

Testing the capital structure of Portuguese family businesses*

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ABSTRACT

The main objective of this study is to empirically test capital structure decisions in Portuguese family-owned businesses under trade-off theory (TOT) and pecking order theory (POT) and attend to the relationships between family/business interaction and agency conflicts. Family-owned businesses are essential for the development of economies, but the financing logic they adopt is not yet adequately clarified by scientific research, especially as they are more exposed to the constraints of markets imperfections. The specific pattern of business ownership may affect the financing decision and the ability to obtain funds externally. This issue is more relevant in economies where family business initiatives and less sophisticated management strategies are expressive. The greater convergence of interests in family businesses and the consequent decrease in agency costs may lead to higher levels of recognized reputation and thus easier access to indebtedness. The empirical study uses static models and dynamic panel models in order to analyze data from 4,952 Portuguese family-owned firms over the period from 2009 to 2016: the TOT following the partial debt adjustment model, and the POT following the model of the impact of the deficit of funds on debt and the model of the relationship between debt and the determinants of financing. The results of the individual tests suggest that Portuguese family-owned businesses adjust debt at the target ratio, albeit influenced by adjustment costs that keep them distant from the optimal, as well as use sources other than debt when a financial deficit occurs. Although the impact of the financial deficit is greater in total debt ratio, the velocity of adjustment to the optimal level is higher in short-term debt. Evidence from a joint test confirms that both theories explain part of the capital structure of Portuguese family-owned businesses.

Keywords: family businesses, capital structure, trade-off theory, pecking order theory, panel data.

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1. INTRODUCTION

The way companies finance themselves, the factors that determine such decisions, and how these choices affect the economy are key issues that have been discussed over time (Frank & Goyal, 2008). Several business theories have emerged to explain the factors that influence decisions about the capital structure of firms, notably the trade-off theory (TOT) by Kraus and Litzenberger (1973) and the pecking order theory (POT) by Myers and Majluf (1984).

The financing decisions of family businesses have been relatively ignored (Keasey et al., 2015). However, Gottardo and Moisello (2014) declare that, although the funding patterns adopted by these companies are not yet adequately clarified, research on the subject has been gathering interest.

Family-run businesses are usually affected by the duality of objectives, which are reflected in the renouncement of share issuance and in the junction of family and business finances (Csákné & Karmazin, 2016). In this context, non-economic factors are highly relevant, and may justify differences in the use of financing sources and in the decision-making process (Acedo-Ramírez et al., 2017; Mohamadi, 2012). Gallo et al. (2004) argue that family businesses have their own “financial logic” where the specific pattern of ownership can affect policies and funding, as well as the ability to obtain external resources. Considering that family businesses, with traits of stability and growth expectations, are essential for the development of the economy, it becomes relevant to clarify the financing patterns they adopt. This is the motivation of choosing the theme.

Managers believe in the worst-case about the expected risk-adjusted earnings before interest and taxes (EBIT) behavior, implying a distortion of restructuring likelihood. This essential feature justifies that companies display a weaker willingness to readjust leverage by choosing a slower pace and smaller size of adjustment (Ban & Chen,

2019). On the other hand, Liu et al. (2020) showed that executive compensation motivates chief executive officer (CEOs) to pursue more aggressive capital structure policy. Even so, the larger leverage is due to better access to debt, which results in lower rebalancing costs (Chernenko, 2019).

The main objective of this article is to understand if Portuguese family businesses seek to achieve an optimized capital structure, as provided by TOT, or if they prefer to deplete internal funds before resorting to external sources of financing, as foreseen by POT.

The empirical study uses panel data methodology. The TOT test follows the partial adjustment model using the generalized method of moments (GMM) system estimator by Blundell and Bond (1998). The POT test follows two models: (i) the model suggested by Shyam-Sunder and Myers (1999), regarding the impact of the deficit of funds on the debt variation, using an ordinary least squares (OLS) regression; and (ii) the model for the relationship between debt and the financing determinants, using static panel models, an OLS regression, a fixed effects model, and a random effects model. In turn, the fixed effects model and the random effects model are calculated using the White (1980) estimator. Finally, the verification of the robustness of the results resorts to a joint test to the two theories, again using the GMM system estimator.

The structure of the article is organized as follows. Section 2 describes international empirical evidence on the subject. Section 3 is devoted to the methodology discussed in the empirical study, defining the tests of the capital structure theories and raising the hypothesis of investigation. Subsequently, the sample is selected, the proxies of the models are defined, and the descriptive statistics are determined. Section 5 presents and discusses the test results. Finally, the main conclusions are summarized.

2. EMPIRICAL EVIDENCE

Family-owned enterprises have a strong presence in the world's economies, contributing to the transmission of knowledge, boosting competitiveness, and generating wealth, especially in the less industrialized regions. Despite the importance of family businesses, the relationship between ownership and financing decisions is still little

explored in the literature (Bauweraerts & Colot, 2012; López-Gracia & Sánchez-Andújar, 2007; Serrasqueiro et al., 2012, 2016). The peculiar characteristics of these companies, such as family presence, risk aversion, and the desire for business continuity in family ownership, influence financial behavior (Correia, 2003; Gottardo

& Moisello, 2014; Vieira, 2014). In addition, this desire conditions the entry of third parties into corporate capital (Blanco-Mazagatos et al., 2009; Romano et al., 2001).

On the other hand, family-owned enterprises are mostly small and medium-sized enterprises (SMEs), for which there are constraints on access to external capital (Bjuggren et al., 2012; Martinez et al., 2021). For example, the market imperfections lead to financial constraints on investment and can magnify the macroeconomic effect of shocks to liquidity that reduce some firms' access to low-cost finance and worsen their balance sheet positions (Fazzari et al., 1988). The determinant size as a measure of financial constraints is justified because small companies are typically young, less known, and therefore more vulnerable to capital market imperfections (Almeida & Campello, 2010). Therefore, financial institutions that specialize in long-term borrower relationships and in balance sheet assessment can be useful in financing smaller firms without access to commercial paper, bonds, and equity market (Fazzari et al., 1988).

Oftentimes, family enterprises face problems related to capital structure as they are characterized by privately held entities. Generally, liquidity imbalances are solved by family members through the reallocation of resources (Csákné & Karmazin, 2016; European Commission [EC], 2009). With regard to successfully established companies, the main financial resources consist of retained earnings, short-term bank loans, and family savings (Csákné & Karmazin, 2016).

Founding families see the company as an asset that will be passed on over the course of future generations (Chami, 2001; Hillen & Lavarda, 2020). While some owners/administrators are more cautious about debt in order to minimize the interference of external agents (Ampenberger et al., 2013; Blanco-Mazagatos et al., 2007; Mishra & McConaughy, 1999), others prefer debt, in order to keep the control of the company in the family (Gottardo & Moisello, 2014; Keasey et al., 2015; King & Santor, 2008).

