CENTRO DE INVESTIGAÇÃO - UAL
CIÊNCIAS ECONÓMICAS E EMPRESARIAIS

Working Paper #002/2019

Does Internal Capital Market Membership Matter for Financing Efficiency? Evidence from the Euro Area*

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Abstract

The paper investigates the efficiency of firms' financing behavior, exploring the effect of the internal capital market (ICM) organizational form on the differences in the cost of capital, capital structure, and the speed of adjustment towards preferred capital structure, between ICM participants and stand-alone peer firms, using two balanced comparable panel data sets of euro area firms of 773 firms each, over the 2004–2013 period.

Univariate statistical analysis, document that firms operating within an active ICM exhibit, on average, lower costs of capital than their comparable stand-alone counterparts. The paper also documents that on average financial leverage ratios are significantly higher for ICM firms than for stand-alone, and that both ICM and stand-alone firms tend to have preferred target leverage ratios. Results from dynamic panel data regression document that both, firms integrated in internal capital markets and single-segment firms, adjust dynamically their financial leverage towards their preferred targets at different speeds. These findings are consistent with the view that ICM membership is linked to information and agency problems, lowering ICM participants' cost of capital, having target leverage ratios, and adjusting their capital structures differently than their stand-alone peers.

Keywords: firm financing; cost of capital; financial leverage targets; speed of adjustment; internal capital markets; bias-corrected estimators
JEL classification: C33; C81; D25; G32; L22

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* The authors are grateful to Veljko Fotak, Aníbal Santos, Heitor Almeida, Murillo Campello, Chris Harris, López de Silanes, Andrew Karolyi, Rui Pascoal, John Hall, and discussants and participants at the 2012 AFA Doctoral Student Consortium in Chicago, IL; the Southern Finance Association meetings, 2018, Asheville, NC; the 26th Finance Forum, 2018, Santander, Spain; the 10th Portuguese Finance Network conference, 2018, Lisbon, Portugal; and the 25th annual conference of the Multinational Finance Society, 2018, Budapest, Hungary, for useful comments and valuable suggestions on an earlier draft. The authors are responsible for all remaining errors and omissions. We are especially grateful to João Pinto and BVD for providing access to euro area sovereign treasury bills data, and to the Amadeus database, respectively. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. Jorge Mota is the corresponding author and can be reached at: jorgemota@ua.pt.

http://dx.doi.org/10.2139/ssrn.3038050

1. Introduction

This paper investigates three dimensions of the efficiency of firms' financing behavior, examining whether or not: (i) factors, like the asymmetric information and agency problems, affect differently, the cost of capital of internal capital market (ICM, hereafter) participants and of their stand-alone peers; (ii) firms integrating active ICMs and their comparable stand-alone cohorts, both, have preferred target capital structure, and whether the former exhibit a higher financial leverage ratio than the latter; and (iii) both, ICM participants and their stand-alone peers, adjust capital structure to their preferred leverage ratios differently.

It is widely accepted that rational agents make their resource intertemporal allocative choices, aiming at maximizing the expected utility of their terminal wealth. Likewise, firms adopt financial behaviors aiming at minimizing the opportunity cost of capital of available alternative financing strategies.[1]

It is also well-known that under complete, perfectly competitive, and frictionless capital markets, the mix of securities a firm should optimally issue it's a matter of indifference (Modigliani and Miller 1958).[2]

However, corporate finance literature provides abundant, compelling, and convincing evidence that firms' financial structure does matter, and therefore it is relevant for firms' valuation (e.g., Hart 2001; Myers 2001; Miller 1988; and Stiglitz 1969).

Extant literature has documented several stylized facts and empirical regularities related with the determinants and the valuation effects of firms financing structures, and their hypothesized relationships with corporate organizational form due to diversification, namely, in terms of the cost of capital (e.g., Hann *et al.* 2013; Lee *et al.* 2009; Leary and Roberts

[1] See, Jensen (2001), for a discussion.
[2] It is a standard practice in corporate finance practice gauging the efficiency of a firm's capital structure through its impact on its opportunity cost of capital (e.g., Fier *et al.* 2013; Gong and Huang 2008; Schwartz 2005; Peyer and Shivdasani 2001; and Fama and French 1999).

2005; Fama and French 2002; Berger and Ofek 1995; Comment and Jarrell 1995; Lang and Stulz 1994; Bradley *et al.* 1984; Bowen *et al.* 1982; and DeAngelo and Masulis 1980).

Empirical findings from prior research document a relationship between firms' financing structure determinants and diversification levels that, arguably, may affect dissimilarly, stand-alone (single-industry) firms and subsidiaries operating under an ICM setup (e.g., Dewaelheyns and Van Hulle 2012).[3]

Despite the ongoing academic debate and the professional attention, empirical evidence on the relationship between the corporate organizational form, capital structure, and the cost of capital, is relatively scarce and mostly focusing on the U.S. and Asian corporate world (e.g., Almeida *et al.* 2015; Buchuk *et al.* 2014; Fier *et al*. 2013; Hann *et al*. 2013; Byoun 2008; Shin and Park 1999).

However, prior research efforts are scarce and prone to some methodological shortcomings. Notably, they have been conducted mostly at parent firm level, somehow neglecting the analysis of diversification effects at subsidiaries level (e.g., Gugler *et al*. 2013; Gautier and Hamadi 2005).[4] Additionally, prior literature has not examined comparable subsamples of ICM firms and comparable stand-alone, based on a matching procedure allowing selecting on a one-to-one (e.g., Hund *et al*. 2012). Finally, extant empirical literature has emphasized the endogeneity and model misspecification problems associated with econometric design of empirical models (e.g., Dang *et al.* 2015; Zhou *et al.* 2014; Byoun 2008; Lemmon *et al.* 2008; Hoshi *et al.* 1991).

The paper looks at firm's financing behavior in terms of the cost of capital, capital structure, and the speed of adjustment towards a preferred target leverage ratio, using two

[3] In this paper we use, interchangeably, diversified firm, multi-industry group, multidivisional firm and business group, as organizational structures operating under internal capital markets. Similarly, we use standalone firm and single-segment firm.

[4] Based on the typical relative difference on size between 'parents' and 'subsidiaries' in many corporate business groups, it can be argued that capital structure adjustments, and their cost of capital implications, are more likely to be felt at subsidiary level.

comparable panel data sets of euro area firms of 773 firms each, over the 2004–2013 period, in a total of 15,460 testable firm-year.

The main findings of the paper document that: (i) ICM firms have lower costs of capital than comparable stand-alone firms; (ii) active ICM membership, likewise the stand-alone organizational form, are both associated with preferred target capital structures; (iii) subsidiaries display a significant higher financial leverage ratios than stand-alone counterparts; and (iv) both, subsidiaries and stand-alone firms, using bias-corrected estimators, adjust at different speeds towards their preferred leverage targets ratios.

These empirical findings contribute to the literature on different accounts: (*i*) provide evidence about the differences on the cost of capital, and on factors that affect it differently, for ICM and comparable stand-alone firms; (*ii*) the design and implementation of a tailor-made matching procedure aiming at mitigating the endogeneity of group membership problem; (*iii*) the estimation of Heckman's (1979) propensity score weighting (PSW) to strengthen the robustness of the matching process; and (*iv*) the use of bias-corrected estimators to obtain evidence on its speed of adjustment towards target capital structure ratios.

The remaining of the paper is structured as follows. Section 2 discusses the relevant theoretical and empirical literature and formulates the hypotheses. Section 3 describes the data and the econometric implementation. Section 4 presents and analyzes univariate statistics and the econometric results. Section 5 summarizes and provides concluding remarks.

2. Theoretical and Empirical Background, and Hypotheses

2.1. Corporate Leverage Theory and Industry Affiliation Effect

Standard corporate finance literature shows that under complete, frictionless, and perfectly competitive markets, firm valuation is unaffected by its debt-to-equity mix choice.[5] Unsurprisingly, the theory is in sharp contrast with the observation of real-world firms' financing evidence.

Under most tax codes, the deductibility of the debt interest expenses provides an incentive for leveraging up the capital structure, consequently increasing the default risk, and bankruptcy costs. Therefore, according to the theory, the firms will adjust, instantaneously and costlessly, its debt ratio to a preferred target, trading-off costs and benefits of debt financing, aiming at maximizing its market valuation.[6] Accordingly, the theory predicts the emergence of an optimal capital structure at the point where the marginal costs and benefits of leverage equate.

Additionally, the dynamic version of the trade-off theory, predicts that firms adjust their financial leverage towards their preferred financial levels over time (Leary and Roberts 2005; Fama and French 2002; De Miguel and Pindado 2001; and Fischer *et al.* 1989).[7]

It is well-established that, whenever in a binding contract the parties are unevenly informed, the superiorly informed party has an incentive to behave opportunistically at the expense of the counterpart (who will incur in non-negligible deadweight informational costs), a financier with a preference for investing in an asset with a specific expected return distribution which is her counterpart private information. Under this theoretical framework, is formalized the pecking order theory (Donaldson 1961; Myers 1984; and Myers and Majluf 1984).

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[5] For reviews of this academic literature see, among others, Graham and Leary (2011), Frydenberg (2011), Myers (2003), Santos (2003, 16-98, chapter 2), Harris and Raviv (1991), Masulis (1988).

[6] According to the static trade-off theory, capital structure results from a trade-off between the costs and benefits, of the different financing sources. For further details, please refer to Chen (1979), Kim (1978), Scott (1976), Kraus and Litzenberger (1973), Baxter (1967), and references therein.

[7] In this context we use interchangeably target and preferred capital structure.

According to the theory, whenever a firm needs to resort to external capital markets to fund its capital investment opportunity set, it tends to follow a pecking order in using and exhausting available financing sources, aiming at minimizing adverse selection deadweight costs in the form of a 'lemons premium'.

Prior research on corporate financing provides compelling evidence supporting the hypothesis that the industry affiliation is an important factor for firm financing structure (Bradley *et al.* 1984, 858; Boquist and Moore 1984, 9; Bowen *et al.* 1982; DeAngelo and Masulis 1980, 23-24; Scott and Martin 1975; Lev 1969, 291; Schwartz and Aronson 1967; and Solomon 1963).[8]

This literature, also suggests a tendency for leverage ratios to revert towards the industry mean / median of their preferred financial leverage ratios, providing empirical support for the proposition that intra-industry average financial leverage ratios are a conspicuous surrogate for firms' target / preferred capital structure (Lee *et al*. 2009; Ghosh and Cai 1999).

2.2. Financing Structure and Cost of Capital in an Internal Capital Market Framework

It is well-acknowledged that value maximizing standalone firms, should make their financing choices searching for minimizing their opportunity costs of capital. It is debatable, however, whether or not a participant in an active internal capital market (ICM) share a similar objective function.

Therefore, it is an empirical question if financing policies of ICM participants, and of stand-alone firms, affects firm valuation identically.

According, among others, to Lewellen (1971), combining businesses generating imperfectly correlated operating cash flow streams, will lower business risk, when compared

[8] Harris and Raviv (1991, 334, table 3) noted that firms in a given industry tend to have similar leverage ratios while financial leverage ratios vary across industries.

with the operation of those businesses independently, due to the reduction in the volatility of 'combined firm' cash flow, therefore reducing bankruptcy risk, idiosyncratic risk, and providing 'coinsurance' that increases debt capacity (Kim and McConnell 1977).[9]

If a firm within an ICM experiences high earnings volatility, the potential costs of financial distress are lower when compared to a stand-alone firm, because business groups may cross-subsidize other members, and honor debt obligations in the event of a default, to protect the group's reputational capital (Chakraborty 2015, 238).

Firms integrated in an ICM may not experience an inverse relationship between business risk and the debt level because marginal bankruptcy costs, as argued in Castanias (1983), will tend to increase at a slower pace for this type of firms.

Agency theory may be an instrumental explanation for the relationship between organizational form, financing structure, and cost of capital (e.g., Maksimovic and Phillips 2002; Scharfstein and Stein 2000; Stein 1997). According to the theory, debt financing can be viewed as a useful governance device in mitigating conflicts of interest between equityholders and managers, through the alignment of their objective functions. Debt financing, similarly to dividends, is also an influential mechanism to mitigate the agency costs of free cash flow which can prevent managers from adopting diversification program that 'will generate lower total gains' (Jensen 1986, 328; Stulz 1990). According to Agrawal and Mandelker (1987), another mechanism that has a role in reducing agency problems are the executive security holdings.

