DETERMINANTS AND DYNAMICS OF CAPITAL STRUCTURE: APPLICATION ON A SAMPLE OF TUNISIAN FIRMS

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Abstract

The aim of this study is to identify the determinants and the dynamics of capital structure for a sample of Tunisian firms. The earlier literature on capital structure stipulates the existence of a target debt ratio *(Bevan and Danbolt (2002), Fama and French (2002), Stein (2002) and Nivorozhkin (2003)).* The empirical evidence indicates that Tunisian firms adjust slowly their level of debts towards target ratios. The result confirms the evidence of *Kremp and al. (1999)* and *Gaud and Jani (2002).*

Keywords: capital structure, trade-off theory, target debt ratio, speed of adjustment, Panel Data

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I. Introduction

The original contribution of Modigliani and Miller (1958) concluded that capital structure is irrelevant to firm value. Since this famous result, numerous authors have extended the analysis to incorporate more realistic considerations. If we allow for factors such as information asymmetry, moral hazard, transactions costs and taxes, then capital structure will no longer have a neutral effect on firm value. Numerous authors (eg Myers (1999), Titman and Tsyplakov (2001)) have examined the optimal capital structure for a firm. To maximise firm value, managers choose a target leverage ratio, which is determined as a trade off between the costs and benefits of borrowing. High debt levels can lead to suboptimal decisions such as abandoning profitable investment opportunities (underinvestment) as noted by Myers (1977) or overinvesting in risky projects (asset substitution) as noted by Jensen and Meckling (1976). However debt may be useful in reducing agency conflicts within a firm, since it forces management to distribute free cash flow (Jensen (1986)).

In practice target debt levels will be influenced by many firm characteristics such as size, growth opportunities, profitability, tangibility, non-debt tax shields and income variability. Two main theories exist aiming to explain how target debt levels are determined, the trade-off theory and the pecking order theory. In the trade-off model, firms identify their optimal leverage by weighting the costs and benefits of an additional dollar of debt. However, the major prediction of the pecking order model is that firms will not have a target or optimal capital structure, but rather follow a pecking order of financing choices.

The balance of empirical evidence to date favours the static trade-off theory over the pecking order theory. The optimal debt ratio is reached when the marginal gain of an additional unit of debt is equal to the marginal cost. However, issues such as capital market segmentation and the existence of imperfections such as transactions costs and taxes may lead us to reject static models in favour of models examining the dynamics of capital structure decisions. Some results exist, however the theory is as yet incomplete. Firsher Heinkel and Zeckner (1989), Leland (1994) and Golstein, Jue and Leland (2001), find that it is not optimal for firms to adjust towards their optimal target when the deviation from the target is inside a bound around the target level. However, other researchers examine the determinants of the choice between internal funds and debt (Marsh (1982), Jalivand and Harris (1984), Baker and Wurgler (2002) and Hovakimian and Tehranian (2004)).

In empirical studies of optimal debt ratios based on firm charactistics it is usual to first analyse the static capital structure analysis followed by an analysis of the adjustment phenomenon (eg Hovakimian, Opler and Titman (2001) and Hovakimian (2004)). Empirical results on the adjustment processes (which implicitly assume a target debt level) are mixed. For example adjustment is fast in some markets eg Spain (Miguel and Pindado (2001)), and slow in others eg Switzerland (Gaud and Jani (2002)). Banerjee et al. (2001) examine factors that affect the speed of adjustment and find that firms typically have capital structure that are not at the

Target and that they adjust very slowly towards the target.

In this paper we examine empirical evidence on capital structure in the Tunisia. The average Tunisian firm has a capital structure that is comprised of 61.9% debt. Financing is generated more via debt than via internally generated funds. We also examine the determinants and the dynamics of capital structure in our sample. The important number of studies on capital structure pushed us to check if the same firm characteristics influence also a different environment as the Tunisian one.

Our main findings are profitability is negatively related to debt ratio. However, tangibility and income variability are positively related to debt. The adjustment of Tunisian firms toward the target debt ratio is slow. This adjustment process varies with the measures of debt retained.

The rest of the paper is organised as following: In section 2, we present a literature review examining the determinants of capital structure. Section 3 contains the data. In Section 4,. We describe the variables. Section 5 presents the models used in our study. Finally, Section 6 contains our conclusions.

