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Target Leverage Dynamics over Business Cycle: Evidence from a Frontier Market

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Abstract

This paper is interested in testing target leverage and adjustment speed across four life cycle stages of Tunisian firms: introduction, growth, maturity and decline. The sample consists of a panel of 24 Tunisian listed firms. The empirical findings reveal that firms adjusting their developmental stages tend to do so with gradual modifications to their leverage (debt levels). Notably, when transitioning from a growth phase to a decline phase, their debt ratios are notably influenced by profitability considerations, underscoring the importance of profit in this decision-making process. Furthermore, the study affirms the existence of enduring debt targets. It does so by demonstrating that a company's targeted debt for the upcoming year significantly influences its current debt levels, particularly when undergoing transitions between developmental stages. This study adds to the literature by considering capital structure determinants based on firm life cycle. Applying dynamic model, contrary to previous studies, the findings of this paper show different levels of target ratio and speed of adjustment along the life cycle stages.

Keywords: *adjustment speed, life cycle, target leverage, trade off theory, capital structure.*

1. Introduction

The trade-off theory of capital structure considers that corporate leverage is determined by balancing the tax-saving benefits of debt against costs of bankruptcy. The theory was developed in the early 1970s and despite a number of important challenges, it remains the dominant theory of corporate capital structure. The theory expects that corporate debt will increase in the risk-free interest rate and if the tax code allows for more generous interest rate tax deductions. Debt is reduced if the deadweight losses from debt overhang and bankruptcy risk are high. The equilibrium price of debt decreases in the tax benefits and increases in the risk-free interest rate.

The empirical literature as discussed by La Rocca et al. (2011), Teixeira and Santos, (2014) highlights that firms tend to make changes to their capital structure across various phases of their business lifecycle. Moreover, according to Myers, (1984), and Elsas and Florysiak, (2011), firms maintain a target leverage ratio that undergoes adjustments over time, aligning with the changing circumstances and dynamics of their business operations. Hackbarth et al. (2006) and Drobetz et al. (2007) have revealed interesting

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associations between the speed of adjustment and variables linked to economic cycles. They consider the significant impact of macroeconomic factors on these adjustments.

However, it’s crucial to note that there exists a gap in empirical evidence pertaining to the adjustments in leverage target ratio across the life cycle. Our results make several contributions to the literature. First, we contribute to the literature on the determinants of leverage ratio under the trade-off theory. Second, we contribute to previous research by considering the Importance of firm life cycle in adjustment speed and target ratio of debt.

2. Theoretical background

Trade-off theory of capital structure consists of two forms, static and dynamic. The static trade-off theory of capital structure bears on the balance between the tax benefit of debt and the financial constraint cost, whereby there will be an optimal capital structure for firms (Myers, 1984), Firms that follow this model will set a target leverage and gradually move towards it. A direct criticism of the static trade-off theory of capital structure is to assume that a firm is always at the optimal level of capital structure. However, in fact, decision on the capital structure is dynamic. Adjustment depends on the expectations and adjusting costs, then firms often restructure actively capital over time (Brigham & Houston, 2012). According to the dynamic trade-off theory of capital structure, the funding decision depends on the near future forecasts and the optimal combination may not always coincide with the long-term target ratio. For example, some companies plan to pay dividends in the next period, while other companies plan to raise capital. When they need capital, firms can borrow or issue equity, or do both.

The theory of compromise hence predicts the cost and benefit analysis of debt financing to achieve optimal capital structure. On the opposite, the other prominent theory of capital structure is pecking order theory that focuses on financing firm operations with its internally generated sources first with retained earnings rather than issuing debt and equity (external financing).

The pecking order theory considers that managers do not aim to maintain a specific target leverage ratio. Instead, it posits that a firm's leverage ratio is essentially a reflection of the ongoing gap between its operating cash flows and its investment requirements over time (Barclay and Smith, 1999). Building upon this perspective, Byoun's findings in 2008 suggest that significant adjustments tend to occur when firms find themselves deviating from their target debt levels, particularly when they have excess debt while enjoying a financial surplus or when they have insufficient debt while facing a financial deficit. Hovakimian and Li's research in 2009 further reveals that the costs associated with making these adjustments are asymmetric, contingent upon whether a firm has excessive debt or insufficient debt in relation to its target leverage. They note that the incremental costs of reducing excess debt with internal funds are notably low, indicating that the source of funds for adjustment plays a fundamental role.

Furthermore, various factors emerge as crucial determinants of the speed of these adjustments. These factors include the level of information asymmetry between insiders and outsiders (Öztekin and Flannery, 2012), variables representing a firm's debt capacity and size (Drobetz et al., 2007; Aybar-Arias et al., 2012), indicators indicating current or prospective additional investments, such as growth (Drobetz and Wanzenried, 2006; Drobetz et al., 2007), growth opportunities (Aybar-Arias et al., 2012), and cash flow (Faulkender et al., 2012).

However, Sobrero and Roberts (2001) show that the different motivations of firms to opt for innovation can conflict, and therefore the authors argue that the trade-off between partner characteristics must be taken in consideration. Understanding the trade-off between the additional risks and potential benefits associated with a higher degree of competition is especially critical when firms ally themselves with actual or potential competitors. However, the trade-off models have not been investigated in previous research on mate selection in competition, and the benefit and risk dimensions have been investigated independently (Akdogan et al., 2015; Alves and Meneses, 2015; Kraus et al., 2018). Indeed, previous research on competition has addressed the fact that intensity of competition exposes a company to higher levels of risk and stress (Fernandez et al., 2018a, b; Raza-Ullah, 2017). One central consideration in this regard is firm life cycle. Financing alternatives and evolution of firm revolves around its life cycle (Fluck 2000, Rocca et al. 2011). Life cycle touches a firm’s numerous characteristics. Drobetza and Wanzenried (2006) found evidence on dividend policy variations across firm life cycle, and more recently, O’Connor and Byrne (2015) pointed to the influence of firm life cycle on corporate governance.

