The Effect of Family Ownership, Control and Management on Corporate Debt Structure – Evidence from Panel Fractional Data

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Abstract

The present study examines the impact of family involvement on the debt structure of family businesses. Family corporate involvement is considered in three related but distinct dimensions: capital ownership, firm's management and corporate control. The marginal effect of each of these three dimensions is specified as a unique regression parameter in a conditional mean model for the proportion of medium- plus long-term debt to total debt. This general strategy calls for an appropriate modelling and estimation approach, taking due account of the response variable's inherent fractional definition and consequential nonlinear functional form of its conditional expectation, given covariates. Such an approach, combining a probit model for the equation of interest with a control function estimation method, is applied to a panel data set on Portuguese family businesses. Estimation results confirm the uniqueness of the impact of each of the three considered dimensions of families' corporate involvement on the debt structure of firms.

JEL Classification: G3, C23, C25
Keywords: Family firms; Management and control considerations; Debt maturity structure; Panel fractional data.

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1 Introduction

The literature on corporate capital structure has become increasingly interested in the study of family involvement in decisions regarding this structure. This growing interest seems amply justified, given the importance of family businesses in most economies. For instance, La Porta *et al.* (1999) show that the majority of firms in the world are family-owned or family-controlled. Astrachan and Shanker (2003) give evidence to the fact that such firms represent 80% to 90% of all North American businesses, while the European Commission estimates this fraction in Europe at around 60% (European Commission 2009). The fraction of family businesses is particularly large with respect to small and medium size enterprises (SMEs); nonetheless, the percentage of large family-owned or family-controlled corporations is also considerable: for instance, Anderson *et al.* (2003) and Villalonga and Amit (2006) show that one third of the enterprises included in the S&P 500 index, and 37% of those in *Fortune*'s 500 are family firms. In this same regard, Maury (2006) has verified that families control about 63% of European non-financial companies. Recently, Aguilera *et al.* (2012), in a survey of previous studies, present more conservative results concerning families' voting rights in several European and Latin America countries, with average percentages ranging from 27% in Peru to 3.6% in the UK.

The relative weight of family companies thus appears to be an undisputed fact, in spite of the variety of received definitions of 'family business'. This diversity helps justify some varying results in the literature, regarding the percentage of family businesses in the overall entrepreneurial universe.(1) In view of these differences, several authors adopt, for definitional purposes, varying thresholds concerning the degree of capital ownership by families. La Porta *et al.* (1999), Setia-Atmaja *et al.* (2009) and Schmid (2013) define family business as one in which the capital share owned by the family gives its members at least 20% of the voting rights. The European Commission, in turn, adopts a 25% voting rights threshold, the same value proposed in Ampenberger *et al.* (2013). Villalonga and Amit (2006), in turn, consider firms in which family members hold at least 5% of the capital and are actively involved in management. In what regards unlisted SME's, Donckels and Fröhlich (1991) define family businesses as those where family members hold at least 60% of capital, while López-Gracia and Sánchez-Andújar (2007) adopt a less conservative 50% threshold.

In spite of the increased investigative interest on family businesses, not many studies have addressed the impact of family involvement on capital structure decisions, namely in the context of unlisted firms (see, *e.g.*, Benavides-Velasco *et al.* 2013). Presumably, one issue of particular interest in this regard consists on the study of the determinants of the structure of debt, namely if one bears in mind that between 1946 and 1987 debt issuance totalled 85% of all external funding (as compared to only about 7% equity – see Bolton and Scharfstein 1996). Indeed, although recent research has produced some contributions regarding credit availability, the cost of loans or the role of collaterals in small business financing (*e.g.*, López-Gracia and Mestre-Barberá 2011; Keasey *et al.* 2015), debt maturity

(1) As recognized by a Group of Experts of the European Commission, there is no "single definition of 'family business' which is exclusively applied to every conceivable area, such as to public and policy discussions, to legal regulations, as an eligibility criterion for support services, and to the provision of statistical data and academic research." European Commission (2009, p. 8). A good synthesis of several 'family business' definitions is presented in Family Firm Institute, Inc. (2013).

remains, for the most part, insufficiently explained. This point is all the more pertinent if, in accordance with theoretical suggestions (*e.g.*, Chen *et al.* 2014; Moro *et al.* 2014), one accepts that debt maturity can play a distinctive role in the reduction of asymmetric information problems and minimization of agency costs. The present study aims at contributing to this debate by addressing the effect of family involvement on the structure of corporate debt, namely in terms of the relative maturity of its components.

In line with recent work – *e.g.*, Villalonga and Amit (2009) and González *et al.* (2013) – and in accordance with recent tendencies regarding the definition of family business, this study considers family corporate involvement in three related dimensions: ownership, control, and management. As is well known, these three aspects of family intervention can coexist in one same business; nevertheless, each one is conceptually unique and may have a specific impact on the structure of debt. In this regard, it should be noted at the outset that, diversely from previous work, the present study utilizes data on actual percentages of capital family ownership, thus circumventing the adoption of a somewhat arbitrary threshold thereof, in order to define family ownership or family control. This option is also preferred because it enables one to gauge differences of the impact of family ownership, control and management on a firm's debt ratio. This aspect seems all the more relevant if one considers the results of Westhead and Cowling (1998) who, after examining differences between family and non-family firms in the UK under different definitions of 'family business', conclude that many of the differences encountered in previous studies seem to hinge more on classificatory discrepancies than on actual differences between the two groups.