II. Literature Review

For its financing, the firm must choose between internally generated funds, debt issues and new stock issues. The choice of a particular sort of financing depends on a set of explanatory variables. In fact, both theoretical and empirical studies show that many factors affect the financial decisions of a firm, especially, by influencing their capital structure. Leverage ratio could be a function of firm specific characteristics and market related variables. We cite mainly: profitability, size, no debt tax shields, growth opportunities, earning volatility, effective fixed assets, equity premium, and term-structure of interest rates[83]. In our study, we focus only on the firm specific characteristics since our sample contain firms which are not listed on the Tunisian stock exchange.

However, the statistical models of capital structure can't take in account the adjustment process over time. Moreover, the optimal debt level explained theoretically doesn't coincide necessary with the observed debt level and this is, especially, due to the existence of adjustment costs. In fact, even if firms have a target ratio, the observed debt ratio can deviate substantially from the target in order to adjust to the fluctuations of assets value in taking in account the adjustment costs. For example, Fisher, Heinkel and Zeckner (1989) and Leland (1994) provide dynamic models where the firms let their leverage fluctuate over time reflecting the accumulated earnings and the losses and do not adjust it toward the target as long as adjustment cost exceed the value lost due to sub-optimal capital structure. Ozkan (2001) notes that it's possible to consider the adjustment process as a result of a balance between the costs of being in disequilibrium and the transaction costs caused by the target ratio movement. The studies of Jalivand and Harris (1984), Frank and Goyal (2001) and Fama and French (2002) postulate the existence of a mean reversion process of debt. Besides, Graham and Harvey (2001) suggest that the debt ratio vary over time and with the type of the firm. Such variability can due to the fact that the debt intensity is measured relatively to the market value of equities. However, they find that between the firms targeting their debt ratio, only some of them note that the shift of price equities affect the debt policy. Besides, Jalivand and Harris (1984) and Fisher et al (1999) allow the adjustment costs to vary by firm and relate them to costs and benefits of deviation from target. Jalivand and Harris (1984) suggest that the financing decisions are interdependent and that the speed of adjustment depends on the size of the firm, the interest rate and the levels of equity prices. Besides, Jalivand and Harris (1984) and Shyam-Sunders and Myers (1999) note that the transaction costs can be a major factor that permits to the firms to adjust fusty toward the target. This result confirms that theoretical predictions of Titman and Tsyplakov (2000). Banerjee et al (2000), as the optimal debt level, the speed of adjustment can fluctuate between the firms and over time. They stipulate that in the case of speed of adjustment, the focus is more on the costs of shifting from one capital structure to another rather on the costs associated with leverage levels. However, Hovakimian, Opler and Titman (2001) suggest that the deviation from the target ratio is an important determinant of the debt vs. equity choice for firms that raise outside financing, but even more so for firms that repurchase some of their outstanding securities. Michael Roberts (2002), with a non parametric analysis, find that firms that adjust slowly toward the target, have relatively more long term debt than their firms. In fact, their need for recapitalization is less frequent. In addition, he suggest that slower adjusting firms are associated with lower volatility in the growth rate of their underlying asset base, which coincides with the prediction of Titman and Tsyplakov (2000) that old economy firms with slow asset depreciation would experience a slower adjustment process.

III. Data

We construct a sample of 44 non financial firms[84] over the period 1997-2001. The sample is composed of 20 firms listed on the Tunisian stock exchange and 24 non listed firms that belong to many sectors

[83] See Harris and Raviv (1991) and Frank et Goyal (2005, 2007).

[84] We remove from the sample the firms which belong to the financial sector, specifically, we exclude firms from the banking and insurance industry since one of their core activities refers to debt management.

(industry, transport, communication, tourism, commerce, real estate…). Data are collected from the Tunisian stock exchange (TSE) and from the financial market council (FMC) (internet sites, financial states, activity reports, official bulletins, banks and the concerned companies.

1. The financial structure of Tunisian firms: a descriptive analysis

Figure (1) shows the evolution of the different measures of leverage (short term, long term and total debt ratios).