This proposal that corporate leverage policy should be considered for investigation under the changing firm life cycle, so that policy makers are able to make changes in leverage policies according to changing life cycle conditions. In previous studies, researchers used univariate proxies for firm life cycle such as firm age or size to study how capital structure responds to dynamics of its life cycle (Berger and Udell 1998). Famous studies in this regard include the studies of Ahsan et al. (2016a), Getzmann et al. (2014), Bradley et al. (1984), and Bontempi and Golinelli (2001). Ahsan et al. (2016b) and Bontempi and Golinelli (2001) used unit root testing to confirm that a percentage of firms follows a target capital structure while Getzmann et al. (2014) used a dynamic panel data model (GMM) and found that firms adjust their capital structure and estimated a target ratio by using the generalized method of moment (GMM).

Firms in declining stages would again experience growth of commercial risk and should reduce their exposure to debt. Some of the empirical research testing the trade-off theory implicitly focused on life cycle stages. Therefore, the process and outcomes can differ depending on firm size, and identifying the similarities and differences between small and large firms may provide additional insights into the specific nature of competition and firm size (Granata et al., 2018; Näsholm et al., 2018). Thus, Graham (2000) notes that “the typical firm could double the tax incentives by emitting debt until the marginal benefit of imposition starts to decline.” However, the author shows that larger and more profitable firms with less expected costs of distress use preserving debt, while companies with single products, a weak guarantee of credits or great future growth opportunity probably at the introduction or growth stages tend to display lower leverage levels. In the same way, the different capital structures are optimal with various stages (Berger and Udell, 1998), because of changes in firm characteristics which in their turn represent a change of its optimal debt level (Mitton, 2008). Advantages and disadvantages from the compromised point of view are examined in some papers (Jensen, 1986; Shleifer and Vishny,1997). The results indicate that control offered by debt is less relevant to the growth of young firms with less free cash-flow, since these latter regularly rely on financial markets in order to obtain capital (for example, via investors of venture capital, Popov and Roosenboom, 2013).

During the maturity phase of a company's life cycle, there tends to be a stronger confidence between shareholders and the market. This heightened trust facilitates smoother transactions for these companies and, as a result, reduces their overall transaction costs compared to firms in the growth phase. In terms of advantages related to debt, the ability to effectively utilize tax shields is contingent upon factors like net income and profitability, as explored in studies by Frelinghaus et al. (2005) and Pfaffermayr et al. (2013). According to the Trade-Off Theory (TOT), many factors are considered: (1) Taxation: More profitable firms are incentivized to take on more debt as they can effectively leverage tax shields to their advantage. (2) Bankruptcy Costs: Firms with relatively low bankruptcy costs, particularly those that can provide collateral, are inclined to maintain high target debt ratios. (3) Diversification: Larger companies, with greater diversification, tend to have lower bankruptcy probabilities, which pushes them toward higher debt ratios.

In summary, as the costs associated with financing transactions and bankruptcy decrease, while the potential for tax benefits remains significant, the Trade-Off Theory becomes more applicable, especially in the case of larger and more mature firms. Consequently, these types of companies tend to establish higher target leverage ratios and maintain higher debt levels (Frelinghaus et al. (2005)).

Financial distress has an important place in capital structure theories. Berk and DeMarzo (2007, p509) explain financial costs as "when a company has difficulty meeting its debt obligations, we say that the company is in financial distress". Kouki and Ben Said (2012) find for French context results contrary to the standard evidence where companies reduce their debt ratio as bankruptcy risk increase. Youssef (2019) found that Tunisian SMEs tended to use debt more intensively in the short term, while long-term debt was rarely used. We also found that the life cycle theory is perfectly adapted to describe the financial behavior adopted by Tunisian SMEs, which tend to use debt (regardless of maturity) during the introduction life cycle phase. Once SMEs age and mature, other sources of funding take over (mainly self-financing and even an IPO).

3. Data and Methodology

3.1 Data

The sample consists of Tunisian companies listed on the stock exchange studied over a 11-year period from 2006 to 2016. The data includes the largest listed Tunisian companies in the first and second market. The choice of the sample is motivated by availability of information (accounting and market). In addition, the selected companies are relatively large in size. The other reasons include transparency and reliability of financial information which is a legal obligation for any IPO. To test the plausibility of our hypotheses, we choose a panel-data of 24 Tunisian companies from several sectors, totaling 240 company-year observations.

3.2 Measurement of the dependent variables

The review of the empirical literature shows the presence of a multitude of variables measuring firm debt level. According to Ziane (2004) and Dufour and Molay (2010), debt is measured by the financial debt ratio, short-term and medium-term and the total balance sheet. Sogorb-Mira (2005) points out that determinants of leverage based only on the total debt ratio could ignore significant differences in debt maturity. Therefore, in order to test this assumption, we focused on the effect of each independent variable on short-term and long-term debt separately. In this study, two measures of long-term debt ratio are proposed:

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

- The second measure uses a market value (ML) of the debt ratio by substituting book equity by market equity [ML = LTD/(LTD +market equity)].(Kouki and Ben said 2012) and (Flannery and Rangan 2006).

3.3 Measure of life cycle stages

Different proxies have been used to identify life cycle stages. Adizes (1999) observed that the interrelationship between flexibility and control is key in defining organizational life stages, while neither firm age, sales, assets, nor number of employees serve this purpose. Kim and Suh (2009) used retained earnings as a proxy, considering its relationship to leverage. DeAngelo et al. (2006) argue that retained earnings help to identify those firms in the capital infusion stage as well as those firms in capital distribution stage. Moreover, they consider profitability similar to retained earnings in that it describes how capital structure decisions are determined by the interplay of growth and profitability (Kim and Suh, 2009). Finally, it's worth noting that the study we have referenced for delineating different life stages, as presented by Dickinson (2011), employs the patterns and characteristics of operating, investing, and financing cash flows. this will be later explained in more detail.

