2% of their total asset, in comparison with an average of 13%), and they have a much lower performance than the average (1.9% in comparison with an average of 8.49%). They have a very low level of bank debt (1.26% and 5.68%, respectively, for the first and the second quantiles, in comparison with an average of 22.68%). This can be explained through agency problems which evidence the weak contractual link between the owner-manager and financial providers, as well as with other firms' stakeholders, such as family members, clients or employees. On the one hand, from banks' perspectives, the lack of information regarding these firms, as financial data are often unavailable or uncontrolled, negatively influences the level of risk perceived, and consequently on the volume, cost and restrictions associated with credit offers (creating an effect of adverse selection). On the other hand, these small firms often perceive bank credits as a risky choice, as they are more expensive than internal financing sources and require the disclosure of sensitive information about their structure and functioning. In addition, these firms have a low cash holding ratio and few fixed assets which results in low depreciation. The growth rate of their turnover is close to the SMEs' average (7.16 in comparison with 8.06), but their performance is very low (1.93% against an average of 8.49%).

The second category comprises medium-sized firms which are evidenced by the middle-level quantiles: 50% of the investigated firms have a debt ratio lower than the average (16.48% in comparison with an average of 22.68%). This indicates that in the second half of the bank leverage distribution, some firms have more bank leverage than others: the firms in the 75% quantile reach a debt ratio of 33.26%, and the ones in the 90% quantile have a debt ratio of 52.41%. Overall, the firms in the 50% quantile have indicators that are lower than the average in terms of size, liquidity, tangibility, cash holding, performance, depreciation and

turnover growth rate. This indicates their financial weakness in comparison with the organizations included in the second half of the distribution.

The third category includes the largest SMEs – which have a size of 9.269 for the 0.9 quantile, in comparison with 5.9619 for the 0.1 quantile. In general, the organizations that have a better performance, but also a higher debt ratio, are situated around the 0.75 and 0.9 quantiles. For the firms in the 0.75 quantile, the liquidity and turnover growth rate are close to the average, while for the ones in the 0.9 quantile, all indicators are above average levels, which indicates a stable financial situation. They also have a higher bank leverage ratio than the others, between 33.26% and 52.41%, against an average of 22.68%. The high debt level can be again explained by the agency theory, as these firms are not only more profitable, but also more transparent than the smaller ones. Indeed, largest ones have to annually provide audited financial information, their employment situation, as well as a list of their debt and liabilities which can be verified through reciprocity auditing.

Finally, the performance was improved over the sample period for all company sizes. This can be the result of the deployment of the Responsibility and Solidarity Pact and the increase in the tax credit for competitiveness and employment, as well as the favorable evolution of external factors such as the depreciation of the Euro and the fall in oil prices. The finding of increased corporate capacity to generate wealth over the past few years is confirmed by the increase in economic and financial profitability ratios.

Table 4: Correlation matrix

	Size	Liquidity	Tangibility	Cash Holding	Performance	Non Debt TS	Growth
Size	1	-0.0037	0.1140***	-0.1800***	-0.0880***	0.0027*	0.8390***
Liquidity		1	-0.0160**	0.0360***	0.0150**	-0.0210***	-0.0530***
Tangibility			1	-0.2270***	-0.1330***	0.1960***	-0.0790***
Cash Holding				1	0.2110***	-0.0970***	-0.1830***
Performance					1	-0.2540***	-0.0300***
Non Debt TS						1	0.0280***
Growth							1

Notes: This table reports the correlation coefficients between the considered firm determinants of the bank leverage of SMEs. *** means that the coefficient is statistically significant at the 1% level. ** is for the 5% level and * is for the 10% level.

Table 4 presents the linear correlation between the variables. It shows that the correlation between size and liquidity is not significant. It means that the size of the firm has no relation with the liquidity level of the firms. The correlation between size and tangibility is

significantly positive. It means that the bigger the firm, the higher the part of tangible assets. The positive correlation is also found for the correlation between size and non-debt tax shield, and between size and growth. The correlation of size with cash holding and with performance is however negative. As for liquidity, the correlation is negative with tangibility, non-debt tax shield and growth while it is positive with cash holding and performance. Turning to the cash holding, its correlation with performance is positive while it is negative with non-debt tax shield and growth. For performance, its correlation with non-debt tax shield and growth are both negative. Finally, the correlation between non-debt tax shield and growth is positive.