During the three first years, the long term debt increases continually. However, the short term debt decreases and causes the decreasing of the total debt ratio. In 2001, the decreasing of the long term debt is partially compensated by the short term debt which fluctuates from 36% to 38%. In short, the financial structure of the Tunisian firms of our sample has not changed significantly during the period 1997-2001. Besides, the total debt ratio is explained mainly by the short term debt.

IV. Variables

Insert table 1

Table 1 provides the definition of the variables used in our study. We define next the major factors that affect debt.

1. Profitability

Although much theoretical work has been done since MoMi (1958), non consistent predictions have been reached of the relationship between profitability and leverage. Tax based models suggest that profitable firms should borrow more, ceteris paribus, as they have greater needs to shield income from corporate tax. However, the pecking order theory (Myers, 1984) suggests that firms use retained earnings first as investment funds and then move to bonds and new equity only if necessary. In this case, profitable firms tend to have less debt. Agency - based models also give us conflicting predictions. On the one hand, Jensen (1986) and Williamson (1988) define debt as a discipline device to ensure that managers pay out profits rather than build empire. In fact, for firms with free cash flows or high debt can restrain management discretion. On the other hand, Chang (1999) shows that optimal contract between the corporate insiders and the outside investors can be interpreted as a combination of debt and equity, and profitable firms tend to use less debt.

In contrast to theoretical studies, most empirical studies show that leverage is negatively related to profitability. In fact, Kester (1986), Titman and Wessel (1988), Bennett and Donnelly (1993), Rajan and Zingales (1995), Mickaelas and al (1999), Ozkan (2000b) and Bevan and Danbolt (2001) find that leverage is negatively related to the level of profitability. Friend and Lang (1988) obtain such findings from US firms. Kester (1986) finds also the result in both the US and Japan. Besides, using international data, Rajan and Zingales (1995) and Wald (1999) for developed countries, Wiwattankantang (1999) and Booth and al. (2001) for developing countries confirm that finding. Fama and French (2002) test tradeoff and pecking order predictions and find that more profitable firms are less levered. However, Long and Maltiz 1985) find a positive relation between leverage and profitability, but, the relationship is not statistically significant.

In our study, we use the ratio earning before interest and tax (EBIT) scaled by total assets to measure the profitability of the firm.

2. Tangibility

Jensen and Meckling (1976) point out that the agency costs of debt exists as the firm may shift to riskier investment after the issuance of debt, and transfer wealth from creditors to shareholders to exploit to the option nature of equity. If a firm's tangible assets are high, then theses assets can be used as collateral, diminishing the lender's risk of suffering such agency costs of debt. In case of bankruptcy, the value of tangible assets should be higher than intangible assets in case of bankruptcy. Williamson (1988) and Harris and Raviv (1990) suggest that leverage should increase with liquidation value and then that leverage is positively correlated with tangibility.

Empirical studies such as Bradley and al (1984) and Titman and Wessel (1988) and Rajan and Zingales (1995) find a positive relation between the probability of debt issues and the ratio of fixed assets. However, Van der Wijist and Thurik (1993), Chittenden and al (1996) and Bevan and Danbolt (2002) find that the relation between tangibility and leverage vary significantly depending on the definition of gearing adopted.

In our study, tangibility will be defined as fixed assets scaled by total assets.

3. Size

Many studies suggest there is a positive relation between leverage and size. Marsh (1982) suggests that large firms more often choose long term debt while small firms choose short term debt. Fama and Jensen (1983) argue that larger firms tend to provide more information to lenders than smaller ones. Rajan and Zingales (1995) argue that larger firms are often more diversified and have more stable cash flow. Moreover, their probability of bankruptcy is smaller compared with smaller ones, ceteris paribus.

Empirical studies, such as Rajan and Zingales (1995), Wald (1999) and Booth and al (2001), find that leverage is positively correlated with the size of the firm. In fact, Rajan and Zingales (1995) and Wald (1999) find that larger firms in Germany tend to have less debt. Besides, Marsh (1982) finds that debt issues are positively correlated with the size of the firm.