Referring to previous classifications of firm life stages, Dickinson (2011) establishes four life stages. The first stage is called introduction. In this stage, the firm produces an innovation. In the second stage, called growth, the firm rises rapidly, as several indices, such as assets, equity, or sales, indicate. During the third stage, maturity, the company reaches a maximum production capacity. Finally, during the fourth stage, decline, the company shows virtually no entries. However, the feature used to discriminate among the life cycles is innovation. Dickinson (2011) used accounting information extracted from the Cash Flow Statement. In this context, the three net cash flow activities (operating, investing, and financing) can take a positive or negative sign, resulting in seven possible combinations, which are regrouped by the author into the four stages previously selected in accordance with the literature, giving rise to the model in Table 1.

Table 1. Life cycle stage model

Cash flow type	Introduction	Growth	Maturity	Decline
Operating	-	+	+	-
Investing	-	-	-	+
Financing	+	+	-	+/-

For the relationship with leverage, there is very little that explains the differences in the financing choices across firm life stages, as Fluck (1999) points out. The empirical evidence is nowadays incipient, being still scarce. Factors such as size, age, profitability, tangible assets, retained earnings (all of them used by Bulan and Yan, 2010), or dividends (DeAngelo et al.,2006), show different leverage patterns when firms are mature, as the maturity effect relates to debt capacity.

Bulan and Yan (2010) identify firms according to two stages, growth and maturity, finding that the pecking order theory (based on information asymmetry between investors and firm managers) better describes the financing behavior of mature than growing firms. Using a different life stage model, both Firelinghouse et al. (2005) and Teixeira and Coutinho (2014) found results consistent with the pecking order theory and confirm that firms tend to adopt specific financing strategies as they progress along their lives. Studying why small firms have different capital structure from large firms, in a theoretical model of optimal financial contracting, Fluck (1999) points to the stage dependency of the control rights of claimholders as the cause, because holders of subsequent security issues have the additional warrant of the firm's existing investors to enforce their claims.

As Dickinson (2011) states, the combination of these cash flow patterns represents the firm’s resource allocation and operational capabilities interacted with the firm’s choice of strategy. One of the most appealing dimensions of this model is that the author’s predictions about each cash flow component as a proxy for life cycle are challenged to be consistent with economic theory. Specifically, the author confirms that economic features vary with life stages as determined by cash flow patterns, but also by a previous reference classification (Anthony and Ramesh, 1992).

3.4 Measurement of the independent variables

We choose the independent variables on the basis of their implications and the assumptions of the three theories mentioned above. We distinguish three categories of variables: variables directly related to the proposed theory, variable of life cycle and control variables. Consistent with previous empirical research, in our study we use the following variables:

Variables related to the trade-off theory

Firm size (Size): Several studies confirm the significant impact of size on firm debt ratio. Size is computed as the logarithm of total assets (as in Frank and Goyal, 2009; LaRocca et al. 2011). Benkraiem and Gurau (2013) studied the effect of various corporate characteristics on the capital structure of French SMEs through a sample of 2,222 firms observed over a four-year period. The results indicate that firm size negatively relates to short-term debt and positively to long-term debt, which confirms that the size variable seems to enhance the leverage capacity of French SMEs only for long-term debt.

However, Yazdanfar and Öhman (2016) found the same positive correlation between the size of Swedish SMEs and short-term debt, whereas it had no significant relationship with long-term leverage.

For lower bankruptcy costs due to higher diversification in larger firms, the tradeoff theory relatively predicts more debt, though issuance costs decrease with firm size, both for equity and bonds (Zender and Lemmon, 2010). In addition, for lenders size is a sign of the firms’ strength, since assets are considered as collateral (Fama and French, 2002). In our study, we formulate the following hypothesis:

Hypothesis 1: Firm size has a positive impact on long-term debt and this effect will be the same for all life cycle stages

Firm profitability (Prof): Under the TOT, a positive relationship between a firm’s profitability and debt is expected. This occurs because taxes, agency costs, and bankruptcy costs collectively exert pressure on more profitable firms, compelling them to lean toward higher levels of leverage. More profitable firms should prefer debt to benefit from the tax shield. Moreover, when firms are profitable, all things being equal, they increase their free cash flow and the marginal benefit of using debt to discipline managers. Finally, an increase in profitability reduces the likelihood of firm bankruptcy and the cost of financial distress originated by the use of debt. Thus, all these reasons lead the TOT to predict a positive relationship between profitability and debt. The compromise hypothesis assumes that profitable firms benefit from leverage and are more likely to use more debt. Following Rajan and Zingales (1995) and Booth et al (2001), we measured this variable by earnings ratio before interest and taxes on total assets. Under Hypothesis 2, we assume a positive relationship between profitability and debt (Hovakimian (2004)).

Hypothesis 2: There is a positive relationship between firm profitability and long-term debt for introduction and growth and negative effect for maturity and decline stages

Tangibility (TANG): Availability of tangible assets, such as property, plant and equipment, may improve the recovery of creditors in case of default of the borrower. Therefore, they decrease the expected bankruptcy costs and enhance the willingness of lenders to provide credit. Reducing costs of expected bankruptcy and agency costs, fixed assets should address the objectives of a company's leverage.

Harris and Raviv (1990) argue that firms with large assets generally have high liquidation value, which implies a positive relationship between debt and guarantees. Moreover, this relationship is confirmed by Bradly et al (1984), Titman and Wessel (1988), Rajan and Zingales (1995), who found evidence that this variable positively correlates with leverage. We use property, gross plant and equipment (PPE) scaled by total assets as a measure of firm tangibility.