In essence, and in short, the present study investigates the impact of family ownership, control, and management on the structure of corporate debt, in the context of unlisted firms. To this effect, the variates measuring each different type of family involvement are included as explanatory variables (along with a set of control variates) in a regression model for the appropriate response variable, measuring corporate debt structure. In line with recent work by Díaz-Díaz *et al.* (2016), this response variable is defined here as the ratio of medium- plus long-term corporate debt to total debt, where the latter is defined as debt that matures after more than one year.

At this point, some relevant econometric issues are worth mentioning. Firstly, as defined, the dependent variable is a proportion, with support the unit interval, [0,1]. Consequently, the relationship between the response and covariates should be modelled in accordance with the fractional nature of the former. For instance, a linear regression model is not appropriate, not only because it can yield predictions of the response outside the unit interval (negative or greater than one) but, more importantly, because it leads to unreliable estimation of the covariates' marginal effects, namely for values of the response close to the boundaries of its theoretical support (zero and/or one). In this sense, a nonlinear regression model, accounting for the latter's inherent fractional nature, is clearly a more appropriate strategy. This concern has been duly noted by several authors, both in the econometric literature (see, *e.g.*, Papke and Wooldridge 2008, and the references therein) and in other areas, such as the financial analysis literature (*e.g.*, Elsas and Florysiak 2015).

Secondly, the present study utilizes a short panel data set, with observations on a large number of firms but relatively few periods for each firm. Besides allowing for unobserved individual (firm) effects, one should account for the fact that the probability of default (PD) is, very likely, an endogenous covariate in the model of debt structure. Following Papke and Wooldridge (2008), both issues are addressed in the paper by adopting a probit model for the equation of interest and combining a control function estimation method with the approach proposed by Mundlak (1978) and Chamberlain (1980). This strategy enables consistent estimation of the quantities of primary interest – namely, marginal effects of the variables measuring family corporate involvement on the structure of debt.

The remainder of the paper is organized as follows. Section 2 describes the regression model of debt structure, its variables and population assumptions, as well as the estimation method used in the study. Section 3 presents and comments on estimation results. Section 4 concludes, with suggestions for future research.

2 Regression Model and Estimation Method

2.1 Variables and Model Assumptions

As mentioned, the response variable in each period (year) is the ratio of medium-plus long-term corporate debt to total debt. Denote this variable for firm *i*, year *t*, as y_{it}. By definition, y_{it} is a fractional variable, that is, $0 \leq y_{it} \leq 1$. In line with usual practice in panel data models, unobserved firm heterogeneity is also allowed, represented by a time-invariant effect; denote this effect for firm i as f_i. The observed explanatory variables and corresponding firm attributes are listed in Table 1 (firm and time indices are omitted in the table).

The various dimensions of family corporate involvement – ownership, management and control – are measured here by the first three covariates in Table 1. In line with Lien *et al.* (2016) family ownership (measured by the variable *ownst*) is defined as the percentage of capital detained by one individual or by different members of the same family. This definition contrasts with most previous studies (*e.g.*, Schmid 2013; Ampenberger *et al.* 2013), which, to this effect, adopt a binary indicator based on a (somehow *ad hoc*) threshold concerning the individual's or family members' voting rights, directly or indirectly owned.

Table 1
Explanatory Variables

Variable (*)	**Description**	**Attribute**
Ownst	Percentage of capital owned by family members	Ownership structure
managst	Percentage of capital owned by the family members who participate in management	Governance structure
controlst	= 1, if family owns more than 50% of the capital, and participates in management (= 0 otherwise).	Control structure
pdlr	$\log[\text{PD}/(1-\text{PD})]$, PD: probability of default	PD log-ratio
size	$\log(sales)$	Size proxy
profitr	EBIT/total assets (**)	Profitability
assetcollval	(Tangible assets + investment property)/total assets	Assets' collateral value
invopp	Intangible assets/total assets	Growth opportunities
fiscal	(Amortisation + depreciation)/ EBITDA (***)	Tax effects
liquidr	Current (assets – liabilities)/ total assets	Liquidity ratio

(*) Firm and year indices (i, t) omitted in covariates' labels.
(**) EBIT: Earnings before interest and taxes.
(***) EBITDA: Earnings before interest, taxes, depreciation and amortisations.

In what concerns family involvement in management and control, two covariates are considered: respectively, *managst* and *controlst*. The first variable is defined as the percentage of capital owned by family members who take part in the firm's management. As previous studies suggest (*e.g.*, Schmid 2013; Díaz-Díaz *et al.* 2016), there are reasons to believe that family involvement in management can have a sizeable influence on financial decisions of firms. Both reputational effects families wish to safeguard, and lower agency costs firms face due to the overlapping of ownership and management can support this potential influence.