Empirical evidence by Li and Li (1996), and Riahi-Belkaoui and Bannister (1994) suggest that diversified firms carry more debt than non-diversified firms, as a mitigating

[9] The coinsurance effect hypothesis predicts that in the context of a group of business firms (an ICM), 'diversification reduces financial constraints through imperfectly correlated cash flows among segments' (Tong 2012, 1592). See also Lewellen (1971), and Kim and McConnell (1977). This effect is expected to be more intense in firms with unrelated diversification strategies (La Rocca *et al.* 2009; Menéndez-Alonso 2003; Bergh 1997).

mechanism for agency costs. Comment and Jarrell (1995) document that the leverage ratio average rises from 33-34 to 38-40 percent for diversified firms.

Overall, it seems there is a non-negligible consensus in the literature that: (i) several firm specific factors, such as corporate diversification level and the industry effect, have impact on the financing structure and cost of capital; and (ii) agency and informational problems affect, differently, stand-alone and subsidiaries firms on their cost of capital.

2.3 Hypotheses Development

Among the factors that, arguably, may hinder the firms' financing behavior, are included adverse-selection problems (e.g., Stein 2003), moral hazard behavior (e.g., Chakraborty 2015; Goel and Thakor 2003), and agency conflicts (e.g., Maksimovic and Phillips 2002; Scharfstein and Stein 2000; Stein 1997).

An ICM framework can be helpful, in mitigating the effects of adverse selection problems, and consequently lowering a firm's cost of capital (Greenwald *et al.* 1984; Myers 1984; and Myers and Majluf 1984). In this context, a subsidiary's financing strategy is coordinated by the headquarters, which have the ability and the incentive to monitor the realization of cash flows, lessening informational problems (e.g., Myers and Majluf 1984; Townsend 1979), and therefore reducing the subsidiary's cost of capital.[10]

An ICM environment can also give rise to agency problems between the headquarters and divisional / subsidiary managers, which may induce inefficient allocation of financial resources (e.g., Scharfstein and Stein 2000). The perceptions that financial claimholders formulate on the impact of headquarters-divisional managers' agency conflicts, may induce

[10] As argued in Hann *et al*. (2013, 1962), 'diversified firms have a lower cost of capital than comparable portfolios of stand-alone firms'. In the same vein, Gatzer *et al.* (2014, 2) provide survey evidence documenting that the surveyed CFOs, associate internal capital markets with lower cost of capital and larger financial slack. See also Belenzon *et al.* (2013), Khanna and Palepu (2000).

rational financiers to commensurately require premiums to cover their exposure to the perceived risk levels, increasing a firm's overall cost of capital.

In an external capital market (ECM) environment and under semi-strong market informational efficiency, the announcement by diffusely owned firms of leverage decrease transactions may be perceived, *ceteris paribus*, by less informed market participants as 'bad news' (e.g., Klein *et al*. 2002). This signaling effect tend to raise the required 'lemons premium' and ultimately, the cost of capital.[11]

Based on the argument that the minimization of the cost of capital is a useful yardstick for gauging the efficiency of a firm's financing behavior (e.g., Schwartz 2005), we hypothesize that subsidiaries of diversified business firms exhibit lower a lower cost of capital than comparable stand-alone cohorts (**H1**: Hypothesis 1).

Prior research provides abundant and compelling evidence documenting a significant industry effect on firms' financing structure (e.g., Teixeira and Santos 2014; MacKay and Phillips 2005; Titman and Wessels 1988; Campbell and Bradley 1986; Boquist and Moore 1984; Bradley *et al.* 1984; Castanias 1983; Bowen *et al.* 1982; DeAngelo and Masulis 1980).[12]

According to Bowen *et al.* (1982), and Lev (1969) firms display a general tendency to adjust towards their industry mean financial leverage ratio, that is often used as a proxy for its target ratio (Lee *et al.* 2009).

Complementarily, Solomon (1963) argues that 'industry groups appear to use leverage as if there is some optimum range appropriate to each group[, w]hile significant intercompany differences in debt ratios exist within each industry the average usage of

[11] Firms raising debt funding in a bank-based ECM, because of banks widely recognized as 'delegated monitors', consequently reducing the level of asymmetric information between borrowers and lenders (e.g., Campbell and Kracaw 1980; Diamond 1984). See Weinstein and Yafeh (1998) for contradictory empirical evidence.
[12] See also, among others, capital structure surveys by Graham and Leary (2011), Megginson (1997), Harris and Raviv (1991), Masulis (1988), and references therein.

leverage by broad industry groups tend to follow patterns over time' (98). This pattern may be due to the fact that there is a 'valuation consequences of a change in a firm's leverage ratio […] related to the direction and magnitude of the change relative to the firm's industry' (Campbell and Bradley 1986, 2).

Additionally, an important implication of the static trade-off model is that market imperfections and frictions establish a link between leverage and firm value, as managers perceive non-negligible value leverage effects in not readjusting to the firm's preferred target financial leverage ratio. Thus, we hypothesize that firms' financial leverage ratios tend to be mean reverting as firms raise external capital to keep financing structures at or close to their perceived 'optimal' target (e.g., Chen and Zhao 2007; Kayhan and Titman 2007; Graham and Harvey 2001), being the industry effect a significant determinant on firms' financing structure.

According, among others, to Lev (1969), and Bowen *et al.* (1982) financing behavior of firms display a general tendency to adjust towards their industry mean financial leverage ratio, which is often used as a proxy for their preferred leverage target ratio (see also, Lee *et al.* 2009; Byoun 2008; Kayhan and Titman 2007; Flannery and Rangan 2006; Leary and Roberts 2005; Ghosh and Cai 1999). This literature provides empirical support for the proposition that industry average financial leverage ratios are a conspicuous surrogate for firms' target intra-industry capital structure.

Under this framework, we hypothesize that both subsidiaries integrating an ICM, and their stand-alone peers, have preferred leverage targets (**H2.a**: Hypothesis 2.a). Additionally, we also hypothesize that subsidiaries of diversified business firms exhibit a higher financial leverage ratio than comparable stand-alone counterparts (**H2.b**: Hypothesis 2.b).

The speed of capital structure adjustment is, arguably, a relevant dimension of a firm's financing behavior, because of its valuation implications. This literature suggests that firms trade-off the advantages and costs of adjusting their leverage levels (e.g., Byoun 2008; Wanzenried 2006; Lev and Pekelman 1975).

Dewaelheyns and Van Hulle (2012) argue that ICM's participants 'may face relatively low adjustment costs because of their access to both internal and external capital markets and the beneficial reputation effects of belonging to a group' (Ibid, 1275), and for this reason they tend to adjust their capital structure more frequently than comparable stand-alone firms, because of potential economies in issuing costs.

However, stand-alone firms may adjust more rapidly because they are, arguably, more likely to bear higher financial costs of being 'out of equilibrium', than their subsidiary peers. Additionally, adjusting more 'vigorously', may contribute for capturing economies of scale on fixed issuing costs.

Ceteris paribus, the higher the speed of adjustment, of both subsidiaries and stand-alone firms, the faster the convergence to the target leverage ratio.

Therefore, we hypothesize ICM's participants adjust at different speed, to their preferred leverage ratios from a target, when compared to their stand-alone peers (**H3**: Hypothesis 3).

3. Data Description and Empirical Implementation

3.1. Subsidiary and Stand-alone Firms: Sample Selection and Data Description

For this empirical analysis we developed two subsamples, one of ICM participants, and another of comparable stand-alone firms. Data for both subsamples was drawn from Amadeus database of the Bureau van Dijk, for a sampling period spanning from 2004 to 2013.

There is not a unique definition of group 'affiliation'. In this paper, we espouse Khanna and Rivkin's (2001) business group concept, as a set of diversified and legally independent firms bounded together by a set of formal and informal ties, and that are accustomed to take coordinated action, i.e., a network of business and financial relationships of varying degrees and kinds. This approach is consistent with much academic work related to the European context (e.g. Belenzon *et al.* 2013; Smagns 2006; Gautier and Hamadi 2005; Faccio and Lang 2002, Deloff 1998) [13]

To be included in our subsidiaries subsample, a firm as to satisfy the following criteria: (i) to be ultimately owned (co-owned) by a Global Ultimate Owner (GUO), a known equityholder of a firm that holds a path of minimum 50.01 percent (directly or indirectly) of its financial capital titles and is independent, i.e., do not have any other GUO[14], or are co-owned by another firm (business group), although not being a GUO or an individual investor GUO, holds, directly and / or indirectly, a minimum ownership of 50.01 percent of the subsidiary, and owns two or more subsidiaries; (ii) *sim*ilarly to extant empirical literature in the area, we excluded financial services firms, education and regulated utilities; (iii) to be established in euro area, for ensuring harmonized financial and fiscal conditions, besides a single unit of account; (iv) firms for which their status is active for the entire sampling period, with at least 8 to 10 years of data for all the used variables, to avoid survivorship bias problems and ensure a balanced panel;[15] (v) annual sales revenue higher than 5 million Euros for at least one of the following sampling years: 2013, 2012, 2011, 2010;[16]

[13] Like other papers with a similar focus that used Amadeus database, e.g., Ferrando *et al.* (2017), Gugler *et al.* (2013), Dewaelheyns and Van Hulle (2012), data for subsidiaries subsample does not include segment data reported on ‘behalf’ of the ‘parent’ firm. Most papers on ICMs use firm segment data (US conglomerates information) that may introduce measurement errors in variables. See Gugler *et al*. (2013) and Whited (2001) for more details.

[14] This classification criterion is based on a strong definition of ownership, which enables us to observe situations in which the parent firm has enough authority to control the financing choices of its subsidiaries (see also Gautier and Hamadi 2005, 21-22). The subsidiaries funding is always requested, firstly, to its headquarters, and these may allow them to establish financing contracts with external entities.

[15] Similar studies in the literature which included in their samples only firms that had data available for the whole period (see Singh *et al.* 2003; Kwok and Reeb 2000) or for at least six consecutive years (Dewaelheyns and Van Hulle 2012; La Rocca *et al.* 2009).

[16] Following Belenzon *et al.* (2013), among others, we exclude very small firms from our estimation subsamples, whose ownership and financial data may miss and may cause biases.

Following Hund *et al.* (2012), and aiming at mitigating the endogeneity of group membership, and ensuring comparability, comparing 'apples to apples' in terms of industry and size, we developed and implemented a tailor-made matching procedure described in Appendix 1.[17]

Using the above described criteria, we build: (*i*) subsample 1 – subsidiaries belonging to a business group – including 900 subsidiary firms with 9000 firm-year observations; and (*ii*) subsample 2 – comparable stand-alone firms – including 3,764 stand-alone firms with 37,640 firm-year observations.[18, 19]

After applying the matching procedure described in appendix 1 we end up with two subsamples of 773 firms each, and a total of 15,460 testable firm years.

Compared with previous studies, our subsamples, in general, focuses in an increased number of business groups and firms owned by them (subsidiaries), and is also based on a longer period (Barton and Gordon 1988; Lowe *et al.* 1994; Kochhar and Hitt 1998; Anderson *et al.* 2000; Flannery and Rangan 2006; Byoun 2008; La Rocca *et al*. 2009; Apostu 2010; Dewaelheyns and Van Hulle 2012).

3.2. Methodological Estimation Procedures

3.2.1. Estimation of the Cost of Capital

[17] For more details on strict comparability criteria, see among others, Lesser and Nicholson (2009).
[18] For subsample 2, we introduced the following adjustments to the subsample 1 sampling criteria: (i) including firms that were not owned (co-owned) by a GUO, or by another firm (business group), even not being a GUO; (ii) that own (co-own) no subsidiaries; and (iii) that were not an ultimate owner. These changes, ensures that the firms are stand-alone in the market, i.e., don't belong to a business group and themselves are not a business group owning subsidiaries.
[19] To minimize the risk of misclassifying a group affiliated firm as standalone, we tested and confirmed if any firm in the subsample 1 was also in the subsample 2.

