The capital structure of French SMEs and impact of the financial crisis: A dynamic panel data analysis (2002-2010)

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ACCEPTED PAPERS

Dear authors and co-authors of the accepted paper,

Congratulation for having you paper accepted into the World Finance Conference, which will take place at the Cagliari University, Sardinia, Italy, between July 26th and 28th, 2017.

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List of the Accepted Papers

| The capital structure of French SMEs and impact of the financial crisis: A dynamic panel data analysis (2002-2010) | • Philippe Adair - University Paris-Est Creteil (FR)
• Mohamed Adaskou - University Ibn Zohr (MA) |

The capital structure of French SMEs and impact of the financial crisis:
A dynamic panel data analysis (2002-2010)

Abstract

We test two main theories of the capital structure upon a balanced panel dataset of 2,370 French SMEs during nine years over the period 2003-2007and the period 2008-2010. Trade-off theory is based on the optimization of a target debt ratio, whereas pecking order theory argues that decision-making is sequential and that firms prefer internal funding to debt, due to asymmetry of information. According to the estimates from the dynamic panel model (GMM), profitability, guarantees upon which access to credit is granted and trade credit confirm trade-off theory. Relationships between debt and the lagged debt ratio, growth opportunities, credit risk and control over ownership support the pecking order theory, which passes better the tests. Hence, no unified theory of the capital structure has yet emerged.

1. Introduction

The access to finance stands as one of the main obstacles to the survival and growth of SMEs. The 2007 financial crisis has exacerbated the difficulties in this area, while SMEs face a double shock, which affect their cash flows: a fall in demand and the tightening of credit conditions, (ECB, 2009). SMEs are more vulnerable in times of crisis for a number of reasons: they cannot easily downsize because they are already small; their financial structure is fragile in as much as they depend on credit and their rating is lowest in terms of credit risk; etc. This article investigates the financial structure of French SMEs and the effects of the 2007 financial crisis by comparing the pre-crisis period and its aftermath.

Brealey, Myers and Allen (2010) state that "*how financial decisions are made*" remains an unanswered question. However, standard corporate finance theory holds that its core concepts are applicable to the financing of all kinds of firms. It assumes the capital structure that maximise the firm value is a matter of choice depending upon a combination of various means of external funding. Debt financing requires payback with cash flow commitments that are independent of the successful use of the money borrowed. Equity financing is less risky as regards cash flow commitments, albeit it dilutes share ownership, control and earnings. The cost of equity is higher than the cost of debt that is a deductible expense.

Search for evidence regarding the capital structure of firms (Rajan and Zingales, 1995) and existence of an optimal financial structure are ongoing research topics in corporate finance. Since the seminal work of Modigliani and Miller (1958, 1963) on the capital structure of business, several theories have developed to release the assumptions of perfect market and the absence of bankruptcy costs, agency costs or transaction costs.

Among these, two major theories emerged. On the one hand, Trade-Off Theory (TOT) holds that firms choose how to allocate their resources comparing the tax benefits of debt with the bankruptcy costs thereof, thus targeting an optimal debt ratio. On the other hand, Pecking Order Theory (POT) challenges the former theory, contending that firms rank sequentially their decision over funding sources: they avoid external financing if they have internal financing available and avoid new equity issuance whenever they can engage in new debt financing. Tests of POT have proved controversial. According to Shyam-Sunder and Myers

(1999), the test over a small sample (157 US firms) over the period 1971–1989 is positive, whereas Frank and Goyal (2003) find that it fails for US small sized-firms whereof information asymmetry is important. Little attention has been paid to the fact that SMEs may not fit standard corporate finance theory, which deserves to be tested in this respect.

López-Gracia and Sogorb-Mira (2008) point out that Small and Medium Enterprises (SMEs) aim to achieve an optimal debt ratio, which is the best explanation for the capital structure of French SMEs (Dufour and Molay, 2010). In contrast, Brounen, De Jong and Koedijk (2004) hold that SMEs lack concern for such a ratio: their financial behaviour being distinct from that of large companies and one may look for a more relevant alternative theory.

In the absence of a financial theory specific to SMEs, research in finance attempted to adopt the teachings of these two theories to study debt behavior of these companies. The funding of SMEs faces various constraints such as the cost of credit, the level of own funds and dependence on customers and suppliers; these patterns deserves thorough analysis, particularly as regards the credit crunch and contraction in activity that occurred since 2008. SMEs often experience problems of asymmetric information, involving substantial information costs, which are typically addressed by POT. Nevertheless, these companies could also aim for a target debt ratio in accordance with TOT.

We address the following controversial issue: which of Trade-Off Theory (TOT) or Pecking Order Theory (POT) provides the best predictions as regards the borrowing behaviour of unlisted SMEs? We examine the main determinants of corporate leverage strategy (both short-term as well as medium and long-term debt) upon a sample of 2,370 French SMEs selected from the DIANE database over a nine-year period (2002–2010). It enables us to compare our outcomes with those of other French studies devoted to this issue since the 1990s, which mostly used non-dynamic panel data analysis upon smaller samples. Thus, our article provides an update and enlarges the prospect.

Our paper is organised as follows: Section 2 sketches the core content related to TOT and POT as regards the debt ratio. Section 3 describes the key variables selected in order to test these assumptions. Section 4 presents the sample and descriptive statistics; it designs the theoretical model and econometric techniques. Section 5 examines the outcomes. Section 6 concludes.

2. Theories of the financial structure of SMEs

2.1. Trade-off Theory (TOT): taxation, bankruptcy and agency costs

Upon strong assumptions such as capital markets are perfect and there are neither tax or agency costs nor transaction costs, Modigliani and Miller (1958) demonstrate that the financial structure is neutral *vis-à-vis* the value of the company. Later on, Modigliani and Miller (1963) relax the neutrality axiom and include taxation: the value of an indebted company is equal to that of a non-corporate debt, plus the present value of the tax savings from debt and less the present value of costs related to potential financial difficulties. Hence, because interest are deductible from taxable profits, firms have an incentive to use debt rather than equity. The value of a leveraged firm is higher in as much as the tax rebate benefits only the business itself, save personal income (Miller, 1977).

