

Capital Structure Determinants: New Evidence from French Panel Data

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Abstract

This paper examines the theoretical and empirical determinants of firms' capital structure choice. The emphasis here is placed on the role of capital market imperfections through the tradeoff, pecking order and market timing theories to explain firms' leverage. Our analysis is conducted on a sample of 244 French listed companies over the period 1997-2007. The empirical results point to the existence of complementarity between the tradeoff hypothesis and the financing deficit variable, while no meaningful effect was detected for market conditions on debt ratio. Market timing in its simple form or extended one, is not confirmed either. The relevance of lagged leverage ratio in all tests confirms the existence of a process of dynamic adjustment to a target level.

Keywords: Capital structure, Trade-off theory, Pecking order, Financial deficit, Market timing, French

1. Introduction

The capital structure framework has been studied for a long time with no satisfactory theoretical model or significant empirical tests (see Harris and Raviv 1991, Frank and Goyal 2008 for surveys). According to Myers (1984), research in this direction still remains a puzzle in the sense that financial theory is unable to accurately describe firms' behavior. The difficulty in implementing empirical tests is due to the approximations used to measure variables (Maddala and Nimalendran 1996, Chang *et al.* 2008). Under such conditions, the results are insufficient to explain the real determinants of firms' debt. Harris and Raviv (1991) find that empirical test of firms' leverage behavior is fraught with problems related to measuring the explanatory variables of capital structure. Rajan and Zingales (1995) pointed out that previous empirical literature and tests are insufficient to shed light on the relevance of the different theories.

The theoretical framework developed by classical theory (Modigliani and Miller 1958) was characterized by a number of unrealistic assumptions that have met several criticisms. Indeed, many financial behaviors remain imperfectly explained by financial theory. Among the new debated issues on the relevance of financial structure are the following questions: (i) how is debt policy influenced by firm's bankruptcy risk? (ii) Does the inclusion of taxations (corporate and personal) allow indebted firms to benefit fully from financial leverage effect?, (iii) can conflicts of interest that may arise between management, shareholders and creditors affect firm's debt policy? (iv) In a market characterized by asymmetric information should the manager convey information about company prospects to the outside?

The consideration of market imperfections factors such as taxation, bankruptcy costs, asymmetric information and agency costs have provided new explanations to firms' debt behavior. *Modigliani and Miller (1963)*, and *Myers (1974)* highlighted the importance of corporate taxation in explaining firms' high leverage. *Fama and Miller*

(1972), *Stiglitz (1974)*, and *Scott (1977)* show that bankruptcy risks and costs may limit the benefit of the potential tax shield derived from deductibility of interest expense. *DeAngelo and Masulis (1980)* argue that non interest tax shield derived from credit tax and depreciation enables firms to use less debt in their capital structure. *Jensen and Meckling (1976)*, and *Fama (1980)* argue that agency costs arising from conflicts of interest between management, shareholders and creditors may provide new explanations to firms' debt behavior. *Donaldson (1961)*, *Myers (1984)*, *Myers and Majluf (1984)* add that information asymmetry between insiders and outsiders and the resulting costs allow companies to prioritize and rank the different sources of funding. *Marsh (1982)* and *Baker and Wurgler (2002)*, claim that the hierarchy of funding based on information asymmetry hypothesis is violated when favorable market conditions raise the value of the company. In such situations, managers can use this opportunity to issue shares. Otherwise, the signal from the market requires the firm to choose the bond issue.

Three directions of research have emerged from these competing theoretical explanations:

- *The Trade-off Theory* considers arbitrage and reconciles between market imperfections related to taxation, bankruptcy and agency costs (Titman 1984, Fama and French 2002, Frank and Goyal 2003, Hovakimian 2004, Hennessey and Whited, 2005, Flannery and Rangan 2006).

- *The Pecking Order Theory* gives more weight to asymmetric information cost and adverse selection in the choice and classification of the possible funding sources (Myers and Majluf 1984, Rajan and Zingales 1995, Barclay *et al.* 1995, Shyam-Sunder and Myers 1999, Fama and French 2005, Lemmon and Zender 2004, Flannery and Rangan 2006).

- *The Market Timing Theory* states that the choice of securities to be issued depends on the health history of the firm's market value (Hovakimian *et al.* 2001, Baker and Wurgler, 2002, Welch 2004, Alt, 2006, Flannery and Rangan 2006, Kayhan and Titman 2007).

The objective of this paper is to shed light on the theoretical and empirical debate opposing these theories. Indeed, we will present in a second section the various explanations proposed in the financial literature, list the assumptions underlying them and briefly discuss some financial market imperfections that might affect in a practical way the conclusions of these theories. In the third section we discuss the methodology used, the choice of variables and assumptions to be tested. In the fourth section of this study we test the determinants of financial structure of French companies, in terms of the following question: what are the factors that influence the choice of financial leverage of French firms? In particular, we propose in the context of the French listed companies several econometric regressions testing whether there is complementarity or inconsistency between the different approaches of financial structure using trade-off, pecking order and market timing theories. Our conclusions will be presented in section five.

2. Literature Review

Since the work of Modigliani and Miller (1958), several theories have been proposed to extend the scope of analysis defined by these authors to reflect market imperfections (taxes, information asymmetry, transaction costs and conflicts of interest). In what follows we offer different explanations of the behavior of corporate debt financing via the theories of target funding, pecking order theory, and Market Timing.

2.1 The Trade-off theory

This theory attempts to explain firm's leverage behavior by considering the possible benefits and costs of debt financing in the presence of tax, bankruptcy costs and agency costs.

2.1.1 Tax and the maximum leverage ratio

According to Modigliani and Miller (1963), when the irrelevance theorem was relaxed to take account tax, the equation of equal values of both unlevered and levered companies will change. In fact the difference between these values will reflect the tax shields for the use of debt which is equal to the product of the tax rate times the amount of debt. *Myers (1974)* considers this reasoning to justify an extreme situation of capital structure composed of debt which does not correspond to reality.