This section describes and analyzes parsimoniously, the procedures used in cost of capital estimation to test hypothesis **H1**.[20]

The cost of capital was estimated following the standard weighted average cost of capital (WACC) model.

3.2.1.1. Estimation of the Cost of Equity

The estimation of the cost of equity capital was conducted under the Capital Asset Pricing Model (CAPM), a most used model for this purpose (e.g., Brotherson *et al.* 2013; Graham and Harvey 2002, 2001).

3.2.1.1.1. Equity Systematic Risk Coefficient

Because our two subsamples include only unlisted firms, their equity betas cannot be estimated either by textbook statistical or econometric methods. Therefore, we followed the 'bottom-up' approach (target beta approach), an analytical accounting-based approach (e.g., Damodaran 2011, 137-147; Beneda 2003).[21]

We estimated the systematic risk of a firm's assets, the asset beta (β_A), as a measure of the operating cash-flow relative volatility generated in a business activity and represented by the coefficient of variation of operating cash flow (e.g., Kale *et al.* 1991; Gabriel and Baker 1980; and Beaver and Manegold 1975).

Underlying this procedure is the assumption that firms in the same industry tend to exhibit similar business risk levels (e.g., He and Kryzanowski 2007; Kaplan and Peterson 1998; Alexander *et al.* 1996). Accordingly, firms in our two subsamples were grouped into

[20] For comprehensive reviews of the cost of capital academic literature see, among others, Brotherson *et al.* (2013), Conroy and Harris (2011), Pratt and Grabowski (2008), Rao and Stevens (2007), Armitage (2005), Patterson (1995), and Ehrhardt (1994).

[21] The 'pure play' approach to beta estimation wasn't a viable approach because of the lack of information of publicly traded comparable firms. For more details see, e.g., Fuller and Kerr (1981).

industry categories according to their NACE code, and for each industry was estimated an asset beta as the weighted (by total assets) average of the individual firm's business risk.

Asset betas were adjusted for firms' specific financial leverage, using Hamada' (1972) procedure.

3.2.1.1.2. The Equity Risk Premium

The equity risk premia for the different domestic capital markets included in our subsamples, were estimated as the difference between the average rates of return on equities drawn from Dimson *et al.* (2016), and country's risk-free rates estimated as described in *3.2.1.1.3.* below.[22]

3.2.1.1.3. Risk-free Rate

Each country risk-free rate was proxied as the sum of the annual average yield of a portfolio of German and Netherlands' AAA rating 3-month maturity sovereign treasury bills, and a country risk premium.[23]

The country risk premium was estimated as the difference between the central point of a 95 percent confidence interval for each annual average yield of 3-month maturity sovereign treasury bill, and the annual average yield of the portfolio of German and Netherlands 3-month maturity sovereign treasury bills.[24]

3.2.1.2. Estimation of the Cost of Debt

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[22] We converted Dimson's *el al.* (2016) equity market real return rates, for each of the ten euro area countries with firms included in the subsamples, into nominal rates applying the European Central Bank's GDP deflator. Because the real return rate and the deflating rate were both relatively small, and their product close to zero, we adopted the linear approximation of the Fisher's equation.

[23] To avoid survivorship bias, we used data only from Germany and the Netherlands, the only countries without missing values in their time series.

[24] To avoid survivorship bias, for Austria, Finland and Greece we used the annual yields of 2-year maturity treasury bonds.

The average annual cost of each firm's outstanding debt (k_D), was estimated using year-on-year debt book value and interest expense (hereafter, 'recent borrowing history' model of Benninga 2000, 39).

3.2.1.3. Estimation of the Capital Structure

It is a finance textbook standard procedure to mark-to-market the weights of the different sources of funding for WACC computation purposes. However, only two of our sampled firms had financial claims listed in regulated secondary markets. Therefore, we assumed debt and equity book values as unbiased estimators of their market values (e.g., Hern *et al.* 2009; Franks *et al.* 2008).[25]

The amount of outstanding debt was estimated as the average book value of debt at the beginning and at the end of each time period.[26]

3.2.2. Empirical Testing

To test the effect of a set of explanatory variables on the cost of capital (**H1**), we regressed them against the cost of capital estimated for the two subsampled firms. Those variables were specified as: (i) dummies for asymmetric information problems; (ii) a dummy for agency conflicts; (iii) firm size, asset tangibility, financial leverage; and, (iv) taxation.

The regression model was specified as:

$$Kc_{it} = \beta_1 EquityBetaDecile1_{it} + \ldots + \beta_{10} EquityBetaDecile10_{it} + \beta_{11} BG_{it} + \beta_{12} Size_{it} + \\ + \beta_{13} Tang_{it} + \beta_{14} ITaxation_{it} + \beta_{15} FinLev_{it} + \varepsilon_i \quad (1)$$

[25] Financial leverage estimation is prone to incorrectly measuring the usage of debt. As a robustness check we estimated the financial leverage as the ratio between interest paying debt and financial capital (interest paying debt plus equity capital).

[26] The year-on-year debt book value estimated as the sum of non-current liabilities (NCLI) and current liabilities (CULI), in terms of Amadeus database nomenclature.

where k_C denotes the cost of capital; $EquityBetaDecile$ 1to 10, information asymmetry dummies; *BG*, agency problems dummy; *Size*, firm size; and *Tang*, asset tangibility; *ITaxation*, implicit taxation; and *FinLev*, financial leverage.[27]

[Insert Table 1 here]

To test if both, subsidiary firms and their comparable stand-alone counterparts have a preferred financial leverage target (**H2.a**), we follow the empirical procedures of, e.g., Fier *et al*. (2013), Flannery and Rangan (2006), and De Miguel and Pindado (2001).[28]

[Insert Table 2 here]

To test if subsidiary firms integrated in an ICM framework, adjust their financial leverage ratios towards their preferred targets, at different speeds than their stand-alone peers (**H3**), we implemented, following prior research, a procedure to estimate the speeds of adjustment (e.g., Byoun 2008; De Miguel and Pindado 2001; and Ozkan 2001).[29]

This process can be estimated through an incomplete (partial) adjustment model specified as (e.g., Flannery and Rangan 2006; Fier *et al*. 2013):

$$\left[D/A\right]_{it} = \gamma\left(D/A\right)^{*}_{it-1} + (1-\gamma)\left[D/A\right]_{it-1} + \varepsilon_{it} \Leftrightarrow \left[D/A\right]_{it} = (\gamma\beta)X_{it-1} + (1-\gamma)\left[D/A\right]_{it-1} + d_t + v_i + \varepsilon_{it} \quad (2)$$

where D_{it} denotes the total debt, A_{it} the total assets, $\left[D/A\right]^{*}_{it-1}$ the financial leverage target ratio for firms *i* at time *t-1*, X_{it-1} denotes a vector of firm and industry characteristics, and γ the target adjustment coefficient.[30]

[27] See table 1 for the definition, the specification, and the expected signs for variable coefficients.
[28] The variables for this test are defined and specified in table 2, jointly with the expected signs for their coefficients.
[29] Underlying the procedure is the argument that the dynamic adjustment process to a financial leverage target ratio, should be considered when verifying, whether or not, different corporate diversification strategies of firms affect speed of adjustment.
[30] For a more detailed discussion on the 'first and second generation' of dynamic panel data methods in empirical corporate finance see, among others, Dang *et al*. (2015), De Vos *et al*. (2015), Zhou *et al*. (2014).

The speed of adjustment SOA (γ), which is the primary variable of interest, was estimated as ($1 - \lambda$), being λ the coefficient of the lagged dependent variable.

3.2.3. Endogeneity Problems

3.2.3.1. Endogeneity of Group Membership

The estimation of ICM's effect on firm cost of capital is an example of the general problem of estimating treatment effects in observational studies. The problem is that the simple average difference in firms' characteristics between treatment (being a subsidiary of a business group) and control group (a non-treated group of firms – stand-alone firms) is only an unbiased estimate of the treatment effect when units are randomly assigned to the treatment (Campa and Kedia 2002).

A stream of empirical literature (e.g., Berger and Ofek 1995; Lang and Stulz 1994), uses matching procedures that implicitly assume firms becoming part of a business group randomly.

In this paper, we performed a tailor-made matching procedure (see Appendix 1 for a description) aiming at mitigating the endogeneity of group membership problem. The matching process comprise building a control group as an 'image' of the treatment group, that reports similar characteristics (variables),[31] given the idea that the treatment does not justifies significant differences between the two subsamples.

Unless there are differences between the two subsamples on the effects of diversification on the cost of capital, occurring only under random assignment, a selection

[31] In traditional matching methods the control group is formed matching units based on one or more characteristics. However, studies of diversification decision show that the two groups of firms also differ in other characteristics. Therefore, and given that there are many possible reasons why firms diversify, partial matches based on only one or two characteristics may not yield the most relevant group for comparison (Villalonga 2004).

bias in an OLS estimate arises due to the correlation between the propensity to diversify and the error term.

A class of estimators that allow mitigating the sample selection bias and identify the treatment effect on the treated in a non-experimental context, is the Heckman's (1979) two-stage model, which applies a PSW.[32]

Heckman's procedure application to our regression analysis and its results are reported in subsection *4.2*.

3.2.3.2. Endogeneity of the Explanatory Variables

This type of endogeneity problem is the result of the equation's disturbance term being correlated with the lagged dependent variable in dynamic panel data models.

According to a non-negligible stream of the empirical literature, e.g., Roberts and Whited (2013), even though instrumental variables (IV) applied in generalized method of moments (GMM) estimators may help to overcome this type of endogeneity, simulation results reported by, e.g., Dang *et al.* (2015) and Zhou *et al.* (2014) indicate that a 'second generation' of dynamic panel data estimators, such as: (i) an analytical bias correction of the fixed-effects - least squares dummy variable correction (LSDVC); and, (ii) a bootstrap-based correction procedure (BCFE) that approximates the bias function and search for unbiased estimates using an iterative BCFE that simulates the distribution of the FE estimator using the original (biased) FE estimates (Everaert and Pozzi 2007); are the most appropriate estimators.

4. Results

4.1. Univariate Statistics Analysis

[32] Because the details on Heckman's procedure can be found in econometric textbooks, or in Villalonga (2004) Campa and Kedia (2002) as applied to diversification, we deliberately omitted them in this paper.

Table 3 present subsamples characteristics in terms of industry, country, and age.

[Insert Table 3 here]

Panel A of table 3 shows that all major non-financial industries are represented in the subsamples, with an emphasis on manufacturing and distribution.

Panel B presents the details on the composition of the 773 firms (on each of the two subsamples) by country, for the sampling period. The composition, by country, of the two subsamples is very similar, with Spain, France and Italy having the highest representations (representing 78.9 percent of the all firms in subsample 1 and 77.6 percent of the all firms in subsample 2) while Austria, Ireland, Luxemburg and Netherlands present the lowest representations in the two subsamples.

Panel C of table 3 shows equilibrium in terms of firms in the three age categories among our two subsamples.[33]

Table 4 Section 1 reports the summary statistics of the variables used to test **H1** and **H2.b** using hypotheses testing in our sampling period, for the subsidiaries of business groups subsample (Panel A) and comparable stand-alone subsample (Panel B).

[Insert Table 4 here]

To test for differences in means, we conducted both parametric and non-parametric tests (Wilcoxon signed-rank (Mann-Whitney) test for equality of means and medians).[34]

Table 5 reports the means (left-hand side) and medians (right-hand side) of those variables in the subsamples 1 and 2, and statistics for equality tests across samples.

[Insert Table 5 here]

[33] Age classification in three categories was adapted from Teixeira and Santos (2014) where a firm is classified as being 'Young' if its age is less than 20 years old; 'Adult' if its age is greater or equal than 20 years and less than 30 years old; and 'Old' if its age is greater or equal than 30 years old.

[34] The *t-test* is a robust test for the normality assumption. Albeit the difference in subsamples size is smaller than 1.5, we conducted the Wilcoxon-Mann-Whitney U test which is a non-parametric test that does not require the assumption of normality.