Hypothesis3: There is a positive relationship between firm tangibility and long-term debt and this effect will be the same for all life cycle stages

Growth opportunities (MTB):For the tradeoff theory, growth means higher bankruptcy costs, lower free cash flow problems and exacerbated debt agency problems, which implies less debt (Frank and Goyal, 2009). Consistently, empirical evidence has found lower debt in firms with future growth opportunities (Rajan and Zingales, 1995; Graham, 2000; Ozkan, 2001) and more volatility in earnings (Bradley et al., 1984). A more rapid growth may increase the need for external resources. In this case, the more the company experiences strong growth of its assets, the more it faces problems financing its activity, which generates a positive impact on its leverage effect. Alternatively, 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. For Benkraiem and Gurau (2013), financing growth is a process that often lasts for several years and consequently requires long-term debt. They found that the growth variable had a positive and a significant coefficient for long-term debt, but this coefficient was not significant for short-term debt. Degryseet al. (2012) showed that Dutch SMEs with significant growth opportunities tended to increase their long-term debt when they required new funds, while Michaelas et al. (1999) found a positive effect of growth opportunities for UK SMEs on short-term leverage. For the trade-off theory, growth means higher bankruptcy costs, lower free cash flow problems and exacerbated debt agency problems, which implies less debt (Frank and Goyal, 2009). We use the Market to Book ratio (MB) as a measure of firm growth opportunities. MTB: market to book = (market value of equity / book value of equity)

Hypothesis4: we suppose positive effect of growth opportunities of firm debt ratio for all life cycle stages

Non-debt tax shield (NDTS): The TOT predicts that firms have an incentive to take debt because they can benefit from the tax shield because of interest deductibility. However, if firms have non-debt tax shields (NDTS), such as depreciation and investment tax credits, they have a lower incentive to use debt from a tax shield point of view and hence use less debt (Graham, 2000). Thus, the trade-off theory predicts a negative coefficient for NDTS in the equation explaining firm leverage. Following Titman and Wessels (1988), we measure NDTS as earnings before taxes minus the ratio between taxes paid and the tax rate.

Non-debt tax shield (NDTS) that includes investment tax credit and expenses may substitute the benefits of a tax shield (Sheikh and Qureshi, 2014). Some authors (DeAngelo and Masulis, 1980; Ramlall, 2009) have suggested that non-debt tax shields are substitute the tax benefits of debt financing. Then, under the tradeoff theory a negative relationship with leverage is predicted. An alternative explanation can be considered from the pecking order theory. A positive relationship with leverage would be predicted since non-debt tax shields work as a proxy for firm assets, indicating affordability or debt capacity of the firm.

Several empirical studies (Bradley et al., 1984; Bennett and Donnelly, 1993) identified a direct relationship between firm leverage and the relative amount of non-debt tax shields, while others found a negative relationship (Ozkan, 2001). 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.

Hypothesis5: NDTS is negatively correlates with debt ratio for all life cycle stages

Bankruptcy risk (Risk): In line with the classical theory of financing, optimal capital structure is obtained by the trade-off between bankruptcy costs and debt tax shield (MM1963). Other studies (Leary and Roberts (2005) have used earnings volatility to measure operational risk. In all cases, risk has a negative effect on firm debt behavior. 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.

Hypothesis6: Bankruptcy risk has a negative impact on long term debt for all life cycle stages

Control variables:

To account for other effects that may influence firm 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 this funds is a source of agency costs between insiders and outsiders. Stulz (1990) considers that debt financing can play a disciplinary device of Management overinvestment and oblige firms to pay out FCF. We measure free cash flow by the difference between operating cash flow and investment scaled by total assets.

- Liquidity (liquid): the effect of this liquidity is mixed between positive and negative effect on capital structure. For some studies asset liquidity increased debt level (Anderson 2002) while others liquid companies use less debt financing and more internal funds (Williamson 1988). By including liquidity, authors suppose that current assets are not balanced to current liabilities and the over or the under difference may explain the positive or the negative relationship between debt and liquidity. Liquidity is computed as the ratio of current assets to current liabilities (as in Ozkan, 2001; Akdal, 2011). Previous empirical research has pointed out to a negative relationship (Bennet and Donnelly, 1993; Ozkan, 2001; Akdal, 2011).

3.5 The Model to be estimated

The target leverage is obtained by regressing leverage ratios on firm characteristics that supposed optimal capital structure according to the trade-off theory (TOT) and formulated by the partial Adjustment model given by:

$$Lev_{it} - Lev_{it-1} = \lambda(Lev^{*}_{it} - Lev_{it-1}) \qquad (1)$$

Where Lev^{*}_{it} is optimal debt ratio given by:

$$Lev^{*}_{it} = \sum \alpha_K X_{Kit} + d_t + u_i + v_{it} \qquad (2)$$

α_K are the coefficients of each debt determinants, dt are the temporal dummy variables, u_i are individual non observable effects and v_{it} is the error term. The debt ratio to be estimated is given by substituting (2) in (1) as follows:

$$Lev_{it} = \beta_0 + \beta_1 Lev_{it-1} + \sum \beta_K X_{Kit} + d_t + u_i + \varepsilon_{it} \qquad (3)$$

Where $\beta_1 = (1-\lambda)\ and\ \beta_K = \lambda\alpha_K$.

The conventional regression in which leverage is estimated according to (3) with considering life cycle stage (LCS: Introduction; Growth; Maturity; Decline) according to table and divided as follows:

- Life cycle Stage 1: Introduction where OCF (-), ICF (-) and FCF (+)
- Life cycle Stage 2: Growth where OCF (+), ICF (-) and FCF (+)
- Life cycle Stage 3: Maturity where OCF (+), ICF (-) and FCF (-)
- Life cycle Stage 4: Decline where OCF (-), ICF (+) and FCF (+-)

OCF; ICF; and FCF are respectively operating; investment and Financial Cash Flow

Table 2 The hypotheses of trade of theory of debt via life cycle stages

	Impact on debt without life cycle	Impact on debt via life cycle as moderator				Authors
	Leverage	Introduction	Growth	Maturity	Decline	
Firm size	+	+	+	-	-	Warner 1977, Ang et al 1982, Titman and Wassel, 1988, Rajan and Zingales 1995
profitability	+	+	+	-	-	Titman and Wessel (1988) Bias et al (1995), Rajan and Zingales (1995), Booth et al (2001).
Tangibility	+	+	+	+	+	Harris and Raviv (1990), Bradly et al (1984), Titman and Wessel (1988), Rajan and Zingales (1995)
MTB (growth)	+	+	+	+	+	Harris and Raviv (1991) Myers 1977) Titman and Wessels (1988), Barclay et al (1995), Rajan and Zingales (1995), Barclay and Smith (1999), Graham (2000),
NDTS	-	-	-	-	-	DeAngelo and Masulis (1980) Bradely, Jarrel and Kim (1984)
Bankruptcy Risk	-	-	-	-	-	MM1963) Leary and Roberts (2005)

4. The empirical Analysis

4.1 Descriptive statistics

In what follows, we will present the different characteristics of the 24 Tunisian companies in our sample in order to offer an objective representation of the different variables of our study. Table 2 presents the descriptive statistics of the continuous and dichotomous variables used in our empirical study.