As for SMEs, they already enjoy a low tax rate that limits at some point any leverage policy conditional to a rebate on interest charges (Ang, 1991). According to Pettit and Singer (1985), SMEs do not follow tax optimisation because they are less likely to be profitable.

The existence of bankruptcy costs (Stiglitz, 1969) involves a balance between the value of the firm and tax benefit; it theoretically drives to an optimal debt level when the marginal benefits associated with tax rebate are equal to the marginal costs associated with bankruptcy due to leverage.

Similarly, forsaking the hypothesis of no agency costs allows for the theoretical existence of an optimal capital structure. Agency theory (Jensen and Meckling, 1976) assumes that there are conflicts of interest between the principal (shareholders) and the agent (business managers); hence, triggering agency costs that affect financing. Conflicts of interest between shareholders and creditors arise because the latter have priority over the former in case of bankruptcy. An optimal debt ratio is achieved when agency costs are minimum.

SMEs should tend to reduce debt in the event that bankruptcy costs are borne. SMEs face no or little agency costs between managers and shareholders, because they are often confused, unless the firm belongs to a group. However, agency conflicts between owners and lenders arise. According to Adam et al (1989, in Colot and Michel, 1996), the lender (principal) experiences difficulties in monitoring the decision of a small firm owner-manager (agent), mostly because transparency in information systems that generates agency costs is missing (Cieply, 1997).

2.2. Pecking Order Theory (POT) and asymmetry of information

Myers and Majluf (1984) developed Pecking Order Theory (POT) upon the asymmetry of information between internal stakeholders (owners and managers) and external providers of the firm. Business leaders adopt a financial policy, which aims at minimising the costs associated with asymmetric information, especially adverse selection, and prefer internal financing to external financing. This theory assumes that decision making of a business leader complies with the following sequence: self-financing, non-risky debt issuance, risky debt issuance and equity issuance as a last resort. Such behaviour eschews a fall in the prices of shares of the firm; it restricts the distribution of dividends in order to increase cash flow and reduces the cost of capital by limiting as much as possible access to loans. Thus, profitable firms enjoy more internal funds available.

Asymmetric information should drive the issue of debt over equity. Debt issuance signals the confidence of the board that an investment is profitable and that the current stock price is undervalued. Equity issuance signals a lack of confidence in the board that may feel the share price is overvalued. An issue of equity would therefore lead to a drop in share price. However, this may not apply to intangible assets.

Ang (1991) and Holmes and Kent (1991) point out that POT applies to SMEs, save subcontracting SMEs or those belonging to a group (Kremp and Phillippon, 2008). SMEs do not aim to achieve an optimal financial structure; they rank their preferences for internal financing over external financing, as well as debt relative to equity. They may wish to borrow when investment funding exceeds their internal cash flow, albeit they will face transaction costs in their credit relationship. These costs may be zero for internal funds (cash flow), albeit higher for new shares issuance, whereas that of debt stand in between. The objective of SMEs managers is to maximise their own wealth, while securing control over decision-making vis-à-vis external actors. Hence, they will first choose internal funds for financing and if such funds prove unavailable, they prefer using debt rather than increasing their capital.

POT is also supported with respect to assumptions regarding the age and profitability of SMEs: they use less debt as time goes by and when their life cycle leads youth to maturity (Berger and Udell, 1998).

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Transaction costs economics, alongside with behavioral finance (Barberis and Thaler, 2003) may also explain the financial behavior of SMEs. Williamson (1988) assumes opportunism and bounded rationality of agents, finding a close relationship between the determinants of financing choices and the nature of the asset to be funded. In the case of an intangible asset, the sequential preferences alleged by Myers and Majluf (1984) would be reversed as follows: cash-flow in the first place, then equity and eventually debt. Moreover, routine behaviour is also challenging: Leary and Roberts (2010, 2012) point out that companies issue shares when they should not do it and mimicry alone could explain up to 70% of corporate financing behavior.

3. Characteristics of French SMEs, key variables and assumptions

3.1. Characteristics of French SMEs

We focus upon SMEs, which are considered as the cutting edge of economic issues; it is worth noting that French SMEs have been studied using various panel data analysis that prove fruitful to discover or check stylised facts (See Appendix 1). As in the case of other European countries (Daskalakis and Psillaki, 2007), SMEs in France are the main source of employment (60% of jobs) and contribute to 55% of value added. SMEs constitute an unbalanced set of three categories: by January 2010, micro-enterprises (0–9 employees) account for 94.25% of all SMEs, whereas small enterprises (10–49 employees) and medium sized enterprises (50–249 employees) account in respect for 4.80% and only 0.79% (OSEO, 2011).

Data may not always be consistent with the SMEs surveys upon small samples (one thousand firms as for France) the European Commission, together with Eurostat and the ECB have designed since the early 2000, especially regarding access to finance.

According to a survey upon French SMEs in 2010 (KPMG, 2012), trade credit remains the main source of financing corporate cash flow in France. Self-financing is the first source of investment funding (40–45% of cases), followed by bank loans (34–38% of cases). The average corporate debt ratio for SMEs is 88.6%: the debt ratio is below 52% for half of SMEs, whereas it is above 158% for a quarter of them. In 2009, the median weight of equity in the balance sheet of SMEs was 42%. Three-quarters of SME managers declare being reluctant to open their capital to outside investors, in fear of losing their independence. Very few SMEs access the financial market: out of 135,823 French Small and midsize firms (excluding micro), only 574 were listed in 2010.

3.2. Key variables and assumptions

We identify capital structure by the debt ratio of the company (*DR*), which is our dependent variable. We gauge it with the ratio of financial debt (short-term and medium-long-term) upon total assets, in line with Ziane (2004) as well Dufour and Molay (2010). The explanatory variables are the lagged debt ratio, age, profitability, growth opportunities, trade credit, guarantees, and (see Table 1). These key variables test the assumptions related to the debt ratio addressing the predictions of TOT vs. POT.

Thresholds of the three categories (micro, small and midsize enterprises) take care of the size of the company and there are specific estimates for each category of SMEs. We did not include variables related to the effects of taxation.