Using accounting information and several empirical tested analytical accounting-based procedures to estimate the components of the cost of capital, we find that the results of cost of capital components estimation are consistent with **H1**, documenting that the cost of capital of firms integrated in an ICM (subsample 1) is significantly lower than comparable stand-alone firms (subsample 2), at the 1 percent level of statistical significance.

The means for the cost of equity and the cost of debt, exhibit statistical significant differences at the 1 and 10 percent levels, for both the subsample 1 and 2. These findings are consistent with our hypotheses.

The results of the Wilcoxon-Mann-Whitney test, in table 5, provide additional support for our parametric testing, both in terms of statistical significance at the 1 and 5 percent levels and hypothesized differences in means and medians.

Overall, the results of the univariate analysis indicate differences in the cost of capital between subsample 1 and subsample 2. Our estimates indicate that the mean and the median of the cost of capital of ICM member firms are, respectively, 10.99 and 11.39 percent lower, and statistically significant at the 1 percent level, than their stand-alone peers. These findings are consistent with extant empirical literature (e.g. Gatzer *et al.* 2014; and Hann *et al.* 2013).

Table 4 Section 2, exhibits summary statistics for the variables, of both subsamples, used in testing H1 using regression analysis. As reported, the two subsets of firms are similar in several dimensions, both in terms of means and medians. Subsidiary sampled firms are slightly larger in terms of total assets. However, both types of firms hold similar percentages of financial leverage and implicit taxation.

Table 6 reports the summary statistics for the variables used to test **H2.a**, for both subsamples. As indicated, asset tangibility, earnings volatility, effective tax rate, and non-debt tax shields, are similar across the two subsamples. Subsidiaries are slightly larger in terms of total assets, and evidence slightly higher profitability. A striking difference between the two sets of firms is that subsidiaries exhibit a significant higher ratio of debt-to-total assets, as reported in Table 5, which is consistent with our **H2.b**.

[Insert Table 6 here]

Pearson correlation coefficients between total debt ratio and the determinants of the capital structure employed in the regression model used to test **H2.a** are reported in table 7. Correlation matrix show that asset base size, asset tangibility, profitability and non-debt tax shield variables are negatively correlated with leverage, while growth opportunities, earnings volatility, and effective tax rate variables are positively correlated with leverage, all at the 1 percent level of statistical significance for the two subsamples.

[Insert Table 7 here]

4.2. Regression Analysis

In addition to the univariate statistical analysis, we regressed our proxies for information asymmetry, agency conflicts, tangibility, size, profitability, implicit taxation, financial leverage ratio, on the cost of capital, for the two subsamples (**H1**).

Regression results reported in table 8, indicate that: (a) the coefficient of the proxy for informational asymmetries is positive and statistically significant at the 1 percent level for the two subsamples, suggesting that asymmetric information problems are likely to impact the firms overall cost of capital - the firms with higher equity betas (*EquityBetaDecile* 1) exhibit a higher coefficients for the information asymmetry proxies; (b) the negative coefficient of the *BG* variable indicates an inverse relationship between the cost of capital of ICM firms and stand-alone;[35] (c) the negative and statistically significant coefficients for the size variable, indicate that, at 1 percent level, the larger the asset base the lower the cost of capital for both subsample 1 and 2; (d) the negative and statistically significant coefficient at 1 percent level

[35] See Table 10, fourth and seventh columns, for further details on statistically significant coefficients for the *BG* variable.

for asset tangibility proxy in subsample 1, can be interpreted as evidence, as expect, of a negative relation with the cost of capital; (e) the 1 percent significant negative coefficient for variable implicit taxation, indicates that income taxation, at the firm level, and the cost of capital are inversely related for firms included in both subsamples; (f) the negative and statistically significant coefficients at the 1 percent level for the financial leverage variable indicate that, for subsample 2, the higher the firm financial leverage the lower the cost of capital.

Results of the application of the PSW treatment-effects show that the estimator signs of the explanatory variables are: (i) consistent with the predicted signs; and (ii) are statistically significant at the usual standard levels; confirming the OLS estimation results. The results of the application of PSW procedure are reported in column 5 of table 8.

[Insert Table 8 here]

Overall, these empirical findings are fairly consistent with, not only, the theoretical arguments put forward in the literature review, but also with the findings of prior empirical research, e.g., Gatzer *et al.* (2014), Hann *et al.* (2013), Graham and Leary (2011), and Harris and Raviv (1991).

To check the robustness of results*,* for **H1**, we used two alternative specifications for the variables involved in the estimation of the cost of capital (k_C): (i) the cost of equity capital (k_E) was estimated under the CAPM, using the annualized real return rates on bills, on equities and the equity risk premium, for each of the ten European Union countries in the euro area, from Dimson *et al.* (2016) database for the period 1966-2015; (ii) financial leverage was specified as the ratio of the interest paying debt to financial capital.[36] Empirical findings are statistically significant at the usual standard levels.[37]

Additionally, we conducted parametric tests for mean comparison in the variables used to test **H1**, between the two subsamples, grouped by industry and by firm age.

All the industry groups exhibit similar patterns of significantly differences between subsample 1 and subsample 2 firms, being the cost of capital significantly lower for ICM firms, than for comparable stand-alone firms.

Statistical significance patterns are also similar when subsamples are split for the three stages of age (young, adult and old).[38]

[Insert Tables 9 and 10 here]

Using OLS we estimated a cross-sectional regression on the determinants of target leverage ratio, to determine if ICM and stand-alone firms have target leverage ratios (**H2.a**). The results are reported in table 11.

[Insert Table 11 here]

Estimation results show that the industry median debt ratio is positively related with firms' leverage ratios at the 1 percent level of statistical significance, which is consistent with, e.g., Byoun (2008) and Flannery and Rangan (2006).

Despite size and asset tangibility variables exhibit a negative relationship with the leverage ratio, and growth opportunities a positive relation, both statistically significant at the 1 and 10 percent levels, these relationships lack, to the best of our knowledge, any sound theoretical foundation.

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[36] For (i) and (ii) specifications, robustness testing results are reported, respectively, in: table 9-A and 9-B for the parametric and non-parametric tests; and, on the left-hand and right-hand side of table 10 for the regression results.

[37] As during the sampling period, some countries in the subsamples, like Greece, Portugal and Ireland, were under financial assistance from International Institutions, which may have impacted, namely, the financing cost of firms operating in these countries. As a robustness check, we excluded from the subsamples the firms located in those countries, and results still exhibit a cost of capital significantly lower for ICM firms, than for comparable stand-alone firms.

[38] Tables with these results are available upon request.

Consistent with prior research, coefficient estimates on profitability and effective tax rate, are statistically significant at the 1 percent level.[39]

Regression results, included in table 11, suggests that ICM and stand-alone firms both have target leverage ratios, which is consistent with mainstream literature (e.g., Fier *et al.* 2013; Byoun 2008; Flannery and Rangan 2006).[40]

Equation (2) tests if ICM firms adjust at different speeds their financial leverage ratios towards their preferred targets, when compared to their stand-alone peers (**H3**).

In estimating equation (2) we used a dynamic target adjustment panel data model, based on the assumption of a constant partial adjustment speed, and controlling for the major determinants of capital structure suggested in the literature.

Table 12 reports the estimation results of equation (2). Applying the pooled OLS, which ignores firm specific effects, the estimates for the speed of adjustment ($\gamma = 1 - \lambda$) will be biased downwards, while FE models are likely to suffer from finite-sample (short panel) bias and lead to upward biased estimates of γ (these are the models presented in the first two columns of table 12).

Given the properties and assumptions of the IV/GMM estimators (Anderson and Hsiao 1981; Arellano and Bond 1991; and Blundell and Bond 1998), and the reference made by Flannery and Hankins (2013) that the system GMM estimates for γ are typically between those of OLS and FE, we only reported (in table 12, column 3) the results of the Blundell and Bond (1998) estimators (SYS-GMM).[41]

[Insert Table 12 here]

[39] Following Fier *et al.* (2013), Flannery and Rangan (2006), we also checked the robustness of the results using the empirical results of (2), reported in table 12.
[40] As a robustness check, we estimated model presented in Table 11 with the independent variables lagged one period (according to Fier *et al.* 2013; and Flannery and Rangan 2006) and obtained the same conclusions. Tables with these results are available upon request.
[41] The tables with the results of the AH-IV Anderson and Hsiao and of the FD-GMM Arellano and Bond estimators can be displayed upon request.

The regression results indicate that the SOA varies, depending on the estimation method performed. The OLS and FE estimates are 9.96 and 43.71 percent, respectively, in the ICM firms' subsample, and 6.90 and 39.73 percent, in the comparable stand-alone subsample, consistent with previous evidence in the literature (e.g., Dang *et al.* 2015; Zhou *et al.* 2014; Byoun 2008; Lemmon *et al.* 2008).

The SYS-GMM estimate of the SOA is 16.68 percent for subsample 1 and 13.44 percent for subsample 2, which fall, as expected, for the two subsamples, into the range between the OLS and FE estimates.

Because the null hypothesis of the Sargan test was rejected, Sargan test results are evidence against the suitability of instruments. Because the null hypothesis of the AR(2) test was not rejected, AR(2) test results are evidence in favor of no autocorrelation in the two subsamples. As argued in Dang *et al.* (2015), Zhou *et al.* (2014), SYS-GMM estimators may produce unreliable estimates of the SOA, whenever their fundamental assumption of valid instruments is violated.

Bias-corrected estimators, LSDVC and BCFE, in columns 4 and 5 of table 12, respectively, report similar adjustment speeds, of 31.63 and 30.15 (wboot) / 28.85 (csd) percent for subsample 1, and 29.70 and 31.52 (wboot) / 32.11 (csd) percent for subsample 2. This evidence is consistent with findings from prior research (e.g., Dang *et al.* 2015; Zhou *et al.* 2014).

Given that the SOAs estimated by LSDVC and BCFE vary in a relatively narrow range between 28.85 and 31.63 percent in subsample 1, and 29.70 and 32.11 percent in subsample 2, we conjecture that these estimates are closest to the true SOA for our subsidiaries and comparable stand-alone subsamples. Based on these ranges of adjustment speeds and on the 10-year sampling period duration, we estimate that stand-alone firms adjust toward their preferred target leverage in 1.88 years, and ICM member firms in 1.93 years (difference statistically significant at the 1 percent level) than the 1.93 number years that ICM member firms take to move toward their target leverage.[42]

Overall, these empirical results indicate that stand-alone peers adjust dynamically their financial leverage ratios towards their preferred targets, at a statistically significant higher speed (at the 1 percent level) to that of ICM, which is consistent with our **H3**. These results are consistent with the empirical evidence reported by, e.g., Dang *et al.* (2015), Zhou *et al.* (2014) and Dewaelheyns and Van Hulle (2012).

Following Dhaliwal and Graham (2001) we tested if there are differences in the SOA according to the firms' age, as a consequence of changes in the adjustment costs. The empirical evidence, using SYS-GMM estimators, indicates that in both ICM and comparable stand-alone firms the SOA increases from 'Young' to 'Old' firm categories.[43]

5. Conclusions

This paper investigated empirically three efficiency dimensions of firm's financing behavior. Firstly, we examined whether factors, like the industry effect, and asymmetric information and agency problems, affect differently, the cost of capital of ICM participants and their stand-alone peers. Secondly, we analyze the proposition that diversified firms integrating business groups, likewise comparable stand-alone firms, both have a preferred target capital structure, and whether the former display a higher financial leverage ratio than the latter. Finally, we studied whether firms integrating active ICMs adjust capital structures to their preferred leverage ratios, at different speeds than their stand-alone peers.

[42] According to Dang *et al.* (2015, 94) 'The "half life" represents the number of years it takes a company to move halfway toward its target leverage after a leverage shock. Formally, it is calculated as ln 0.5 / ln (1- [γ])'.
[43] Tables with these results are available from the authors upon request.

Results from univariate parametric and non-parametric testing, document that ICM member firms exhibit significant 10.99 and 11.39 percent lower mean / median costs of capital than comparable stand-alone firms, therefore, providing support to the hypothesis 1.

Additionally, regression results provide evidence documenting that the cost of capital of ICM participants is, as expected, significantly lower than single segment firms, and significantly impacted by factors related to asymmetrical information problems and agency conflicts. Moreover, coefficients for asset base tangibility, size, taxation, and financial leverage, exhibit statistical significance at the usual levels, and exhibit the expected signs.