The correlation coefficients show that in general, the size of the company (total asset) increases in concordance with the increase in capital investment in tangible assets (0.114), depreciation (non-debt TS) and growth of turnover. Indeed, when a company grows, its production cycle and its evolution of the turnover becomes mechanically more important. However, contrary what we can expect, the size of SMEs is moving in the opposite direction of changes in performance and cash holding. This can be explained by the large number of companies of very small sizes with low performance (as indicated above for firms in the 50% quantile). As for the liquidity ratio, it has a low correlation with the other indicators. Indeed, the evolution of the WCR (the liquidity ratio) is marked by the entry into force of the law on the modernization of the economy (2008). The investment in fixed assets strongly impacts the evolution of the immediate cash availabilities (a negative correlation of tangibility with cash holding at -0.227 and with the performance at -0.133). This suggests the presence unprofitable investments of very small firms (as indicated above). Finally, it is not a surprise to state a positive correlation between growth and depreciation (non-debt TS) which is 0.196.

Regarding the cash holding, it evolves in a positive correlation with the performance (0.211) but in the opposite direction of the growth of turnover (-0.183). This means that the cash availabilities resulting from sales are used more quickly to other purposes than to be kept in the reserves (for example, purchases of fixed assets, repayment of debts, increases of receivables or stocks...). It makes sense that the performance moves in the opposite direction of depreciation, but again it is surprising to note that sales growth does not improve the performance and vice versa (their correlation is -0.03). This can be explained once again by the large number of very small non-performing companies.

Overall, the statistical description of our sample shows that it is necessary to distinguish between different categories of firms in function of the quantile distribution of the bank leverage level. It is important to note that the higher is the level of bank debt, the higher is the

size of firms (measured by the value of total asset), as shown on Table 3. It means that the distinction between different quantiles of bank leverage level also allows us to distinguish the firms in function of their size. This indication will be important in the interpretation of results in Section 4.

The next section will present the methodology framework with the objective to analyze the impact factors at firm level on the bank leverage of SMEs in France.

3.2. Methodology: Quantile regressions for panel data

The quantile regression for panel data is chosen in this study because it allows detecting the impact of the independent variables on the dependent variable not in a linear way for the whole series but in a nonlinear way in dividing the distribution of the dependent variable in different quantiles. To the best of our knowledge, this is the first time that this approach is used for French SMEs.

The following equations show how we proceed:

$$y_{j,t} = \alpha + \theta_{\mu} x_{j,t} + \psi_{\mu} z_j + y\varepsilon_{j,t} \quad (1)$$

$$\text{Quant}_{\mu}(y_{j,t} | x_{j,t}) = \alpha + \theta_{\mu} x_{j,t} + \psi_{\mu} z_j + y\varepsilon_{j,t} \quad (2)$$

$y_{j,t}$ is the dependent variable indicating bank leverage level of firm j on date t ;

$x_{j,t}$ is a vector of bank debt drivers or independent variables (as defined in Table 1) of firm j on date t

α is the constant

θ_{μ} is the estimated coefficients vector related to the dependent variables $x_{j,t}$

μ indicates the quantile level

$y\varepsilon_{j,t}$ is the error terms of the estimation procedure

$\text{Quant}_{\mu}(y_{j,t} | x_{j,t})$ indicates the independent variable ($y_{j,t}$) by quantile level (μ) conditional to the dependent variable $x_{j,t}$.

Equation (1) presents the linear version of the estimation that shows the results for the whole series of the independent variable without distinguishing between quantiles. Equation (2) presents the quantile version of the estimation in which the independent variable is divided into different sub-samples determined by the values of quantiles. The quantiles that we consider are 0.1, 0.25, 0.5, 0.75 and 0.9. The quantile regression for panel data is estimated using the method OLS. So, the use of this method ensures the robustness of our empirical results.

Equations (1) and (2) are first estimated for the whole period 2003-2016. In the second step, the impact of the GFC is investigated through the estimation of equations (1) and (2) for three distinct sub-periods: the pre-crisis period (2003-2007), the crisis period (2008-2009), and the post-crisis period (2010-2016). The comparison of the estimated coefficients over the three different sub-periods and over different quantiles of bank leverage levels will help us detect the nonlinear nature of the relationship between firm-factors and the level of bank leverage both in time and in the quantile distribution. This also contributes to explain the mixed results obtained in the previous studies in this topic.

The next section will detail the results obtained and its managerial implications.

4. Results and discussions

Tables 5 to 8 are organized in two different parts. Part 1 is for the whole series (named “All Sample”) while part 2 is for different quantiles from 0.1 to 0.9. For example, at quantile 0.1, we do the estimation for the 10% of the firms that have a bank leverage level lower than 1.26% of total asset (the quantile value indicated in Table 2). At quantile 0.25, we do the estimation for the 25% of the firms that have a bank leverage level lower than 5.86% of total asset, and so on for the other quantiles. For each quantile, there are two columns: the first one is for the value of the estimated coefficients (which are the principal results) and the second column shows the standard error. A significant and positive coefficient means that the corresponding firm-factor impacts the banking leverage of SMEs positively. In the contrary, a significant and negative coefficient means that the corresponding firm-factor impacts the bank leverage level negatively. In order follow the structure of our hypotheses’ formulation, we will analyze the results for each one of the dependent variables through four different periods (the whole period and the three sub-periods under-consideration).