Table 2a : Descriptive Statistics

Life cycle	Variable	Mean	St.dev	Min	Max	sekewness	Kurtosis
Introduction (N=30)	BL	0.388	0.226	0.104	0.926	0.0944	0.7702
	ML	0.368	0.237	0.0506	0.9140	0.1791	0.5846
	Size	18.34	1.052	16.976	21.586	0.0001	0.0037
	Tang	0.226	0.193	0.00005	0.6803	0.0736	0.0141
	Prof	0.055	0.0699	-0.1430	0.2344	0.0879	0.6240
	NDTS	0.047	0.0405	-0.0009	0.1381	0.1497	0.5665
	FCF	-0.021	0.0939	-0.2176	0.2475	0.4633	0.1568

	BR	0.408	2.025	-2.566	10.500	0.0000	0.0000
	MTB	1.522	1.268	0.1660	6.9786	0.0000	0.0000
	Liquidity	1.948	1.280	0.4995	6.2850	0.0002	0.0037
Growth (N=37)	BL	0.3367	0.2094	0	0.8283	0.0900	0.9560
	ML	0.2144	0.2185	0	0.8115	0.0001	0.0286
	Size	18.616	1.1105	16.667	21.239	0.1368	0.4131
	Tang	0.3290	0.1571	0.0857	0.6608	0.0780	0.7823
	Prof	0.0790	0.0837	-0.0819	0.3583	0.0028	0.0192
	NDTS	0.0560	0.0260	0.0160	0.1277	0.0030	0.1112
	FCF	0.164	0.1872	-0.0762	1.0336	0.0000	0.0000
	BR	0.0417	0.5522	-1.8400	1.5330	0.0469	0.0041
	MTB	3.9366	4.7916	0.0786	26.042	0.0000	0.0000
	Liquidity	1.3217	0.8325	0.3093	3.8181	0.0009	0.0275
Maturity (N=144)	BL	0.1406	0.1804	0	0.7617	0.0000	0.0167
	ML	0.1091	0.1795	0	0.9951	0.0000	0.0000
	Size	17.975	0.8074	16.583	21.428	0.0000	0.0001
	Tang	0.2748	0.2185	0000006	2.0006	0.0000	0.0000
	Prof	0.1281	0.1234	-0.1575	1.2068	0.0000	0.0000
	NDTS	0.0488	0.0480	0.00009	0.5363	0.0000	0.0000
	FCF	0.1471	0.1693	-0.01382	1.7236	0.0000	0.0000
	BR	0.1487	0.6743	-1.5636	6.5791	0.0000	0.0000
	MTB	2.4519	1.8568	0.00343	11.296	0.0000	0.0000
	Liquidity	6.9805	18.608	0.5319	108.48	0.0000	0.0000
Decline (N=53)	BL	0.1992	0.2204	0	1.1142	0.0001	0.0013
	ML	0.2286	0.2637	0	0.99995	0.0035	0.4313
	Size	18.257	1.0438	16.786	21.612	0.0001	0.0200
	Tang	0.1785	0.1572	0.00005	0.6834	0.0016	0.0389
	Prof	0.1120	0.1050	-0.1152	0.3491	0.0115	0.3122
	NDTS	0.0361	0.0432	-0.0276	0.2815	0.0000	0.0000
	FCF	0.2577	0.1428	-0.3052	0.6830	0.0001	0.0000
	BR	0.0505	0.9185	-3.0961	2.9633	0.0951	0.0001
	MTB	1.8261	1.9252	-0.6869	11.708	0.0000	0.0000

	Liquidity	4.4477	10.613	0.6655	61.560	0.0000	0.0000
All firms (N=264)	BL	0.2080	0.2180	0	1.1142	0.0000	0.0093
	ML	0.1773	0.2268	0	0.99995	0.0000	0.0003
	Size	18.163	0.9568	16.583	21.612	0.0000	0.0000
	Tang	0.2575	0.2016	0.00005	2.0006	0.0000	0.0000
	Prof	0.1097	0.1123	-0.1575	1.2068	0.0000	0.0000
	NDTS	0.0471	0.0440	-0.0276	0.5363	0.0000	0.0000
	FCF	0.1060	0.1730	-0.3052	1.7236	0.0000	0.0000
	BR	0.1436	0.9589	-3.0961	10.500	0.0000	0.0000
	MTB	2.4287	2.5327	-0.6869	26.0420	0.0000	0.0000
	Liquidity	5.1071	14.696	0.30933	108.4814	0.0000	0.0000

Table 2b: Mean Differences

	Mean diff.(Growth minus Introduction)		Mean diff.(Matutity minus Growth)		Mean diff.(Decline minus Maturity)	
	Mean Diff	student	Mean Diff	student	Mean Diff	Student
BL	-0,0513	-0,9628	-0,1961	-5,7019	0,0586	1,9008
ML	-0,1536	-2,7561	-0,1053	-3,0389	0,1195	3,6219
Size	0,276	1,0360	-0,641	-3,9663	0,282	2,0021
Tang	0,103	2,4100	-0,0542	-1,4163	-0,0963	-2,9387
Prof	0,024	1,2554	0,0491	2,2864	-0,0161	-0,8437
NDTS	0,009	1,1019	-0,0072	-0,8786	-0,0127	-1,6902
FCF	0,185	4,9308	-0,0169	-0,5298	0,1106	4,2322
BR	-0,3663	-1,0551	0,107	0,8909	-0,0982	-0,8179
MTB	2,4146	2,6827	-1,4847	-2,9668	-0,6258	-2,0770
Liquidity	-0,6263	-2,4154	5,6588	1,8455	-2,5328	-0,9355

Table 2a reports the descriptive statistics by life cycle stage. The entire sample has mean book value debt and market value debt ratios respectively of 20.8% and 17,73%; being higher for firms during growth and maturity than during the introduction phase. The mean profitability of 10,97% shows strong differences between the negative mean for firms during the introduction phase and around 12% during growth and maturity. The mean NDTS of 4.71% is higher for firms during growth and maturity and the same for firms during the introduction and decline phases.