2.1.2 Costs of bankruptcy and the static tradeoff theory

The main shortcoming of debt financing emanates from the possibility of a failure to pay off interest as well as the principal amount to the lender. Obviously, the more a company borrows, the risk of insolvency is even higher. Indeed from a certain level of debt, the probability of bankruptcy is no longer negligible, these costs include direct and indirect costs which can affect and reduce the residual sums of money that creditors and shareholders may receive from the company in case of ruin. In this situation, a compromise must be found between the advantage of tax savings derived from debt and the cost of bankruptcy to determine optimal capital structure. Despite the

importance of the issue, the results of work done up to date are not convincing. Some studies in the U.S. and the French contexts confirm the importance of these costs (Baxter 1967). In contrast, other studies consider that these costs are low (Ang et al. 1982, Warner 1977, Weiss 1990)

2.1.3 Taxation and Alternatives to interest expense

As suggested by DeAngelo and Masulis (1980), depreciation deductions, depletion, amortization and investment tax credits are considered from a tax perspective as substitutes for debt corporate tax shields. Consequently, the debt ratio of a company should be inversely related to the importance of the non-debt tax shelter other than interest expense that it may receive. Consequently, and contrary to *Miller's irrelevance proposition* (1977), there is an optimal allocation debt-equity for each company. Especially, if both companies have the same expected earnings, the firm that provides opportunities for high non-debt tax deductions will be less indebted.

2.1.4 Conflicts of Interest and agency costs of debt and equity

According to Fama and Miller (1972), Jensen and Meckling (1976), Jensen (1986), Myers (1977) and Stulz (1990), the use of external financing in the presence of asymmetric information and incomplete contracting can give rise to the potential conflicts of interests between managers, Stockholders and debtholders. These problems in turn could give rise and lead the company to a suboptimal investment strategy, which is not consistent with the objective of maximizing firm value. In this model, debt financing reduces overinvestment cost but increases underinvestment costs. However, equity financing raises the cash available to managers, reduces underinvestment costs but amplifies overinvestment costs.

2.2 Theory of financing hierarchy

The hypothesis of hierarchical financing suggests that firms prefer using retained earnings to pay dividends and finance investment opportunities. When external financing becomes necessary (i.e. when internal funds are insufficient to finance profitable investment projects), firms issue debt first and then they proceed with issuing new shares as a last resort.

The literature suggests two main views to explain the financial choices of the company:

- The Donaldson's (1961) approach suggests an explanation based on costs. In fact, according to this author financing firms adopt a hierarchical order, to avoid expenses incurred during an issuance of shares. In addition, he states that in the case of financing deficit, firms prefer debt to common shares, because the issuance costs of this instrument are generally lower than those of equity.
- Myers (1984), Myers and Majluf (1984) challenge this view and support pecking order proposals because firms seek to maximize shareholders' wealth. In fact according to these authors, the cost explanation is not well-founded because the advantage of debt in terms of economics and risk is mitigated by the issuance cost. They argue that the issue of new shares is not in the shareholders' interests because it generally leads to a drop of share value. The results obtained by Marsh (1982), Masulis and Korwar (1986), Mikkelson and Partch (1986), confirm this point of view. Myers and Majluf (1984) also add that debts are preferred to equity, because the issuance of riskless debt has no impact on the value of existing shares. Moreover even if debt is risky, the effect of its issuance on the firm's market value will be more favorable than that exerted by the use of new shares. In this case, market reaction is more sensitive to the dilution of capital than a rise in the level of firm's commitments.

2.3 Theory of Market Timing

According to this approach, the behavior of firms' debt is influenced by the market and economic conditions of share prices. Firms are more likely to issue equity after a run up in share prices and tend to issue debt following declines of stock prices. Based on the prediction of market price movements which suppose inefficient capital market, managers have incentives to time the market. The first appearance of such explanations is detected by analyzing the historical studies of stock returns: Taggart (1977), Marsh (1982), Asquith and Mullins (1986). More recent studies use the Market to Book ratio to detect possibilities of timing: Rajan and Zingales (1995), Jung, Kim and Stulz (1996), Hovakimian, Opler and Titman (2001), Baker and Wurgler 2002, Welch (2004).

Taggart (1977) uses the debt to equity ratio as a proxy for debt capacity, and finds that firms decide to issue shares and bonds on the basis of their levels of permanent financial slack and their capacity for long-term debt. According to Marsh (1982), for a publicly traded company, the choice of the financial instrument to be issued over a given period is influenced by market conditions and the history of its stock price. Examining firms in developed countries (G7), Rajan and Zingales (1995) showed that leverage and Market to book ratio are significantly correlated and argued that this result proves the existence of Market Timing in these countries. Using the residual income model, Havakimian, Opler and Titman (2001) show that both the problem of undervaluation and tradeoff

theory tend to be more crucial in determining securities issuance choice. They suggest that their result is improved when introducing the Market to Book ratio as an additional control variable.

According to Baker and Wurgler (2002), market timing plays an important role in determining firms' behavior in setting the appropriate financial structure. In other words, the financial choices of the firm are the outcome of past adjustments of their stock prices and the desire to time the market. Indeed, during periods of market growth and prosperity, managers take advantage of the situation to issue shares to mitigate the stress of debt constraints and thereby increase the opportunity of its entrenchment. In the case where the climate is an unfavorable financial market that matches a strict control exercised by majority shareholders, officers are limited to requirements and constraints imposed by the market, seeking to issue less risky debt.