Table 5: Regression results for the *whole period*

All sample			Quantiles									
			0.10		0.25		0.50		0.75		0.90	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Size	-0.1085***	0.0023	-0.0795***	0.0018	-0.1088***	0.0022	-0.1241***	0.0029	-0.0851***	0.0026	-0.0393***	0.0037
Liquidity	-0.0002***	0.0001	-0.0491***	0.0000	-0.0319***	0.0000	-0.0090***	0.0001	-0.0001**	0.0000	-0.0001***	0.0000
Tangibility	0.0485***	0.0074	-0.1244***	0.0066	-0.0327***	0.0073	0.0405***	0.0091	0.0428***	0.0078	0.0291**	0.0112
Cash Holding	-0.1726***	0.0099	-0.1214***	0.0077	-0.2106***	0.0093	-0.2555***	0.0123	-0.1651***	0.0113	0.0014	0.0170
Performance	-0.5720**	0.0106	-0.1598***	0.0097	-0.2858***	0.0103	-0.4571***	0.0132	-0.6334***	0.0130	-0.7470***	0.0231
Non Debt TS	-0.0785**	0.0239	0.0562*	0.0334	0.0579**	0.0286	-0.0663**	0.0295	-0.1610***	0.0239	-0.0421	0.0353
Growth	0.0984***	0.0024	0.0791***	0.0018	0.1046***	0.0022	0.1174***	0.0030	0.0740***	0.0027	0.0290***	0.0039
Intercept	0.6815**	0.0109	0.5092***	0.0092	0.5647**	0.0107	0.6585***	0.0135	0.8474***	0.0114	0.9770***	0.0156
Adj. R2		0.1891										
Pseudo R2				0.2161		0.1644		0.1180		0.1073		0.1251
#Obs	24825		24825		24825		24825		24825		24825	

Notes: This table reports the results of the estimation for the whole period (2003-2016). The dependent variable is the banking leverage. Coef. is for the value of the estimated coefficients. Std. Err. is for the standard error of the estimated coefficients. “All sample” means that the estimation is performed on the whole series while “Quantiles” means that the estimation is performed on a portion of the series following the quantiles. *** means that the coefficient is statistically significant at the 1% level. ** is for the 5% level and * is for the 10% level.

Table 6: Regression results for the *pre-crisis period (2003-2007)*

	All sample		Quantiles									
	Coef.	Std. Err.	0.10		0.25		0.50		0.75		0.90	
			Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Size	-0.0903 ^{***}	0.0035	-0.1038 ^{***}	0.0036	-0.1341 ^{***}	0.0037	-0.1164 ^{***}	0.0041	-0.0643 ^{***}	0.0046	-0.0254 ^{***}	0.0049
Liquidity	-0.0001	0.0001	-0.0301 ^{***}	0.0000	-0.0065 ^{***}	0.0000	0.0000	0.0000	-0.0001 ^{***}	0.0000	-0.0001 ^{***}	0.0000
Tangibility	0.0112	0.0117	-0.0769 ^{***}	0.0127	-0.0187	0.0126	0.0512 ^{***}	0.0138	0.0366 ^{**}	0.0154	0.0277 [*]	0.0156
Cash Holding	-0.1103 ^{***}	0.0168	-0.1685 ^{***}	0.0176	-0.2052 ^{***}	0.0172	-0.1912 ^{***}	0.0198	-0.0859 ^{***}	0.0230	-0.0153	0.0233
Performance	-0.6263 ^{***}	0.0160	-0.2557 ^{***}	0.0183	-0.4236 ^{***}	0.0161	-0.5803 ^{***}	0.0187	-0.6984 ^{***}	0.0242	-0.7345 ^{***}	0.0308
Non Debt TS	-0.0414	0.0407	-0.0098	0.0380	-0.1093 ^{***}	0.0419	-0.2547 ^{***}	0.0477	-0.2363 ^{***}	0.0579	-0.1169 [*]	0.0707
Growth	0.0754 ^{***}	0.0035	0.1025 ^{***}	0.0036	0.1289 ^{***}	0.0037	0.1029 ^{***}	0.0041	0.0480 ^{***}	0.0048	0.0135 ^{***}	0.0052
Intercept	0.7704 ^{***}	0.0160	0.4860 ^{***}	0.0167	0.5502 ^{***}	0.0170	0.7516 ^{***}	0.0188	0.9394 ^{***}	0.0201	1.0196 ^{***}	0.0194
Adj. R2		0.2112										
Pseudo R2				0.1664		0.1262		0.1124		0.1259		0.1581
#Obs	8379		8379		8379		8379		8379		8379	

Notes: This table reports the results of the estimation for the whole period (2003-2016). The dependent variable is the banking leverage. Coef. is for the value of the estimated coefficients. Std. Err. is for the standard error of the estimated coefficients. “All sample” means that the estimation is performed on the whole series while “Quantiles” means that the estimation is performed on a portion of the series following the quantiles. ^{***} means that the coefficient is statistically significant at the 1% level. ^{**} is for the 5% level and ^{*} is for the 10% level.