In the context of the agency theory, presented by Jensen and Meckling (1976), family businesses are considered

more efficient because the principal and the agent are generally the same person or have homogeneous interests. The literature shows that agency costs are lower because of the greater alignment of interests among family members (Schulze et al., 2003a, 2003b; Steier et al., 2004; Woodman, 2017) and due to their risk aversion, the preservation of social ties, and the holding of less onerous debts (Mohamadi, 2012), since creditors identify the image and reputation of both the family and the company. This seems to justify the fact that family businesses have low agency costs that motivate a negative relationship between family ownership and indebtedness. However, emerging problems of the ingrained ownership, information asymmetry, and altruism may determine the use of debt as a form of monitoring.

As for the predominance of the TOT or the POT in financing decisions, the scientific evidence is mixed, suggesting that family businesses may choose to establish a target debt level or to determine a hierarchy of funding sources.

A number of studies have identified that family businesses first exhaust internal resources to meet funding needs (Ampenberger et al., 2013; Mehboob et al., 2015; Mohamadi, 2012) and only later use external funding as predicted by the POT. In this context, equity financing is deferred to debt financing (Crocì et al., 2011) in order to avoid opening the capital to third parties due to fear of losing business control (Gottardo & Moisello, 2014). Thus, the relationship between internal funds and external financing can be substantially affected by the endogeneity of investment when firms are financially constrained (Almeida & Campello, 2010).

Other studies have identified that family businesses set goals by adjusting the actual indebtedness to the optimal level, counterbalancing the costs and the benefits resulting from indebtedness (Acedo-Ramírez et al., 2017; Tahir et al., 2016), as provided by the TOT.

Complementarily, Serrasqueiro et al. (2016) concluded that the financing decisions of younger and smaller companies are more in line with the POT's assumptions, while older and larger companies align with the TOT.

3. METHODOLOGY

3.1 Testing the TOT

From the perspective of the TOT, companies continually revert their actual indebtedness to optimum "target" debt. In this context, we followed the procedure described by Fama and French (2002), Sogorb-Mira and López-Gracia (2003), and Shyam-Sunder and Myers

(1999). Here we analyze the variation of the debt ratio towards the optimal, using the partial adjustment model, and verify the speed of this adjustment. The partial adjustment model is expressed by equation 1:

$$D_{it} - D_{it-1} = \lambda(D_{it}^* - D_{it-1}) \quad \boxed{1}$$

Solving for D_{it} , the current level of indebtedness is defined by equation 2:

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

where D_{it} is the level of debt of the firm i in the period of time t , D_{it-1} is its level of debt in the previous period, D_{it}^*

is the optimal level of debt of the firm i in period t , λ is the speed of adjustment of the actual level of the debt to the optimal, and $(1-\lambda)$ are the adjustment costs.

To compare the results, we consider three dependent variables indicative of corporate debt (Table 1).

Table 1

Description of dependent variables

Dependent variable	Notation	Proxy	Authors
Total debt ratio	D_{it}	$\frac{\text{Total Liabilities}}{\text{Total Asset}}$	Acedo-Ramírez et al. (2017), Adair and Adaskou (2015), Caetano (2011), Correia (2003), Gottardo and Moisélo (2014), López-Gracia and Sánchez-Andújar (2007), Mishra and McConaughy (1999), Serrasqueiro et al. (2016)
Short-term debt ratio	D_{itst}	$\frac{\text{Short term Liabilities}}{\text{Total Assets}}$	Serrasqueiro et al. (2012), Thanh and Huong (2017)
Natural logarithm of Debt-to-Equity ratio	D_{itln}	$\ln\left(\frac{\text{Total Liabilities}}{\text{Equity}}\right)$	López-Gracia and Sogorb-Mira (2008)

Source: *Elaborated by the authors.*

According to the assumptions of the TOT, the coefficient λ must be quantified between 0 and 1, while the adjustment costs must be inversely related to λ . If $\lambda > 0$, the company adjusts, increasing or decreasing, the level of debt to the optimal; if $\lambda < 1$, the company partially achieves the optimal, due to the positive transaction and adjustment costs.

To estimate the expression 2, it is important to find the optimum debt ratio. Not being directly observable, it becomes necessary to resort to a “proxy”. Following the procedure of Fama and French (2002), López-Gracia and Sogorb-Mira (2008), Sogorb-Mira and López-Gracia (2003), and Serrasqueiro et al. (2012, 2016), the optimal debt ratio can be estimated through the financing determinants that, by empirical evidence from the TOT, affect the capital structure of the companies (equation 3):

$$D_{it}^* = \varphi_0 + \sum_{k=1}^m \varphi_k Z_{kit} + n_i + v_{it} \quad 3$$

where φ_0 represents the regression’s constant, Z_{kit} are the m independent variables regarding company i in period t , φ_k are the coefficients of each financing determinant Z_k , n_i are the specific individual effects (which are not directly observable by the financing determinants) of each company i , and v_{it} is the term of random perturbation.

Once the optimal debt ratio has been defined, the partial adjustment model can be reached, considering the determinants that – in this theory – influence the financing decisions on the capital structure of the companies. Substituting the expression 3 in expression 2 and rearranging the terms, we obtain equation 4:

$$D_{it} = \lambda \varphi_0 + \delta D_{it-1} + \sum_{k=1}^m \beta_k Z_{kit} + \theta_i + \varepsilon_{it} \quad 4$$

where $\delta = (1-\lambda)$, $\beta_k = (\lambda \varphi_k)$, $\theta_i = (\lambda n_i)$ and $\varepsilon_{it} = (\lambda v_{it})$. Afterward, the determinants of funding and underlying research hypotheses are defined.

3.1.1 Research hypotheses and variables

The TOT expects companies to continuously adjust the actual debt ratio to an optimal level, where there is a trade-off between tax benefits and debt-related costs. However, when companies adjust the ratio, they support transaction costs that prevent a full debt adjustment to the optimal target (Acedo-Ramírez et al., 2017; Caetano, 2011; López-Gracia & Sogorb-Mira, 2008; Serrasqueiro et al., 2016). In this context, the research hypotheses for Portuguese family enterprises are formulated:

H₁: Companies adjust the actual debt ratio to the optimal level.

H_{1,1}: High transaction costs keep companies away from the optimal level of indebtedness.

Despite the motivations for family companies to resort to debt as a form of monitoring, it is expected that greater convergence of interests and thus lower agency costs will improve the reputation recognized in the market and, consequently, the access to less burdensome debt. This leads to another research hypothesis (López-Gracia & Sánchez-Andújar, 2007):

H_{1,2}: The family/company interaction implies lower agency costs in family businesses, facilitating the use of debt as a resource. This hypothesis is verified by the behavior of λ .

It is now important to define the determinants of financing under the TOT's propositions (Adair & Adaskou, 2015; Caetano, 2011; Frank & Goyal, 2008, 2009; Serrasqueiro & Caetano, 2015): effective tax rate, other non-debt tax shields, growth opportunities, profitability, size, age, and tangible assets. The signs of the expected

$$D_{it} = \delta D_{it-1} + \beta_0 + \beta_1 ETR_{it} + \beta_2 NDTs_{it} + \beta_3 GO_{it} + \beta_4 PROF_{it} + \beta_5 SIZE_{it} + \beta_6 AGE_{it} + \beta_7 TANG_{it} + \theta_i + \varepsilon_{it} \quad [5]$$

where ETR_{it} is the effective tax rate of the company i in period t , $NDTS_{it}$ are the non-debt tax shields of the company i in period t , GO_{it} are growth opportunities of the company i in period t , $PROF_{it}$ is the profitability of the company i in period t , $SIZE_{it}$ is the size of the company i in period t , AGE_{it} is the company's age i in period t , $TANG_{it}$ is the assets tangibility of the company i in period t , the term θ_i represents the specific individual effects of each company i , and ε_{it} is the term of random perturbation.