Kayhan and Titman (2007), Hovakimian (2006) point out that the main reproach to Baker and Wurgler's model (2002) is the proxy used to capture market timing. Following these authors' criticisms, the historical market to book ratio may capture not only past equity market timing but also the firm's growth opportunities. Other authors (Welch 2004, Alti 2006) have attempted to explain the timing of the market by using other indicators such as market appreciation of share price.

3. Data and Methodology

3.1 Sample Selection

Our sample consists of 244 French companies listed on the "SBF 250" index belonging to several sectors (Industrial: 119 companies (48.7%), Service and trade: 86 companies (35.24%), Transport: 23 companies (9.42%), Oil sector: 16 companies (6.55%).

These firms are observed over the 1997-2007 period, allowing us to form a cylinder of panel data of 2684 observations. Accounting, financial and ownership structure data are obtained after consulting those companies' annual reports available in the "MERGENTONLINE." database. Market capitalization of firms is obtained by consulting "DATASTREAM" database.

3.2 The Models

The econometric formulation proposed in this study examines the determinants of capital structure in accordance with the theoretical and empirical studies discussed above. Our goal is to identify the main factors explaining the observed variation in the debt levels of listed French firms and to test the various models derived from each theory, in order to recognize which one that best reflects the reality of companies. We propose in this work to test the following three competing theories: (1) The Tradeoff theory, (2) The Pecking order theory, (3) The market timing theory.

3.2.1 The Trade-off model

Analysis of previous literature shows that researchers used two types of econometric formulations to test the behavior of firms' debt via "trade-off" theory.

- The static tradeoff model:

According to Titman and Wessel (1988), Opler and Titman (1996), Fama and French (2002), Adedeji (2002), Chen (2004), the theoretical model to be tested is presented in the following form:

$$D_{it} = \beta_k \cdot X_{it} + u_{it} \quad (1)$$

Where D_{it} is the dependent variable which reflects the debt ratio for the firm i in the year t , X vector of explanatory variables, u_{it} is the residual error term. The explanatory variables used are based on the analysis of market imperfections such as taxation, asymmetric information and conflicts of interests. Proxy measures are: tangibility of assets, firm size, profitability, non-debt tax shields, and bankruptcy risk.

- The dynamic tradeoff model:

The dynamic model assumes the existence of adjustment costs. The econometric method of adjustment to the target requires that the changes in the value of debt ratio are explained by deviations from the target. The model then takes the following form:

$$D_{it} - D_{it-1} = \lambda(D_{it}^* - D_{it-1}) + \varepsilon_{it} \quad (2)$$

Where D_{it}^* is optimal debt ratio for firm i in time t , λ is a parameter that reflects the speed of adjustment towards the target ratio (where $0 < \lambda < 1$). Since the value of optimal debt ratio is not observable, previous studies used one

or more proxy variables. Two measures are proposed: (i) the first uses for each company or for the entire sample the average debt ratio over the period. (ii) The second measure assumes a function with several explanatory variables, which is written as follows:

$$D_{it}^* = \sum_k r_k X_{kit} + \varepsilon_{it} \tag{3}$$

Where r_k is the target debt ratio as a percentage of the explanatory variable X_k . The formulation of the tradeoff model in the presence of these variables is:

$$D_{it} = (1 - \lambda) D_{it-1} + \sum_k b_k X_{kit} + v_{it} \tag{4}$$

Where b_k is the coefficient of the variable X_k which is equal to speed of adjustment times target ratio λr

3.2.2 The Pecking order model

According to Shyam-Sunder and Myers (1999), the change in debt is explained by a single variable which is financial slack ratio DEF (deficit to total assets). In this case the model is written as follows:

$$\Delta D_{it} = a + b_{po} DEF_{it} + e_{it} \tag{5}$$

Where ΔD_{it} is the amount of debt issued in period t, DEF is the financing gap. The latter is calculated taking into account several variables such as the dividend (Div), net investment in the firm (I), change in working capital (ΔFDR), R_t the portion of the long-term debt to repay at the year t, cash flow from operations (CF).

$$Deficit_t = Div_t + I_t + \Delta FDR_t + R_t - CF_t \tag{6}$$

Where DEF is Deficit deflated by total assets.

Adedji (2002) expands this formulation by adding other variables such as non-debt tax shield (NDS), opportunities for growth (MB), firm size (Size), structure of assets (SA), and earnings volatility (Vol).

$$\Delta D_{it} = a + b_{po} DEF_{it} + \sum_k \alpha_k X_{kit} + e_{it} \tag{7}$$

3.2.3 The Market Timing model

Following Rajan and Zingales (1995), Baker and Wurgler (2002), the market timing hypothesis considers growth opportunity measured by the market to book ratio as the main factor explaining the behavior of firms' debt. The formulation of this explanation is written as follows:

$$D_{it} = a + b_1 MB_{tim,it-1} + b_2 MB_{it-1} + b_3 Size_{it} + b_4 Prof_{it} + b_5 Tang_{it} + u_{it} \tag{8}$$

MB_{tim} which is the weighted average of the past Market-to-book ratios, starting with the first available observation to date t-1. The weighting for each year is financial slack. According to Baker and Wurgler (2002), this variable is written:

$$MB_{tim,t-1} = \frac{\sum_{s=0}^{t-1} (e_s + d_s) MB_s}{\sum_{r=0}^{t-1} (e_r + d_r)} \tag{9}$$

Where e, and d denote respectively net equity issue and net debt issue. According to Hovakimian (2004), MB_{tim} is weighted average of a time series of past MTB ratios.

Welch (2004) proposes the implied debt ratio (IDR) that distinguishes the effect of stock price changes on leverage. Assuming that managers change neither debt nor equity during the period [t-1, t], the implied debt ratio (IDR) is assumed to measure the mechanical impact of stock price changes on leverage.

$$IDR_t = \left[\frac{D_{t-1}}{E_{t-1} * (1 + r_{[t,t-1]}) + D_{t-1}} \right] \tag{10}$$

Where D, E, and r are respectively the book value of debt, the market value of equity, and the realized

appreciation of share price during the period between t-1 and t.