The chow test of mean difference between life cycle stages (Table 2b) presents significant difference for market leverage, Tangibility, Profitability, FCF and Market to Book ratio.

4.2 Empirical results

To determine the characteristics of the model to be estimated, it is necessary to study the statistical properties of the model. In fact, the profitability series are, for a long time, considered normally distributed. However, some studies of these series have shown that their distributions are not normal. These distributions are often asymmetric and leptokurtic. They are often show "thick tails". Normality of returns is checked by symmetry (Skewness) and kurtosis (Kurtosis) coefficients.

The results of the static model

Table 3 presents the findings regarding the factors influencing firm leverage and the speed of adjustments across the four life cycle stages under investigation. Notably, when assessing debt using the book ratio, we observe that the conventional determinants of capital structure play a significant role in explaining the target leverage ratio. However, it's important to mention that TANG and MTB do not exhibit significance in these models.

Furthermore, when examining market leverage, we notice that variables like TANG, NDTS, and BR do not hold significance across the stages, but their coefficients and significance levels exhibit variations throughout the four stages. Nevertheless, certain factors remain relatively stable as determinants of target leverage from the introduction to the decline stage, notably profitability and bankruptcy risk. Additionally, growth opportunities consistently emerge as a significant determinant of market leverage, exhibiting consistent signs across all stages of the life cycle.The relationship between firm size and book leverage exhibits some interesting dynamics across the various life cycle stages. Specifically, during the growth stage, there is a positive relationship, indicating that larger firms tend to have higher book leverage. However, during the introduction stage, the coefficient shows a negative relationship, suggesting that smaller firms are inclined to have higher book leverage at this stage. The positive and statistically significant coefficient observed during the growth stage aligns with the traditional assumptions of both the Trade-Off Theory (TOT) and the Pecking Order Theory (POT). These theories suggest that larger firms with more significant growth opportunities may choose to employ more debt in their capital structure.

To further investigate these dynamics, a Chow test was conducted to compare the relationships and coefficients across the four distinct life cycle stages. The highly significant coefficients obtained for all the independent variables indicate that these relationships indeed differ significantly across the stages, highlighting the changing financial dynamics that firms undergo as they progress through their life cycles.

Table 3 Firme life cycle stages and determinants of debt target ratio vis static model

Variable	BL					ML				
	All firms	Introduction	Growth	Maturity	Decline	All firms	introduction	Growth	maturity	Decline
Size	0.1021***	0.09291	0.07895**	0.1822***	0.05081	0.099***	0.088830	0.0899**	0.1431***	0.05484
	(0.000)	(0.137)	(0.011)	(0.000)	(0.157)	(0.000)	(0.154)	(0.014)	(0.000)	(0.172)
Tang	-0.06387	-0.4442	0.17557	0.07026	-0.3593	-0.0461	-0.28285	0.14407	0.2207**	-0.18509
	(0.444)	(0.254)	(0.321)	(0.436)	(0.104)	(0.572)	(0.501)	(0.503)	(0.028)	(0.478)
Prof	-0.3735**	-0.0786	-0.28118	0.10438	-0.0408	-0.314**	-0.26786	-0.1418	-0.0276	-0.1318
	(0.012)	(0.885)	(0.285)	(0.363)	(0.891)	(0.013)	(0.641)	(0.660)	(0.827)	(0.725)
Ndts	0.84999*	-0.6534	0.41526	0.48951	-0.4864	0.3289	-1.1089	1.10441	-0.1522	-0.4635
	(0.079)	(0.675)	(0.640)	(0.164)	(0.281)	(0.479)	(0.503)	(0.323)	(0.698)	(0.498)
Ratio fcf	-0.0536	0.0054	-0.00230	0.02407	0.02909	-0.0741	0.08055	0.40137*	0.0034	-0.0580
	(0.321)	(0.990)	(0.988)	(0.615)	(0.833)	(0.178)	(0.860)	(0.070)	(0.949)	(0.773)
BR	0.03793**	-0.0084	0.07458*	0.00031	0.0690**	0.0156	-0.01266	-0.0641	-0.0197	0.0624**
	(0.019)	(0.598)	(0.057)	(0.979)	(0.010)	(0.208)	(0.469)	(0.228)	(0.148)	(0.078)

Mtb	0.00230	0.03204	0.00465	0.00653	-0.0168	-0.030***	-0.03589	-0.029***	-0.023***	-0.0430**
	(0.645)	(0.218)	(0.503)	(0.360)	(0.166)	(0.000)	(0.207)	(0.001)	(0.003)	(0.014)
Liquid	-0.0018***	-0.01166	-0.1039**	0.00012	-0.0034	-0.001***	-0.02474	-0.06474	0.000026	-0.0023
	(0.000)	(0.732)	(0.013)	(0.917)	(0.329)	(0.000)	(0.508)	(0.190)	(0.983)	(0.532)
Constant	-1.6251***	-1.2440	-1.0837*	-3.19034	-0.6015	-1.5179	-1.0502	-1.4180*	-2.425***	-0.6381
	(0.000)	(0.267)	(0.077)	(0.000)	(0.367)	(0.000)	(0.344)	(0.050)	(0.000)	(0.389)
R-squared	0.3280	0.1928	0.7497	0.2101	0.3417	0.3369	0.3058	0.7827	0.2131	0.4830
Wald chi2	508.55	8.99	51.40	79.21	23.33	847.69	6.91	43.32	46.00	19.54
Observations	264	30	37	144	53	264	30	37	144	53