3.2 Testing the POT

From the POT's perspective, companies use external financing only when internal resources are exhausted. In accordance with this, we followed the procedure described by Shyam-Sunder and Myers (1999). Here it is assumed

$$FD_{it} = \Delta Fixed Assets + \Delta Working Capital + \Delta Long term Debt - CF \quad [7]$$

where $\Delta Fixed Assets = Fixed Assets_t - Fixed Assets_{t-1}$, $\Delta Working Capital = Working Capital_t - Working Capital_{t-1}$, $\Delta Long term Debt = Long term Debt_t - Long term Deb_{t-1}$, and $CF = Cash Flow = Net Profit + Depreciation + Amortization$.

In the search for robust results, the POT is also tested through a regression between indebtedness and the determinants of corporate financing. Subsequently, the determinants of funding and the underlying research hypotheses are defined.

3.2.1 Research hypotheses and variables

The POT provides for companies to use internal funds as the primary form of financing. However, when these funds are insufficient to meet the needs, companies seek, first and foremost, to issue debt and, as a last resort, to issue shares. In this context, the following research hypothesis is formulated for Portuguese family companies (Shyam-Sunder & Myers, 1999):

H₂: The change in corporate debt is justified by the deficit of funds. This hypothesis is verified by the behavior of α and b_{PO} .

$$D_{it} = \alpha + \beta_1 CF_{it} + \beta_2 AGE_{it} + \beta_3 HGOLCF_{it} + \beta_4 LGOHCF_{it} + n_i + v_{it} \quad [8]$$

where CF_{it} is the cash flow of the company i in period t , $HGOLCF_{it}$ and $LGOHCF_{it}$ are the growth opportunities

relationship between the determinants of financing and debt are shown in Table 2.

The partial adjustment model, defined with the relevant financing determinants of the TOT, is expressed by equation 5:

that changes in debt are caused by the need for corporate funds, using a regression expressed by equation 6:

$$\Delta D_{it} = \alpha + b_{PO} FD_{it} + v_{it} \quad [6]$$

where $\Delta D_{it} = D_{it} - D_{it-1}$ is the change in debt, α is the regression constant, FD_{it} is the financial deficit of the company i in period t , b_{PO} is the *pecking order* coefficient, and v_{it} is the error term.

The verification of the POT depends on the behavior of α and b_{PO} , which should equal 0 and 1, respectively (Shyam-Sunder & Myers, 1999). To estimate the expression 6, it is important to define the variable FD_{it} , following the suggestion of López-Gracia and Sogorb-Mira (2008), Serrasqueiro et al. (2012, 2016), and Sogorb-Mira and López-Gracia (2003) (equation 7):

It is important now to define the determinants of financing under the POT proposals (López-Gracia & Sánchez-Andújar, 2007; López-Gracia & Sogorb-Mira, 2008; Serrasqueiro et al., 2011; Sogorb-Mira & López-Gracia, 2003): cash flow, age, the relationship between cash flow and growth opportunities. The signs of the expected relationship between the determinants of financing and debt are shown in Table 2.

López-Gracia and Sogorb-Mira (2008) point out that the variables cash flow and growth opportunities should not be used separately, since the interaction between the two influences financing decisions. Thus, these hypotheses are also added:

H_{2a-1}: There is a positive relationship between debt and high growth opportunities with low cash flows.

H_{2a-2}: There is a negative relationship between debt and reduced growth opportunities with high cash flows.

The model, for the relationship between the debt and the relevant financing determinants of the POT, is expressed by equation 8:

of the company i in period t (corresponding to situations of high growth opportunities with low cash flows,

and situations of low growth opportunities with high cash flows, respectively), n_i are the specific individual effects of company i , and v_{it} is the term of random perturbation.

Table 2 details the *proxies* used by the literature to represent the financing determinants associated with the independent variables of the TOT model and the POT models:

Table 2
Description of the independent variables

Independent variable	Notation	Proxy	Expected Sign	Authors
Effective tax rate	ETR	$\frac{\text{Income Tax Expenses}}{\text{EBT}}$	+	Caetano (2011), López-Gracia and Sánchez-Andújar (2007), López-Gracia and Sogorb-Mira (2008), Serrasqueiro and Caetano (2015), Serrasqueiro and Nunes (2010), Serrasqueiro et al. (2011, 2012, 2016), Sogorb-Mira and López-Gracia (2003)
	NDTS (1)	$\frac{\text{Depreciation} + \text{Amortization}}{\text{Total Assets}}$	-	Caetano (2011), Dang (2005), Fama and French (2002), Keasey et al. (2015), López-Gracia and Sánchez-Andújar (2007), López-Gracia and Sogorb-Mira (2008), Serrasqueiro et al. (2012, 2016), Sogorb-Mira and López-Gracia (2003)
	NDTS (2)	$\frac{\text{Depreciation} + \text{Amortization}}{\text{EBITDA}}$	-	Ramalho and Silva (2009)
Non debt tax shields	NDTS (3)	$\frac{\text{EBIT} - \text{Interest Expenses} - \text{Income Tax Expenses}}{\text{Sales}}$	-	Vieira (2014)
	NDTS (4)	$\frac{\text{Depreciation} + \text{Amortization}}{\text{EBIT}}$	-	Correia (2003)
	GO (1)	$\frac{\text{Total Assets}_t - \text{Total Assets}_{t-1}}{\text{Total Assets}_{t-1}}$	-	Ramalho and Silva (2009), Serrasqueiro et al. (2011, 2012), Thanh and Huong (2017), Tong and Green (2005),
Growth opportunities	GO (2)	$\frac{\text{Intangible Assets}}{\text{Total Asset}}$	-	Acedo-Ramírez et al. (2017), Adair and Adaskou (2015), Caetano (2011), Sogorb-Mira and López-Gracia (2003)
	GO (3)	$\frac{\text{Sales}_t - \text{Sales}_{t-1}}{\text{Sales}_{t-1}}$	-	López-Gracia and Sánchez-Andújar (2007), López-Gracia and Sogorb-Mira (2008)
	GO (4)	$\frac{\text{Net Profit}_t - \text{Net Profit}_{t-1}}{\text{Net Profit}_{t-1}}$	-	Setia-Atmaja et al. (2009)
Profitability	PROF (1)	$\frac{\text{EBIT}}{\text{Total Assets}}$	+	Dang (2005), Fama and French (2002), López-Gracia and Sánchez-Andújar (2007), López-Gracia and Sogorb-Mira (2008), Ramalho and Silva (2009), Serrasqueiro and Caetano (2015), Serrasqueiro et al. (2011, 2012, 2016), Sogorb-Mira and López-Gracia (2003), Vieira (2014)
	PROF (2)	$\frac{\text{EBT}}{\text{Total Assets}}$	+	Thanh and Huong (2017)
	PROF (3)	$\frac{\text{EBIT}}{\text{Sales}}$	+	Rita (2011), Serrasqueiro et al. (2016)
	PROF (4)	$\frac{\text{EBITDA}}{\text{Total Assets}}$	+	Ampenberger et al. (2013)
	PROF (5)	$\frac{\text{Net Profit}}{\text{Total Asset}}$	+	Correia (2003)
Size	SIZE (1)	$\ln(\text{Sales})$	+	Gottardo and Moisello (2014), López-Gracia and Sánchez-Andújar (2007), Ramalho and Silva (2009), Rita (2011), Serrasqueiro and Caetano (2015), Serrasqueiro et al. (2016), Silva (2012)
	SIZE (2)	$\ln(\text{Total Assets})$	+	Dang (2005), Fama and French (2002), Gottardo and Moisello (2014), Keasey et al. (2015), López-Gracia and Sogorb-Mira (2008), Serrasqueiro et al. (2011, 2016), Setia-Atmaja et al. (2009), Silva (2012), Sogorb-Mira and López-Gracia (2003), Thanh and Huong (2017)