3.3 Choice of variables and hypotheses to be tested

The dependent variable: Two measures of long-term debt ratio are proposed:

- The first is Book leverage (BL) which measures level of debt as the ratio of long-term debt (LTD) over the sum of book long term debt and book equity [$BL = LTD / (LTD + \text{Book equity})$]

- The second measure uses a market value (ML) of the debt ratio by substituting book equity by market equity [$ML = LTD / (LTD + \text{market equity})$].

The Explanatory variables:

We chose the explanatory variables on the basis of their implications and explanations of the three theories mentioned above. We distinguish two categories of variables: variables directly related to the proposed theory and control variables. Consistent with previous empirical works, we use in our research the following variables:

Firm size (Size): several studies confirm the existence of a significant impact of size on the firm's debt ratio, however, financial theory suggests two contradictory explanations:

- (i) According to tradeoff theory, size is considered as a proxy of bankruptcy cost (Warner 1977, Ang et al 1982, Titman and Wessel, 1988, Rajan and Zingales 1995 ...). Indeed, some empirical studies highlight the existence of economies of scale in terms of bankruptcy costs; the larger the company, the greater the level of diversification to reduce cash flow volatility, the lower is bankruptcy risk. In this case, size has a positive impact on debt ratio.
- (ii) Within the pecking-order theory where information asymmetry plays a role in the financial behavior of firms, size is used as the inverse measure of information obtained by outside investors. In this case, it reflects for large companies the easier access to capital markets and their preference to issue more financial assets (shares). Small firms are more sensitive to asymmetry of information, find it difficult to issue debt, and prefer internal financing. In this context, debt should be a decreasing function of size.

Unlike the works of Titman and Wessel 1988, Rajan and Zingales 1995, Ozkan 2001 (used turnover ratio), we use the natural logarithm of total assets as a proxy for firm size. We assume this variable as positively correlated with long-term debt ratio (Hypothesis 1)

Tangibility (Tang): When information is asymmetric between firms and lenders, the resulting agency costs can be reduced if the firm has sufficient tangible assets to deal with the risk of moral hazard (Jensen and Meckling 1976). In this view, companies that have significant tangible assets will have more debt capacity on the market and will be less financially constrained. Indeed this type of asset is less sensitive to asymmetric information and financial distress problems. In the case of high debt agency cost, tangible assets can be used as collateral, decreasing the lender's risk and reducing firm's bankruptcy risk.

Several authors have used this variable in their studies: Jensen and Meckling (1976) assume that over-investment risk is less pronounced when the firm has significant fixed assets in its balance sheet; Williamson (1988), and Harris and Raviv (1990) argue that firms with large assets generally have high liquidation value, which implies a positive relationship between debt and guarantees. Also this relation is confirmed by Bradley et al (1984), Titman and Wessel (1988), Rajan and Zingales (1995), who showed evidence that this variable is positively correlated with leverage.

Like Baker and Wurgler (2002) and Chang et al (2008) we use property, gross plant and equipment (PPE) scaled by total assets as a measure of firms' tangibility. We assume that this variable has a positive impact on firms' debt ratio (hypothesis 2)

Growth opportunities (MB): Most of the previous studies estimated the significant effect of growth opportunities on corporate debt. There are two possible explanations: (i) A more rapid growth may increase the need for external resources. In this case, the more the company has strong growth in its assets, the more it faces problems of financing its business, which generates a positive impact on its leverage. On the other hand, consistent with agency theory, conflict of interest between shareholders and creditors will be more severe when the values of future growth opportunities are higher (Myers 1977). In addition, we should expect a negative relationship between future growth and leverage. This hypothesis is confirmed by Titman and Wessels (1988), Barclay et al (1995), Rajan and Zingales (1995), Barclay and Smith (1999), Graham (2000), Heshmati (2001), Booth et al (2001), and Hovakimian, Hovakimian and Tehranian (2004).

According to Harris and Raviv (1991), we use the Market to Book ratio (MB) as a measure of firm's growth

opportunities. We assume (hypothesis 3) that this variable is negatively correlated with debt ratio (Flannery and Rangan 2006).

Profitability (Prof): As an indicator of firm performance, the effect of profitability on leverage is ambiguous: an increase in profitability allows the company to strengthen its financial autonomy and thus use less debt in its capital structure. As a consequence, this variable is supposed to be negatively correlated with leverage (Titman and Wessel (1988) Bias et al (1995), Rajan and Zingales (1995), Booth et al (2001). One interpretation of this relationship is proposed by pecking order theory (as developed by Donaldson (1961), Myers (1984)) which states that firms with more profitability prefer internally generated funds to finance projects. Alternatively, the tradeoff hypothesis considers that profitable firms benefit from leverage effect and are more willing to use more debt. In this way, this variable has a positive signal on lenders who interpret this growth as a good indicator of future repayments. Following Rajan and Zingales (1995), and Booth et al (2001), we measured this variable by earnings ratio before interest and taxes on total assets. Within Hypothesis 4, we assume a negative link between profitability and debt (Hovakimian (2004)).

Non-debt tax shield (NDTS): from a tax point of view, DeAngelo and Masulis (1980) consider that non-debt tax benefits constitute alternatives to tax shield interests. In other words, firms with sufficient investment credits tax and depreciation are likely to use less debt. Several measures have been suggested in the literature: Bradely, Jarrel and Kim (1984) used depreciation and investment tax credits, Wald (1999) used the depreciation of fixed assets. In our case, like Fama and French (2002), we measure the ratio of depreciation and amortization to total assets as a proxy of non-debt tax shield. We assume that this variable has a negative effect on debt (Hypothesis 5).