Note :BL : the book leverage .ML : the market leverage. Size: ln total asset, Prof The carrying cost,Tang: prperty, gross planet and equipment/total asset, growth opportunity : MTb Market value of equity/book value of equity, NDTS: Depreciation and amortization/total assets, BR the inverse of the interest coverage ratio (interest expense / earnings before interest and taxes) FCF: the difference between operating cash flow and investment scaled by total assets, liquidity is computed as the ratio of current assets to current liabilities

*Significance at the 5% level ; **Significance at the 1% level ; *** Significance at the 0.1% level

However, when we examine the coefficients for growth, maturity, and decline (columns 3, 4, and 5), we observe higher values, indicating that these stages have coefficients closer to zero (0.969, 0.628, and 0.933, respectively). This proximity to zero implies higher transaction costs associated with these stages. More specifically, the coefficients suggest that there are varying levels of transaction costs across the four life cycle stages, with notably higher costs during the growth phase compared to the introduction, maturity, and decline phases.

Interestingly, our results do not provide support for our third hypothesis, which compared the introduction stage with the other two stages. However, it's worth noting that Hypothesis 3 is corroborated by the observed reduction in transaction costs when transitioning from the growth stage to the maturity stage.

The results of the dynamic model

However, growth, maturity and decline (columns 3,4 and 5) show higher coefficients, meaning, they are closer to zero (0.388, 0.742 and 0.894, respectively) and hence higher transaction costs. The coefficients point to different levels of transaction costs during the four life cycle stages, remarkably higher during decline compared to the introduction, maturity and growth phases.

Table 4 Determinants of firm leverage according to stage change. GMM System

VARIABLE	BL					ML				
	All firms	Introduction	growth	maturity	Decline	All firms	Introduction	Growth	Maturity	decline
BL(-1)	0.7832***	-0.2621	0.0310	0.3719***	-0.0659					
	(0.000)	(0.157)	(0.828)	(0.000)	(0.663)					
ML(-1)						0.5634***	-0.1979	0.6115	0.2572***	0.1057
						(0.000)	(0.385)	(0.325)	(0.000)	(0.688)
Size	0.0472	0.03595	0.5038***	-0.0597	-0.1635	0.0307	-0.07665	0.1867	-0.0451	-0.0564
	(0.118)	(0.807)	(0.000)	(0.177)	(0.124)	(0.369)	(0.642)	(0.186)	(0.276)	(0.764)
TANG	0.1751**	0.51958	-0.2361	0.0812	-0.4035	0.0859	0.5520	0.3914	0.04861	-1.166
	(0.039)	(0.404)	(0.330)	(0.290)	(0.480)	(0.346)	(0.433)	(0.395)	(0.510)	(0.255)

PROF	-0.0640	0.23390	-0.1470	-0.325***	-0.0623	0.0616	-0.0649	0.6959	-0.1333	0.0958
	(0.557)	(0.637)	(0.632)	(0.001)	(0.759)	(0.606)	(0.907)	(0.204)	(0.161)	(0.791)
NDTS	-0.1925	-2.0896***	1.2558**	0.2734	-0.1705	-0.2871	-1.631*	2.224*	-0.0199	0.2296
	(0.446)	(0.000)	(0.044)	(0.330)	(0.449)	(0.295)	(0.003)	(0.078)	(0.940)	(0.600)
Ratio FCF	-0.0074	-0.07285	-0.0033	0.00736	0.01614	0.0327	-0.0623	0.2504	0.03948	-0.0810
	(0.894)	(0.724)	(0.973)	(0.883)	(0.791)	(0.576)	(0.788)	(0.158)	(0.388)	(0.463)
BR	-0.003	0.01266	-0.0114	-0.0076	0.0148	-0.0006	0.00622	-0.0474	-0.00319	0.00971
	(0.633)	(0.360)	(0.605)	(0.105)	(0.166)	(0.930)	(0.681)	(0.247)	(0.489)	(0.609)
MTB	0.0202***	0.04522**	0.0153***	0.00012	-0.0129	-0.0106**	-0.0224	-0.0071	-0.0174*	-0.0425
	(0.000)	(0.032)	(0.001)	(0.984)	(0.465)	(0.018)	(0.394)	(0.321)	(0.004)	(0.179)
LIQUID	0.00068	0.0110	-0.0067	0.00009	-0.0002	0.00031	0.00814	-0.0277	-0.00020	-0.0000
	(0.653)	(0.632)	(0.873)	(0.939)	(0.871)	(0.843)	(0.754)	(0.711)	(0.854)	(0.987)
Constant	-0.8855	-0.3185	-9.09***	1.1696	3.2801	-0.4677	1.814	-3.648	0.94153	1.4717
	(0.107)	(0.906)	(0.000)	(0.147)	(0.104)	(0.459)	(0.552)	(0.159)	(0.214)	(0.680)
Wald chi2	108.91	32.10	182.34	30.57	6.04	36.34	10.61	28.95	40.83	5.73
Observation	216	27	35	112	42	216	27	35	112	42

Note: BL: book leverage. ML: market leverage. Size: ln total assets, Prof The carrying cost, Tang: property, gross plant and equipment/total assets, growth opportunity: MTb Market value of equity/book value of equity, NDTS: Depreciation and amortization/total assets, BR the inverse of the interest coverage ratio (interest expense / earnings before interest and taxes) FCF: the difference between operating cash flow and investment scaled by total assets, liquidity is computed as the ratio of current assets to current liabilities

*Significance at the 5% level; **Significance at the 1% level; *** Significance at the 0.1% level

Life cycle stages and the adjustment speed and target debt ratio determinants

According to our model the adjustment speed λ and the target debt ratio determinants α_k X_{Kit} are obtained from the regression estimated coefficients β_k as follows:

$$\begin{cases} \lambda = 1 - \beta_1 \\ \alpha = \beta_k \big/ \lambda \end{cases}$$