The lagged debt rate from one period (*DRt-1*) is a determining variable for the current debt ratio and an increasing function of size. The larger the size of the firm, the more the debt ratio depends on the lagged variable. This positive relationship can be explained by bankruptcy costs included in TOT: an inverse relationship is supposed to exist between size and the risk

of bankruptcy; hence, the size of the firm can inform the creditors of a potential bankruptcy. Our first hypothesis (H1) assumes that the debt of the past period influences the current debt and therefore there is a relationship between the size and the debt rate of the company, which may be positive (TOT) or negative (POT).

Table 1: testing TOT *vs.* POT and the related set of assumptions

Financial theory	Hypothesis	Variables regarding	Definition	Code	*DR*
TOT *vs.*POT	*H1*	Impact of the lagged debt ratio	Lagged variable (one year)	DR_{t-1}	+ -
TOT *vs.* POT	*H2*	The existence of an optimal financial structure in a dynamic perspective	2002 - date of registration. Quantitative variable.	*AGE*	+ -
TOT *vs.* POT	*H3*	Profitability	Operating income / total assets. Quantitative variable	*PROF*	+ -
TOT *vs.* POT	*H4*	Growth opportunities	Intangible assets / total assets. Quantitative variable	*GO*	- +
TOT *vs.* POT	*H5*	The confidence of suppliers as a good signal	Credit to customers - accounts payable / total liabilities. Quantitative variable	*TC*	+ -
TOT *vs.* POT	*H6*	The presence of guarantees as a good signal	Tangible fixed assets + inventories / total assets. Quantitative variable	*GAR*	+ -
TOT *vs.* POT	*H7*	Credit risk	Calculated score *Dummy* variable	*RIS*	+ -
TOT *vs.* POT	*H8*	Ownership	Calculated from DIANE data *Dummy* variable	*IND*	+ -

Source: Authors

Age (*AGE*) is the difference between the first year of observation (2002) and the registration date of the firm: the older the firm is, the larger its information record. TOT assumes the existence of a positive relationship between age and debt ratio; the fact that mature firms have better reputation and more experience can reduce agency costs through a positive signal on the quality of potential investments. Conversely, assuming that the cash flow of SMEs is a positive function of age, and according to POT, mature firms have less recourse to leverage. Our second hypothesis (*H2*) states that mature firms do experience a higher debt ratio (TOT) vs. a lower one (POT).

We measure profitability (*PROF*) with the ratio of operating income upon total assets. TOT assumes a positive relationship between profitability and the debt ratio. On the one hand, a profitable business may prefer debt because it maximises its value thanks to tax advantage. On the other hand, profitability sends the lender a signal as regards the financial health of the company and reduces information asymmetries that constitute a major obstacle to financing SMEs. Conversely, according to POT, profitability exert a negative impact upon the debt ratio. Profitable companies will give priority to cash flow funding in order to secure their independence and to eschew exposure to information asymmetry. SMEs borrow, as the only source of significant external liquidity, once they exhaust their ability to generate internal funds. Since the amount of profit determines cash flow, profitable firms are less leveraged. Our third hypothesis (*H3*) states that profitability affects the debt ratio, either positively (TOT) or negatively (POT).

We gauge growth opportunities (*GO*) with the ratio of intangible assets to total assets (Dufour and Molay, 2010). Agency theory holds that the relationship should be negative: growth opportunities may induce moral hazard; firms are considered as more risky and fail convincing lenders to grant them credit; those with growth potential tend to have a low debt

ratio (Myers, 1977). Conversely, according to POT, the relationship should be positive: the combination of growth potential and very limited access to financial markets drives SMEs to look for bank financing (Chittenden, Hall, and Hutchinson, 1996).

Our fourth hypothesis (*H4*) states that the relationship between growth opportunities and the debt ratio should be negative (TOT) vs. positive (POT).

Trade credit (*TC*) results from the difference between the gross amount of customer credit and debt supplier. We express it as a percentage of the balance sheet, by dividing the balance of trade credit with total assets. The firm becomes a lender or borrower depending on the sign of the balance of trade receivables and debts (Dietsch and Kremp, 1998). TOT holds that the ability of the firm to borrow from its trading partners may send to lenders a signal of its good payback capacity: trade credit exerts a positive effect as it eases granting bank credit thereof. In contrast, Petersen and Rajan (1994) argue that commercial debt is a substitute for financial debt when firms face credit rationing. For a large number of firms in the development stage of their lifecycle (including startups), trade credit is the main source of working capital as compared to bank loans (European Commission, 2003). According to POT, trade credit is less risky for SMEs: hence, the relationship with debt should be negative. Our fifth hypothesis (*H5*) states that trade credit affects the debt ratio, positively (TOT) vs. negatively (POT).

We gauge guarantees (*GAR*) from the share of fixed assets and inventories in the balance sheet (Bourdieu and Colin-Sédillot, 1993; Titman and Wessels, 1988). Collateral is a major requirement from donors in the credit relationship (López-Gracia and Sogorb-Mira, 2008); it reduces agency costs and drives commitment to longer term loans (Harris and Raviv, 1990; Jensen and Meckling, 1976). This requirement may also reduce the risk of moral hazard, as it is a means for self-selection of borrowers; it is a deterrent for managers to under-invest and make discretionary levies (Berger and Udell, 1990; Besanko and Thakor, 1987; Jensen and Meckling, 1976; Myers, 1977). Titman and Wessels (1988) argue that firms holding assets that may constitute a collateral are more leveraged. Our sixth hypothesis (*H6*) states that firms wherein total fixed assets and inventories are more important in their balance sheet experience a higher debt ratio (TOT) vs. a lower one (POT).

Credit risk (*RIS*) corresponds to a probability of default if the company is unable to meet its commitments. According to the logistic model, the probability of default of the company (p), is obtained from the score (S) by the following formula: $p = 1/1 + \exp S$

The score is calculated from numerous accounting and financial ratios in order to screen risky firms. The scoring function used is as follows:

$S = 0.3665 + 0.0388*FA + 0.3801*FRI + 0.0217*CF + 0.0524*P + 0.0809*NI + 0.00495*SP$

S denotes the score, *FA* financial autonomy, *FRI* financial rate of interest, *CF* cash flow, *P* performance, *NI* net income and *SP* the share of personnel.