Bankruptcy risk (Risk). In accordance with the classical theory of financing, optimal capital structure is obtained by the tradeoff between bankruptcy costs and tax shield of debt (MM1963). Other studies (Leary and Roberts (2005) used earnings volatility to measure operational risk. In all cases, the risk has a negative effect on the behavior of firms' debt. We measure this variable by the inverse of the interest coverage ratio (interest expense to earnings before interest and taxes FF/EBIT). We assume a negative impact of bankruptcy risk on the choice of the firm's financial structure (Hypothesis 6).

Funding gap (DEF): According to pecking order theory (Shyam - Sunder and Myers 1999), change in debt is the result of a need for external funds rather than as a target debt justified by a partial adjustment mechanism. We measure this variable by the ratio of financial slack DEF (as defined by formula 6) to total assets We test the hypothesis that the coefficient on this variable (see formula 5) is significantly equal to one while that which reflects the constant is equal to zero (hypothesis 7).

Timing the market: we use two variables proposed by Baker and Wurgler (2002) and Welch (2004) (See formulas 9 and 10). We assume that these variables have a negative impact on the behavior of firms' debt (Hypothesis 8, 9).

Control variables: to account for other effects that may influence firms' debt we prefer to use variables suggested by Agency theory:

- free cash flow Ratio (FCF): According to Jensen (1986), free cash flow is the amount available after financing all positive NPV projects. The existence of these funds is a source of conflict between shareholders and managers. The latter aim at maximizing their utility functions at the expense of the owners' wealth (perquisites and inefficient investment). In this context, debt financing acting as a disciplinary device of managerial opportunism, constrains firm to pay out its free cash flows (Stulz 1990).

We measure free cash flow by the difference between operating cash flow and investment scaled by total assets. We assume that this variable has a positive effect on leverage.

- Ratio of concentration of ownership (HH), and managerial ownership ratio (MSO) are used as indicators of ownership structure. In this context these two variables reflect the conflicts of interest between insiders and outsiders. Indeed, and according to Stulz (1988), Harris and Raviv (1988) concentrated ownership incites blockholders opportunism who use debt to increase their power by dominating more resources. In contrast, managerial ownership encourages directors to use less debt in order to limit the company's bankruptcy risk (Jensen et al 1992, Mehran 1992). We measure concentration of ownership by the Herfindahl-Hirschman index, calculated as the sum of the square of the capital held by the three main shareholders (Demsetz and Lehn 1985). We measure managerial ownership by percentage of shares held by executive officers.

Insert Table 1 here

4. Empirical results

4.1 Correlations and Descriptive Statistics

Table 2 below (see annex) shows correlations between the different variables of our models. Overall, the level of correlations between variables is low: the highest coefficients (0.496 and 0.522) correspond respectively to the positive relationship between profitability (Prof) and free cash flow variable (FCF) and the positive relationship with growth as measured by MTB with its lagged value. All other correlations are close to 10%. In addition, analysis of this table shows that the variable financial deficit (DEF) is weakly and negatively correlated with tradeoff variables (Profitability (Prof), non-debt tax shields (NDTS), and bankruptcy risk (Risk)), whereas this relationship is positive with the market timing variable.

Insert Table 2 here

Descriptive statistics (see Table 3) shows that the minimum and maximum levels of book and market value of corporate debt are respectively 0 and 0.99 with an average close to 0.513 for the book value of debt and 0.345 for market debt. These results show that level of long-term debt is widely dispersed but with a tendency less than 50%. Profitability is close to 8% while the risk of failure as measured by the inverse of interest coverage ratio is moderately high (with absolute value 11%) than the low values of tangible assets (0.3%).

Insert Table 3 here

4.2 Results of econometric tests

4.2.1 Results of the tradeoff-hypothesis

Table 4 (see appendix) presents the main results of the estimations of tradeoff- hypothesis. Overall, the explanatory variables significantly explain levels of firms' long-term debt. The adjusted R-squared varies between 63% and 73% depending on whether the dependent variable is market or book measure and whether the model is static or dynamic. All the explanatory variables (except the variable bankruptcy risk (RISK)) of the tradeoff theory are significant for all regressions. For all estimates, some variables have kept their positive effects (MTB, NDTS, Risk) or negative (size) while other variables have changed their sign from static models to dynamic models (Prof., Tang).

Firm Size (Size): The significant negative effect of size is observed only for models where debt is measured by Book formula. This result is not consistent with the predictions of the tradeoff hypothesis. Indeed, many empirical studies find the opposite (positive effect) influence of size of debt. Marsh (1982), Rajan and Zingales (1995), Both et al (2001), and Wald (1999) justify this sign by the fact that large firms have more easy access to financial markets which choose long-term debt while small firms prefer short-term debt when they have insufficient internal financing. The negative sign of firm size is much justified by market timing hypothesis which is the opposite of pecking order mechanism. In this case, large companies prefer issuing financial securities (shares) when market conditions of the firm are good.

Profitability (Prof): The variable profitability has a positive and significant effect for the book measure of debt and negative and significant effect for market measure. The latter result is consistent with the predictions of Myers (1984), Rajan and Zingales (1995), Booth et al (2001) and Fama and French (2002) who consider that this variable may play a fundamental role in explaining the hypothesis of hierarchical behavior (negative effect). On the other hand and following agency theory hypothesis as formulated by Jensen (1986), and Williamson (1988), leverage can help reduce conflict of interest between shareholders by limiting overinvestment problems and can be used to increase return on equity when the company's profitability is high enough.

Growth (MTB): The positive and significant effect of this variable supports the idea that firms with high growth in assets have more need to external funds to finance investment projects. This result supports the predictions of Titman and Wessels (1988), Barclay et al (1995), Rajan and Zingales (1995), who argue that agency conflicts between shareholders and debtholders are more serious when the firm faces more growth opportunities. In this case, the presence of such future prospects will allow managers to moderate the current level of financial leverage in order to be later exploited.