Table 2

Cont.

Independent variable	Notation	Proxy	Expected Sign	Authors
Age	AGE (1)	$\ln(\text{number of years of life})$	+/-	Acedo-Ramírez et al. (2017), Ampenberger et al. (2013), Keasey et al. (2015), López-Gracia and Sánchez-Andújar (2007), López-Gracia and Sogorb-Mira (2008), Serrasqueiro et al. (2016), Setia-Atmaja et al. (2009), Sogorb-Mira and López-Gracia (2003), Vieira (2014)
	AGE (2)	$\text{number of years of life}$	+/-	Adair and Adaskou (2015), Croci et al. (2011), Ramalho and Silva (2009)
Assets tangibility	TANG (1)	$\frac{\text{Fixed Assets}}{\text{Total Assets}}$	+	Correia (2003), Croci et al. (2011), Dang (2005), Ellul (2008), Gottardo and Moisello (2014), Mishra and McConaughy (1999), Serrasqueiro and Caetano (2015), Serrasqueiro et al. (2012, 2016), Setia-Atmaja et al. (2009), Thanh and Huong (2017)
	TANG (2)	$\frac{\text{Fixed Assets} + \text{Inventories}}{\text{Total Assets}}$	+	Adair and Adaskou (2015), Ramalho and Silva (2009), Sogorb-Mira and López-Gracia (2003)
Cash flow	CF (1)	$\frac{\text{EBIT} + \text{Depreciation} + \text{Amortization}}{\text{Total Assets}}$	-	López-Gracia and Sánchez-Andújar (2007)
	CF (2)	$\frac{\text{EBIT} + \text{Depreciation} + \text{Amortization}}{\text{Fixed Assets}}$	-	Sogorb-Mira and López-Gracia (2003)
	CF (3)	$\frac{\text{Net Profit} + \text{Depreciation} + \text{Amortization}}{\text{Total Assets}}$	-	Keasey et al. (2015), Serrasqueiro et al. (2011),
	CF (4)	$\text{Net Profit} + \text{Depreciation} + \text{Amortization}$	-	López-Gracia and Sogorb-Mira (2008)
	CF (5)	$\frac{\text{EBIT} + (\text{Depreciation} + \text{Amortiz.} + \text{Provisions})}{\text{Total Assets}}$	-	Acedo-Ramírez et al. (2017)
Relationship between growth opportunities and cash flow	HGOLCF and LGOHCF	Conditional Dummy Variables	+	López-Gracia and Sánchez-Andújar (2007), López-Gracia and Sogorb-Mira (2008), Serrasqueiro et al. (2011)

EBIT = earnings before interest and taxes; EBITDA = earnings before interest, taxes, depreciation, and amortization;

EBT = earnings before taxes.

Source: Elaborated by the authors.

To determine the variables $HGOLCF_{it}$ and $LGOHCF_{it}$ in two steps, the dummy variables are initially used (Table 3).

Table 3

Description of the dummy variables

1	For companies that, at any given time, present simultaneously growth opportunities above the average of the total sample and cash flows below the average of the total sample.
0	Other situations.
1	For companies that, at any given time, exhibit simultaneously growth opportunities below the average of the total sample and cash flows above the average of the total sample.
0	Other situations.

Source: Elaborated by the authors.

Subsequently, the variables $HGOLCF_{it}$ and $LGOHCF_{it}$ are calculated multiplying the previous dummy variable by the proxy of growth opportunities.

3.3 Conjoint Test

Testing both the TOT and the POT aims to identify which of the theories of capital structure explains better performance in the Portuguese family businesses. The study considers the partial adjustment model and the model of Shyam-Sunder and Myers (1999), following the procedure of Serrasqueiro and Nunes (2010). Adding the expressions 1 and 6, we have equation 9:

$$D_{it} - D_{it-1} = \lambda(D_{it}^* - D_{it-1}) + \alpha + b_{PO}FD_{it} + v_{it} \quad \boxed{9}$$

Including in the expression 9 the determinants of the TOT and POT financing, the joint test model is given by equation 10:

$$D_{it} = \alpha + \delta D_{it-1} + b_{PO}FD_{it} + \beta_1 ETR_{it} + \beta_2 NDS_{it} + \beta_3 GO_{it} + \beta_4 PROF_{it} + \beta_5 SIZE_{it} + \beta_6 AGE_{it} + \beta_7 TANG_{it} + \beta_8 CF_{it} + \beta_9 HGOLCF_{it} + \beta_{10} LGOHCF_{it} + \theta_i + \varepsilon_{it} \quad 10$$

where α is a regression constant, θ_i are the specific individual effects of each company i , and ε_{it} is the term of random perturbation.

3.3.1 Research hypotheses

To carry out the joint test, the research hypotheses formulated by Serrasqueiro and Nunes (2010) are replicated:

whose development results in the expression 11:

11

H₃: If $b_{PO} \neq 0$ and $\lambda \neq 0$, the TOT and the POT are not mutually exclusive.

H₄: If $\lambda > b_{PO}$, corporate financing decisions are closer to the assumptions of the TOT than to the assumptions of the POT.

H₅: If $b_{PO} > \lambda$, corporate financing decisions are closer to the assumptions of the POT than to the assumptions of the TOT.

4. SAMPLE AND DATA

4.1 Selection Process

Considering the scarcity of information on succession issues, this study follows the criterion of ownership to identify family businesses, more specifically, the reference proposed by López-Gracia and Sánchez-Andújar (2007, p. 276): “We considered all those businesses with a shareholder (single or family) owning more than 50% and the rest of the shares being relatively diluted as a family firm.” The selection of Portuguese family companies used the SABI database (<https://sabi.bvdinfo.com> – The Iberian Balance Sheet Analysis System is managed by

Informa SA and Bureau van Dijk). Although it does not report on the participation of the family members in the management of the companies, it indicates the distribution of the capital of the companies, allowing the selection of those that have characteristics of family property. In addition, information was extracted on the respective financial statements and concentration of capital.

Of the 605,724 companies in Portugal, 4,952 small, medium, and large family companies were selected in the period between 2009 and 2016, according to the filters shown in the Table 4.