In addition, the actual control of families over firms is also a major concern in the study. As recognized in various studies (see, *e.g.*, Díaz-Díaz *et al.* 2016, and the references therein), the assessment of the degree of actual control of a firm by the family based on capital ownership requires the consideration of the whole control chain, correctly identifying the direct or indirect family ownership participation, thereby avoiding biased assessments (wrongly ascribing control to a family without firm control, or denying such control when, in fact, the family controls the firm through indirect capital holdings). Incidentally, it is worth mentioning that such analysis is particularly difficult for unlisted firms, owing to less information available. In order to obviate the potential assessment bias, a conservative stance is adopted, by using the dummy variable *controlst*, equal to one if the family holds more than 50% capital *and* takes part in the firm's management. Presumably, one can thus distinguish cases in which the family actually controls capital and management, from situations where it does not.

In line with the established literature (*e.g.*, Díaz-Díaz *et al.* 2016; Namara *et al.* 2017), the model of interest also includes control variates, measuring other attributes of the firms that can influence the structure of debt. These covariates include: firm size (*size*) proxied by $\log(sales)$; profitability (*profit*), measured by the ratio of earnings before interest and taxes to total assets; assets' collateral value (*assetcollval*), measured by the relative weight of tangible assets and investment property within total assets; growth opportunities (*invopp*), measured by the relative weight of intangible assets within total assets; non-debt tax shields (*fiscal*), measured by the relative weight of depreciation and amortizations within earnings before interest, taxes, depreciation and amortizations; liquidity (*liquidr*), measured by the ratio of difference between current assets and liabilities to total assets; a strictly increasing function of the probability of default (PD) (*pdlr*) used to assess the firm's degree of solvency and, thus, its financial risk (the formal definition of *pdlr* as log-ratio of PD – check Table 1 – is justified below).

All explanatory variables, except *pdlr*, are assumed strictly exogenous conditionally on f_i (which means that they are not correlated with time-varying omitted variables affecting y_{it}, nor do they react to past changes in y_{it}). Denote the row vector of these exogenous covariates for firm *i* and year *t* as $\boldsymbol{x_{it}}$.

There is reason to suspect that one of the explanatory variables, $pdlr_{it}$, is an endogenous covariate in the equation of interest. As described in Table 1, this variable is a function of PD which can be loosely defined as the degree of certainty that a firm will go into default. This notion is intimately related to the firm's credit rating and can reasonably be assumed to depend on time-varying omitted variables (*e.g.*, characteristics of the economic climate and firm's sector) and to be influenced by past values of the debt ratio.(2) Both simultaneity and feedback are ruled out by the strict exogeneity assumption that is adopted for all the other covariates.

The likely endogeneity of $pdlr_{it}$ in the equation of interest prompts the search for at least one time-varying exogenous variable, not included in the model, to serve as instrument for $pdlr_{it}$. One such candidate is provided by the firm's age,

(2) The observations for PD used in the study, retrieved from the SABI database, are produced by the Multi Objective Rating Evaluation (MORE) model, developed by modeFinance®.

henceforth denoted as *age* (measured in years). While there doesn't seem to be an overall consensus on the type of relationship between both variables, the influence of *age* on PD appears to be an undisputed fact. Several arguments in the literature support this general statement: Firstly, according to some authors, *age* has a negative impact on PD: more recent firms face a greater risk of mortality than older firms, reflecting the so-called "liability of newness" (*e.g.*, Ericson and Pakes 1995). When firms start to operate, they do not know their efficiency levels, acquiring information, efficiency and competitiveness as they become more mature and experienced, with less efficient firms eventually leaving the market. Thus, the learning process reduces the risk of non-survival (Esteve-Pérez *et al.* 2010). In addition, older firms have access to a larger volume of credit (Ayadi *et al.* 2017), usually enjoy better reputation (Matemilola *et al.* 2017) and, accordingly, face a lower PD (Cultrera and Brédart 2016). A second line of reasoning (*e.g.*, Coad and Guenther 2013; Amendola *et al.* 2015) suggests an inverted *U* shape for PD as a function of *age*, on the basis of a so-called "liability of adolescence" hypothesis (Fichman and Levinthal 1991). After the firm's founding PD is relatively low because the company is protected from the scarcity of initial resources and founders have a strong will to face initial problems. However, the risk of default increases up to a maximum, some two years after the start, as resources and initial options of the company wear off. From this point on, the survival risk rate increases with the firm's age. Finally, some studies, based on the "liability of senescence" hypothesis (*e.g.*, Mata *et al.* 2011) and on life cycle theories, suggest that older firms face a higher probability of exiting the market, due to obsolescence of products, business concepts and management strategy or, in the particular case of family firms created by the founder, because of difficulty in finding a successor for the business (Esteve-

Pérez *et al.* 2010).