FA (%) = (Equity / Total assets fund) * 100
FRI (%) = (Interest / Net Sales) * 100
CF (%) = (Cash flow before distribution / Net Sales + Operating subsidies) * 100
P (%) = (Profit before taxes / Net sales + Operating subsidies) * 100
NI (%) = (Net income / net shareholders' equity) * 100
SP (%) = (Personnel costs + Employee participation in profit / value added) * 100

We classify SMEs in three types of credit risk according to Basel II:

if $p < 20\%$, the company carries low or medium risk (LMR);

if $20\% \leq p < 25\%$, the company carries strong risk (SR);

if $p \geq 25\%$, the company carries excessive risk (UR).

We include credit risk thanks to three indicators: LMR *dummy*, SR *dummy* and UR *dummy*. Given the existence of information asymmetry, low and medium-risk and high-risk businesses should be less leveraged than excessive risk businesses. The seventh hypothesis (*H7*) is stated as follows: credit risk has a negative influence on debt, according to TOT as well as POT.

The dilution or the concentration of ownership upon the capital of a company (*IND*) characterizes respectively that company as independent or as owned by a group. It is worth noticing that Kremp and Philippon (2008) observe a large increase in the share of SMEs belonging to a group: from 20% (1997) to 50%° (2006). We include ownership thanks to two dummy variables: *independent* dummy and *group-owned* dummy. The control of the capital structure and debt strategy are less constrained for independent businesses than for group-owned businesses. On the other hand, as for the average effective rate and administrative costs whatever the credit method (fixed rate overdraft, leasing), debt for independent SMEs proves more expensive than for SMEs belonging to a group, (Chai and Nguyen, 2011). Our eighth hypothesis (*H8*) is stated as follows: with respect to group-owned businesses, independent businesses experience a higher (TOT) *vs.* a lower (POT) debt ratio.

4. Sample design, descriptive statistics and balanced panel model

4.1. Sample design and descriptive statistics

Data come from the widely used DIANE database, collected from 1,085,000 French firms, which are available over ten years (at the maximum). We assume that biases remain roughly constant overtime; hence, the database enables to make relevant comparisons with other comparable French studies (See Appendix 1) in order to highlight some stylized facts.

We have not tested "extended" POT that distinguishes rationed SMEs using trade credit from non-rationed SMEs accessing bank credit (see the disequilibrium model in Cabo-Valverde, Rodriguez-Fernandez and Udell, 2009). Credit rationing in France was widespread even before the 2008 financial crisis occurred; it affects younger SMEs, falling out of our scope, that experience high growth rate but both less cash flow and collateral (Alexandre and Stephan-Buisson, 2014).

The selection of the sample complies with the definition of SMEs: according to the European Commission in 2005: an SME is any business that employs less than 250 people, with total assets from €2 million (minimum) up to €43 million (maximum), and sales turnover from €2 million (minimum) up to €50 million (maximum). We selected firms according to the classification of business activity (NAF level 60) from the French statistical office (INSEE), which includes all manufacturing, trade and services establishments; agriculture and financial activities, associations, as well as holding and real estate companies without employees are excluded (MEF, 2002). All financial data are updated and available for the observation period of nine consecutive years [2002, 2010]. Our balanced panel of 2,370 SMEs comprises 21,330 observations over almost a decade.

The panel distribution by size and categories of SMEs (See Table 2) shows that small enterprises (10–49 employees) are predominant and account for nearly two-thirds (64.60%), whereas micro-enterprises (17.34%) and midsize enterprises (18.06%) represent an almost equivalent share. Unsurprisingly, it does not match the distribution of OSEO (2011).

As for industries, construction, manufacturing, trade and services respectively account for 19.87, 24.81, 36.37 and 18.95%. Manufacturing and trade industries comprise the largest number of firms, whereas the tertiary sector encapsulating trade and services is slightly prominent (55.32%). Almost three out of four micro-enterprises operate in the trade and services industries. Small businesses are more concentrated in the manufacturing and trade

industries. The midsize enterprises display a rather balanced distribution wherein the construction and manufacturing industries are slightly dominant.

The overall debt ratio for all selected SMEs is 57%. Midsize companies are more leveraged (60.94%) than micro-enterprises (56.78%) and small firms (55.78%). Hence, the U shaped relationship between size and the debt ratio is non-linear.

Equity is the primary source of funding for SMEs: 40.38% of total liabilities for micro-enterprises, 41.53% for small firms and 35.17% for midsize enterprises. The relationship between the share of equity in total assets and size of the firm displays a U shaped non-linear curve that was already observed in the early 2000 (European Commission, 2003).

Trade credit is the second largest source of funding and account for over one quarter of the SMEs liabilities: 24% for micro-enterprises, 24.75% for small firms and 25.53% for midsize enterprises. Trade credit increases with size and there is a linear positive relationship.

Debt is the third largest source of financing for SMEs: 16.21% of liabilities for micro-enterprises, 14.78% for small firms and 15.14% for medium enterprises. There is a strong dispersion as regards debt (including short-term), reflecting the heterogeneity of SMEs. The relationship between average financial debt and the size of business displays a non-linear U-shaped curve.

Table 2: distribution of SMEs by size according to industry (year 2010)

Size		Industry				
		Building & construction	**Manufacturing**	**Trade**	**Services**	**Total**
Microentreprises (<10 employees)	N	46	66	200	99	411
	%	1.94	2.78	8.44	4.18	17.34
	(% row)	(11.19)	(16.06)	(48.66)	(24.09)	
	(% column)	(9.77)	(11.22)	(23.20)	(22.05)	
Small enterprises (10-49 employees)	N	310	397	560	264	1,531
	%	13.08	16.75	23.63	11.14	64.60
	(% row)	(20.25)	(25.93)	(36.58)	(17.24)	
	(% column)	(65.82)	(67.52)	(64.97)	(58.80)	
Medium sized enterprises (50-249 employees)	N	115	125	102	86	428
	%	4.85	5.27	4.30	3.63	18.06
	(% row)	(26.87)	(29.21)	(23.83)	(20.09)	
	(% column)	(24.42)	(21.26)	(11.83)	(19.15)	
Total	N	471	588	862	449	2,370
	%	19.87	24.81	36.37	18.95	100.00

Source: DIANE, Authors

At first glance, these patterns suggest that the sequence reversal between equity and debt runs against POT, whereas it matches rather well transaction costs economics. When adding trade credit with (financial) debt to gauge overall debt, the broader picture is as follows: equity ranks first over overall debt for both the micro and small businesses running against POT, albeit it ranks second for midsize firms in accordance with POT.