Table 4

Sample constitution

Restrictions	Sample (n. companies)
Portuguese companies	605,724
Active companies	332,874
Corporations and limited liability companies	330,345
Non-financial corporations	319,138
Individual or family controls more than 50% of the property	284,188
Present accounts for the period 2009-2016	57,936
Positive equity	39,713
Small, medium, and large family businesses	4,952

Note: Decree-Law n. 98. (2015, June 2) classifies as micro-entities companies that do not exceed two of the three limits: € 350,000 in balance sheet, € 700,000 in net business, and 10 employees (on average) during the period. The exclusion of the micro-entities from the sample was due to the low bargaining power in access to credit, being very conditioned to the rules of the financial market. Consequently, their contribution would be reduced in order to analyze the financing choices of family businesses, which is the main objective of this study.

Source: Elaborated by the authors.

4.2 Selection of Proxies for Models

The choice of the most appropriate proxies for each capital structure theory was based on the weighting of several criteria: the results of the Pearson correlation matrices [this information with the significance levels for the determinants of TOT and POT financing and for the Shyam-Sunder and Myers (1999) model variables can be made available upon request to the authors]; the simulation of estimates on multiple specifications in the TOT model and the POT model, with the dependent variable defined by the D_{it} ratio, the $D_{it\ st}$ ratio, and the $D_{it\ ln}$ ratio; the underlying tests of individual significance and global significance, using the t Student statistic and the Fisher-Snedecor F statistic, respectively; the underlying analyzes of the quality of adjustment of the regression models, through the determination coefficients R^2 .

For the determinants of financing of the TOT in the partial adjustment model, the non-debt tax shields [NDTS (1)], growth opportunities [GO (1)], profitability [PROF (2)], size [SIZE (1)], age [AGE (1)], and assets tangibility [TANG (2)] proxies were those that estimated the best structures for the dependent variables total debt (D_{it}) and debt-to-equity ($D_{it\ ln}$). For the dependent variable short-term debt ($D_{it\ st}$), the same proxies were selected, with the exception of GO (1) and TANG (2), which were replaced

by GO (2) and TANG (1), respectively. The effective tax rate (ETR) variable was maintained in the model, despite the low statistical significance, because its relationship with the dependent variables is important for this study.

For the model of the determinants of financing of the POT, cash flow [CF (3)] and AGE (1) proxies estimated the best structure for all dependent variables. It should be noted that the inclusion of the GO variable was due to the need to determine the dummy variable growth opportunities above the average of the total sample and cash flows below the average of the total sample (HGOLCF) and the dummy variable growth opportunities below the average of the total sample and cash flows above the average of the total sample (LGOHCF). Although the GO (2) proxy has greater significance in the model whose dependent variable is $D_{it\ st}$, the HGOLCF and LGOHCF variables were calculated for all models through the proxies CF (3) and GO (1) because, in addition to facilitating the calculation, GO (1) and GO (2) have similar statistical significance.

4.3 Descriptive Statistics

Table 5 presents the descriptive statistics of the proxies selected for the study, whose sample includes 39,616 observations.

Table 5
Descriptive statistics of the variables (n = 39,616)

Variable	Notation	Mean	Standard deviation	Minimum	Maximum
Total debt ratio	D_{it}	0.553	0.2272	0	2.9982
Short-term debt ratio	$D_{it\ st}$	0.4161	0.2149	0	2.35
Natural logarithm of debt-to-equity ratio	$D_{it\ ln}$	0.2392	1.1408	-8.0889	9.0037
	ΔD_{it}	-0.0159	0.1043	-2.6693	2.9241
	$\Delta D_{it\ st}$	-0.0145	0.1408	-1.5003	1.6395
	$\Delta D_{it\ ln}$	-0.0696	0.4337	-7.6658	9.4695
Financial deficit	FD	-0.0027	0.2938	-35.9465	26.4694
Effective tax rate	ETR	0.3223	3.5902	-106.6051	362.4484
Non debt tax shields	NDTS (1)	0.0381	0.0376	-0.1781	0.8075
Growth opportunities	GO (1)	0.0481	0.3299	-0.8622	49.8082
	GO (2)	0.0102	0.0625	-0.0074	0.9198
Profitability	PROF (2)	0.0463	0.0822	-3.1495	0.9055
Size	SIZE (1)	7.5911	0.9978	-0.0174	13.6302
Age	AGE (1)	2.967	0.6127	0	4.727
Assets tangibility	TANG (1)	0.2478	0.2103	0	1.0211
	TANG (2)	0.4196	0.2402	0	1.1197
Cash flow	CF (3)	0.0716	0.0859	-3.1710	4.7425
Relationship between growth opportunities and cash flow	HGOLCF	0.0433	0.2917	0	49.8082
	LGOHCF	-0.0126	0.0507	-0.7857	0.0846

Notes: The variables are described in tables 1, 2 and 3.

Source: Elaborated by the authors.

D_{it} is the dependent variable with a higher mean value, followed by $D_{it\ st}$ and $D_{it\ ln}$. These variables present negative mean variations, being the $\Delta D_{it\ ln}$ more expressive.

Among the determinants of financing of the TOT in the partial adjustment model, we highlight SIZE (1) and AGE (1) with higher mean values. Also with respect to the independent variables in the same model, we highlight ETR, GO (1), GO (2), and PROF (2) due to marked volatility, with a standard deviation (SD) above the mean.

The variable financial deficit (FD), in the model

proposed by Shyam-Sunder and Myers (1999), has negative mean value, meaning that Portuguese family companies generated surplus funds during the period under analysis and justified the negative variations on the debt ratios. However, this variable assumes a SD above the mean.

In the model of determinants of financing of the POT, the variable AGE (1) presents the upper average value and the variable LGOHCF presents negative average value. However, the variables CF (3), HGOLCF, and LGOHCF assume marked volatility.

5. RESULTS AND DISCUSSION

5.1 TOT Test

5.1.1 Adjustment of the actual level of debt to the target

Table 6 presents the results for the partial adjustment model, expressed in the equation 5, of the actual level of debt towards the optimum target level and for the relationship between the financing determinants and the dependent variables representing the indebtedness. That model includes the lagged variable D_{it-1} , making it impossible to use the OLS

estimator due to the correlation of this independent variable with the individual (unobservable) effects n_i and with the error term v_{it} . Consequently, the GMM system estimator of Blundell and Bond (1998), which is more efficient than the GMM estimator of Arellano and Bond (1991), was used because the estimation of the coefficients of the model takes into account the existence of autocorrelation by the presence of the lagged variable and the heterogeneity represented by the individual effects of the panel (Baltagi, 2005).