However, Remmers and al (1974) don't find a size effect. Besides, Baclay and Smith (1996), Stohs and Mauer (1996), Demirguc-Kunt and Maksimovic (1999), Mickaelas et al (1999) and Ozkan (2001) suggest that debt maturity is positively correlated with the size of the firm. Van der Wijst and Thrik (1993) and Barclay et al (1995) find their results to depend on whether the estimation is undertaken as OLS or fixed effects estimation. Van der Wijst and Thurik find both short and long term gearing to be positively related to company size, although the regression coefficients are much smaller under fixed effects than OLS estimation, and no longer statistically significant. Barclay et al find an even larger change in the coefficients, with the correlation between size and total gearing reversing polarity, from significantly negative under pooled OLS to significantly positive under fixed effects panel estimation. Most of the above mentioned studies use the natural logarithm of sales or of total assets to measure firm size. Samuel, Huang and Song (2002) find a correlation coefficient of 0.79 between the natural logarithm of sales and of total assets. Thus, each of them should b ea good proxy for company size.

Here we approximate the size effect by the logarithm of total assets.

V. Models

1. Static models

In order to analyse firms with panel data, we refer to the model of Nivorozhkin (2003) (M1) and the model of Wanzenried (2002) (M2).

To test the capital structure dynamics, we estimate the following static model (M1):

$$L_{it} = b_0 + \sum_j b_j y_{jit} + \sum_i b_t t + e_{it} \qquad (1)$$

Where,

L_{it} : The leverage of firm I in year t ;

y_{jit} : the vector of explanatory variables ;

b_0 : a constant term ;

$\sum_t b_t t$: time dummies ;

e_{it} : the statistical noise assumed to have mean zero and constant variance.

The second model (M2) is a fixed effect panel data model having the following form:

$$d_{it} = X_{it}\beta + \gamma_t + \mu_{it} \qquad (2)$$

Where,

d_{it} : Log (Long term debt/Total assets) ;

X_{it} : represents the explanatory variables;

γ_t : time effect assumed constant for given t over i ;

μ_{it} : the statistical noise assumed to have mean zero and constant variance.

In order to test the model (M1), we use panel data analysis, as "it's possible to include time effects as well as control for the heterogeneity of firms by including firm-specific effects" (Gaud, Jani, Hoesli and Bender (2005, p11)).

Wanzenried (2002) use log (long term debt/total asset) as a dependant variable. The log specification generally leads to a better fit. Also, the theory does not tell us whether there is a linear or non-linear relationship between the variables (Wanznried, 2002, p11).

In our empirical study, the choice of the estimation method is made by the Fisher test that permits to test the presence of the fixed effects. The result of the test provides an F_c superior to the tabulated value ($F\alpha$). Thus, there are no specific effects.

a. Results

Insert Table 2

Table 2 reports that all the coefficients are significant (except the tangibility coefficient) at the level of 5%. The inclusion of time dummies doesn't affect the results. These variables improve the regression. However, they aren't significant.

A decomposition of total debt between the long term debt and short term debt shows that:

- When we regress the explanatory variables on the long term debt, we find the same results that their regression on the total debt ratio.
- When we regress the explanatory variables on the short term debt, the coefficient of tangibility becomes negative and non significant.

Finally, we find a coefficient of 15% when the dependent variable is the total debt ratio. However, this coefficient is 21% when the dependent variables are the long term or the short term debt ratio.

Insert Table 3

Table 3 shows that all the variables (except the profitability) are significant at the level of 5%. The coefficients of the variables (Tang, Prof, and VROA) keep the same signs. But, the coefficient associated to the size becomes positive and significant.

b. Analysis

The profitability has a negative effect in Tunisia, and this, whatever the measure of debt chosen. This result is consistent with the result of Booth et al. (2001) that affirm that the profitability is the most important independent variable, since it's always negative and very significant. This finding supports the pecking order theory as reported in several other studies (Titman and Wessel (1988), Chang (1999) and Fama and French (2002)). Another interpretation of the negative and the significant coefficient is the fact that the Tunisian economy is an economy in transition. In fact, the higher economic uncertainty of transitional countries may significantly decrease the tax advantage of debt. In addition, in equilibrium, the tax advantages of debt are usually offset (at some level) by the risk of costly bankruptcy. The often used argument is that the low bankruptcy costs of transitional countries may lead to a higher desired level of leverage (Nivorozkin , 2003).