Table 5 adjustments speed and target debt ratio determinants

	All firms	Introduction	Growth	Maturity	Decline
Adjustment speed λ for book and market leverage	0.2168	1.626	0.969	0.6281	1.065
	0.4564	1.1979	0.3885	0.2428	0.8943

Target debt ratio determinants for Book and market leverage

size	0,217712177	0,022109471	0,519917441	-0,095048559	-0,153521127
	0,067265557	-0,063986977	0,480566281	-0,185749588	-0,063066085
Tang	0,807656827	0,319544895	-0,243653251	0,129278777	-0,378873239
	0,188212095	0,460806411	1,007464607	0,200205931	-1,303813038
prof	-0,295202952	0,143849938	-0,151702786	-0,51743353	-0,058497653
	0,134969325	-0,054178145	1,791248391	-0,549011532	0,107122889
MTB	0,093173432	0,027810578	0,015789474	0,000191052	-0,012112676
	-0,023225241	-0,018699391	-0,018275418	-0,071663921	-0,047523203
NDTS	-0,887915129	-1,285116851	1,295975232	0,435281006	-0,160093897
	-0,629053462	-1,361549378	5,724581725	-0,081960461	0,256737113
BR	-0,013837638	0,007785978	-0,011764706	-0,012099984	0,013896714
	-0,001314636	0,00519242	-0,122007722	-0,013138386	0,010857654

According to table 5, the average adjustment speed, the coefficient of lagged market leverage for all firms is about 0.4564, and for growth maturity and decline stages these coefficients are respectively 0.388; 0.242 and 0.894. these results show that the speed of adjustment is not the same for each life cycle stage: the low value is for maturity and the high value is for decline stage. This conclusion is not the same for the book value of debt where the speed level is higher for all stages. The target debt ratio determinants show also differences between the estimated of book value of debt and the estimated market value of debt. All variables related to pecking theory size, tangibility profitability MTB, NDYS and Bankruptcy risk show that their target ratios reach the maximum value in Growth stage while in decline stage the target ratio is at the low value. Considering all these results we conclude that the target debt ratio is not the same for market or book valuation and not the same for each life cycle stage.

5. Conclusion

Determining the optimal capital structure is a critical consideration for financial decision-makers. Both empirical evidence and surveys consistently suggest that companies aim to achieve a specific debt-to-equity ratio, often referred to as their target leverage. The relationship between a firm's leverage ratio and well-established firm characteristics has typically been interpreted in the context of conventional capital structure models, such as the trade-off theory and the pecking order theory. However, these models primarily address the target leverage itself and do not explicitly address how firms adjust towards this optimal debt ratio.

Our study draws the conclusion that the target leverage and the speed of adjustment towards the optimal capital structure are not uniform but rather vary across the different stages of a business's life cycle. We based our analysis on a panel database of publicly listed Tunisian companies observed over an 11-year period, spanning from 2006 to 2016.

To distinguish between the various life cycle stages, we employed a methodology initially proposed by Dickinson (2011). This methodology utilizes the patterns of operating, investing, and financing cash flows. Additionally, we introduced an alternative measurement of financing cash flows by considering a combination of growth and risk factors. This refinement allows us to differentiate between firms in the introduction and growth phases from those in the maturity and decline phases of their life cycles.

When considering two measures of debt, book leverage and market leverage, our examination of the determinants of target leverage across different stages of the business life cycle yields several noteworthy findings: (1) firm Size exhibits the most consistent and stable relationship with market leverage during the transition from growth to maturity stages. In contrast, growth opportunities show a negative relationship with market leverage during this phase. (2) Bankruptcy Risk has a positive relationship with book leverage, but its sign changes when market leverage is considered. (3)The variable representing growth opportunities displays low coefficients and a negative sign when market leverage is used as the measurement. This suggests that this factor has opposite effects: increased funding needs and debt capacity in contrast to higher cash flows during the growth to decline phases. The negative coefficient observed during growth, maturity, and decline aligns with the idea that higher information asymmetry reduces access to new external funding, which is consistent with the Pecking Order Theory (POT).

Regarding adjustment speed, our findings reveal a pattern of high adjustment speed during the introduction and decline phases, which implies significantly lower transaction costs during these periods. In contrast, during the growth phase, firms tend to engage in other business ventures or increase their investments to achieve higher growth, resulting in increased asymmetric information and reduced access to capital markets.

Overall, our results provide partial support for both the Trade-Off Theory (TOT) and the Pecking Order Theory (POT) in explaining the determinants of target leverage and adjustment speed across different stages of a firm's life cycle.

In summary, our research yields several important conclusions: Firms moving between different life cycle stages tend to rely on long-term target debt ratios as part of their capital structure planning. Notably, during the transition from the introduction stage to the decline stage, adjustments to the next-year target debt are made at a faster speed compared to adjustments to the most recent target. This suggests that factors proxying the debt target exhibit substantial variations from year to year, and deviations from these targets are likely to align with anticipated needs two or three years ahead. Conversely, firms transitioning from the growth to maturity stages are likely to have more stable financial requirements, allowing them to adjust their financing in shorter time . Consequently, next-year targets do not significantly improve adjustment speed in this context.

Our contributions to the literature on leverage target ratio are twofold: (1) we demonstrate that, for Tunisian firms, the determinants of capital structure and the speed of adjustment to target debt levels are contingent upon the firm's life cycle stage. Capital structure serves different roles at various stages of a firm's life cycle, and our findings provide insights into how these roles evolve. (2) we introduce a new explanatory factor in the study of target leverage—next-year target debt. Our results show the relevance of next-year targets in describing a firm's current debt and its adjustment behavior. Furthermore, we highlight variations in the importance of next-year target debt across different life cycle stages of firms. In essence, our research sheds light on the nuanced nature of capital structure decisions and adjustments among Tunisian firms, underscoring the importance of considering the life cycle stage when analyzing these dynamics.

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