The Non-Debt tax shield (NDTS): The positive and significant link between this variable and debt confirms the predictions of Bradly, Jarrel and Kim (1984). However this effect is contrary to the standard assumption which considers non-debt tax savings as substitutes for debt interest tax shields and thus inciting firms to use less debt in their capital structure (DeAngelo and Masulis 1980).

The bankruptcy risk (RISK): The empirical test shows that the variable measured by bankruptcy risk "RISK" is not significant in all econometric formulations. Nevertheless, this variable has a positive impact on debt depending

on whether the model is static or dynamic. This result is contrary to the standard evidence that companies must reduce their leverage ratio as bankruptcy risk increases. This confirms that the reaction of firms' leverage to the increase of their financial expense ratio is not always observed as the earnings coverage ratio is not large enough.

Tangibility (Tang): Empirical tests show that this variable is negative and significant for models with a book measure of leverage "BL" and positive and significant (only for the static specification) with market debt (ML). These results are justified by the fact that when the behavior of firm's leverage is conducted by a process of adjustment to a target ratio, the existence of guarantee allows it to borrow more long term debt which justifies the positive effect of this variable. In the case, where leverage behavior does not have a strategic long-term target, assets tangibility will exert a negative impact on external financing needs.

The addition of other **control variables** reflecting the existence of free cash flow (FCF), capital concentration (Herfindahl index HH) or managerial ownership (MSO) does not improve previous results. Tests show that all these variables are insignificant regardless of the econometric formulation and type of debt used in the regression.

Insert Table 4 here

Target Leverage and Speed of Adjustment: In all the dynamic approaches used to choose capital structure according to the theory of tradeoff, allows a company to consider the possibility of adjusting current debt to a target level depending on the selected explanatory variable (X). The results of the empirical tests confirm the relevance of the lagged endogenous variable. Indeed, in all estimations this variable shows a positive and significant effect (at 1%) on the company's financial behavior. According to equations (3,4), it is possible to calculate the average speed at which the firm adjusts its debt to its current target ratio r . Table 5 below, summarizes these parameters. The Analysis of previous results shows that the speed of adjustment to the target capital structure is 51.6% when debt is measured by market value and equals to 47.9% when is measured by the book proxy. The target ratios (absolute value) of debt for the explanatory variables are respectively close to 6% and 16 % for market and book measures of debt

Insert Table 5 here

4.2.2 The empirical tests of the pecking order hypothesis

In this paragraph, we test the pecking order hypothesis in accordance with Shyam Sunder and Myers (1999), and Flannery and Ragan (2006). Table 6 (see appendix) shows that the simple formulation of this theory explains respectively about 71% and 74% of market and book leverage ratio.

Unlike previous empirical studies, the coefficient b_{po} associated with the variable financial deficit (DEF) is different from 1 (with a negative value -0.002) and significant at 10% level for the market debt ratio. However, this coefficient is not significant for the book measure of leverage. The coefficient of the constant is significant with a value different from zero which suggests that financing deficit explains partially the debt ratio. These results, confirm those obtained by Garcia and Mira (2003).

According to Flannery and Ragan (2006), the addition of other control variables such as: size, growth, profitability, risk, tangibility and non-debt tax shield, increases the significance level of the financing deficit variable as explanatory of leverage dynamics for either book or market measures. However, the addition of variables such as free cash flow (FCF), Herfindahl index (HH) and managerial participation (MSO) do not improve previous results.

It is important to recognize that, this variable deficit (DEF) has kept a stable negative sign for all specifications of market debt and a positive sign for the book measure. This suggests, that in the context of the pecking order theory, behavior of financing deficit is not the same when changing the proxy used for debt ratio. The reaction of the dependent variable is likely to be more significant when we use market measure of leverage, in this case we obtain a negative sign consistent with the predictions of Shyam Sunder and Myers-(1999), Frank and Goyal (2003), Kayham and Titman (2007).

In sum our results of the estimation of the financing hierarchy hypothesis in its simple or generalized form confirm the assumption that change in long-term debt is partially explained by the financing deficit as measured by Shyam Sunder, and Myers (1999). Similarly an attempt to combine such estimates with the assumption of simple partial or dynamic adjustment improves the degree of relevance of this variable which always keeps a stable sign of the coefficient, but statistically significant at the 10% and different from one.

Insert Table 6 here

4.2.3 The estimation results of market timing theory

The results of the estimation (see Table 7) of this approach in its simple form show that the proposed model cannot explain firms' leverage behaviour. The variable measuring market timing (MBtiming) is negative and not

statistically significant for both selected measures of debt. Similarly, the addition of other control variables reflecting partial adjustment in accordance with the tradeoff model (Flannery and Rangan 2006) does not improve the degree of relevance of this variable regardless of the formulation considered. Note that, this variable has kept its negative sign confirming the predictions of Baker and Wurgler (2002) who argue that firms tend to issue equity when the financial market maintains good situations which favor any form of stock issue.

In addition, the empirical tests show that the effect of lagged market to book ratio (MB-1) is significant only for the dynamic specification of the book debt ratio. This shows that the addition of control variables does not improve the significance of the market timing variable (MB_{tim}) which remains irrelevant. In this case, the mechanism of market timing is not validated in the French context. Empirical validation of an improved measure of market timing in accordance with Welch (2004) shows that the variable measuring the effect of inertia IDR is not statistically significant at 10%. This result confirms those obtained by Flannery and Rangan (2006) who find a weak effect of market appreciation (IDR) on leverage.