In view of the above, the equation of interest should account for the following aspects: all observed covariates, $pdlr_{it}$ included, can be correlated with firm-specific, time-invariant unobserved heterogeneity; the potentially endogenous $pdlr_{it}$ can, in addition, be correlated with time-varying omitted variables affecting y_{it} and can react to past values of the response. In line with Papke and Wooldridge (2008), these issues can be accommodated by the set of assumptions described next.

The model for the conditional mean of y_{it} is formulated as

$$E(y_{it}|\boldsymbol{z_i}, pdlr_{it}, f_i, u_{it}) = E(y_{it}|\boldsymbol{x_{it}}, pdlr_{it}, f_i, u_{it}) =$$
$$\Phi(\boldsymbol{x_{it}\beta_1} + \delta_1 pdlr_{it} + f_i + u_{it}), \qquad (1)$$
$$i = 1, \dots, N, \qquad t = 1, \dots, T,$$

where $\Phi(\cdot)$ denotes the standard normal c.d.f., $\boldsymbol{\beta_1}$ and δ_1 are parameters, $\boldsymbol{z_i} \equiv (\boldsymbol{x_i}, \boldsymbol{a_i})$ denotes the set of all strictly exogenous covariates for all periods, with $\boldsymbol{x_i} \equiv (\boldsymbol{x_{i1}}, \dots, \boldsymbol{x_{iT}})$ and $\boldsymbol{a_i} \equiv (age_{i1}, \dots, age_{iT})$, and u_{it} represents time-varying omitted variables that can be correlated with $pdlr_{it}$.

In line with Chamberlain (1980) and Mundlak (1978), unobserved heterogeneity is assumed as conditionally normal, given exogenous variables (included in (1) or not); formally,

$$f_i = \alpha_1 + \boldsymbol{\bar{z}_i\gamma_1} + g_i, \qquad g_i|\boldsymbol{z_i} \sim \mathcal{N}(0, \sigma_g^2),$$

where $\boldsymbol{\bar{z}_i} \equiv N^{-1}\sum_{t=1}^{T}\boldsymbol{z_{it}}$ denotes the set of time-averages of all exogenous variables, for firm i. This equation formalizes the possible correlation between exogenous variables and time-invariant omitted factors. Introducing f_i into (1), one can write

$$E(y_{it}|\boldsymbol{z_i}, pdlr_{it}, g_i, u_{it}) = \Phi(\alpha_1 + \boldsymbol{x_{it}\beta_1} + \boldsymbol{\bar{z}_i\gamma_1} + \delta_1 pdlr_{it} + v_{it}), \qquad (2)$$

with $v_{it} \equiv g_i + u_{it}$ possibly correlated with $pdlr_{it}$ – but not with $\boldsymbol{z_i}$. In order to implement the control function (CF) estimator (Section 2.2), a reduced form for

$pdlr_{it}$ must be considered; adopt the linear equation,

$$pdlr_{it} = \alpha_2 + \boldsymbol{z_{it}}\boldsymbol{\beta_2} + \boldsymbol{\bar{z}_i}\boldsymbol{\gamma_2} + c_{it}, \tag{3}$$

where c_{it} can be correlated with v_{it} (if $pdlr_{it}$ is correlated with the firm effect, f_i, and/or time-varying omitted variables, u_{it}). Under the assumption that v_{it} is conditionally normal, given $(c_{it}, \boldsymbol{z_i})$,

$$v_{it} = \zeta c_{it} + w_{it}, \qquad w_{it} \rfloor (c_{it}, \boldsymbol{z_i}) \sim \mathcal{N}(0, \sigma_w^2),$$

replacing v_{it} in (2) and integrating with respect to w_{it}, one obtains

$$E(y_{it}|pdlr_{it}, \boldsymbol{z_i}, c_{it}) = \Phi(\alpha^* + \boldsymbol{x_{it}}\boldsymbol{\beta}^* + \boldsymbol{\bar{z}_i}\boldsymbol{\gamma}^* + \delta^* pdlr_{it} + \zeta^* c_{it}), \tag{4}$$

where an asterisk denotes division of the original parameters by $\sqrt{1 + \sigma_w^2}$.

Expression (4) results from standard mixing properties of the normal distribution. For this expression to hold, however, the potentially endogenous covariate must have unbounded, or considerably unlimited, support – see, *e.g.*, Papke and Wooldridge (2008). Therefore, due to its fractional nature, PD cannot be directly used as covariate. Rather, the variable $pdlr$ ($\equiv \log[\mathrm{PD}/(1 - \mathrm{PD})]$) has unbounded support, so it is used instead. Note that $pdlr$ is strictly increasing in PD, so marginal effects of changes in the former have the same sign as those of PD.