Table 3: distribution of SMEs categories according to their legal status

Legal status / Category		Micro-enterprises	Small enterprises	Midsize enterprises	Total (%)
Partnership + Real estate company + Cooperative	N (%)	1 (0.04)	12 (0.5)	4 (0.16)	17 (.7)
Limited liability company. + Single member limited liability cy + Personal business	N (%)	147 (6.2)	408 (17.21)	46 (1.95)	601 (25.36)
Simple stock company + Personal stock cy + Stock partnership	N (%)	203 (8.56)	837 (35.31)	295 (12.45)	1335 (56.32)
Stock company. + Stock cy with executive board	N (%)	60 (2.53)	274 (11.56)	83 (3.5)	417 (17.59)
Total	N (%)	411 (17.3)	1531 (64.6)	428 (18.1)	2370 (100.0)

Source: DIANE, Authors

According to the distribution of SMEs by their legal status (See Table 3 and Appendix 2), all stock companies account for three quarters of the sample. Simple stock companies represent more than half the sample and are rather small firms: their average debt ratio during the period is the same regardless of the category (or size) and equals the average debt ratio of all companies. Similar characteristics apply to other stock companies, representing less than one in six SMEs. Limited Liability Companies, one out of four SMEs, are rather microenterprises; their debt ratio declines with their size (small and midsize firms have less debt) but remains above the average debt ratio of all companies. The reverse relationship between the size and legal status in terms of debt is obvious for less-capitalized companies that are also smaller as for Limited Liability Companies, whereas there is nonlinear (U shaped) relationship with respect to stock companies.

According to the distribution of ownership (Table 4), 806 independent SMEs represent one-third (34.01%), whereas 1,564 SMEs owned by a group represents about two-thirds (65.99%) of the sample. A majority of shareholders own directly slightly over half of SMEs (indicator D).

Table 4: sample distribution by indicators of independence

Indicators of independence	Frequency	%
Total independent enterprises (A)	806	34.01
Owned enterprises (B)	241	10,17
Owned enterprises (C)	7	0,3
Owned enterprises (D	1316	55,53
Total owned enterprises (B, C and D)	1564	65,99
Total enterprises	2370	100

Source: DIANE, Authors

According to Table 5, the number of excessive risk businesses (UR) increases by 40.5%, rising from 363 in 2007 to 510 in 2010. Similarly, the number of high-risk enterprises (SR) increases by 10.22%, from 538 in 2007 to 593 in 2010. Conversely, the number of low and medium risk (LMR) businesses declines by 13.75%, from 1,469 in 2007 to 1,267 in 2010. These trends highlight the impact of the financial crisis upon our panel of SMEs.

Table 5: trends in businesses according to the category of risk

	2002	2003	2004	2005	2006	2007	2008	2009	2010
Low and medium risk (LMR)	1503	1422	1412	1397	1375	1469	1382	1306	1267
Strong risk (SR)	516	548	554	572	576	538	587	570	593
Unacceptable risk (UR)	351	400	404	401	419	363	401	494	510

Source: DIANE, Authors

The distribution of SMEs according to risk and the debt ratio (Table 6) shows that the average debt ratio is 15% for the overall sample. Micro-enterprises experience an average debt ratio of 16%, whereas the debt ratio for small and medium enterprises is 15%. Hence, debt is a decreasing function of size and an increasing function of risk. As for low and medium risk (LMR), micro enterprises display a higher debt ratio (16%) than small and medium enterprises (13%). As for the transition to high risk (SR), the debt ratio declines for micro enterprises (15%) whereas it increases for small business (15%) and medium enterprises (16%). The debt ratio is higher (20%) with regard to excessive risk (UR) and substantially identical for all enterprises.

Table 6: debt ratio according to risk and the category of SMEs

	Microenterprises		Small enterprises		Midsize enterprises		Total	
	Debt ratio							
	Average	N	Average	N	Average	N	Average	N
Low-medium risk (LMR)	16%	5059	13%	5902	13%	1572	14%	12533
Strong risk (SR)	15%	1756	15%	2364	16%	934	15%	5054
Unacceptable risk (UR)	20%	1246	20%	1711	19%	786	20%	3743
Total	16%	8061	15%	9977	15%	3292	15%	21330

Source: DIANE, Authors

4.2. The dynamic balanced panel model

We design our model with the generalised method of moments (GMM) that was initially proposed by Hansen (1982) and dates back at least to Sargan (1958). This dynamic estimation technique provides solutions to the problems of simultaneity bias, reverse causality or omitted variables. As with any method of instrumentation, the issue is to find the instruments, which are both valid (not correlated with the error terms) and robust (strongly correlated with the explanatory variables). Two estimators are available: the first difference estimator (GMM-DIF) provided by Arellano and Bond (1991) takes for each period the first difference of the estimated equation to remove specific effects; then it instruments explanatory variables of the equation in first difference with their values in level lagged by one period or more. The system estimator (GMM-SYS) from Blundell and Bond (1998) combines the first difference equations with the level equations wherein the variables are instrumented by their first difference. Using Monte Carlo simulations, Blundell and Bond (1998) showed that the GMM-SYS estimator outperforms the GMM-DIF estimator whose results are biased when the instruments are weak.