Table 7: Regression results for the crisis period (2008-2009)

	All sample		Quantiles									
	Coef.	Std. Err.	0.10		0.25		0.50		0.75		0.90	
Coef.			Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	
Size	-0.0936***	0.0059	-0.0700***	0.0042	-0.1001***	0.0052	-0.1081***	0.0073	-0.0733***	0.0072	-0.0295***	0.0098
Liquidity	-0.0029***	0.0008	-0.0650***	0.0003	-0.0394***	0.0005	-0.0132***	0.0010	0.0000	0.0009	-0.0009	0.0011
Tangibility	0.0364**	0.0185	-0.1754***	0.0141	-0.0509***	0.0162	0.0846***	0.0226	0.0678***	0.0226	0.0515*	0.0285
Cash Holding	-0.1469***	0.0259	-0.0990***	0.0186	-0.1777***	0.0224	-0.1808***	0.0318	-0.1145***	0.0335	-0.0199	0.0437
Performance	-0.5939***	0.0259	-0.1892***	0.0207	-0.3381***	0.0228	-0.5451***	0.0318	-0.6949***	0.0359	-0.7503***	0.0547
Non Debt TS	0.0023	0.0750	0.0692	0.0533	0.1023	0.0673	-0.0931	0.0902	-0.1567*	0.0865	-0.1041	0.0959
Growth	0.0780***	0.0063	0.0706***	0.0043	0.0923***	0.0054	0.0995***	0.0077	0.0576***	0.0076	0.0151	0.0103
Intercept	0.7676***	0.0272	0.5760***	0.0200	0.6447***	0.0242	0.7178***	0.0334	0.9104***	0.0317	1.0381***	0.0393
Adj. R2		0.2041										
Pseudo R2				0.2289		0.1629		0.1248		0.1310		0.1560
#Obs	3653		3653		3653		3653		3653		3653	

Notes: This table reports the results of the estimation for the whole period (2003-2016). The dependent variable is the banking leverage. Coef. is for the value of the estimated coefficients. Std. Err. is for the standard error of the estimated coefficients. “All sample” means that the estimation is performed on the whole series while “Quantiles” means that the estimation is performed on a portion of the series following the quantiles. *** means that the coefficient is statistically significant at the 1% level. ** is for the 5% level and * is for the 10% level.

Table 8: Regression results for the *post-crisis period (2010-2016)*

	All sample		Quantiles									
	Coef.	Std. Err.	0.10		0.25		0.50		0.75		0.90	
			Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Size	-0.1002***	0.0038	-0.0675***	0.0023	-0.0964***	0.0031	-0.1053***	0.0038	-0.0902***	0.0052	-0.0485***	0.0068
Liquidity	-0.0077***	0.0007	-0.0563***	0.0002	-0.0424***	0.0004	-0.0252***	0.0007	-0.0087***	0.0011	-0.0010	0.0013
Tangibility	0.0472***	0.0108	-0.1451***	0.0071	-0.0470***	0.0090	0.0168	0.0107	0.0356**	0.0140	0.0040	0.0181
Cash Holding	-0.1332***	0.0140	-0.0852***	0.0082	-0.1667***	0.0109	-0.1962***	0.0138	-0.1596***	0.0192	0.0246	0.0265
Performance	-0.5817***	0.0162	-0.1442***	0.0096	-0.2607***	0.0130	-0.4342***	0.0161	-0.6054***	0.0238	-0.7544***	0.0364
Non Debt TS	-0.1581***	0.0321	0.0115	0.0197	0.0472	0.0345	0.0054	0.0318	-0.0965***	0.0353	0.0258	0.0414
Growth	0.1037***	0.0040	0.0710***	0.0024	0.0999***	0.0032	0.1120***	0.0040	0.0966***	0.0053	0.0471***	0.0068
Intercept	0.5706***	0.0170	0.4924***	0.0116	0.5122***	0.0144	0.5617***	0.0168	0.6779***	0.0212	0.8756***	0.0257
Adj. R2		0.1967										
Pseudo R2				0.2513		0.2014		0.1462		0.1105		0.11
#Obs	12793		12793		12793		12793		12793		12793	

Notes: This table reports the results of the estimation for the whole period (2003-2016). The dependent variable is the banking leverage. Coef. is for the value of the estimated coefficients. Std. Err. is for the standard error of the estimated coefficients. “All sample” means that the estimation is performed on the whole series while “Quantiles” means that the estimation is performed on a portion of the series following the quantiles. *** means that the coefficient is statistically significant at the 1% level. ** is for the 5% level and * is for the 10% level.