These empirical findings provide evidence consistent with the predictions that a participant in an active ICM may experience benefits associated with its organizational form, in the form, among other, of lower deadweight costs of asymmetric information and agency problems, which may be helpful in reducing ICM firm members' cost of capital.[44]

Consistent with the results of prior research, our empirical findings provide evidence of the presence of a significant industry effect on firms' capital structure, supporting the hypothesis that firms, irrespective of their organizational form, have preferred target capital structures.

Regression results provide significant evidence documenting that both, ICM members and stand-alone firms, have preferred target leverage ratios. Additionally, findings also indicate that, the former exhibit, as expected, significant 2.04 and 2.31 percent mean / median higher leverage than the latter.

Results of empirical testing, also provides evidence supporting to hypothesis that firms dynamically readjust their capital structures. Bias-corrected estimators (LSDVC and BCFE), indicate that firms integrating active ICM narrow the gap between their actual and their

[44] Both our parametric and non-parametric testing and the regression results are robust to alternative specifications of the variables involved in the estimation of the cost of capital.

preferred level of financial leverage at speeds between 28.85 to 31.63 percent per year, while stand-alone firms adjust at speeds between 29.70 to 32.11 percent per year. This evidence is interpreted as supportive of the dynamic trade-off capital structure theory.

Concluding, the paper provides statistically significant findings indicating that: (i) the financing behavior of firms integrating the ICMs through which diversified firms allocate capital, is more efficient, gauged by the cost of capital yardstick, than comparable stand-alone firms; (ii) both types of organizational form firms, have preferred target capital structures; (iii) subsidiaries of diversified firms exhibit, on average, higher financial leverage than their comparable stand-alone counterparts; and (iv) whenever subsidiaries and stand-alone alike, deviate from their preferred capital structure, they adjust dynamically, at different speeds, their financial leverage, towards the preferred target.

Appendix 1: Matching Procedure

The Amadeus database automatically classifies each firm as belonging to a 'peer group'. Each peer group has a code,[45] includes firms that operate in the same industry,[46] are in the same size (total assets) group,[47] which can have differentiated ownership structures (e.g., subsidiary firms, stand-alone firms), among other firms' individual characteristics that differentiates them.

To select a one-to-one subsample of stand-alone firms that matches the industry and the size of firms in subsample 1, as closely as possible, we developed a VBA (Visual Basic for Applications) macro. The first matching step – ensuring that to a firm in subsample 1, a comparable firm, belonging to the same industry, exists in subsample 2 – would be guaranteed by the 'peer group' variable. To accomplish this first step, the excel macro had to: given a firm in subsample 1, find only firms in subsample 2 that belong to the same 'peer group'. To perform the second step of the matching procedure, the excel routine had to, among firms previously selected in subsample 2 and which belong to the same peer group, find the firm with the best match (as closely as possible) in terms of total assets and sales, during the entire sampling period.[48] For subsample 2, the necessary financial firm-

[45] For example, 2712 VL, where the numeric part of the code corresponds to the 4-digit NACE classification code and the letters in the code (VL) correspond to a classification for the size of the firm.
[46] The industry matching is based on a 4-digit NACE classification code, 3-digit US SIC classification core code, and on NACE Rev. main section.
[47] The firms were classified according to four possible size groups: VL – Very Large Firms; LA – Large firms; ME – Medium sized firms; SM – Small firms.
[48] To perform the second step of the matching procedure, the excel routine, instead of finding the best match, could calculate the mean or median of all variables and all firms (or the firms included in a specified maximum

level information, for all the used variables, belong to firms with the best matching procedure as described above.

Acknowledgements

The authors are grateful to Veljko Fotak, Aníbal Santos, and participants at the 2012 AFA Doctoral Student Consortium in Chicago, IL, 2018 26th Finance Forum in Santander, Spain, 2018 10th Portuguese Finance Network Conference in Lisbon, Portugal and 2018 25th Annual Conference of the Multinational Finance Society in Budapest, Hungary for useful comments and valuable suggestions on an earlier draft. The authors are responsible for all remaining errors and omissions.

We are especially grateful to João Pinto and BVD for providing access to euro area sovereign treasury bills data, and to the Amadeus database, respectively. We are especially grateful to BVD for providing access to the Amadeus database. An earlier version of this paper circulated under the title 'Internal Capital Markets and the Efficiency of Firms' Financing: Evidence from the Euro Area'.

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

Agrawal, A., and G. Mandelker. 1987. "Managerial Incentives and Corporate Investment and Financing Decisions." *The Journal of Finance* 42 (4): 823–837.

Alexander, I., C. Mayer, and H. Weeds. 1996. *Regulatory Structure and Risk and Infrastructure Firms: An International Comparison.* World Bank Policy Research Working Paper, 1698.

Almeida, H., C. Kim, and H. Kim. 2015. "Internal Capital Markets in Business Groups: Evidence from the Asian Financial Crisis." *The Journal of Finance* 70 (6): 2539–2586.

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distance interval regarding the value of the 2013 total assets of each firm in the subsample 1) in each peer group of subsample 2 and use it to make the one-to-one match with the firms in subsample 1.
However, the aforementioned procedure would lead to important differences in the variables distribution (in terms of its shape and dimension) across subsamples. For instance, the total assets median of the subsample 1 (for the whole subsample) is larger than the total assets median of the subsample 2.
Nevertheless, as a robustness check, the descriptive statistics for subsample 2 were calculated using as information, to make the matching, the median for each variable of the firms in each peer group, and the results were similar to the ones of the best match. However, to perform the aforementioned procedure, we didn't use all firms in each peer group of stand-alone firms, which would increase the scattering of the results. We only used the firms for which their 2013 total assets was positioned within a maximum distance interval [-50%; 50%] of the value of the 2013 total assets of each firm in the subsample 1.

Anderson, R., T. Bates, J. Bizjak, and M. Lemmon. 2000. “Corporate Governance and Firm Diversification.” *Financial Management* 29 (1): 5–22.

Anderson, T., and C. Hsiao. 1981. “Estimation of Dynamic Models with Error Components.” *Journal of the American Statistical Association* 76 (375): 598–606.

Antoniou, A., Y. Guney, and K. Paudyal. 2008. “The Determinants of Capital Structure: Capital Market-Oriented Versus Bank-Oriented Institutions.” *Journal of Financial and Quantitative Analysis* 43 (01): 59–92.

Apostu, A. 2010. “The Effects of Corporate Diversification Strategies on Capital Structure: An Empirical Study on European Companies.” MSc diss., Aarhus University.

Arellano, M., and S. Bond. 1991. “Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations.” *Review of Economic Studies* 58 (2): 277–297.

Armitage, S. 2005. The Cost of Capital: Intermediate Theory. Cambridge University Press.

Beneda, N. 2003. “Estimating Cost of Capital using Bottom-up Betas.” *The CPA Journal* 73 (5): 66–73

Barton, S., and P. Gordon. 1988. “Corporate Strategy and Capital Structure.” *Strategic Management Journal* 9 (6): 623–632.

Baxter, N. 1967. “Leverage, Risk of Ruin and the Cost of Capital.” *The Journal of Finance* 22 (3): 395–403.

Beaver, W., and J. Manegold. 1975. “The Association between Market-Determined and Accounting-Determined Measures of Systematic Risk: Some Further Evidence.” *The Journal of Financial and Quantitative Analysis* 10 (2): 231–284.

Belenzon, S., T. Berkovitz, and L. Rios. 2013. “Capital Markets and Firm Organization: How Financial Development Shapes European Corporate Groups.” *Management Science* 59 (6): 1326–1343.

Benninga, S. 2000. *Financial Modeling.* 2nd ed. Cambridge, Massachusetts: MIT Press.

Berger, P., and E. Ofek 1995. “Diversification's Effect on Firm Value.” *Journal of Financial Economics* 37 (1): 39–65.

Bergh, D. 1997. “Predicting Divestiture of Unrelated Acquisitions: an Integrative Model of ex ante Conditions.” *Strategic Management Journal* 18 (9): 715–731.

Blundell, R., and S. Bond. 1998. “Initial Conditions and Moment Restrictions in Dynamic Panel Data Models.” *Journal of Econometrics* 87 (1): 115–143.

Boquist, J., and W. Moore. 1984. "Inter-Industry Leverage Differences and the DeAngelo-Masulis Tax Shield Hypothesis." *Financial Management* 13 (1): 5–9.

Bowen, R., L. Daley, and C. Huber Jr. 1982. "Evidence on the Existence and Determinants of Inter-Industry Differences in Leverage." *Financial Management* 11 (4): 10–20.

Bradley, M., G. Jarrell, and E. Kim. 1984. "On the Existence of an Optimal Capital Structure: Theory and Evidence." *The Journal of Finance* 39 (3): 857–878.

Brotherson, W., K. Eades, R. Harris, and R. Higgins. 2013. ""Best Practices" in Estimating the Cost of Capital: An Update." *Journal of Applied Finance* 23 (1): 1–19.

Bruno, G. 2005. "Estimation and Inference in Dynamic Unbalanced Panel-Data Models with a Small Number of Individuals." *Stata Journal* 5 (4): 473–500.

Buchuk, D., B. Larrain, F. Muñoz, and F. Urzúa. 2014. "The Internal Capital Markets of Business Groups: Evidence from Intra-Group Loans." *Journal of Financial Economics* 112 (2): 190–212.

Byoun, S. 2008. "How and When Do Firms Adjust Their Capital Structures toward Targets?" *The Journal of Finance* 63 (6): 3069–3096.

Campa, J., and S. Kedia. 2002. "Explaining the Diversification Discount." *The Journal of Finance* 57 (4): 1731–1762.

Campbell, C., and M. Bradley. 1986. "Industry Leverage Regularities: Optimal Capital Structures or Neutral Mutations?" PhD diss., University of Michigan, Graduate School of Business Administration.

Campbell, T., and W. Kracaw. 1980. "Information Production, Market Signalling, and the Theory of Financial Intermediation." *The Journal of Finance* 35 (4): 863–882.

Castanias, R. 1983. "Bankruptcy Risk and Optimal Capital Structure." *The Journal of Finance* 38 (5): 1617–1635.

Chakraborty, I. 2015. "The Effect of Business Risk on Capital Structure of Indian Corporate Firms: Business Groups vs. Stand-Alone Firms." *Global Economic Review* 44 (2): 237–268.

Chen, A. 1979. "A Theory of Corporate Bankruptcy and Optimal Capital Structure." In *Handbook of Financial Economics*, edited by J. Bicksler, 275-291. Amesterdam: North-Holland.

Chen, L., and X. Zhao 2007. "Mechanical Mean Reversion of Leverage Ratios." *Economics Letters* 95 (2): 223–229.

Comment, R., and G. Jarrell. 1995. "Corporate Focus and Stock Returns." *Journal of Financial Economics* 37 (1): 67–87.

Conroy, R., and R. Harris. 2011. "Estimating Capital Costs: Practical Implementation of Theory's Insights." In *Capital Structure and Financing Decisions: Theory and Practice*, edited by K. Baker and J. Martin, chapter 11: 191-210. New York, NY: John Wiley & Sons.

Damodaran, A. 2011. *Applied Corporate Finance.* 3rd ed. John Wiley & Sons.

Dang, V., M. Kim, and Y. Shin. 2015. "In Search of Robust Methods for Dynamic Panel Data Models in Empirical Corporate Finance." *Journal of Banking and Finance* 53: 84–98.

De Miguel, A., and J. Pindado. 2001. "Determinants of Capital Structure: New Evidence from Spanish Panel Data." *Journal of Corporate Finance* 7 (1): 77–99.

De Vos, I., G. Everaert, and I. Ruyssen. 2015. "Bootstrap-based Bias Correction and Inference for Dynamic Panels with Fixed Effects." *Stata Journal* 15 (4): 986–1018.

DeAngelo, H., and R. Masulis. 1980. "Optimal Capital Structure under Corporate and Personal Taxation." *Journal of Financial Economics* 8 (1): 3–29.

Deloof, M. 1998. "Internal Capital Markets, Bank Borrowing, and Financing Constraints: Evidence from Belgian Firms." *Journal of Business Finance & Accounting* 25 (7-8): 945–968.