Two tests are associated with the estimator of GMM dynamic panel. The Sargan / Hansen over-identification test takes care of the validity of lagged variables chosen as instruments; Statistics following this test, under the null hypothesis H0 of validity of the combination of instruments chosen, a khi2 law with *pk* degrees of freedom where *p* is the number of instrumental variables and *k* is the number of estimated coefficients in the model. The Arellano and Bond autocorrelation test takes care of the absence of autocorrelation of second order errors in the difference equation for the null H0 hypothesis.

In the model we estimate, the use of lagged variables as instruments varies according to the nature of explanatory variables: for exogenous variables, their current values are used as instruments. For predetermined or weakly exogenous variables, possibly influenced by past values of the dependent variable, but are uncorrelated with future of the error term, their lagged values of at least one period can be used as instruments. For endogenous variables, only their lagged values by at least two periods can be valid instruments.

Thus, the dynamic model that we test thereafter is the following:

$$DF_{it} = \alpha_0 + \alpha_1 DF_{it-1} + \alpha_2 AGE_{it} + \alpha_3 PROF_{it} + \alpha_4 OC_{it} + \alpha_5 CIE_{it} + \alpha_6 GAR_{it} \\ + \alpha_7 DummyLMR_{it} + \alpha_8 DummySR_{it} + \alpha_9 Dummyindependent_{it} + \varepsilon_{it}$$

5. Outcomes and interpretations

Table 7 presents the dynamic estimates with associated tests. We used the following instruments: *DRt-1* (lag3) *PROF* (lag3), *GO* (lag2), *TC* (lag2) and *GAR* (lag1), where (lag) stands for the lagged variables *t-1*, *t-2* and *t-3* that are used as instruments. Exogenous variables are age (*AGE*), default risk indicator (*RIS*) and the independence of the company (*IND*) that we also used as instruments. In as much as the model is estimated in system, Sargan test and Arellano and Bond disturbances autocorrelation AR(1) and AR(2) enable to validate the combination of instruments we used and reject the presence of second order autocorrelation, upon both the overall sample and according to each category (or size) of SMEs. According to a breakdown by period, estimates show that the financial structure of SMEs is not neutral. The tested explanatory variables are significant at the 1% level. The set of variables affect the debt ratio for all SMEs as well as for the categories of micro, small and medium enterprises.

The lagged variable (*DRt-1*) is most significant (1%) and positively correlated with the debt ratio for all SMEs during both periods. Our results do not support the bankruptcy cost theory and therefore invalidate TOT. The coefficients of the lagged variables can be interpreted as the expression of adjustment costs upon the level of debt, with particular reference to the impact of non-measurable economic factors. During the first period (2003-2007), it is an inverted U-shaped positive relationship between lagged variable and the debt ratio by size of SMEs (micro, small and midsize enterprises). This positive relationship is strengthened during the second period (2008-2010), still in the form of an inverted U. Coefficients of the lagged variables may be interpreted as adjustment costs of the debt level, particularly in reference to the incidence of non-measurable economic factors (Ziane, 2004) or path-dependency (Coleman, 2014). In line with Ziane (2004), *H1* hypothesis of a positive relationship is confirmed, albeit not an increasing function of the size of the firm.

The age variable (*AGE*) of the company is most significant (1%) and negatively correlated with the debt ratio (approximately -0.1%) and this result applies for each category of SMEs. It refutes the predictions of TOT and the agency theory holding that older firms have a better reputation and more experience, enjoying reduced agency costs thanks to a positive signal. Conversely, it sustains the predictions of POT, whereby the more the company is mature, the more its cash flow increases and the less it resorts to debt financing. *H2* hypothesis of a negative relationship between the age of the company and its debt ratio is consistent with the findings of Boussaa (2000), Adaskou and Adair (2011) as well as Adaskou and Adair (2015), whereas Ziane (2004) observes an ambiguous effect.

Profitability (*PROF*) has a positive and significant effect on the debt ratio. Prior to 2008, the positive effect is not significant as for all SMEs. It is significant (1%) and negative respectively positive on micro and small enterprises, whereas it proves negative but

insignificant on medium enterprises. After 2008, the effect is most significant (1%) and positive for all SMEs but proves negative upon microenterprises, which favour the use of internal resources over bank loans; it is positive and not significant for small and medium enterprises. As for all SMEs, the result rejects the POT predictions with regard to preference for internal financing and in as much as it is large the company needs less external resources and therefore debt. This result confirms the predictions of TOT with regard to the use of debt from profitable enterprises as a means of tax savings, allowing them also to reduce agency costs and to signal good corporate financial health to donors. According to categories, microenterprises confirm POT, whereas small and midsize businesses confirm TOT. The H3 hypothesis is invalidated as for all SMEs and during both periods: the profitability of the company positively influences the debt ratio. This positive relationship is not in accordance with the conclusions of Molay and Dufour (2010), Adaskou and Adair (2015) and Ziane (2004).