4.1. The impact of size on bank leverage level

The observation of Tables from 5 to 8 shows that all the coefficients are significant and negative. It means that for French SMEs, the lower the total asset of the firm, the higher the level of bank leverage. This result contradicts our theoretical hypothesis stating a positive relationship between size and the bank leverage level. One possible explanation of this negative relationship is that SMEs used other financing means during the 2003-2016 period (from family, WCR management, own funds for smaller ones, and bonds for bigger ones). However, for the last two quantiles (0.75 and 0.9), value of the coefficients is smaller suggesting that for firms that already have a high level of bank leverage, the impact of the size on the bank debt level is less than for firms which have lower bank debt level. This may be explained by the fact that debt is less expensive for these larger firms thanks to their lower bankruptcy cost and their lower information asymmetry. It is worth noting that the interest rate has been historically low in France and the French government conducted initiatives to help SMEs to survive after the GFC, for example the Responsibility and Solidarity Pact in 2013.

The comparison between the three sub-periods (Tables 6 to 8) shows that there is no changes in the sign and the significance level of all the coefficients. They are always significantly negative at 1%, confirming our hypothesis. However, we notice that the coefficients tend to be lower during the crisis, especially for the 0.1; 0.25 and 0.5 quantiles. It means that, during the crisis, the size of the firms had a lower impact on the bank leverage level. This may suggest that size was a less important criterion in the decision of banks to provide credit to the firms during the GFC. Indeed, for banks, these small businesses are often young companies with little information at their disposal. It thus increases the uncertainty about repayment capabilities. According to Paranque (2005) and Gardes and Machat (2013), the risk for SMEs is less about their profitability than uncertainty about their sustainability. Thus, in a situation of economic crisis, they become the main victims of the credit crunch. This may be explained by the fact that loan applications decreased during the GFC because of the erosion of business confidence in banks and seek other ways to finance their businesses (for example with crowdfunding, business angels, etc.). A recent study³ indicates that 28% of business loan applications were rejected in 2010. Another reason is the sluggishness of the economy which encourages businesses to rebuild their cash flow rather than to invest in new projects (Alexandre and Buisson-Stéphan 2014).

³ Business Monitor for BIS (July 2011).

4.2. The impact of liquidity on bank leverage level

As for the impact of liquidity (the ratio between current assets and current liabilities) on the bank leverage level, the empirical results confirm our theoretical hypothesis about its negative impact. It means that the higher the liquidity level of the firm, the lower the level of bank leverage. This result thus confirms the pecking order theory stating that firms will prefer internal funding in order to preserve the control. Indeed, the excess of short-term liquidity (between current assets and current liabilities) is used to finance the activities of the firm which conducts to a lower need of bank loans and explains this negative relationship. However, we notice that the value of the coefficients is lower for liquidity than for size. It means that liquidity is a less significant factor of the bank leverage level of SMEs.

The comparison between the quantiles shows that the value of the coefficients changes in function of the quantile and in general, the higher the quantile, the lower the coefficient is. It means that the higher the level of bank debt, the less the impact of liquidity is. This result suggests that the more the firms have bank debt, the less the liquidity plays an important role in the financing of the firms' activities. This seems to be logical because the financing is performed with bank loans for these firms. This may be explained by the trade-off theory stating that firms will balance between the cost and advantage of debt. In this case, the firms in the high quantiles prefer long-term debt from banks than short-term debt from current liabilities.

The comparison between the three sub-periods shows that the coefficients tend to be higher during the GFC than before the GFC. This suggests that during the GFC, the liquidity level of firms had a higher impact on the bank leverage level. It may suggest that during this difficult time for SMEs, the banks pay more attention on the ability of SMEs to finance their current assets. The remaining negative coefficients suggest that the lower the liquidity level, the lower the bank leverage level. So, for banks, the less the firm is able to finance its current assets, the less they accept to lend money to this company. This can be explained by the higher agency cost and information asymmetry of firms with low liquidity level. The situation remains the same during the post-crisis period.

There are however two exceptions: the coefficient is not significant for the 0.5 quantile in the pre-crisis period, for the 0.75 and 0.9 quantiles in the crisis period and for the 0.9 quantile in the post-crisis period. Several important information can be drawn from this exception. First, it is important to distinguish between the quantiles of the bank leverage level. Second, it is important to distinguish between the time periods when investigating the determinant

factors of bank leverage level of SMEs. Third, this insignificance of the three mentioned coefficients shows that for firms that are highly indebted (in the quantiles from 0.5 to 0.9), the level of liquidity does not play an important role in the determination of the bank debt level in the crisis period. This may suggest that for firms that already have a high level of debt, they already acquire a certain confidence from banks and thus the level of liquidity of these firms is not an important factor for banks in the evaluation of the loan application.