2.2 Estimation and inference

Model (1) cannot be directly estimated by methods that assume exogeneity of all covariates (such as pooled quasi-maximum likelihood, QML, or generalized estimating equations, GEE), due to the possible endogeneity of $pdlr_{it}$. One viable alternative, enabled by the foregoing assumptions, consists on CF estimation of the parameters of the conditional model (4) (α^* through ζ^*). With the adopted reduced form for $pdlr_{it}$ – equation (3) – the control functions are provided by c_{it}, under which presence $pdlr_{it}$ becomes exogenous in model (4). The control functions are not directly observable so they must be estimated as residuals from the first-stage estimation of the reduced form. These residuals are then introduced in expression (4), replacing c_{it}, enabling its estimation by, *e.g.*, pooled QML, using, for instance, a Bernoulli quasi-likelihood. Formally, for firm i, the individual contribution to the log-quasi-likelihood can be expressed as

$$LL_i = \sum_{t=1}^{T} [y_{it} \log \Phi_{it}^* + (1 - y_{it}) \log(1 - \Phi_{it}^*)], \tag{5}$$

where $\Phi_{it}^* \equiv \Phi(\alpha^* + \boldsymbol{x_{it}\beta}^* + \boldsymbol{\bar{z}_i\gamma}^* + \delta^* pdlr_{it} + \zeta^* \hat{c}_{it})$ and $\hat{c}_{it}$ denotes first-stage residuals from the estimation of the reduced form (3).

In the second-stage estimation (maximization of $\sum_{i=1}^{N} LL_i$), standard errors of the coefficients' estimates must be adjusted, due the fact that the c_{it} are themselves estimated. Alternatively, the bootstrap can be used to obtain valid standard errors (the chosen method in the present study – Section 3). Upon estimation of (4), the endogeneity of $pdlr_{it}$ can be statistically tested by a significance test of the hypothesis $\zeta^* = 0$. This test can be easily implemented on the basis of the t statistic associated with the estimated parameter.

The quantities of primary interest in the present study are marginal effects of changes in the covariates measuring family corporate involvement on the structure of debt. Marginal effects on fractional responses are not constant but depend on covariates' values due to the nonlinearity of the model for the conditional mean of y_{it}. Following the usual practice, one representative measure of these effects can be obtained by computing average partial effects (APEs), obtained as averages of marginal effects (for each covariate) across individuals. Marginal effects correspond to partial derivatives (for continuous covariates) or first differences (for discrete covariates). In a panel data context, APEs can be computed for each different period (averaging across individuals for each t) and, also, for all individuals in all the sampled periods (averages across all the NT sample observations). The following section presents estimation results using a panel data set of observations on Portuguese unlisted firms.

3 Empirical Results

3.1 Data Set

The sample used in the study constitutes a panel data set of yearly observations on N = 13,619 Portuguese unlisted firms, from 2007 (t = 1) up to 2012 (t = 6 = T). The sample contains information on the explanatory variables listed in Table 1, as well as on y_{it} and age_{it}, the selected instrument for $pdlr_{it}$.

The sample data was collected from the SABI database (Iberian Balance Sheets Analysis System, prepared by the Bureau Van Dijk). The database contains, among other elements, financial information, ownership data and default risk indicators for most of the firms included therein. Several filters were employed to obtain the working sample for the present study. Firstly, only unlisted nonfinancial firms, reporting ownership and default risk data for all the years 2007–2012, were considered. Secondly, only firms in operation (that is, with positive turnover and assets) over the full sample period were considered; accordingly, namely because they are subject to specific regulation and capital requirements, firms undergoing mergers or total shutdown, as well as firms involved in bankruptcy proceedings, were excluded from the sample. Thirdly, only limited liability and public limited firms were considered, so as to ensure the most possible reliable data; accordingly, those firms with inconsistent accounting reports were excluded from the sample. Finally, in view of present purposes, only firms with financial debt were considered in the study. As previously mentioned, the resulting working sample constitutes a balanced panel of 13,619 firms, observed yearly over six years, leading to a grand total of 81,714 observations.

Table 2 displays summary statistics for the variables used in the study. Summary statistics are computed for the first and last years (2007 and 2012, respectively) as well as for the whole sample (third column under each statistic). The variable *pdlr* is replaced in the table by its input, PD, directly informative on the sampled firms' default probability (as mentioned above, the former transformation is used to ensure validity of equation (4) under the adopted assumptions).

The observed average of medium/long-term debt (with reference to total debt) for the firms in the sample, over the full sample period, is 51%. The average debt increased from 35% in 2007 to 63% in 2012. These values are higher than those reported in previous studies (López-Gracia and Mestre-Barberá 2015; Díaz-Díaz *et al.* 2016) with regard to Spanish SME's (respectively, 19.5% and 16.7%). However, they are inferior to what is reported by several studies in the context of American firms (*e.g.*, Barclay and Smith 1995 – 71.8%; Datta *et al.* 2005 – 78.5%). As noted by Díaz-Díaz *et al.* (2016), the lesser weight of medium/long-term debt within total corporate debt in the context of economies oriented towards the banking system – like the Spanish and Portuguese economies – reflects banks' preference for short-term debt concession, aiming at a minimizing the effects of information asymmetry.