Table 7: outcomes from dynamic estimates (GMM-SYS) of the debt ratio

	2003-2007				2008-2010			
	SMEs	**Micro**	**Small**	**Midsize**	**SMEs**	**Micro**	**Small**	**Midsize**
DR_{t-1}	0,596***	0,536***	0,609***	0,524***	0,705***	0,547***	0,752***	0,619***
	(0,015)	(0,022)	(0,028)	(0,041)	(0,029)	(0,050)	(0,052)	(0,083)
Age	0,000***	-0,001***	0,000***	-0,001***	0,000***	-0,001***	-0,001***	0,000***
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
PROF	0,053	-0,454***	0,318***	-0,067	0,326***	-0,366***	0,174	0,051
	(0,073)	(0,092)	(0,139)	(0,108)	(0,068)	(0,130)	(0,126)	(0,078)
OC	0,276***	0,366***	0,347***	-0,167	0,238***	0,123	-0,341***	0,213***
	(0,054)	(0,072)	(0,084)	(0,131)	(0,059)	(0,122)	(0,099)	(0,099)
CIE	-0,139***	-0,178***	0,041	-0,067	0,141***	0,247***	0,187***	0,209***
	(0,028)	(0,052)	(0,052)	(0,051)	(0,019)	(0,031)	(0,032)	(0,044)
GAR	0,241***	0,273***	0,375***	0,296***	0,445***	0,571***	0,283***	0,235***
	(0,016)	(0,031)	(0,037)	(0,041)	(0,020)	(0,034)	(0,043)	(0,032)
RIS Dummy LMR	-0,028***	0,035***	-0,059***	-0,021***	-0,043***	0,035***	-0,025***	-0,038***
	(0,008)	(0,011)	(0,015)	(0,011)	(0,008)	(0,015)	(0,012)	(0,009)
RIS Dummy SR	-0,018***	0,002	-0,033***	-0,007	-0,025***	0,001	-0,015***	-0,027***
	(0,004)	(0,005)	(0,006)	(0,006)	(0,004)	(0,006)	(0,005)	(0,006)
IND Dummy independent	-0,004***	-0,012***	0,000	0,002	-0,003	-0,005	0,002	0,009***
	(0,002)	(0,003)	(0,002)	(0,003)	(0,002)	(0,004)	(0,002)	(0,004)
Constant	-0,003	0,014	-0,073***	0,010	-0,115***	-0,105***	-0,036**	-0,024
	(0,008)	(0,013)	(0,017)	(0,021)	(0,010)	(0,023)	(0,021)	(0,022)
Quality of adjustment								
Total observations	14220	5309	6710	2201	7110	2752	3267	1091
AR(1)	26,29	14,91	15,92	-9,96	17,09	-7,02	11,06	-3,98
p-value	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
AR(2)	2,25	1,70	-0,58	0,25	-	-	-	-
p-value	0,024	0,088	0,561	0,800	-	-	-	-
Sargan	453,78	240,72	130,24	112,43	71,26	103,58	75,62	75,06
p-value	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000

***, **, * respectively p<0.01, p<0.5 and p<0.1. (Standard deviation into parentheses).

The impact of growth opportunities (*GO*) on the debt ratio is most significant (1%) and positive (24.1%) for all SMEs. According to categories, this positive effect is stronger for midsize enterprises (38.1%). Indeed, if we assume that growing companies do not have the full capacity to finance their growth with their own resources, the positive association of these growth opportunities with the debt ratio would mean that debt is a priority in order to finance

their borrowing needs. It does not validate TOT that predicts the existence of a negative relationship between growth opportunities and the debt ratio due to the existence of agency costs and risk: the more a company experiences high growth opportunities the more it is risky, prompting donors to take more care with regard to the financing thereof. *H4* hypothesis is verified in accordance with POT predictions: there is a positive relationship between growth opportunities and the debt ratio. This finding is consistent with those of Ziane (2004), Dufour and Molay (2010), Adaskou and Adair (2011) as well as Adaskou and Adair (2015).

The effect of the trade credit balance (*TC*) upon the debt ratio is most significant (1%) and negative before the crisis as for all SMEs as well as for micro and midsize enterprises, in contrast with small businesses: the relationship is an inverted U shape. This seems to confirm POT, whereby trade credit is a substitute for financial debt, in accordance with Adaskou and Adair (2011). After the crisis, there is a positive effect upon all SMEs and each category: the relationship is U-shaped. This seems to confirm TOT, in accordance with Trabelsi (2006) as well as Adaskou and Adair (2015), who find a positive and significant relationship. *H5* hypothesis stating that firms using more trade credit experience a lower debt ratio remains controversial.

Guarantees (*GAR*) is most significant (1%) and positively correlated (20.1%) with the debt ratio for all the SMEs, especially micro and small businesses: companies with fixed assets and inventories in their balance sheet are more indebted. Due to the high costs of failure and agency costs associated with granting loans to SMEs, lenders require collateral as a major selection criterion (Lopez-Gracia and Sogorb-Mira, 2008); it reduces agency costs and triggers greater incentive for creditors to engage in long-maturity interest-bearing loans (Jensen and Meckling, 1976; Harris and Raviv, 1990). *H6* hypothesis is validated. This observed positive relationship between guarantees and the debt ratio confirms the predictions of TOT. Our result is consistent with those of Ziane (2004), Trabelsi (2006), Adaskou and Adair (2011), as well as Adaskou and Adair (2015).

Credit risk (*RIS*) corresponds to a probability of default would the company fail to meet its commitments. This risk is expressed with a dummy and UR dummy (excessive risk) stands as a reference. During both periods, dummies LMR (low and medium risk) and SR (high risk) are significant and slightly negative for all SMEs and according to categories. Companies with low or medium risk and high risk are less indebted than excessive risk businesses. This result may due to self-selection prompting companies with low and medium risk and high risk to avoid debt and leverage other funding sources such as trade credit and self-financing. *H7* hypothesis is validated: credit risk negatively influences the debt ratio, which proves compatible with TOT as well as with POT.

Independence of the company (*IND*) takes care of the fact that the company is either independent or owned by a major shareholder (group). The dummy group-owned is regarded as a reference. Companies belonging to a group have less funding constraints than independent businesses and belonging to a group is a good signal to donors. During the first period, the dummy independent is significant (1%) and slightly negative for all SMEs as well as for microenterprises; it is positive but not significant for small and medium enterprises. During the second period, relationship proves negative but not significant as for all SMEs and micro-enterprises; it is positive for small and medium enterprises. *H8* hypothesis is validated, independent companies are less indebted than group-owned enterprises. This seems to confirm POT.

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6. Conclusion

We focused on the determinants of debt ratio upon a large balanced panel of 2,370 French SMEs. The panel was observed for nine years [2002-2010], broken down into two periods [2003-2007] and [2008-2010]. Our first objective was to identify to what extent trade-off theory (TOT) *vs.* pecking order theory (POT) explains best the financial behaviour of SMEs. Our second objective was to study the impact of the 2007 crisis on SME financing structure and long lasting effect of the explanatory variables determining the debt ratio of SMEs. According to estimates of the dynamic GMM model, we reject the indifference assumption as for the choice of financial structure, and we conclude that both theories only partly explain the borrowing behaviour of SMEs.