In contrast to theoretical predictions, we don't find a positive impact of size on leverage. In fact, we show a negative effect on debt ratios for all estimations. This effect is significant at the 5 % level when the total debt ratio or the short tem debt ratio is considered. However, it loses its significance with the long term debt ratio. This negative relation between size and debt identified in the Tunisian context can be the consequence of an approach based on informational asymmetries. This finding is consistent of the result of Rajan and Zingales (1995) that note that size acts as an inverse proxy for the information obtained by outsider's investors. However, the non significance of the coefficient of size on the long time can be explained by the suggestion of Nivorozhkin (2003) that predicts that the size of a company in the transition economies instead of being a financial variable may instead serves as a stability proxy for creditors. He suggests that quite often the large companies are subject to some form of government-sponsored investment programs. The financing whiten these programs can take the form of guaranties or direct financing.

The coefficient of the tangibility is positive and significant with the total debt ratio, but a positive and significant coefficient at the 5%level with the long term debt. This later finding confirms the importance of collaterals in the financing decisions of Tunisian firms. This result is consistent with the agency theory (Jensen and Meckling, 1976). In fact, more the number of collaterals is important more the firm tends to use them to reduce the agency costs of debt. Besides, we find a negative and significant coefficient between the tangibility and the short term debt at the 5%level. This result is consistent with the result of Bevan and Danbolt (2002) that suggests that the importance of collaterals is less pronounced in the short term. Moreover, firms tend to have a close relationship (of confidence) with their creditors. This negative effect confirms the theory of Grossman and Hart (1982) that stipulate that the increased amount of uncollateralized (more risky) debt would increase the monitoring by lenders. That would alleviate the conflict of interest between firm's shareholders and self-interested managers. The variable of income variability shows a positive and significant coefficient with the debt ratios. This result is consistent with the finding of Nivorozhkin (2003) concerning the Bulgarian firms. In fact, Nivorozhkin (2003) explain the positive sign by the segmented credit market and the lax lending policies of the Bulgarian banks.

Concerning the results relative to the model of Wanzenried (2002) (M2), they are similar to results found above for the variables: income variability and tangibility (positive and significant coefficients). The profitability shows the same sign, but, it loses its significance. The main modifications concern the variable size. In fact, we find for this later a positive and a non significant coefficient with the total debt ratio. This finding confirms the instability of the variable size during our study.

2. Dynamic model

We investigate the dynamics of capital structure. In fact, the hypothesis stipulating the inexistence of the adjustment costs is unrealistic. Thus, we must take in account the adjustment process toward a target and the transaction costs. For that, we test the model of Nivorozkin (2003) on our sample of Tunisian firms.

The model we estimate takes the following form:

$$L_{it} = (1 - \delta_{it})\, L_{it-1} + \delta_{it}\, L^*_{it} + \mu_{it} \qquad (3)$$

Where,

L_{it} : the ratio of total debt to total asset ;

μ_{it} : an error term.

The target ratio of debt is modelled by the following linear relationship:

$$L^*_{it} = b_0 + \sum_j b_j\, y_{jit} + \sum_t b_t\, t \qquad (4)$$

Nivorozhkin (2003) estimates the following linear relationship:

$$\delta_{it} = c_0 + \sum_k C_k\, Z_{kit} + \sum_t C_t\, t \qquad (5)$$

Taking transaction costs into account, the model can be written as follows:

$L_{it} = (1 - \delta_{it})\, L_{it-1} + \delta_{it}\, L^*_{it} + \mu_{it}$ avec $0< \delta_{it} <1$

and $L^*_{it} = b_0 + \sum_j b_j\, y_{jit} + \sum_t b_t\, t$

Once developed, equation (3) becomes:

$$L_{it} = (1 - \delta_{it})\, L_{it-1} + \delta_{it}\, b_0 + \delta_{it} \sum_j b_j\, y_{jit} + \delta_{it} \sum_t b_t t + \mu_{it} \qquad (6)$$

Where,

y_{jit} : a vector of the same explanatory variables used in the section III ;

δ_{it} : the speed of adjustment ;

L_{it-1} : lagged debt;

$\sum_t b_t t$: time dummies (T97-T2001).