Table 2
Summary Statistics

Statistic	Mean			St. Deviation			Minimum			Maximum		
Year	2007	2012	07-12	2007	2012	07-12	2007	2012	07-12	2007	2012	07-12
y	.35	.63	.51	.39	.40	.42	0	0	0	1	1	1
ownst	.88	.92	.91	.27	.24	.25	0	0	0	1	1	1
managst	.46	.47	.47	.25	.26	.26	0	0	0	1	1	1
controlst	.84	.86	.86	.36	.34	.35	0	0	0	1	1	1
PD	.05	.03	.03	.09	.04	.06	.0005	.0005	.0005	.93	.56	.93
size	6.58	6.54	6.61	1.38	1.46	1.40	0	0	0	14.24	13.96	14.28
profitr	.08	.05	.06	.07	.05	.06	.0001	.0002	.0001	.97	.81	.96
assetcollval	.29	.27	.28	.23	.24	.23	0	.24	0	1.00	1.00	1.00
invopp	.01	.01	.01	.05	.06	.05	0	0	0	.91	.96	.98
fiscal	.45	.46	.44	1.68	.92	.99	-14.27	0	-44	168	46	168
liquidr	.17	.30	.25	.30	.29	.30	-.99	-.89	-.99	1	1.46	1.46
age	14.95	19.95	17.45	11.28	11.28	11.40	1	6	1	107	112	112

Number of firms in the sample: $N = 13{,}619$. Check Table 1 for description of variables.

With regard to family corporate involvement, the firms in the sample present high percentages of capital ownership by one individual or by the elements of one same family, with a global average of about 91% over the six years considered, increasing from about 88% in 2007, to 92% in 2012. Although employing a different metric, Díaz-Díaz *et al.* (2016) find equally high values for the participation of family members or individuals in the capital of unlisted Spanish firms (80.5%). When one considers the capital owned by family members who play a role in management (variable *managst*), the firms in the present sample display averages of 46% (2007), 47% (2012) and 47% (2007–2012). When the family detains more than 50% capital (covariate *controlst*) – that is, the family has control according to the most conservative criterion – and also has a role in management, one can observe percentages of 84.3% (2007), 86.5% (2012) and 85.7% (2007–2012).

Finally, with regard to control covariates, the data yield the following sample averages (for respectively, 2007, 2012 and 2007–2012); PD (probability of default): 5%, 3% and 3%; *size* proxy: 6.58, 6.54 and 6.61; *age* (in years): 17.45 (global average); *profitr* (profitability of total assets): 8%, 5% and 6%; *assetcollval* (weight of tangible fixed assets and investment property in total assets): 29%, 27% and 28%; *invopp* (growth opportunities proxy): 1%, 1% and 1%; *fiscal* (non-debt tax shields proxy) 45%, 46% and 44%; *liquid* (general liquidity index): 17%, 30% and 25%.

3.2 Estimation Results

Model (4) was estimated by pooled QML, based on a Bernoulli quasi-likelihood and a Probit conditional mean specification for y_{it} – expression (5). The reduced form used to obtain the estimated control function, $\hat{c}_{it}$, is expressed in (3), with $\boldsymbol{z_{it}}$ composed of the (i,t)-th observations for all the variables in Table 1, except $pdlr_{it}$, replaced in $\boldsymbol{z_{it}}$ by age_{it}. Estimates of the reduced form's coefficients, as well as estimates and standard errors of the parameters of model (4) are presented in the Appendix (tables A1 and A2). Table 3 presents the APEs of unit changes of the covariates on the debt structure. The first three rows refer to the quantities of primary interest in the present study, estimating the effect of family corporate involvement on debt proportions.

The possible endogeneity of $pdlr_{it}$ in the model can be statistically assessed with a significance test of the coefficient of $\hat{c}_{it}$. The corresponding observed t-ratio of 42.938 (check Table A1) is highly significant, a result that seems to confirm the endogeneity of $pdlr_{it}$ in the adopted model of debt structure.

Table 3
Average Partial Effects (APE)

Variable [(a)]	APE	Standard Error [(b)]
ownst	-.032 **	.015
managst	.043 **	.015
controlst	-.060 ***	.010
pdlr	-.580 ***	.015
size	.001	.005
profitr	-1.560 ***	.040
assetcollval	1.069 ***	.025
invopp	.970 ***	.057
fiscal	.003 **	.001
liquidr	.846 ***	.018

/*: Significant at the 5%/1% nominal level.
(a) Check Table 1 for description of variables.
(b) Standard errors computed through the delta method, using bootstrap-based standard errors of parameters' estimates (included in Table A2).

The empirical results support the idea of an inverse relationship between the percentage of capital owned by an individual or members of a family and debt maturity. This notion contrasts with the positive relation found in some studies – *e.g.*, Díaz-Díaz *et al*. (2016) (although with a different metric to assess family ownership). The main argument for the estimation of a positive relationship between family ownership and debt maturity has focussed on the consideration that family businesses show a greater risk aversion, have a long-term investment horizon and are highly concerned with the reputation and survival in the long run (Caprio *et al.* 2011; Cheng 2014). These features contribute to the depth and types of agency conflicts between owners and creditors, which, together with their costs, should be considered when evaluating debt maturity. If, on the one hand, such characteristics can help decrease agency conflicts and corresponding costs

(Anderson *et al.* 2003; Faccio *et al.* 2011), on the other hand, one cannot ignore that significant conflicts prevail, between major and minor proprietors – as, *e.g.*, Villalonga and Amit (2006) and Croci *et al*. (2011) point out. However, the latter Authors, when examining the effect of family control on financial decisions in listed European firms, suggest that credit markets are more prone to provide long-term credit in the case of family firms.