Table 6

Partial adjustment model

Independent variables	Dependent variables		
	D_{it}	$D_{it\ st}$	$D_{it\ ln}$
D_{it-1}	0.5166***		
$D_{it-1\ st}$		0.4824***	
$D_{it-1\ ln}$			0.8137***
λ	0.4834***	0.5176***	0.1863***
ETR	-0.00004	-0.00002	-0.0007
NDTS (1)	0.2249***	0.2071***	0.2335***
GO (1)	0.1022***		0.6727***
GO (2)		-0.1226***	
PROF (2)	-0.6016***	-0.3832***	-2.3287***
SIZE (1)	0.0387***	0.0360***	0.0293***
AGE (1)	-0.0164***	-0.0142***	-0.0552***
TANG (1)		-0.0665***	
TANG (2)	0.0591***		-0.0049
Hansen	1,091.01***	702.41***	293.78***
m_1	-10.15***	-15.06***	-11.05***
m_2	9.93***	8.10***	6.96***
Wald (χ^2)	174.272***	92,636.79***	22,967.57***
N. obs.	39,616	39,616	39,616

Notes: The variables are described in tables 1, 2 and 3. Hansen test has as H_0 the validation of the restrictions imposed by the use of instruments; m_1 and m_2 represent the first and second order autocorrelation tests, respectively, having as H_0 the absence of autocorrelation; the Wald test follows a χ^2 distribution and has as H_0 that the independent variables, globally, do not explain the dependent variable.

* = p -value < 0.1; ** = p -value < 0.05; *** = p -value < 0.01.

Source: Elaborated by the authors.

The results of the Hansen test are statistically significant at 1%, suggesting the rejection of H_0 , and thus the restrictions imposed by the use of instruments are not valid, pointing to an over-identification of the restrictions. In addition, the results of the autocorrelation test are also significant at 1%, suggesting the rejection of H_0 and thus confirming first and second order autocorrelation in the models, which validates the need to use GMM dynamic models. Given the non-validity of the instruments, we conclude that the results obtained by the GMM system estimator are not considered robust. However, the values of the Wald test are relevant at 1%, proposing the rejection of H_0 and thus the independent variables – taken globally – are significant to explain the dependent variables.

The empirical results of the partial adjustment model show that the rate of adjustment of short-term debt ($\lambda = 0.5176$) towards the optimal ratio is relatively higher than the rate of adjustment of total debt ($\lambda = 0.4834$) and much higher than the rate of debt-to-equity adjustment ($\lambda = 0.1863$). This evidence allows us to validate H_1 that companies adjust the actual debt ratio to the optimal level, in that the estimates of the coefficients λ are positive.

Even so, these estimates are less than 1, indicating that Portuguese family companies face transaction costs that keep them away from the optimal debt level (Myers, 1984), and can be accepted as $H_{1,1}$. This evidence converges with the studies of López-Gracia and Sánchez-Andújar (2007), on Spanish family companies, Bauweraerts and Colot (2012), on Belgian family companies, and Serrasqueiro et al. (2012, 2016), in reference to the Portuguese family businesses.

In the context of family businesses, it is anticipated that reduced agency costs, given the family/business interaction, will result in higher levels of reputation and, consequently, easier access to indebtedness. The results obtained by the coefficient λ , in relation to total debt and short-term debt, suggest that companies have some difficulty in adjusting the level of indebtedness to the optimal level, thus the $H_{1,2}$ can be accepted.

5.1.2 Determinants of financing

Table 7 summarizes the test results to the TOT using the partial debt adjustment model, considering that the optimal level depends on the financing determinants.

Table 7

Verification of the trade-off theory (TOT) research assumptions

Independent variables	Expected relationship	Estimated relationship	Validation of hypotheses or relationship
λ	$\lambda > 0$	$\lambda > 0$	H_1 : Validated
$(1 - \lambda)$	$(1 - \lambda) > 0$	$(1 - \lambda) > 0$	$H_{1,1}$: Validated
Agency costs			$H_{1,2}$: Validated
ETR	+	n.s.	Rel. not validated
NDTS	-	+	Rel. not validated
GO	-	+/-	Rel. not validated
PROF	+	-	Rel. not validated
SIZE	+	+	Rel. validated
AGE	+	-	Rel. not validated
TANG	+	+/-/n.s.	Rel. not validated

Notes: The variables are described in tables 1, 2 and 3.

n.s. = non-significant.

Source: Elaborated by the authors.

Contrary to what was expected, there was a negative but not significant relationship between ETR and debt in its three proxies. This suggests that Portuguese family businesses do not take advantage of the tax benefits of interest, derived from increasing debt, indicating the rejection of expected relationship sign. In the NDTS, there were positive relationships, significant at 1%, with the three debt proxies. Contrary to what was expected, Portuguese family companies do not reduce the use of credit when they are able to enjoy non-debt tax shields, suggesting the rejection of expected relationship sign.

The positive, statistically relevant, relationship of the GO with the dependent variables D_{it} and $D_{it,ln}$ does not allow the expected relationship sign to be accepted, despite the strong negative relation with the dependent variable $D_{it,st}$. This evidence suggests that, given growth opportunities, Portuguese family businesses reduce short-term debt and increase medium and long-term debt. The significant negative relationship between PROF and the dependent variables does not allow us to accept expected relationship sign. Moreover, this result converges with the assumptions of the POT, in which the companies start

to resort to self-financing and only when the internal resources run out, will they resort to external capital. The variable SIZE obtained a positive relationship, significant at 1%, with the dependent variables, corroborating the expected relationship sign. This means that Portuguese family businesses with a larger size (and market position, in terms of image and reputation) face less likelihood of insolvency and less amount of asymmetric information, ensuring more trust with creditors and facilitating more debt. The important negative relationship between AGE and debt proxies does not allow us to accept expected relationship sign. In addition, this result converges with the POT, where older companies tend to accumulate more profit and, consequently, use less debt. Finally, the significant positive relationship between the variable TANG and D_{it} allows us to accept the expected relationship sign. However, there is a significant negative relationship with $D_{it\ st}$ and not significant with $D_{it\ ln}$. This suggests that

Portuguese family businesses use the value of tangible assets as warranty for obtaining credit, mainly in longer maturities.

5.2 POT Test

5.2.1 Relationship between the financing deficit and the variation in indebtedness

Table 8 presents the results for the model proposed by Shyam-Sunder and Myers (1999), expressed in equation 6, in regard to the impact of the financial deficit on the variation of the dependent variables representing debt. The estimation of this model resorted to an OLS regression, since the dependent variable is presented by the first differences and, therefore, the individual (unobservable) effects of the companies become irrelevant, being eliminated in the model.

Table 8

Impact of the financial deficit on changes in indebtedness

Independent variables	Dependent variables		
	ΔD_{it}	$D_{it\ st}$	$\Delta D_{it\ ln}$
α	-0.0155***	-0.0146***	-0.0697***
FD	0.1614***	-0.0197***	-0.0100
R^2	0.0087	0.0017	0.00005
R^2_{Adj}	0.0086	0.0017	0.00002
F	345.9***	67.23***	1.83
N. obs.	39,616	39,616	39,616

Note: The variables are described in tables 1, 2 and 3. F test has as H_0 the statistical insignificance of the set of independent variables.

* = p -value < 0.1; ** = p -value < 0.05; *** = p -value < 0.01.

Source: Elaborated by the authors.

The regressions of the Shyam-Sunder and Myers model present estimates close to 0 for parameter α , converging with what was predicted by the POT, and for parameter b_{PO} , diverging from the predictions. Generally, the b_{PO} results indicate that the marginal increase in the financial deficit has no impact on indebtedness. However, we can observe a significant positive relationship between the FD and the total debt change (ΔD_{it}) and a significant negative relation between the FD and the short-term debt variation ($\Delta D_{it\ st}$).