Insert Table 7 here

5. Concluding Remarks

In the first part of this study, we presented different views on the controversial issue of capital structure. Some of these theories claim that there is an optimal capital structure and therefore the financing decision has an impact on the company's market value, while others argue the opposite. In recent years, models involving the existence of an optimal capital structure through a tradeoff between bankruptcy costs and debt tax shields and developed against the Miller and Modigliani's irrelevance theorem have been highly controversial. Indeed, both the insignificance of bankruptcy costs and tax gains of debt make these models unconvincing and would perhaps have required expansion by considering other market imperfections.

Recent models for the determination of an optimal financial structure have followed two different lines of research. The first sought to overcome the restrictive nature of bankruptcy costs by reference to the signaling theory and agency theory. The second group, using a more complete formulation of taxes, has sought to consider tax shield among other items than those provided by debt. It must be noted that these two lines of research clarify and represent a significant improvement over traditional designs. Advanced models of optimal capital structure should then adopt an approach based on competition between agency costs, signaling and tax.

In the second part of this study, we sought to identify the empirical determinants of debt levels of French companies. Indeed, the observation and analysis of corporate financial behavior can be very instructive, providing valuable information and solutions to the capital structure problem. Thus, economic and financial variables combined can lead to the establishment of a typology of firms' leverage ratios. However, as we have pointed out the existing empirical studies cannot systematically lead to the assumption of robust relationship between these variables that would fully explain the financial structure of companies. Furthermore, variables considered as significant vary from one model to another. In this case empirical comparisons and confrontations between different approaches and theory of financial structure have significantly improved research in this direction.

The empirical tests conducted on French firms, allow us to classify the determinants of financial structure as follows: firms adjust their debt levels based on a target ratio explained by several variables: (i) firm size, (ii) profitability (iii) growth opportunities, (iv) non debt tax shield. It seems that the level of corporate debt is determined by the resolution of the mechanisms of tradeoff between benefits and costs of debt while searching for an optimal debt ratio. Similarly, financial behavior can be oriented in the light of assessments and evaluations of financing deficit. In this case, the theory of pecking order explains financial behavior of French firms and would allow managers to better choose between debt and equity.

Finally, the empirical tests showed that market imperfections (taxes, bankruptcy costs, asymmetric information) have a significant impact on the determination of financial behavior of firms. However, the effect of certain variables is not approved. The role of bankruptcy risk, for example, is quite uncertain. It is the same case for Market Timing variables (theory of market timing) and variables ranging from behavior to the existence of free cash flow, Blockholders and insiders ownership.

While many explanations presented in this study have helped to elucidate firms' leverage behavior, many other problems related to this topic remain unresolved. Recently, academic research (Hackbarth 2009) has introduced behavioral aspects of corporate finance like managerial optimism and overconfidence as new insights on the capital structure puzzle.

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Table 1. Measures of variables and predicted signs

Variable	Name	measure	Predicted sign
Book leverage	BL	LTD/(LTD + Book equity)	Dependent variable
Market leverage	ML	LTD/(LTD + market equity)	Dependent variable
Firm's size	Size	Log (TA)	+
Tangibility	Tang	PPE/TA	+
Growth opportunity	MTB	market value of equity/ book value equity. Where, MTBR is lagged MTB.	-
Profitability	Prof	EBIT/TA	-
Non-debt tax shield	NDTS	(depreciation + amortization)/TA	-
Bankruptcy risk	Risk	FF/EBIT	-
Funding gap(deficit)	DEF	Deficit/TA	DEF coef=1
Timing of the market	MB _{tim}	See formula 9	-
Free cash-flow	FCF	(operating cash flow - investment)/TA	Control variable
Concentration of ownership	HH	Herfindahl-Hirschman index= sum of the square of the capital held by the three main shareholders	Control variable
Managerial ownership	MSO	Percentage of shares held by executive officers.	Control variable
Market appreciation(welch 2004)	IDR	See formula 10	

TA is total assets, LTD is Long term debt, PPE is property, gross plant and equipment, EBIT is earnings before interests and taxes, FF is interest expense, Deficit see formula 6.

Table 2. Correlation Matrix of explanatory variables (244french firms, 1997-2007)

	FCF	SIZE	TANG	MTB	MTBR	PROF	NDTS	RISK	DEF	MB _{tim}	HH	MSO
FCF	1.000											
SIZE	-0.016	1.000										
TANG	0.047	0.065	1.000									
MTB	-0.026	-0.088	-0.025	1.000								
MTBR	-0.022	-0.067	-0.007	0.522	1.000							
PROF	0.496	-0.014	0.024	0.043	0.006	1.000						
NDTS	0.277	-0.222	-0.045	0.054	0.021	0.048	1.000					
RISK	0.045	0.013	-0.006	0.017	0.015	0.041	0.042	1.000				
DEF	0.012	0.112	0.160	0.007	0.003	-0.051	-0.063	-0.005	1.000			
MB _{tim}	0.006	0.287	0.051	0.039	0.045	0.008	-0.072	0.012	0.076	1.000		
HH	-0.001	0.191	-0.040	-0.031	-0.036	-0.037	-0.036	0.003	-0.037	0.109	1.000	
MSO	0.068	-0.396	0.028	0.042	0.048	0.030	0.092	0.005	-0.038	-0.174	-0.173	1.000

Table 3. Descriptive Statistics of all variables (244 French firms, 1997-2007)

	BL	ML	SIZE	TANG	MTB	PROF	NDTS	RISK	DEF	MB _{tim}	HH	MSO	FCF
MOY	0.513	0.345	8.643	0.003	1.351	0.077	0.038	-0.115	-0.222	5.298	0.460	0.340	0.064
DEV	0.230	0.112	0.970	0.098	2.421	0.113	0.064	2.625	1.092	17.743	0.168	0.277	0.092
MIN	0.000	0.000	6.300	-0.994	0.000	-0.849	-0.324	-98.000	-10.030	-64.947	0.010	0.000	-0.825
MAX	0.994	0.955	11.269	0.802	49.584	1.128	0.845	0.970	10.987	89.263	0.995	0.999	0.485