In spite of this conclusion one cannot ignore that strategies employed by unlisted firms – of which family businesses are a frequent example – differ, in some important respects, from those adopted by listed firms. Firstly, the former are usually more opaque in terms of information provided (Berger and Udell 1998), thus suffering the effects of information asymmetries more intensely and, therefore, experiencing increased difficulty in accessing long-run funding (as creditors rather provide short-run credit so as to be able to control contract options more often). Such a situation is particularly relevant in economies based upon the banking system and in the case of family SME's, where funding by the banks is quite significant. Secondly, the results of unlisted firms are more volatile, rendering them more vulnerable and presenting a greater risk in the eyes of financing banks (López-Gracia *et al.* 2015). These arguments help support the notion of an inverse relationship between capital owned by an individual or family members, and debt maturity, as evinced by present empirical results.

The most usual argument supporting a positive relation between family involvement and debt maturity is based upon the idea that family firms are concentrated capital businesses, run by their owners (Wu *et al.* 2007). Thus, when one analyses the effect of family member's participation in management on debt maturity, the above empirical results show a positive relation (significant at 1%

level) between both. This ownership–management alignment helps reduce agency costs (in line with Anderson *et al.* 2003; Villalonga *et al.* 2015; Díaz-Díaz *et al.* 2016) and leads firms into adopting conservative policies and pursuing risk reduction strategies. In addition, as suggested by Gomez-Mejia *et al.* (2007), the management of family run businesses is conditioned by a socioemotional wealth that, in conjunction with the informal relations set between business and family activities, leads to a strengthening of autonomy and control, to family cohesion, reconnaissance and reputation (Zellweger *et al.* 2013) – and, thus, conditions debt maturity. In particular, the reputation and long-run survival concerns by family members in management compel them to invest in lower risk projects (Deephouse and Jaskiewicz 2013; Croci *et al.* 2017) and to decrease the predisposition to expropriate creditors' wealth through asset substitution (Jensen and Meckling 1976). Under these circumstances, family property, together with family involvement in management, raises business credibility through implicit contracts, thereby leading to the increase of debt maturity, owing to lower need by creditors to exert tighter control through a renegotiation of the short-term debt.

If, on the one hand, business management by proprietor family members can contribute to increase debt maturity, on the other hand, this same ownership can render managers immune to an array of control mechanisms (a phenomenon termed in the literature as "management entrenchment"), thereby requiring increased supervision on the part of creditors (Elyasiani and Zhang 2017). Thus, as recently recognised by Vallelado *et al.* (2017), the relation between debt maturity and business ownership and management can be explained by the interplay of the hypotheses of interests' convergence and entrenchment. In order to assess this possible behaviour, the study uses a binary variable which indicates whether the family detains capital control (using the most conservative criterion - 50%) and, simultaneously, takes part in management. The negative effect of this variable on debt maturity (significant at 1%) supports the notion that 'entrenched' managers, mainly concerned with their own interests, contribute to an increase of the risk of default, harming the collateral value of debt and contributing to increased costs of financial distress (Lin *et al.* 2012) – thus requiring more diligent and intense supervision from creditors (Elyasiani and Zhang 2017).

In this same sense, Kim (2015) argues that market imperfections can yield agency problems and, under significant information asymmetry, controlling proprietors can easily expropriate minor proprietors to their own benefit. In addition, legal protection of investors is often scarce, so controlling proprietors tend to maintain controlling rights significantly higher than their cash flow rights. In order to monitor this potential behaviour, creditors prefer to grant short-term credit, rather than medium- and long-term credit. This is so because, as argued by Guney and Ozkan (2005), short-term credit, usually associated with frequent renegotiation, enables a reduction of agency costs due to management entrenchment. On the other hand, resorting to short-term credit, rather than to medium- and long-term credit, constitutes a mechanism through which managers inform markets about their commitment to maintain the expropriation risk under control and, also, diminish the potential agency costs of debt.

In what concerns the effect of control covariates on the structure of debt, their signs and significance concord, in general, with the results obtained by previous studies. In particular: *i.* firms with a greater probability of default have more difficulty in obtaining medium- and long-run credit, due to the greater risk they represent for creditors; *ii*. total asset profitability, which constitutes future selffinancing ability, is an important source of funding, alternatively to long-run debt and increasing the capacity of short-term indebtedness; *iii*. asset maturity (asset collateral value) is positively related to debt maturity, by virtue of the guarantees it offers to creditors; *iv*. growth opportunities and non-debt tax shields are positively related to longer terms debt (therefore, negatively related to short-term debt) – namely because the former constitute investment opportunities that require financing with a funding source with equal maturity, and the latter can be viewed as short-term substitutes, in terms of the legal protection they provide, of interest paid; *v*. the liquidity yielded by the firm's activity, by showing a negative impact on short-term debt, fuels the hypothesis that these short-run financing sources are mutual surrogates.