The Fisher-Snedecor F test confirms that the independent variable FD is only significant at 1% in the model ΔD_{it} and in the model $\Delta D_{it\ st}$. The reduced coefficients of determination, R^2 and R^2_{Adj} , justify the low explanatory power of any of the models, represented by the three debt proxies, at the expense of the FD variable.

It seems that the low proportion of debt financing in relation to the deficit of funds corresponds to the

portion of capital obtained to meet the needs not covered by the internal resources of Portuguese family enterprises, contrary to the assumptions of the POT and the acceptance of H_2 . These evidences diverge from the expected, considering the study of Serrasqueiro et al. (2012, 2016), on Portuguese family businesses, and the study of Bauweraerts and Colot (2012), on Belgian family companies, although they converge with the study of Sogorb-Mira and López-Gracia (2003) on Spanish SMEs.

5.2.2 Determinants of financing

Table 9 presents the estimates of the relationship between the debt proxies and the financing determinants in the POT, expressed in equation 8, using static panel models: an OLS regression, a fixed effects model, and a random effects model, respectively. To identify the most appropriate form of estimation, we used the results of the Breusch-Pagan *Lagrange multiplier* (LM) test and

the Hausman test. Since heteroskedasticity is a common phenomenon in studies that use cross-sectional data, the fixed effects model and the random effects model were computed using the White (1980) estimator. This estimator

determines the same results as the traditional estimator for the coefficients, although the standard error, and thus, the level of significance of the t Student test considers possible heteroskedasticity (Murteira et al., 2016).

Table 9

Determinants of financing in the pecking order theory (POT)

Independent variables	Dependent variable: D_{it}		
	OLS	Fixed effects	Random effects
α	0.81***	1.1101***	1.0225***
CF (3)	-0.5545***	-0.2750***	-0.288***
AGE (1)	-0.0747***	-0.1812***	-0.1514***
HGOLCF	0.0525***	0.0147	0.0164
LGOHCF	-0.1689***	0.0172	0.0110
R ²	0.0778	0.1322	0.1127
R ² _{Adj}	0.0777	0.0082	0.1126
F	835.17***	1,320.52***	1,257.75***
LM (χ^2)		89,119***	
Hausman (χ^2)		746.91***	
N. obs.	39,616	39,616	39,616
		Dependent variable: D_{itst}	
α	0.6255***	0.9430**	0.8026***
CF (3)	-0.3671***	-0.1525***	-0.1703***
AGE (1)	-0.0630***	-0.1740***	-0.1263***
HGOLCF	0.0390***	0.0126	0.0150
LGOHCF	-0.1677***	0.0116	0.0003
R ²	0.0499	0.0746	0.0582
R ² _{Adj}	0.0498	-0.0577	0.0582
F	519.84***	698.31***	612.46***
LM (χ^2)		64,717***	
Hausman (χ^2)		502.61***	
N. obs.	39,616	39,616	39,616
		Dependent variable: D_{itIn}	
α	1.5621***	3.2274**	2.7868***
CF (3)	-2.8087***	-1.4984***	-1.5499***
AGE (1)	-0.3847***	-0.9708***	-0.8213***
HGOLCF	0.2765***	0.0968	0.1044
LGOHCF	-0.6279***	0.3452***	0.3162***
R ²	0.0810	0.1650	0.1404
R ² _{Adj}	0.0809	0.0457	0.1403
F	873.1***	1,712.67***	1,617.65***
LM (χ^2)		92,564***	
Hausman (χ^2)		947.23***	
N. obs.	39,616	39,616	39,616

Notes: The variables are described in tables 1, 2 and 3. F test has as H_0 the statistical insignificance of the set of independent variables; the Breusch-Pagan Lagrange multiplier (LM) test follows a χ^2 distribution and has as H_0 the non-relevance of the individual (unobservable) effects; Hausman test follows a χ^2 distribution and has as H_0 that the individual (unobservable) effects are not correlated with the explanatory variables; the fixed effects models and the random effects models were computed using the White estimator.

OLS = ordinary least squares

* = p -value < 0.1; ** = p -value < 0.05; *** = p -value < 0.01.

Source: Elaborated by the authors.

The results of the LM test are statistically significant at 1% for the three debt proxies, suggesting the rejection of H_0 , and thus, the individual effects are relevant in explaining the model, therefore an OLS regression is not the most efficient way of proceeding to the estimation. Consequently, the Hausman test should be used to see if the correlation between individual effects and explanatory variables is significant. The results of this test are significant at 1%, suggesting the rejection of H_0 , and so the fixed effects model constitutes the most consistent and efficient estimation model.

In general, the reduced values of the determination coefficients, R^2 and R^2_{Adj} , justify the poor explanatory quality of the models, with D_{itln} being the one that presents the best fit to the data. However, the Fisher-Snedecor F test results are relevant at 1%, suggesting that the independent variables are globally important regardless of the proxy used for the debt.

The empirical results support a significant negative relationship between the CF and the indebtedness in all models. This suggests that the presence of information asymmetry between the company and the credit market, on the one hand, and, on the other hand, the reluctance to open capital to external family members, should lead Portuguese family businesses to resort, first, to internally generated resources to support financing needs. This

evidence is consistent with what is predicted by the POT and confirms expected relationship sign.

The variable AGE also has a significant negative relationship with the three models of indebtedness, suggesting that the capacity to accumulate profit increases with the life cycle of Portuguese family companies, reducing the need to resort to external funds. This evidence is consistent with the predicted by the POT and confirms expected relationship sign.

The evidence for CF and AGE converge with the studies of Acedo-Ramírez et al. (2017), Bjuggren et al. (2012), Croci et al. (2011), López-Gracia and Sánchez-Andújar (2007), Mehboob et al. (2015), Serrasqueiro et al. (2012, 2016), and Vieira (2014). The positive but not relevant relationship between the HGOLCF and debt proxies does not allow us to accept H_{2a-1} . Finally, the insignificant positive relationship of the LGOHCF with the dependent variables D_{it} and D_{itst} and the significant positive relationship with the dependent variable D_{itln} contradict the assumptions of the POT and suggest the rejection of the H_{2a-2} .

Table 10 summarizes the results of the test to the POT, through the impact of the FD in the variation of the indebtedness and the relationship between the determinants of the financing and the debt.

Table 10

Verification of the pecking order theory's investigation hypotheses

Independent variables	Expected relationship	Estimated relationship	Validation of hypotheses
α and b_{PO}	$\alpha = 0$ and $b_{PO} = 1$	$\alpha \cong 0$ and $b_{PO} \cong 0$	H_2 : Not validated
CF	-	-	H_{2a} : Validated
AGE	-	-	H_{2b} : Validated
HGOLCF	+	n.s.	H_{2c-1} : Not validated
LGOHCF	-	n.s./+	H_{2c-2} : Not validated

Notes: The variables are described in tables 1, 2 and 3.

n.s. = non-significant.

Source: Elaborated by the authors.