Dewaelheyns, N., and C. Van Hulle. 2012. "Capital Structure Adjustments in Private Business Group Companies." *Applied Financial Economics* 22 (15): 1275–1288.

Dhaliwal, D., and J. Graham. 2001. "Discussion of the Influence of Firm Maturation on Firms' Rate of Adjustment to Their Optimal Capital Structures." *Journal of the American Taxation Association* 23 (s-1): 95–98.

Diamond, D. 1984. "Financial Intermediation and Delegated Monitoring." *Review of Economic Studies* 51 (3): 393–414.

Diamond, D. 1996. *Liquidity, Banks, and Markets: Effects of Financial Development on Banks and the Maturity of Financial Claims.* Policy Research Working Paper Series 1566, The World Bank.

Dimson, E., P. Marsh, and M. Staunton. 2016. *Credit Suisse Global Investment Returns Yearbook 2016.* Credit Suisse Research Institute.

Donaldson, G. 1961. *Corporate Debt Capacity: A Study of Corporate Debt Policy and the Determination of Corporate Debt Capacity.* Washington, DC: BeardBooks.

Ehrhardt, M. 1994. *The Search for Value – Measuring the Company's Cost of Capital.* Harvard Business School Press.

European Central Bank. 2008. *The New Euro Area Yield Curves. Monthly Bulletin.* February, 95–103. European Central Bank.

Everaert, G., and L. Pozzi. 2007. "Bootstrap-Based Bias Correction for Dynamic Panels." *Journal of Economic Dynamics and Control* 31 (4): 1160–1184.

Faccio, M., and L. Lang. 2002. "The Ultimate Ownership of Western European Corporations." *Journal of Financial Economics* 65 (3): 365–395.

Fama E., and K. French. 1997. "Industry Costs of Equity." *Journal of Financial Economics* 43(2): 153–193.

Fama, E., and K. French. 1999. "The Corporate Cost of Capital and the Return on Corporate Investment." *The Journal of Finance* 54 (6): 1939–1967.

Fama, E., and K. French. 2002. "Testing Tradeoff and Pecking Order Predictions about Dividends and Debt." *Review of Financial Studies* 15 (1): 1–33.

Ferrando, A., M. Marchica, and R. Mura. 2017. "Financial Flexibility and Investment Ability across the Euro Area and the UK." *European Financial Management* 23 (1): 87–126.

Fier, S., K. McCullough, and J. Carson. 2013. "Internal Capital Markets and the Partial Adjustment of Leverage." *Journal of Banking and Finance* 37(3): 1029–1039.

Fischer, E., R. Heinkel, and J. Zechner. 1989. "Dynamic Capital Structure Choice: Theory and Tests." *The Journal of Finance* 44 (1): 19–40.

Fisher, I. 1930. *The Theory of Interest.* New York: The Macmillan Co.

Flannery, M., and K. Hankins. 2013. "Estimating Dynamic Panel Models in Corporate Finance." *Journal of Corporate Finance* 19: 1–19.

Flannery, M., and K. Rangan. 2006. "Partial Adjustment toward Target Capital Structures." *Journal of Financial Economics* 79 (3): 469–506.

Franks, J., M. Lally, and S. Myers. 2008. *Recommendations to the New Zealand Commerce Commission on an Appropriate Cost of Capital Methodology.* New Zealand Commerce Commission.

Frydenberg, S. 2011. "Capital Structure Theories and Empirical Tests: An Overview." In *Capital Structure and Financing Decisions: Theory and Practice*, edited by K. Baker and J. Martin, chapter 8: 129-149. New York, NY: John Wiley & Sons.

Gabriel, S., and C. Baker. 1980. "Concepts of Business and Financial Risk." *American Journal of Agricultural Economics* 62 (3): 560–564.

Gatzer, S., D. Hoang, and M. Ruckes. 2014. *Internal Capital Markets and Diversified Firms: Theory and Practice.* Working Paper Series in Economics, 64. Karlsruher Institut für Technologie (KIT).

Gautier, A., and M. Hamadi. 2005. "Internal Capital Market Efficiency of Belgian Holding Companies." *Revue de l'association française de finance* 26 (2): 11–34.

Gebhardt, W., C. Lee, and B. Swaminathan. 2001. "Toward an Implied Cost of Capital." *Journal of Accounting Research* 39 (1): 135–176.

Ghosh, A., and F. Cai. 1999. "Capital Structure: New Evidence of Optimality and Pecking Order Theory." *American Business Review* 17 (1): 32–38.

Gode, D., and P. Mohanram. 2003. "Inferring the Cost of Capital Using the Ohlson–Juettner Model." *Review of Accounting Studies* 8 (4): 399–431.

Goel, A., and A. Thakor. 2003. "Why Do Firms Smooth Earnings?" *The Journal of Business* 76 (1): 151-92.

Gong, P., and H. Huang. 2008. "Research on Financing Efficiency and its Influential Factors: Evidence from Listed Companies in China." *Corporate Finance Review* 12 (6): 5–16.

Graham, J. 1999. "Do Personal Taxes Affect Corporate Financing Decisions?" *Journal of Public Economics* 73: 147–185.

Graham, J., and C. Harvey. 2001. "The Theory and Practice of Corporate Finance: Evidence from the Field." *Journal of Financial Economics* 60 (2-3): 187–243

Graham, J., and C. Harvey. 2002. "How Do CFOs Make Capital Budgeting and Capital Structure Decisions?" *Journal of Applied Corporate Finance* 15 (1): 8–23.

Graham, J., and M. Leary. 2011. "A Review of Empirical Capital Structure Research and Directions for the Future." *Annual Review of Financial Economics* 3: 309–345.

Greenwald, B., J. Stiglitz, and A. Weiss. 1984. "Informational Imperfections in the Capital Market and Macroeconomic Fluctuations." *The American Economic Review* 74 (2): 194–199.

Gugler, K., E. Peev, and E. Segalla. 2013. "The Internal Workings of Internal Capital Markets: Cross-Country Evidence." *Journal of Corporate Finance* 20: 59–73.

Hamada, R. 1972. "The Effect of the Firm's Capital Structure on the Systematic Risk of Common Stocks." *The Journal of Finance* 27 (2): 435–452.

Hann, N., M. Ogneva, and O. Ozbas. 2013. "Corporate Diversification and the Cost of Capital." *The Journal of Finance* 68 (5): 1961–1999.

Harris, M., and A. Raviv. 1991. "The Theory of Capital Structure." *The Journal of Finance* 46(1): 297–355.

Hart, O. 2001. "Financial Contracting." *Journal of Economic Literature* 39 (4): 1079–1100.

He, Z., and L. Kryzanowski. 2007. "Cost of equity for Canadian and U.S. sectors." *The North American Journal of Economics and Finance* 18 (2): 215–229.

Heckman, J. 1979. "Sample Selection Bias as a Specification Error." *Econometrica* 47 (1): 153–161.

Hern, R., T. Haug, A. Legg, and M. Robinson. 2009. *Cost of Capital for PR09: A Final Report for Water UK.* London, UK: NERA Economic Consulting.

Hoshi, T., A. Kashyap, and D. Scharfstein. 1991. "Corporate Structure, Liquidity, and Investment: Evidence from Japanese Industrial Groups." *The Quarterly Journal of Economics* 106 (1): 33–60.

Hund, J., D. Monk, and S. Tice. 2012. "Apples to Apples: The Economic Benefit of Corporate Diversification." Available at SSRN: https://ssrn.com/abstract=2023786.

Jensen, M. 1986. "Agency Cost of Free Cash Flow, Corporate Finance, and Takeovers." *American Economic Review* 76 (2): 323–329.

Jensen, M. 2001. "Value Maximization, Stakeholder Theory, and the Corporate Objective Function." *European Financial Management* 7 (3): 297–317.

Kahn, R., and T. Whited. 2018. "Identification Is Not Causality, and Vice Versa." *The Review of Corporate Finance Studies* 7 (1): 1–21.

Kale, J., T. Noe, and G. Ramirez. 1991. "The Effect of Business Risk on Corporate Capital Structure: Theory and Evidence." *The Journal of Finance* 46 (5): 1693–1715.

Kaplan, P., and J. Peterson. 1998. "Full-Information Industry Betas." *Financial Management* 27 (2): 85–93.

Kayhan, A., and S. Titman. 2007. "Firms' Histories and Their Capital Structures." *Journal of Financial Economics* 83 (1): 1–32.

Khanna, T., and J. Rivkin. 2001. "Estimating the Performance Effects of Business Groups in Emerging Markets." *Strategic Management Journal* 22 (1): 45–74.

Khanna, T., and K. Palepu. 2000. "Is Group Affiliation Profitable in Emerging Markets? An Analysis of Diversified Indian Business Groups." *The Journal of Finance* 55 (2): 867–891.

Kim, E. 1978. "A Mean-Variance Theory of Optimal Capital Structure and Corporate Debt Capacity." *The Journal of Finance* 33 (1): 45–63.

Kim, E., and J. McConnell. 1977. "Corporate Mergers and the Co-Insurance of Corporate Debt." *The Journal of Finance* 32 (2): 349–365.

Kiviet, J. 1995. "On Bias, Inconsistency, and Efficiency of Various Estimators in Dynamic Panel Data Models." *Journal of Econometrics* 68 (1): 53–78.

Klein, L., O'Brien, T., and Peters, S. 2002. "Debt vs. Equity and Asymmetric Information: A Review." *Financial Review* 37 (3): 317–349.

Kochhar, R., and M. Hitt. 1998. "Linking Corporate Strategy to Capital Structure: Diversification Strategy, Type and Source of Financing." *Strategic Management Journal* 19 (6): 601–610.

Kraus, A., and R. Litzenberger. 1973. "A State-Preference Model of Optimal Financial Leverage." *The Journal of Finance* 28 (4): 911–922.

Kwok, C., and D. Reeb. 2000. "Internationalization and Firm Risk: An Upstream-Downstream Hypothesis." *Journal of International Business Studies* 31 (4): 611–629.

La Rocca, M., T. La Rocca, D. Gerace, and C. Smark. 2009. "Effect of Diversification on Capital Structure." *Accounting and Finance* 49 (4): 799–826.

Lang, L., and R. Stulz. 1994. "Tobin's Q, Corporate Diversification, and Firm Performance." *Journal of Political Economy* 102 (6): 1248–1280.

Leary, M., and M. Roberts. 2005. "Do Firms Rebalance Their Capital Structures?" *The Journal of Finance* 60 (6): 2575–2619.

Lee, A., J. Lee, and C. Lee. 2009. *Financial Analysis, Planning & Forecasting, Theory and Application.* 2nd ed. Singapore: World Scientific Publishing.

Lemmon, M., M. Roberts, and J. Zender. 2008. "Back to the Beginning: Persistence and the Cross-Section of Corporate Capital Structure." *The Journal of Finance* 63 (4): 1575–1608.

Lesser, J., and E. Nicholson. 2009. "Abandon All Hope? FERC's Evolving Standards for Identifying Comparable Firms and Estimating the Rate of Return." *Energy Law Journal* 30 (105): 105–132.

Lev, B. 1969. "Industry Averages as Targets for Financial Ratios." *Journal of Accounting Research* 7 (2): 290–299.

Lev, B., and D. Pekelman. 1975. "A Multiperiod Adjustment Model for the Firm's Capital Structure." *The Journal of Finance* 30 (1): 75–91.

Lewellen, W. 1971. "A Pure Financial Rationale for the Conglomerate Merger." *The Journal of Finance* 26 (2): 521–537.

Li, D., and S. Li. 1996. "A Theory of Corporate Scope and Financial Structure." *The Journal of Finance* 51 (2): 691–709.

Lowe, J., T. Naughton, and P. Taylor. 1994. "The Impact of Corporate Strategy on the Capital Structure of Australian Companies." *Managerial and Decision Economics* 15 (3): 245–257.

MacKay, P., and G. Phillips. 2005. "How Does Industry Affect Firm Financial Structure?" *Review of Financial Studies* 18 (4): 1433–1466.