In our empirical study, we suppose, first, that the speed of adjustment is constant ($\delta_{it} = \delta$). Then, we test successively its dependence on the chosen sector (industrial or not) and on size (big firms or firms of the total sample).

When the speed of adjustment of the firms of the total sample is assumed constant, we have $\delta_{it} = \delta$. T-statistic of the coefficient $(1 - \delta)$ is written as follows :

H_0 : $(1 - \delta) = 0$

H_1 : $(1 - \delta) \neq 0$

a. Results

Insert Table 4

In table 4 we present the regression results for the total sample of the 44 Tunisian firms, when the speed of adjustment is constant. The analyses of the results of the models (M1a and M1b) show a high and significant coefficient for the lagged variable of debt at the level of 5%. In fact, the adjustment coefficient is 0.84 when the dependent variable is total debt ratio and 0.75 when the dependent variable is the long term debt ratio. Thus, the adjustment costs can fluctuate according to the measure of debt used. However, we note the most important adjustment costs with the total debt ratio. The speed of adjustment (δ = 0.15 for M1a and δ = 0. 25 for M1b) is lying between 0 and 1 conforming to the hypothesis. This confirms the existence of positive adjustment costs. Besides, the coefficients of the other explanatory variables show the same signs than those of the static model. However, the variables (size and tangibility) loose their significance when the dependent variable is the total debt ratio. Finally, R^2 is 76% when we use the debt ratio as a debt measurement and 75% when the dependent variable is the long term debt. Thus, the fit of the dynamic model in terms of R^2 is improved substantially compared to the static model.

Insert Table 5

In table 5 we present the regression results of the sample of 31 industrial firms. We find a high and significant coefficient for the lagged debt variable at the level of 5%. In fact, this coefficient is

0. 82% (0.67%) when the dependent variable is the total debt ratio (the long term debt ratio). The speed of adjustment (δ = 0.18 for M2a and δ = 0. 33 for M2b), between 0 and 1, which confirms the existence of adjustment costs for the sample of the industrial firms. Concerning the other explanatory variables, we find the same results than those of the total sample. However, we find instable effects for the variables tangibility and profitability. Finally, R^2 is 0.79% (0.63%) when the dependent variable is the total debt ratio (the long term debt ratio).

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Insert Table 6

In table 6 we present the regression results of the sample of 10 big firms. We find a high and significant coefficient for the lagged debt variable at the level of 5% (0.83%). Contrary to the predictions, this coefficient relative to the adjustment costs is superior to the coefficient associated to the total sample (0.75). Besides, the coefficient of the speed of adjustment (0.17) is between 0 and 1. We conclude the existence of positive and important adjustment costs for the sample of big firms. However, the other explanatory variables show the same results than the total sample, except the variable profitability. In fact, the coefficient of this later becomes negative and loses its significance. Finally, R^2 is 0. 88%.

b. Analysis

Our results show that whatever the measure of debt used, the costs of adjustment are important. Thus, the speed of adjustment is slow, which confirms a slow adjustment process toward the target. The adjustment process is slow in Tunisia and it's similar to the results of others countries as the French market (0.72) (Kemp et al (1999), the Suisse market (0.62) (Gaud and Jani, 2002) and the Czech market (0.82) (Nivorozhkin, 2003). However, these costs are more important than those of the American (0.41), German (0.47) and the English (0.48) markets (Shyam-Sunder and Myers, 1999; Kremp et al., 2001; Ozkan, 2001). Thus, the adjustment process is slow. This behaviour can be explained by the existence of market imperfections, especially, the existence of the transaction costs. This result is consistent with the result of Wanzenried (2002, p.17) that predicts that the adjustment coefficient (α <1) (i.e., the firms that not adjust completely from one period to another period), confirms the existence of the adjustment costs. However, a slow adjustment process can be, conforming to the suggestion of Nivorozhkin (203, p. 25), due to the conservative policies of banks and the exposure control. Besides, Taggart (1977) explain this process by the fact that the short term financing absorb an important part of the fluctuations of the financing deficit.