5.3 Conjoint Test

Once the tests have been performed on each theory, Table 11 presents the results of the joint test of the Shyam-Sunder and Myers (1999) model and the partial adjustment model, taking into account the determinants of funding provided by the TOT and the POT. The behavior of the coefficient of adjustment λ of the TOT model is

compared with the coefficient b_{PO} of the POT model, in order to identify which of the theories shows the best performance.

As previously mentioned, the model expressed in equation 11 includes the lagged variable D_{it-1} , so the estimation of the model of the joint test uses the GMM system estimator of Blundell and Bond (1998).

Table 11
Conjoint test

Independent variables	Dependent variables		
	D_{it}	D_{itst}	D_{itln}
D_{it-1}	0.5328***		
D_{it-1st}		0.4987***	
D_{it-1ln}			0.8248***
λ	0.4672***	0.5013***	0.1752***
FD	0.0001**	-0.0130**	-0.0172
ETR	-0.0001	-0.00004	-0.0007
NDTS (1)	0.2328***	0.2451***	0.4901
GO (1)	0.0910***		0.74***
GO (2)		-0.1182***	
PROF (2)	-0.5546***	-0.3493***	-2.0405***
SIZE (1)	0.0369***	0.0334***	0.0273***
AGE (1)	-0.0154***	-0.0121***	-0.0503***
TANG (1)		-0.0649***	
TANG (2)	0.0574***		-0.0087
CF (3)	-0.0455	-0.0168	-0.3981
HGOLCF	0.0449	0.0993***	-0.0745
LGOHCF	-0.1431***	-0.0438*	-0.3128***
Hansen	1,121.49***	713.41***	339.10***
m_1	-10.75***	-15.17***	-11.28***
m_2	10.17***	8.29***	6.95***
Wald (χ^2)	193,010.20***	101,429.50***	24,376.30***
N. obs.	39,616	39,616	39,616

Notes: The variables are described in tables 1, 2 and 3. Hansen test has as H_0 the validation of the restrictions imposed by the use of instruments; m_1 and m_2 represent the first and second order autocorrelation tests, respectively, having as H_0 the absence of autocorrelation; the Wald test follows a χ^2 distribution and has as H_0 that the independent variables, globally, do not explain the dependent variable.

* = p -value < 0.1; ** = p -value < 0.05; *** = p -value < 0.01.

Source: Elaborated by the authors.

The results of the Hansen test and the autocorrelation test are statistically significant at 1%, suggesting, in both cases, the rejection of H_0 . The presence of autocorrelation justifies the use of dynamic panel models, but given the invalidity of the instruments, it is concluded that the results of the GMM system estimator are not considered robust. However, the values of the Wald test are relevant at 1%, proposing the rejection of H_0 , and thus, the independent variables – taken globally – are significant to explain the dependent variables.

The empirical results show that the coefficients λ decreased slightly with the independent variables of the POT model (tables 6 and 11) to determine the proxies of the indebtedness. As in the TOT model, positive λ coefficients suggest that Portuguese family companies adjust the actual debt ratio to the optimal target. However, these estimates below 1 indicate that businesses face

transaction costs that prevent them from reaching the optimal debt level completely. In addition, the coefficients b_{PO} close to 0, as occurred in the POT model, indicate that the financial deficit has no influence on the recourse to indebtedness.

It can be seen that the coefficient of adjustment λ is much higher than the regression coefficient b_{PO} of the variable FD in the three proxies of indebtedness. Moreover, both coefficients are statistically significant in the model of total debt ($\lambda = 0.4672$ and $b_{PO} = 0.0001$) and in the model of short-term debt ($\lambda = 0.5013$ and $b_{PO} = -0.0130$). This indicates that the TOT appears to have a better performance than the POT. However, apart from the proxy of indebtedness, it is found that $\lambda \neq 0$ and $b_{PO} \neq 0$, justifying that both theories can explain financing decisions. This evidence is consistent with the conclusions of the individual tests.

Regarding the financing determinants, the independent variable NDTs loses significance in the model D_{it}^{in} . The CF variable has no explanatory relevance in any model, while the HGOLCF variable only has relevance in the D_{it}^{st} model. Finally, the relevant negative relationship of

the LGOHCF variable in the three models of indebtedness is highlighted, contradicting the previous evidence and converging with the assumptions of the POT.

Table 12 summarizes the empirical results of the joint test.

Table 12

Verification of the hypotheses of investigation of the joint test

Independent variables	Expected relationship	Estimated relationship	Validation of hypotheses
λ and b_{PO}	$b_{PO} \neq 0$ and $\lambda \neq 0$	$b_{PO} \neq 0$ and $\lambda \neq 0$	H_3 : Validated
λ and b_{PO}	$\lambda > b_{PO}$	$\lambda > b_{PO}$	H_4 : Validated
λ and b_{PO}	$b_{PO} > \lambda$	$\lambda > b_{PO}$	H_5 : Not validated

Notes: The variables are described in tables 1, 2 and 3.

n.s. = non-significant.

Source: Elaborated by the authors.

The results corroborate the previous conclusions, indicating that the financing decisions of Portuguese family companies are closer to the assumptions of the TOT than to the assumptions of the POT. In fact, the level of debt adjustment towards the optimal target is considerably higher than the magnitude of the impact of the deficit of funds on changes in indebtedness. This suggests acceptance of H_4 and rejection of H_5 . The evidence described converges with the studies of Acedo-Ramírez et

al. (2017), Ampenberger et al. (2013), Croci et al. (2011), Keasey et al. (2015), López-Gracia and Sánchez-Andújar (2007), and Serrasqueiro et al. (2012, 2016).

Although the variations in indebtedness are relatively scarcely influenced by insufficient internal financing, the results support that the TOT and the POT are not mutually exclusive; therefore, both can explain part of the financing decisions of these companies, suggesting the acceptance of H_3 .

6. CONCLUSION

The results of the isolated test to the TOT suggests that the Portuguese family companies adjust the level of indebtedness towards the target, although influenced by transaction and adjustment costs that keep them away from the optimum.

The results of the isolated test to the POT, considering the model of Shyam-Sunder and Myers (1999), suggest that, when the financing needs are not covered by the internal resources, the Portuguese family companies resort to sources other than debt.

Confronting the two tests, we conclude that the magnitude of the impact of the financial deficit is greater in total debt ratio and smaller in short-term debt ratio and in debt-to-equity ratio, although the velocity of adjustment to the optimal ratio is higher in short-term debt. In addition, the negative mean value of financial deficit means that those companies generate internal surpluses that compensate for the financing needs.

The results of the joint test corroborate the previous conclusions, justifying the better performance of the TOT in explaining the financing decisions of Portuguese family companies. In addition, the significant positive relationship with SIZE is consistent with the TOT.

On the other hand, the results of the isolated test to the POT, considering the determinants of the financing, show significant negative relationships with CF and AGE.

It is anticipated that the greater convergence of interests, given family/business interaction, and the consequent decrease in agency costs will result in higher levels of recognized reputation and thus easier access to indebtedness. In this context, Portuguese family companies adjust the level of debt, offsetting the costs associated with tax benefits, through decisions on capital structure closer to the TOT, but not exclusively, because a positive, albeit reduced, change in total debt resulting from financial deficit was identified.

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