4.3. The impact of tangibility on bank leverage level

The impact of tangibility on the bank leverage level changes following the quantile and the time period. Our theoretical hypothesis stimulates that this relationship should be positive because a higher proportion of fixed assets means a higher level of guarantee, thus a lower bankruptcy cost and a lower information asymmetry, and finally a higher level of loans that banks accept to lend. However, this hypothetical relationship is not validated for the 0.1 and 0.25 quantile in all periods (with negative and insignificant coefficients). As for the higher quantiles (0.5; 0.75 and 0.9), the coefficients are however positive or insignificant for all periods. This difference between low and high quantiles of the bank leverage level is interesting. For firms with a low level of bank leverage, the higher is the proportion of fixed assets, the lower is the level of bank leverage. This result can be explained by the fact that for these very small firms, the bankruptcy cost and information asymmetry are so high that the banks do not want to lend them money even with a higher level of fixed assets. When the firms attain a certain size (from the 0.5 quantile), the banks are more confident and provide loans to these firms more easily. This shows how it is difficult for very small firms to obtain bank loans⁴. This finding may also suggest that the smallest firms do not use the bank debt to finance their fixed assets while larger firms depend strongly on bank loans to finance their tangible assets. These latter will need as much funding as their assets and activities are high (Berger and Udell 1998).

The comparison between the three sub-periods shows the sign and the significance of the coefficient do not change, confirming thus our hypothesis. However, the value of these coefficients is higher during the GFC period for all quantiles. It means that during the crisis, the proportion of fixed assets plays a more important role in the evaluation of the loan applications than before and after the crisis period. It means that in difficult times, fixed assets show an important signal to gain confidence from banks. However, for very small firms, the

⁴ See for example Hoang et al. (2017) for more information about very small firms in France.

relationship remains negative during the crisis period and confirms their difficulty to obtain bank credits. In some cases, the coefficients are insignificant in the pre-crisis and post-crisis periods (at 0.25 quantile and 0.5; 0.9 quantiles, respectively). This finding means that in more stable periods, fixed assets may play a less important role in the determination of the bank leverage level. The coefficients are lower in the post-crisis period. It means that the situation improves after the crisis for very small firms and the bank easing policy works and smaller firms are more open to bank lending. This is thanks to the European Central Bank's quantitative easing policy. The lower value of coefficients during the post-crisis period also suggests that the increase in fixed assets is made more with equity than debt. Again, these results show the importance to distinguish between both quantiles and time periods.

4.4. The impact of cash holding on bank leverage level

As for the impact of cash holding on the bank leverage level, our theoretical hypothesis suggests that the relationship should be negative. This is because following the pecking order theory, firms will finance by cash first before using bank debt. So, the higher the level of cash, the lower the level of bank leverage is. Following the empirical results, our hypothesis is validated in almost all cases, except for the last quantile (0.9) for which the coefficients are not significant in all periods. This exception can be explained by the fact that for firms that are already highly indebted, the level of cash does not play an important role in the level of bank leverage. Thus, the low interest rate is also profitable for large and already highly indebted SMEs. For the first quantile, the coefficient is lower than the others in the whole period (-0.12). It may be explained by the fact that for these very small firms, short-term debt is a solution for immediate liquidity. We also notice that the value of the coefficients related to cash holding is much higher than that of the other variables (except for the performance variable). It means that the value of cash held by SMEs constitutes an important signal to banks in the evaluation loan applications. It also suggests that the level of cash holding constitutes an important signal to SMEs in the decision to apply for bank loans.

The comparison between the three sub-periods shows that the coefficients are the lowest in the crisis period for almost all cases (except for the 0.75 quantile). It means that the cash level impacts less on the level of bank leverage during the crisis period. This may be explained by the fact that during crisis time, cash holding is used to finance firms' activities. Its level thus decreased during this period and has less impact on the level of bank leverage. Furthermore, in a situation of financial and economic crises, the restriction of access to bank credit is

strengthened (Alexandre and Buisson-Stéphan 2014). This rationing is particularly harmful for the firms in the 0.25 and 0.5 quantiles having to balance between the risk of indebtedness (their debt level is between 5.86% and 15.48% of the total asset, see Table 3) and the loss in profitability (their level of profitability is below the average, 1.9% and 6.8%, against 8.49% on average, see Table 3). It is worth noting that outstanding bank loans have evolved during the crisis faster than the GDP in value as bank indebtedness has been more abundant and cheaper since 2007 in France than in the European Union (Rameix, 2011). Furthermore, the European Investment Fund has provided guarantees to French financial intermediaries, allowing them to be partially capitalized by the secured portfolios (Kraemer-Eis et al. 2016). In the post-crisis period, indebtedness is also used for investments with which firms can profit from the tax credit for competitiveness and employment⁵ which moved from 4% of the payroll in 2013 to 6% in 2014.