However, concerning the sample of the industrial companies, the adjustment coefficients observed (0. 18) are not economically smaller than those of the total sample (0.15), when we use as a proxy of debt the total debt ratio. But, the speed of adjustment is more important (0.33) when we choose the long term debt ratio as a debt measure. This can be due to the fact that the managers in the industrial sector prefer the long term debt which is related to an important financing by the Tunisian banks.

Concerning the sample of big firms, the adjustment coefficient observed is positive and significant at the 5% level (0. 83). In addition, the speed of adjustment is not more important than the speed of adjustment of the total sample (0.15). Thus, in our study, big firms don't adjust quicker than the other firms toward the target ratio. This contradicts the prediction of Diamond (1982) which stipulates that the size is a sufficient criterion to access to the external financing, for example, the bond market. This finding can, also, be explained by the orientation of the Tunisian firms, especially big firms, to the internal financing, in particular, when they enter to the stock exchange, which oblige them to bear important adjustment costs. Our result is consistent with the result of Remmers et al. (1974) and Gaud and Jani

(2002) who don't confirm the existence of a size effect and the result of Wanzenried (2002) concerning a sample of British firms. This finding is also consistent with the result of De Haas and Peeters (2004) who confirm that the size of the firm doesn't influence the target debt ratios. Finally, we note that throughout our study, the variable size suffers of sign instability and insignificance (in both the static and the dynamic models).

VI. Conclusion

Our study which tried to identify the determinants and the dynamics of capital structure, is conducted is order to understand the financial behaviour of Tunisian firms.

Our results show that profitability is negatively related to debt ratio. However, tangibility and income variability are positively related to debt. Besides, size shows mitigated findings.

The analysis of the adjustment process confirms the existence of a partial adjustment toward the target debt ratio, related to the existence of positive and important transaction costs and then, a slow speed of adjustment. Thus, the adjustment of Tunisian firms toward the target debt ratio is slow. However, this adjustment process varies with the measure of debt retained (long term debt ratio or total debt ratio). The industrial Tunisian firms adjust quicker than the others to the target debt ratio. However, big Tunisian firms don't show less transaction costs than the others firms. This result suggests that the variable size is not a sufficient criterion to access to the external financing, mainly, to bond market.

Future research should focus study the relation between the ownership structure and the capital structure, in order to exanimate how firms take their financing decisions (Timothy, Brailsford and Pua, 2002) financing decisions and capital budgeting decisions of firms (Foot and Stein, 2000). Finally, we suggest including in the models studied other firm characteristics such the variable age (De Haas and Peeters, 2004), and even macro economic variables such as inflation, interest rate and GDB growth. In fact, macro economic environments and the institutional context have important roles in capital structure decisions.

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Figure 1. Evolution of debt and internal funds of 44 Tunisian firms

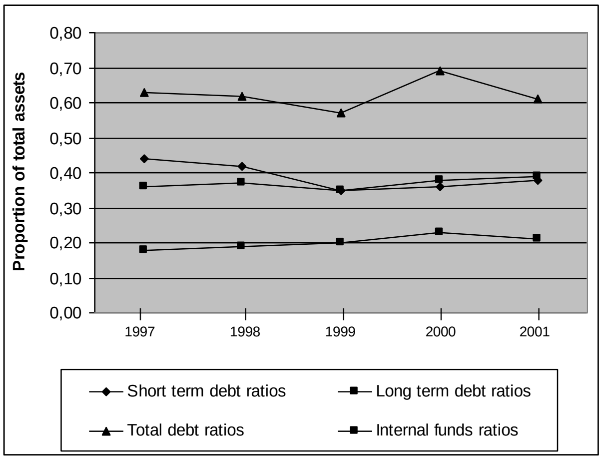

Table 1. Description of the variables used in our study

Dependent variable	Code	Proxy	Expected sign
Debt	L_{it}	Total debt / Total assets	
Explanatory variables			
size	SIZE	Log (Total assets)	+
Tangibility	Tang	Fixed assest / Total assets	+
Profitability	Prof	BAII / Total assets	-
Income variability	VROA	σ (BAII) / Total assets	+

Table 2. Regression results of Model (M1)