Table 4. Trade-off tests(244 French firms, period 1997-2007)

	<i>Book Leverage(BL)</i>			<i>Market Leverage(ML)</i>		
	(1)	(2)	(3)	(1)	(2)	(3)
<i>Constant</i>	1.660 ^a	1.058 ^a	1.023 ^a	0.274 ^a	0.175 ^a	0.178 ^a
<i>BL(-1)</i>	-	0.521 ^a	0.521 ^a	-	-	-
<i>ML(-1)</i>	-	-	-	-	0.483 ^a	0.483 ^a
<i>SIZE</i>	-0.137 ^a	-0.097 ^a	-0.094 ^a	0.008	0.0001	-0.0006
<i>MTB</i>	0.008 ^a	0.005 ^a	0.005 ^a	0.004 ^a	0.002 ^a	0.002 ^a
<i>Prof</i>	0.231 ^a	0.074 ^c	0.106 ^b	-0.039 ^c	-0.040 ^c	-0.049 ^c
<i>NDTS</i>	0.185 ^a	0.142 ^a	0.161 ^a	0.061 ^c	0.049 ^c	0.045
<i>RISK</i>	0.001	0.001	0.001	0.0004	0.0002	0.0002
<i>TANG</i>	-0.024 ^c	-0.073 ^a	-0.072 ^a	0.013 ^c	0.015	0.017
<i>MSO</i>	-	-	-0.012	-	-	-0.007
<i>FCF</i>	-	-	-0.038	-	-	0.015
<i>HH</i>	-	-	0.027	-	-	0.013
<i>Adjusted R²</i>	0.633	0.738	0.738	0.583	0.706	0.706
<i>Fixed effect ?</i>	Yes	Yes	Yes	No	Yes	Yes
<i>N</i>	2568	2336	2334	2568	2336	2334

Table 5. Long-term debt target ratios r and adjustment speed λ

	Variables	Debt accounting measure	Debt market measure
Target ratios	<i>Size</i>	$r = 0,2017$	-
	<i>MTB</i>	$r = 0,0104$	$r = 0,0048$
	<i>Prof</i>	$r = 0,1543$	$r = 0,0779$
	<i>NDTS</i>	$r = 0.2923$	$r = 0.0942$
	<i>Risk</i>	-	-
	Tangibilité	$r = 0.1535$	-
Adjustment speed		$\lambda = 0.479013$	$\lambda = 0.51667$

Table 6. Pecking order tests (244 French firms, period 1997-2007)

	<i>Book Leverage(BL)</i>			<i>Market Leverage(ML)</i>		
	(1)	(2)	(3)	(1)	(2)	(3)
<i>Constant</i>	0.221 ^a	1.090 ^a	1.055 ^a	0.177 ^a	0.158 ^a	0.163 ^a
<i>BL(-1)</i>	0.561 ^a	0.519 ^a	0.519 ^a	-	-	-
<i>ML(-1)</i>	-	-	-	0.487 ^a	0.481 ^a	0.482 ^a
<i>DEF</i>	-0.002	0.004 ^c	0.004 ^c	-0.002 ^c	-0.002 ^c	-0.002 ^c
<i>SIZE</i>	-	-0.100 ^a	-0.097 ^a	-	0.002	0.001
<i>MTB</i>	-	0.005 ^a	0.005 ^a	-	0.002 ^a	0.002 ^a
<i>Prof</i>	-	0.074 ^c	0.107 ^b	-	-0.040 ^c	-0.049 ^c
<i>NDTS</i>	-	0.139 ^a	0.159 ^a	-	0.050 ^c	0.046
<i>RISK</i>	-	0.0006	0.0006	-	0.0002	0.0002
<i>TANG</i>	-	-0.079 ^a	-0.078 ^a	-	0.018	0.019
<i>MSO</i>	-	-	-0.012	-	-	-0.007
<i>FCF</i>	-	-	-0.040	-	-	0.016
<i>HH</i>	-	-	0.030	-	-	0.011
<i>Adjusted R²</i>	0.721	0.738	0.739	0.703	0.706	0.706
<i>Fixed effect ?</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	2340	2336	2334	2340	2336	2334

Table 7. Market timing tests (244 French firms, period 1997-2007)

	<i>Book Leverage(BL)</i>		<i>Market Leverage(ML)</i>		
	(1)	(2)	(1)	(2)	(3)
<i>Constant</i>	0.222 ^a	1.072 ^a	0.176 ^a	0.183 ^a	0.137 ^a
<i>BL(-1)</i>	0.563 ^a	0.532 ^a	-	-	-
<i>ML(-1)</i>	-	-	0.486 ^a	0.488 ^a	0.536 ^a
<i>MBtim</i>	-0.0002	8.65E-06	-6.14E-05	-1.24E-05	-
<i>SIZE</i>	-	-0.097 ^a	-	-0.0007	0.002
<i>MTB(-1)</i>	-0.002	-0.002 ^c	0.0008	0.0007	-0.0003
<i>PROF</i>	-	0.072 ^c	-	-0.035 ^c	-0.046 ^b
<i>NDTS</i>	-	0.159 ^a	-	0.054 ^c	0.058 ^b
<i>RISK</i>	-	0.0006	-	0.0002	0.0002
<i>TANG</i>	-	-0.075 ^a	-	0.015	0.020
<i>IDR(welch)</i>	-	-	-	-	0.0001
<i>MTB</i>	-	-	-	-	0.002 ^a
<i>Adjusted R²</i>	0.721	0.736	0.703	0.704	0.718
<i>Fixed effect ?</i>	Yes	Yes	Yes	Yes	Yes
<i>N</i>	2340	2336	2340	2336	2130