4 Concluding Remarks

In spite of the abundant research in the area of family business, the number of studies aiming at an understanding of the relationship between family corporate involvement and debt maturity for unlisted family firms remains scarce. This issue is all the more relevant if one considers both the importance of such businesses in most economies and the role debt maturity can have in the minimization of agency costs and of the consequences of information asymmetry firms face. As recognized by many studies, these two issues are particularly relevant in this context, as firms are characterized by a stronger risk aversion and a great concern with reputation and long-run survival. The present study aims at contributing to this understanding by looking at the effects of family corporate involvement on debt maturity – considering its (close but distinct) dimensions of ownership, management, and control.

The empirical results of the present study indicate that the percentage of family owned capital has a negative effect on debt maturity. This result supports those theses stating that family businesses suffer the effects of information asymmetries quite severely, having a greater difficulty to access long-term financing, because creditors prefer to grant short-term credit in order to be able to control contract conditions more frequently.

In addition, if one considers the ownership of family members who are also managers, results suggest a positive effect on debt maturity. This finding corroborates the argument that an ownership-management alignment not only helps reduce agency costs but also compels family managers to adopt risk reduction strategies, namely as a means to safeguard reputation and family cohesion, as well as the long-run survival of the firm.

Nevertheless, one should not overlook the fact that when a family holds control of the firm and takes part in its management, there can be room for the so-called “management entrenchment” phenomenon. The results of the present study suggest a negative relation between debt maturity and family management and capital control; a finding that concords, in general, with the fact that banks, by looking at the possible consequences of the board entrenchment, may wish to strengthen their position through more frequent debt renegotiation.

An integrated analysis of the foregoing results can provide a significant contribution for the understanding of the debt maturity of family firms. In particular, the positive effect on debt maturity of jointly owning and managing the firm and, on the other hand, the negative influence of jointly managing and controlling the firm may be indication that managers with a lesser capital participation prefer longer maturities. This preference can be interpreted as a tentative shield from outside pressure by creditors – being forced to resort to short-term loans when they hold a clear control of capital, thereby promoting the convergence of managers and financiers' interests.

The present enquiry only addresses family firms with corporate debt, leaving out firms without debt. The inclusion of these firms poses some substantive and methodological issues (with, *e.g.*, consideration of two-part models for panel fractional data) that justify a separate paper on their own. Naturally, such issues constitute a challenging avenue for subsequent research.

Appendix: Auxiliary Tables

This Appendix displays results that underline the empirical results of Section 3, diverted from the main text to facilitate the exposition of the core issue of the study. These results include estimates of the parameters of model (4) (Table A1) as well as estimates of the reduced form's coefficients (Table A2). Standard errors for the estimates of model (4) were computed by bootstrap, with 499 resamples of the firms in the sample (in each bootstrap replica the time series for resampled firms are unchanged).

Table A1
Pooled Probit QML Estimation of Model (4)

	Covariate		Covariate's Time Average	
	Coeff. Estimate	St. Error [(a)]	Coeff. Estimate	St. Error [(a)]
constant	-3.285 ***	.093	-	-
ownst	-.106 ***	.050	-.341 ***	.067
managst	.140 ***	.048	-.102 *	.059
controlst	-.195 ***	.035	.125 **	.050
pdlr	-1.891 ***	.049	-	-
age	-	-	-.014 ***	.001
size	.004	.015	-.245 ***	.016
profitr	-5.081 ***	.130	-16.643 ***	.446
assetcollval	3.483 ***	.086	-3.707 ***	.115
invopp	3.161 ***	.188	-3.213 ***	.237
fiscal	.011 **	.004	-.129 ***	.014
liquidr	2.758 ***	.064	-5.009 ***	.087
$\hat{c}_{it}$ [(b)]	2.061 ***	.048	-	-

*/**/***: Significant at the 10%/5%/1% nominal level.
[(a)] Bootstrap standard errors computed with 499 bootstrap replicas of cross-sectional units.
[(b)] Estimate of control function (c_{it}).

Table A2
OLS Estimation of Reduced Form for $pdlr_{it}$ – Equation (3)

	Variable (z_{it})		Variable Time Average ($\bar{z}_i$)	
	Coeff. Estimate	Robust St. Error	Coeff. Estimate	Robust St. Error
constant	-1.585	.064	-	-
age	-.061	.002	.057	.002
ownst	-.032	.041	-.128	.060
managst	-.010	.041	.022	.054
controlst	-.030	.030	.001	.046
size	-.063	.012	-.025	.014
profitr	-1.854	.101	-8.695	.320
assetcollval	.236	.053	-1.547	.071
invopp	-.064	.146	-1.005	.238
fiscal	.006	.004	-.054	.030
liquidr	-.606	.025	-1.718	.049

Compliance with Ethical Standards

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