MacKie-Mason, J. 1990. "Do Taxes Affect Corporate Financing Decisions?" *The Journal of Finance* 45 (5): 1471–1493.

Maksimovic, V., and G. Phillips. 2002. "Do Conglomerate Firms Allocate Resources Inefficiently Across Industries? Theory and Evidence." *The Journal of Finance* 57 (2): 721–767.

Masulis, R. 1988. *The Debt/Equity Choice.* Ballinger Publishing Company.

McKenzie, K., and J. Mintz. 1992. "Tax Effects on the Cost of Capital." In *Canada-US Tax Comparisons*, edited by J. Shoven, and J. Whalley, 189-216. University of Chicago Press.

Megginson, W. 1997. *Corporate Finance Theory.* Addison-Wesley Longman, Incorporated.

Menéndez-Alonso, E. 2003. "Does Diversification Strategy Matter in Explaining Capital Structure? Some Evidence from Spain." *Applied Financial Economics* 13 (6): 427–430.

McLaney, E., J. Pointon, M. Thomas, and J. Tucker. 2004. "Practitioners' perspectives on the UK cost of capital." *The European Journal of Finance* 10(2): 123–138.

Miller, M. 1988. "The Modigliani-Miller Propositions after Thirty Years." *The Journal of Economic Perspectives* 2 (4): 99–120.

Modigliani, F., and M. Miller. 1958. “The Cost of Capital, Corporation Finance and the Theory of Investment.” *The American Economic Review* 48 (3): 261–297.

Myers, S. 1977. “Determinants of Corporate Borrowing.” *Journal of Financial Economics* 5 (2): 147–175.

Myers, S. 1984. “The Capital Structure Puzzle.” *The Journal of Finance* 39 (3): 574–592.

Myers, S. 2001. “Capital Structure.” *The Journal of Economic Perspectives* 15 (2): 81–102.

Myers, S. 2003. “Financing of Corporations.” In *Handbook of the Economics of Finance*, edited by G. Constantinides, M. Harris, and R. Stulz, Vol. 1A, chapter 2, 215–253. Elsevier.

Myers, S., and N. Majluf. 1984. “Corporate Financing and Investment Decisions When Firms Have Information that Investors Do Not Have.” *Journal of Financial Economics* 13 (2): 187–221.

Ozkan, A. 2001. “Determinants of Capital Structure and Adjustment to Long Run Target: Evidence from UK Company Panel Data.” *Journal of Business Finance and Accounting* 28 (1-2): 175–198.

Patterson, C. 1995. *The Cost of Capital – Theory and Estimation.* Quorum Books.

Peyer, U., and A. Shivdasani. 2001. “Leverage and Internal Capital Markets: Evidence from Leveraged Recapitalizations.” *Journal of Financial Economics* 59 (3): 477–515.

Pratt, S., and R. Grabowski. 2008. *Cost of Capital - Applications and Examples.* 3rd ed. Hoboken (NJ), USA: John Wiley & Sons.

Rajan, R., and L. Zingales. 1995. “What Do We Know About Capital Structure: Some Evidence from International Data.” *The Journal of Finance* 50 (5): 1421–1460.

Rao, R., and E. Stevens. 2007. *A Theory of the Firm’s Cost of Capital.* World Scientific.

Riahi-Belkaoui, A., and J. Bannister. 1994. “Multidivisional Structure and Capital Structure: The Contingency of Diversification Strategy.” *Managerial and Decision Economics* 15 (3): 267–276.

Roberts, M., and T. Whited. 2013. “Endogeneity in Empirical Corporate Finance.” In *Handbook of the Economics of Finance*, edited by G. Constantinides, M. Harris, and R. Stulz, Vol. 2, chapter 7, 493–572, Elsevier.

Robichek, A., and S. Myers. 1966. “Problems in the Theory of Optimal Capital Structure.” *The Journal of Financial and Quantitative Analysis* 1 (2): 1–35.

Santos, M. 2003. “Firm’s Capital Structure Decisions: Theory and Empirical Evidence from Portuguese Banks.” PhD diss., University of Aveiro, Portugal.

Scharfstein, D., and J. Stein. 2000. “The Dark Side of Internal Capital Markets: Divisional Rent-Seeking and Inefficient Investment.” *The Journal of Finance* 55 (6): 2537–2564.

Schwartz, A. 2005. “A Normative Theory of Business Bankruptcy.” *Virginia Law Review* 91: 1199–1265.

Schwartz, E., and J. Aronson. 1967. “Some Surrogate Evidence in Support of the Concept of Optimal Financial Structure.” *The Journal of Finance* 22 (1): 10–18.

Scott Jr., D., and J. Martin. 1975. “Industry Influence on Financial Structure.” *Financial Management* 4(1): 67–73.

Scott Jr., J. 1976. “A Theory of Optimal Capital Structure.” *The Bell Journal of Economics* 7 (1): 33–54.

Shin, H., and Y. Park. 1999. “Financing Constraints and Internal Capital Markets: Evidence from Korean Chaebols.” *Journal of Corporate Finance* 5 (2): 169–191.

Shyam-Sunder, L., and S. Myers. 1999. “Testing Static Tradeoff against Pecking Order Models of Capital Structure.” *Journal of Financial Economics* 51: 219–244.

Singh, M., W. Davidson III, and J. Suchard. 2003. “Corporate Diversification Strategies and Capital Structure.” *The Quarterly Review of Economics and Finance* 43 (1): 147–167.

Smångs, M. 2006. “The Nature of the Business Group: A Social Network Perspective.” *Organization* 13 (6): 889–909.

Solomon, E. 1963. *The Theory of Financial Management.* New York (NY), USA: Columbia University Press.

Stein, J. 1997. “Internal Capital Markets and the Competition for Corporate Resources.” *The Journal of Finance* 52 (1): 111–133.

Stein, J. 2003. “Agency, Information and Corporate Investment.” In *Handbook of the Economics of Finance*, edited by G. Constantinides, M. Harris, and R. Stulz, Vol. 1, 111–165. Elsevier.

Stiglitz, J. 1969. “A Re-Examination of the Modigliani-Miller Theorem.” *The American Economic Review* 59 (5): 784–793.

Stulz, R. 1990. “Managerial Discretion and Optimal Financing Policies.” *Journal of Financial Economics* 26 (1): 3–27.

Teixeira, G., and M. Santos. 2014. "Do Firms Have Financing Preferences Along Their Life Cycles? Evidence from Iberia." In *Proceedings of the 2007 Midwest Finance Association meetings*, Vol 4. Minneapolis (MN), USA.

Titman, S., and R. Wessels. 1988. "The Determinants of Capital Structure Choice." *The Journal of Finance* 43 (1): 1–19.

Tong, Z. 2012. "Coinsurance Effect and Bank Lines of Credit." *Journal of Banking and Finance* 36 (6): 1592–1603.

Villalonga, B. 2004. "Does Diversification Cause the "Diversification Discount"?" *Financial Management* 33 (2): 5–27.

Wanzenried, G. 2006. "Capital Structure Dynamics in the UK and Continental Europe." *The European Journal of Finance* 12 (8): 693–716.

Weinstein, D., and Y. Yafeh. 1998. "On the Costs of a Bank-Centered Financial System: Evidence from the Changing Main Bank Relations in Japan." *The Journal of Finance* 53 (2): 635–672.

Whited, T. 2001. "Is It Inefficient Investment That Causes The Diversification Discount?" *The Journal of Finance* 56 (5): 1667–1691.

Zhou, Q., R. Faff, and K. Alpert. 2014. "Bias Correction in the Estimation of Dynamic Panel Models in Corporate Finance." *Journal of Corporate Finance* 25: 494–513.

Table 1. Variables and expected signs

Variables	Definition / Explanation	Variable Metric	Expected Sign
Equity Beta Decile 1 to 10	A higher value on a firm equity beta may be an indicator for the need to disclose more information, i.e., a higher level of asymmetric information. Organizing our subsamples by deciles (using the temporal equity beta mean for each firm), and classifying each decile as a dummy variable, allows us to test if firms with the higher equity beta level (*Equity Beta Decile 1*) have a higher increase on the cost of capital. If the ICM potentially reduce the information asymmetry, the coefficient for dummy variable 1 should be higher for stand-alone than for subsidiaries.	Dummy variables: the firms in the highest decile according to the equity beta level are classified with the value 1 in the *Equity Beta Decile 1* dummy variable; the firms in the lowest decile according to the equity beta level are classified with the value 1 in the *Equity Beta Decile 10* dummy variable	+
Subsidiaries of Business Groups (BG)	According to the literature on the impact of the agency problems on the firms financing behavior, a more concentrated ownership structure on the subsidiaries may help to control the agency and asymmetric information problems, when compared with a more diffuse ownership structure of stand-alone firms (e.g., Chakraborty 2015; Goel and Thakor 2003) regarding earnings smoothing), promoting the financing policy efficiency and a decrease on	The proxy variable for the ownership structure is a dummy variable that distinguish between subsidiaries (with the value 1 in the *BG* dummy variable) and stand-alone (with the value 0 in the *BG* dummy variable)	-

	the firm overall cost of capital.		
Size and Tangibility (Tang)	A higher firm size and asset tangibility represents a higher asset base, which may have a negative impact on the firm overall risk. Thus, size and tangibility may be negatively related to the cost of capital (see, among others, Gode and Mohanram 2003; Gebhardt *et al.* 2001).	*Size* - Natural logarithm of total assets (book value); *Tang* - Ratio of fixed assets to total assets (book value)	-
Implicit Taxation (ITaxation)	An increase on the implicit taxation variable raises the tax savings, decreasing the overall financial risk, and consequently having a negative impact on the cost of capital (see, e.g., Graham 1999; McKenzie and Mintz 1992; and Mackie-Mason 1990).	Ratio of total tax to total taxable income	-
Financial Leverage Ratio (FinLev)	An increase of the financial leverage ratio has a 'positive' impact on a firm cost of debt because, a higher debt level increases the firm overall financial risk and consequently its cost of debt. However, when increasing the financial leverage, the firm is issuing financial resources that have a lower cost when compared with resources coming from equity issuing's which, until reaching the optimal capital structure, will lower the overall firm cost of capital.	Ratio of long-term debt plus loans (short-term bank loans) to financial capital	-

Notes: It is expected an increase on the *EquityBetaDecile* dummy variable coefficient from the *EquityBetaDecile10* to *EquityBetaDecile1*.

Table 2. Capital structure determinants

Variables	Definition / Explanation	Variable Metric	Expected Sign
Size	Larger firms tend to have more collateralizable assets, which in case of bankruptcy, are more likely to have market value. The lenders risk, in case of larger firms with higher tangible assets, may be reflected in a lower risk premium demanded by the lenders. According to Rajan and Zingales (1995), firm size may be an inverse proxy for the probability of financial distress, which may increase its capacity to hold more debt and borrow more to maximize their tax benefits. Additionally, the information asymmetries may be lower for larger firms with more tangible assets, which turn in to easier access to debt markets and to borrow at lower cost.	Natural logarithm of total assets (book value)	+
Tangibility of assets (Tang)		Ratio of fixed assets to total assets (book value)	+
Profitability (Profi)	According to the pecking order, the trade-off and the free cash flow a firm *profitability* may affect its capital structure. According to the pecking-order theory we can expect an inverse relation between *profitability* and the leverage level, since the availability of internal funds may be a potential 'substitute' of debt financing. According to Jensen (1986), agency costs may increase with free cash flow, but may be reduce through an increase on debt level. Additionally, and according to the trade-off theory, more profitable firms may prefer a higher debt level to be able to benefit from tax shield. For more details, see among others, Fier *et al.* (2013), La Rocca *et al.* (2009), Antoniou *et al.* (2008), Byoun (2008).	Ratio of operating profit (earnings before interest and taxes, (EBIT)) to total assets (book value)	+/-
Growth opportunities (GrowthOp)	The presence of information asymmetries, with outside investors not having the same knowledge about the *growth opportunities* than the insiders, may lead firms with greater *growth opportunities* to prefer using internal funds instead of debt (Myers and Majluf 1984), to be potentially less exposed to problems of undervaluation and higher debt premiums. Additionally, firms with *growth opportunities* may have more flexibility in choosing future investments. This may lead firms to 'retain' financial flexibility through a low leverage level given them the ability to take advantage of those opportunities in the future (Myers 1977). Empirical evidence on the negative relation between *growth opportunities* and the leverage level is reported, among other, by La Rocca *et al.* (2009), Antoniou *et al.* (2008), Byoun (2008), Menéndez-Alonso (2003).	Growth rate of annual sales (sales growth)	-
Earnings volatility (Risk)	In firms with higher *earnings volatility* the risk of an 'earnings level dropping below their debt servicing commitments' increases (Antoniou *et al.* 2008, 64). This potential risk increase may bring higher funding costs and higher bankruptcy costs. Therefore, firms facing higher *earnings volatility* should have a lower leverage level.	First difference of annual earnings (% change); EBIT minus the average of the first difference	-
Effective tax rate (EFT)	In accounting terms, borrowing increases the interest payments but consequently decreases the earnings before taxes, which leads to a decrease in the amount of tax payments. Hence, potential 'gains' from borrowing increase with the tax rate.	Ratio of total tax to total taxable income	+
Non-debt tax shield (NDTS)	DeAngelo and Masulis (1980) argue that for firms that can use other tax deductions, like depreciations (*Non-Debt Tax Shields*), the tax advantage of leverage will decrease when the depreciation deductions increase. As a consequence, firms will use less debt in their capital structure.	Ratio of depreciation to total assets	-
Industry median (IndMed)	Industry median debt ratio, to control for industry characteristics not captured by other explanatory variables (Flannery and Rangan 2006). This variable was estimated through 'building' a peer group, with the same characteristics (US SIC/NACE code, dimension) for each subsidiaries and for each stand-alone firm (according to the aforementioned process to build the peer groups).	Industry median debt ratio	+