4.5. The impact of performance on bank leverage level

As for the impact of performance on the bank leverage level, basing on the pecking order theory, our hypothesis suggests that it should be negative because the higher the performance, the more firms can use internal funding provided by profit, and the less they need to use external financing from banks. The empirical results validate this hypothesis because all the coefficients are significantly negative and their value is the highest compared to those related to the other variables. It shows clearly that performance is the most important factor in the determination of the bank leverage level. On the bank side, a good performance shows that the firm has a good health and is thus less risky to invest in. On the firm side, a good performance incites it to develop more and has a higher need for financing. The negative relationship shows however that this development is more financed by internal funds than external funds because the higher is the performance, the lower is the level of bank leverage. So, the pecking order theory explains the bank leverage choice of French SMEs.

The comparison between the three sub-periods shows that the coefficients are lower in the crisis period than in the pre-crisis period. This means that during the crisis period, the performance impacts less on the bank leverage level. This may be explained by the fact that during the crisis period, the performance of SMEs is lower than the pre-crisis period and thus has less impact on the bank leverage level. The comparison between the quantiles shows that

⁵ The purpose of the competitiveness and employment tax credit (CICE) is to finance the improvement of companies' competitiveness through, inter alia, investment, research, innovation, training, recruiting, prospecting for new markets, ecological and energy transition and rebuilding their working capital.

the higher is quantile, the higher the value of the coefficients is. This may be explained by the fact that the higher the level of bank leverage, the more the firm can be profitable and the less they depend on bank financing for future development. This constitutes a vicious circle in the financing SMEs. The more they have bank loans, the higher their profitability and the less they will need bank loans for the next circle.

4.6. The impact of non-debt tax shield on bank leverage level

As for the impact of non-debt tax shield on the bank leverage level, the results are mixed while the theoretical hypothesis suggests a negative relationship. Indeed, following the hypothesis, the amount corresponding to the non-debt tax shield related to the depreciation of assets can be used to finance the firms. Thus, a higher value of the non-debt tax shield should reduce the value of bank leverage. Empirically, this relationship is mixed, meaning positive in some cases, negative in some cases and insignificant in some others. It means that the nonlinearity is the most present for this variable. However, a rule seems to be applied: for most quantiles, the coefficients are not significant in the crisis and post-crisis periods. It may suggest that after the onset of the crisis, the banks less consider the non-debt tax shield when evaluating loan applications of SMEs. As we mentioned above, the performance remains the most important determinant of the bank leverage level. For the other periods, the coefficients are negative in most cases following our hypotheses. Indeed, DeAngelo and Masulis (1980) argue that depreciation leads to tax deductions. As a result, these non-debt tax shields can replace the tax advantages of debt (Titman and Wessels 1988), and firms with large non-debt tax shields would be less likely to be heavily leveraged.

However, there are two exception in the whole period, at 0.1 and 0.25 quantiles, for which the coefficients are significantly positive meaning that the higher the non-debt tax shield, the higher the bank leverage level is. These two exceptions are for firms in the lowest quantiles with low levels of bank leverage. We can thus deduce that for very small firms with low level of bank debt, a higher value of non-debt tax shield may indicate a higher capacity to reimburse the loans and encourage banks to lend them money. On the other hand, the comparison between quantiles shows that the higher the quantile, the higher the value of the coefficients is for quantiles higher 0.5 and in the pre-crisis period. It means that for firms that are already highly indebted, the higher is their debt, the less the non-debt tax shield impacts on their bank leverage level, in the pre-crisis period. It suggests that an existent high level of debt can be already a good signal for banks and they are less attentive on other indicators of

firms. However, result changes after the occurrence of the GFC (crisis and post-crisis periods) for which the higher the quantile, the higher the value of the coefficients is. This suggests that the GFC changes the way that banks evaluate loan applications and makes them paying more attention on other indicators of firms such as the non-debt tax shield.