First, the relationship between the debt ratio and lagged debt ratio is positive for all SMEs and over both two periods, especially the second period. It is an inverted U shape according to the size of SMEs. It reverses the bankruptcy costs theory and seems to confirm the predictions POT, although it may also suggest the existence of adjustment costs upon the level of debt with regard to transaction costs. Second, the relationship between age and the debt ratio lacks interpretation: all coefficients are nil for the various categories of SME. Third, profitability has a positive impact on the debt ratio of all SMEs in the two periods, especially after the crisis. Prior the crisis, the influence of profitability is negative upon micro and midsize enterprises, whereas it is positive upon small businesses. For all SMEs, the result rejects TOT and confirms POT. According to categories, microenterprises confirm POT, whereas small and midsize businesses confirm TOT. Fourth, growth opportunities have a positive influence on the debt ratio during both periods and for all SMEs in accordance with POT. Prior to 2008, it is positive and significant upon micro and small enterprises, except for midsize enterprises. After 2008, it is positive on micro and midsize enterprises but proves negative upon small businesses. Fifth, trade credit has a negative effect on the debt ratio during the first period upon all SMEs and each category, except for small businesses: the relationship is an inverted U shape. This seems to confirm POT. After the crisis, there is a positive effect upon all SMEs and each category: the relationship is U-shaped. This seems to confirm TOT. Sixth, guarantees confirm the prediction of TOT, whereas it reject that of POT. Seventh, with regard to credit risk, low- and medium-risk as well as high-risk companies leverage less than excessive-risk businesses, the number of which is increasing after 2008. This result seems to confirm both TOT and POT. Eighth, SMEs belonging to a group may face less funding obstacles than independent businesses. However, over the two periods, independent SMEs are less indebted than group-owned enterprises, which tends to confirm POT.

POT passes the test better than does TOT, although some evidence supports each theory. In agreement with Harris and Raviv (1991) and Myers (2001), we join the conclusion of Frank and Goyal (2008) that no currently available theory explains alone the determination of the capital structure of SMEs.

Our study contains limitations inherent to the nature of book accounting data (Welch, 2002), the approximate measurement of some variables as well as heterogeneity of SMEs. Due to selection criteria, our balanced panel cannot display a representative picture of French SMEs.

However, our study supports most but not all findings from previous studies on the capital structure of SMEs in France (Appendix 1); these studies covered prior shorter periods and smaller samples, but did not use GMM estimation with the exception of Ziane (2004). The use of a dynamic panel corrects the endogeneity bias and thus contributes to the development of more robust stylized facts.

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Appendix 1: an overview of studies upon the capital structure of French SMEs

Authors	Sample, country, period and techniques	Outcomes
Bédué (1997)	Balanced panel of 1,387 firms (DIANE); France, 1989-1993; OLS estimators and *Between*	POT is validated. Agency theory is verified. Emphasis is upon the role of collateral in the credit relationship.
Boussâa (2000)	Balanced panel of 1,712 SMEs (DIANE); France, 1991-1995; multivariate analysis and econometric analysis (OLS, *Within* and *Between*)	POT and signal theory explain the financial structure of SMEs. Trade credit reduces information asymmetry.
Ziane (2004)	Balanced panel of 2,551 SMEs (DIANE); France, 1994-2001; estimate the moments (GMM)	POT is most common but not exclusive from TOT.
Trabelsi (2006)	Balanced panel of 1,898 SMEs (DIANE); France, 1995-2002; OLS	POT and TOT are compatible.
Daskalakis & Psillaki (2007)	Balanced panel: 320 SMEs (Italy); 52 firms (Portugal); 1,252 firms (Greece) and 2,006 SMEs (France); 1997-2002.	POT is validated.
Bellettre (2010)	Unbalanced panel of 56,605 micro-enterprises (DIANE); France, 1998-2006; panel model with fixed effects and instrumental variables.	POT does not explain the preference of micro-enterprises for debt, as compared to current accounts.
Dufour & Molay (2010)	Balanced panel of 1,535 SMEs (DIANE), France, 2000-2007; OLS, generalized least squares with fixed effects or random effects; results associated with the best specification.	TOT is validated, but POT (semi-strong version) cannot be rejected. Change in debt depends on the funding gap.
Adair & Adaskou (2011)	Balanced panel of 1,520 SMEs (DIANE), France, 2000-2004; OLS, *Within*, QGLS and instrumental variables.	POT and TOT are validated according to variables, albeit some remain unexplained. POT is slightly better validated
Adair & Adaskou (2015)	Balanced panel of 2,370 PME (DIANE), France, 2002-2010; OLS, *Within*, QGLS and instrumental variables.	POT and TOT are validated according to variables, albeit some remain unexplained. POT is slightly better validated

Source: Authors

Appendix 2: distribution of SMEs categories according to their legal status and debt ratio

	Micro-enterprises		Small enterprises		Midsize enterprises		Total		
	Debt ratio		Debt ratio		Debt ratio		Debt ratio		
	Average	N	Average	N	Average	N	Average	N	%
Legal status									
Partnership	0.21	23	0.35	32	0.14	17	0.25	72	0.34%
Real estate company	0.34	2	0.31	7	.	.	0.32	9	0.04%
Cooperative	0.19	19	0.25	23	0.14	30	0.19	72	0.34%
							(0.225)	(153)	(0.72%)
Limited liability cy	0.18	2,818	0.17	1,878	0.13	200	0.17	4,896	22.95%
Single member limited liability cy	0.20	277	0.14	189	0.13	38	0.17	504	2.36%
Personal business	0.12	4	0.05	5	.	.	0.08	9	0.04%
							(0.17)	(5,409)	(25.35%)
Simple stock company	0.15	3,681	0.14	5,639	0.16	2227	0.15	11,547	54.14%
Personal stock cy	0.11	150	0.12	192	0.08	99	0.11	441	2.07%
Stock partnership.	0.20	13	0.35	6	0.05	8	0.19	27	0.13%
							(0.148)	(12,015)	(56.34%)
Stock company	0.15	902	0.15	1,694	0.15	572	0.15	3,168	14.85%
Stock company with executive board	0.15	172	0.14	312	0.16	101	0.15	585	2.74%
							(0.15)	(3,753)	(17.59%)

| Total observations | 0.16 | 8,061 | 0.15 | 9,977 | 0.15 | 3,292 | 0.15 | 21,330 | 100.00% |