	Explanatory variables	Constant	SIZE	Tang	Prof	VROA	R^2	F
	Expected signs		+	+	-	+		
Dependent variables	Total debt	1.205 (6.366)*	-0.036 (-3.470)*	0.123 (1.536)	-0.335 (-3.523)*	0.467 (4.526)*	0.156	4.884
	Long term debt	0.130 (1.153)*	-0.002 (-0.354)*	0.331 (6.939)*	-0.111 (-1.962)*	0.159 (2.594)*	0.216	7.294
	Short term debt	1.057 (6.859)*	-0.034 (-3.980)*	-0.197 (-3.030)*	-0.221 (-2.859)*	0.322 (3.832)*	0.213	7.154

SIZE = Log (Total assets). Tang = Fixed assets / Total assets. Prof = BAII / Total assets. VROA = Standard deviation (BAII) / Total assets. R^2: Regression coefficient. F: Fisher statistic. ( ) : t-statistics. (*) : coefficient significant at the level of 5%. T-statistics are reported in parentheses.

Table 3. Regression results of Model (M2)

Explanatory variables	Constant	SIZE	Tang	Prof	VROA	R^2	F
Expected signs		+	+	-	+		
Variable endogène Log (Dettes LMT / Actif Total)	-3.811 (-4.345)*	0.042 (0.834)	2.487 (6.497)*	-0.785 (-1.742)	1.383 (2.805)*	0.193	12.932

SIZE = Log (Total assets). Tang = Fixed assets / Total assets. Prof = BAII / Total assets. VROA = Standard deviation (BAII) / Total assets.
R^2: Regression coefficient . F: Fisher statistic. ( ): t-statistics (*): coefficient significant at the level of 5%. T-statistics are reported in parentheses.

Table 4. Regression results of OlS analysis on all firms with a constant speed of adjustment

	Explanatory variables / Dependent variables	Constant	Lagged debt (L_{it-1})	SIZE	Tang	Prof	VROA	R²	F
M1a	Total debt	0.158 (1.333)	0.847 (21.044)*	-0.004 (-0.631)	0.017 (0.366)	-0.213 (-4.164)*	0.159 (2.663)*	0.767	112.547
M1b	Long term debt	0.060 (0.728)	0.750 (15.012)*	-0.002 (-0.435)	0.095 (2.441)*	-0.079 (-2.038)*	0.110 (2.475)*	0.663	66.953

SIZE = Log (Total assets). Tang = Fixed assets / Total assets. Prof = BAII / Actif total. VROA = Standard deviation (BAII) / Total assets.
R^2: Regression coefficient. F: Fisher static. ( ): t -statistics. (*): coefficient significant at the level of 5%. T-statistics are reported in parentheses.

Table 5. Results of OLS analysis on industrial firms

	Explanatory variables / Dependent variables	Constant	Lagged debt (Li_{t-1})	SIZE	Tang	Prof	VROA	R²	F
M2a	Total debt	0.364 (2.916)*	0.822 (17.199)*	-0.016 (-2.402)*	0.054 (0.876)	-0.182 (-3.997)*	0.165 (3.009)*	0.799	93.852
M2b	Long term debt	0.020 (0.199)	0.673 (11.296)*	-0.001 (-0.247)	0.190 (3.086)*	-0.045 (-1.065)	0.1221 (2.482)*	0.631	40.518

SIZE = Log (Total assets). Tang = Fixed assets / Total assets. Prof = BAII / Total assets. VROA = Standard deviation (BAII) / Total assets.
R^2: Regression coefficient. F: Fisher static. ( ): t-statistics. (*): coefficient significant at the level of 5%.

Table 6. Results of OLS analysis on big firms

	Explanatory variables / Dependent variable	Constant	Lagged debt (L_{it-1})	SIZE	Tang	Prof	VROA	R²	F
M3	Long term debt	0.104 (1.012)	0.831 (14.144)*	-0.002 (-0.443)	0.080 (2.033)*	-0.730 (-4.642)*	-0.371 (-0.476)	0.886	61.9157

SIZE = Log (Total assets). Tang = Fixed assets / Total assets. Prof = BAII / Total assets. VROA = Standard deviation (BAII) / Total assets.
R²: Regression coefficient. F: Fisher statistic. ( ): t-statistics. (*) : coefficient significant at the level of 5%.