4.7. The impact of growth on bank leverage level

As for the impact of sales' growth on the level of bank leverage, our hypothesis suggests a positive relationship and our empirical results validate this hypothesis. French SMEs thus follow the pecking order theory because they prefer internal funding offered by the growth of sales than external funding. This is true for all quantiles and all period, except for the 0.9 quantile in the crisis period for which the coefficient is insignificant. The comparison between the three sub-periods shows that the value of the coefficients is the lowest during the crisis period. It means that during this period, the growth of sales impacts less on the bank leverage level than before and after the crisis. This can be explained by the fact that the growth of sales is lower in this period and thus provides a lower impact which is still significant and positive. The comparison between the quantiles shows again that for quantiles under 0.5, the higher the quantile, the higher the value of the coefficients; while for quantiles over 0.5, it is the inverse. This means that for firms that are already highly indebted, the growth of sales is less determinant in the level of bank leverage. Again, it suggests that a high level of bank leverage constitutes a positive signal to banks because the firms are already accepted in previous loan applications. That is why the other indicators of these firms have less effect than for firms that have lower bank debt level.

5. Conclusion

Based on a sample of 24,825 firm-year observations on French SMEs over the 2003-2016 period, we have performed a quantile analysis on the impact of size, liquidity, tangibility, cash holding, performance, non-debt tax shield and growth on the level of bank leverage. The empirical results show that it is necessary to consider the nonlinear aspect when investigating firm-determinants of the level of bank leverage of SMEs. This nonlinearity can be in the level of bank debt and in time. Indeed, for firms which have a medium and high level of bank leverage (more than 16% of the total asset, in the quantiles over 0.5), the impact of firm factors is lower than for firms which have a low level of bank debt (less than 16% of the total asset, in the quantiles under 0.5). This finding suggests that a firm which already has a

medium and high level of bank leverage can give more confidence to banks when examining the loan applications because this firm was already examined in this past. In this case, banks pay less attention on the other indicators of the firms such as size, liquidity, tangibility, cash holding, performance, non-debt tax shield and growth.

It is also important to note that contrarily to our theoretical hypothesis, the size of French SMEs (measured by total asset) has a negative impact on the level of bank leverage. It means that the higher is the size of firms, the lower is the level of bank leverage. This negative relationship for French SMEs can be explained based on the pecking order theory because the larger the firm, the more it can finance its activities and investments by internal funds in order to preserve the control on the firm. It also indicates that the growth in the total asset of SMEs is not financed by bank leverage but by other means.

The results on the other variables also indicate that the pecking order theory is more adapted to the case of French SMEs, confirming the finding of Bellettre (2010) and Hoang et al. (2017). Indeed, the results indicate that whenever the firms can use internal funding offered by a higher level of liquidity, of cash-holding, of performance, of non-debt tax shield, and of sales, they will less use external funding such as bank loans in order to preserve the control of the firm. We also note that for banks, the most important criterion when examining the loan applications of SMEs is the performance of the firm. This is followed by the cash holding level, sales, non-debt tax shield, tangibility, size and liquidity. Contrarily to what we believe, the use of tangibility as guarantees is less important than the cash holding level in the viewpoint of banks.

It is also important to note that the global financial crisis of 2008-2009 has a significant impact on the way the firm factors impact on the level of bank leverage. In almost all cases, the value of the estimated coefficients is lower in the crisis period. It shows that there was a significant change in the way that firms consider the confidence on banks and also in the way that banks provide loans to finance SMEs' activities. As for the firm side, entrepreneurs have less confidence on banks after the collapse of Lehman Brothers and other large banks. As for the bank side, they have less resources due to their loss on financial markets. As a consequence, there were less banks loans provided during the financial crisis and it also changes the way that banks consider firm factors when examining loan applications. As a response to this situation, the French government develops different programs to sustain the financing of SMEs, such as the creation of the BPI (*Banque Publique d'Investissement*, or

Public Bank for Investment, in 2012) and the program on tax credit for competitiveness and employment.

Our finding also reveals that the SMEs that are the most exposed to the rationing of bank credit during the crisis period are young, generate less profitability and have fewer fixed assets available to guarantee. This confirms the finding of Paraque (2003), Alexandre and Buisson-Stéphan (2014) and Gardes and Machat 2013. Depending on the risk, smaller SMEs are less affected by their profitability than by the uncertainty about their sustainability. Thus, in a situation of economic crisis, they are the main victims of the credit crunch. In this context, the challenge of SMEs for which the informational structure is characterized by a certain level of opacity is to produce information on how it manages a sustainable development in order to obtain the best support possible (Ang 1991). The establishment of an implicit long-term relationship with a bank may nevertheless allow them to limit credit rationing situations (Sharpe 1990, Gardes and Machat 2013).

Compared to previous studies, our study with a quantile regression nuance the results of previous studies and help explain the inconclusive findings. Indeed, the results depend on the quantiles of the bank leverage distribution. Not considering this aspect may conduct to a linear conclusion that does not reveal the precise nature of the role that firm factors have on the level of bank leverage, as we have shown in this study. For this reason, we suggest the consideration of the quantile approach for future research on the factors impacting the financing of firms.

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