Table 3. Subsamples characteristics

Panel A: Industry composition

Industry	Number of firms in subsample 1 and subsample 2	%
Agriculture, forestry and fishing; Mining and quarrying; Electricity, gas, steam and air conditioning supply; Water supply; sewerage, waste management and remediation activities (Internal classification - Industry 1)	51	6.6%
Manufacturing (Internal classification - Industry 2)	210	27.2%
Construction (Internal classification - Industry 3)	51	6.6%
Trade (Wholesale and Retail) (Internal classification - Industry 4)	300	38.8%
Transport and Communication's (Internal classification - Industry 5)	77	10.0%
Other (Accommodation and food service activities; Professional, scientific and technical activities; Administrative and support service activities; Human health and social work activities; Arts, entertainment and recreation; Other service activities) (Internal classification - Industry 6)	84	10.9%
	773	

Notes: The industry classification was based on the Nace Rev. 2, main section and is also according to the classifications used by Dewaelheyns and Van Hulle (2012) and Fama and French (1997).

Panel B: Country composition

Country	Number of firms in subsample 1	%	Number of firms in subsample 2	%
Austria	2	0.3%	1	0.1%
Belgium	89	11.5%	63	8.2%
Finland	7	0.9%	6	0.8%
France	186	24.1%	184	23.8%
Germany	44	5.7%	45	5.8%
Greece	7	0.9%	39	5.0%
Ireland	0	0.0%	0	0.0%
Italy	196	25.4%	161	20.8%
Luxembourg	1	0.1%	3	0.4%
Netherlands	1	0.1%	0	0.0%
Portugal	12	1.6%	16	2.1%
Spain	228	29.5%	255	33.0%
	773		773	

Panel C: Age composition

Age	Number of firms in subsample 1	%	Number of firms in subsample 2	%
Young (>= 0 and < 20)	225	29.1%	218	28.2%
Adult (>= 20 and < 30)	248	32.1%	271	35.1%
Old (>= 30)	300	38.8%	284	36.7%
	773		773	

Table 4. Summary statistics of the variables used to test H1

The subsidiaries of business groups and comparable stand-alone firms subsamples consists of 6,360 firm-year observations from the 2004 to 2013 Amadeus files. This table reports the number of observations (N), mean, median, standard deviation (Std. Dev.), coefficient of variation (cv), minimum (Min), maximum (Max), skewness, and kurtosis of the variables considered in the empirical applications to test H1.

Section 1: Summary statistics of the variables used to test H1, using hypotheses testing (described in detail in section 3.2.1.)

Panel A: Summary statistics - subsidiaries of business groups subsample

Variables	N	Mean	Median	Std. Dev.	CV	Min	Max	Skewness	Kurtosis
Asset beta (industry)	6360	0.4115	0.4271	0.1031	0.2506	0.2173	1.4542	6.29	66.49
Debt to equity ratio	6360	3.8335	1.6016	37.9385	9.8966	-0.0331	2956.6080	74.25	5771.71
Tax rate	6360	0.3389	0.3266	0.1459	0.4305	0.0000	1.0000	0.87	6.51
Equity beta	6360	1.4627	0.8135	15.9399	10.8977	0.2297	1263.3270	78.04	6177.23
Equity to total Assets	6360	0.4059	0.3844	0.2123	0.5232	0.0003	1.0342	0.34	2.35
Debt to total Assets	6360	0.5941	0.6156	0.2123	0.3574	-0.0342	0.9997	-0.34	2.35
ERP	6300	0.0401	3.8486	2.3581	0.5879	-1.1452	11.1851	-0.13	2.36
Rf	6300	0.0180	2.0010	1.3109	0.7269	0.0155	4.8323	0.34	1.74
Cost of equity	6300	0.0810	0.0511	0.8723	10.7716	-0.2015	68.8151	77.70	6121.38
Cost of debt	1460	0.0655	0.0483	0.0671	1.0235	0.0000	0.7825	4.37	31.00
Cost of capital	1460	0.0473	0.0404	0.0331	0.7007	0.0035	0.4305	4.72	40.91

Panel B: Summary statistics - comparable stand-alone subsample

Variables	N	Mean	Median	Std. Dev.	CV	Min	Max	Skewness	Kurtosis
Asset beta (industry)	6360	0.4115	0.4271	0.1031	0.2506	0.2173	1.4542	6.29	66.49
Debt to equity ratio	6360	4.5220	1.5709	46.8858	10.3683	0.0145	1794.0380	31.75	1106.29
Tax rate	6360	0.3320	0.3174	0.1518	0.4573	0.0000	0.9986	1.05	6.46
Equity beta	6360	1.6902	0.8166	15.3186	9.0632	0.2198	625.6013	35.08	1350.27
Equity to total Assets	6360	0.4084	0.3890	0.2094	0.5127	0.0006	0.9857	0.37	2.46
Debt to total Assets	6360	0.5916	0.6110	0.2094	0.3539	0.0143	0.9994	-0.37	2.46
ERP	5990	0.0403	4.0965	2.2307	0.5530	-1.1452	11.1851	-0.24	2.36
Rf	5990	0.0180	2.0010	1.3111	0.7280	0.0155	4.8323	0.34	1.75
Cost of equity	5990	0.0862	0.0519	0.6015	6.9763	-0.0928	24.0826	34.61	1313.06
Cost of debt	1460	0.0688	0.0517	0.0645	0.9369	0.0000	0.6297	4.20	28.88
Cost of capital	1460	0.0525	0.0450	0.0308	0.5880	0.0090	0.3651	4.23	32.32

Section 2: Summary statistics of the variables used to test H1, using regression analysis (described in detail in section 3.2.2.)

Panel A: Summary statistics - subsidiaries of business groups subsample

Variables	N	Mean	Median	Std. Dev.	CV	Min	Max	Skewness	Kurtosis
Size	6360	9.4386	9.3370	1.1975	0.1269	4.5726	14.6762	0.3531	3.4642
Tangibility	6360	0.2748	0.2127	0.2381	0.8664	0.0000	0.9813	0.9417	3.0972
Implicit Taxation	6360	0.3389	0.3266	0.1459	0.4305	0.0000	1.0000	0.8699	6.5129
Financial Leverage Ratio	5088	0.2027	0.0900	0.2386	1.1771	0.0000	0.9893	1.0070	2.8858

Panel A: Summary statistics - subsidiaries of business groups subsample

Variables	N	Mean	Median	Std. Dev.	CV	Min	Max	Skewness	Kurtosis
Size	6360	9.0928	9.0958	1.0527	0.1158	3.1997	12.4623	-0.1677	3.8074
Tangibility	6360	0.2819	0.2216	0.2304	0.8172	0.0000	0.9655	0.8926	2.9456
Implicit Taxation	6360	0.3320	0.3174	0.1518	0.4573	0.0000	0.9986	1.0519	6.4629

Financial Leverage Ratio	5088	0.2586	0.1843	0.2554	0.9877	0.0000	0.9968	0.7411	2.4045

Table 5. Parametric and non-parametric tests for equality of means and medians between the variables used to test H1 and H2.b in the subsidiaries of business groups and stand-alone subsamples

The variables used to test H1 were described in detail in section *3.2.1.* *, ** and *** indicate significance of the coefficients at 10%, 5% and 1% level, respectively. A statistically significant difference, upward or downward, can be proved through the one-sided t-test for mean comparison of two independent subsamples, and assuming unequal variances: diff > 0*** representing a difference between the mean of the two groups that is statistically significantly greater than zero, i.e., we have a variable that has a statistical significant higher mean for subsidiaries when compared with stand-alone firms; diff < 0*** representing a difference between the mean of the two groups that is statistically significantly less than zero, i.e., that we have a variable that has a statistical significant higher mean for stand-alone firms when compared with subsidiaries.

	Mean					
	Subsidiaries subsample	Stand-alone subsample	Two sided t-test (Equality Test)	One sided t-test (statistically significant difference in the means) for:	Wilcoxon-Mann-Whitney test (Stand-alone mean of variable x == Subsidiaries mean of variable x)	Wilcoxon-Mann-Whitney test - probability that a random draw from the first population (stand-alone) is larger than a random draw from the second population
Asset beta (industry)	0.4274	0.4274	0.0000		0.000	0.500
Debt to equity ratio	2.5952	2.6703	-0.3475		-1.782*	0.481
Tax rate	0.3333	0.2863	9.8143***	diff > 0***	-10.689***	0.386
Equity beta	1.1647	1.2524	-1.2059	diff < 0*	0.319	0.503
Equity to total Assets	0.4041	0.4161	-1.6066*	diff < 0**	1.782*	0.519
Debt to total Assets	0.5959	0.5839	1.6066*	diff > 0**	-1.782*	0.481
ERP	0.0427	0.0490	-8.8298***	diff < 0***	6.890***	0.574
Rf	0.0177	0.0174	0.6374		-0.855	0.491
Cost of equity	0.0664	0.0754	-2.8590***	diff < 0***	7.704***	0.582
Cost of debt	0.0655	0.0688	-1.1067	diff < 0*	3.401***	0.544
Cost of capital	0.0473	0.0525	-3.6548***	diff < 0***	7.113***	0.591

	Median		
	Subsidiaries subsample	Stand-alone subsample	Wilcoxon-Mann-Whitney test
Asset beta (industry)	0.4210	0.4210	0.0014
Debt to equity ratio	1.6455	1.5538	2.3027
Tax rate	0.3235	0.3000	94.7521***
Equity beta	0.8210	0.8186	0.0014
Equity to total Assets	0.3780	0.3916	2.3027
Debt to total Assets	0.6220	0.6084	2.3027
ERP	0.0437	0.0512	26.0883***
Rf	0.0200	0.0174	0.0344
Cost of equity	0.0526	0.0579	31.2342***
Cost of debt	0.0483	0.0517	5.0304**
Cost of capital	0.0404	0.0450	29.1275***

Table 6. Summary statistics of the variables used to test H2.a

The subsidiaries of business groups subsample consists of 7,180 firm-year observations from the 2004 to 2013 Amadeus files. This table reports the number of observations (N), mean, median, standard deviation (Std. Dev.), coefficient of variation (cv), minimum (Min), maximum (Max), skewness, and kurtosis of the variables considered in the empirical applications to test H2. The variables used to test H2 were described in detail in section *3.2.2.* as follows. The dependent variable, total debt ratio (book leverage) is measured by the ratio of total debt, including debt of both long-term and short-term maturities, to total assets. The independent variables are: industry median debt ratio (*IndMed*); *Size*; tangibility of assets (*Tang*); profitability (*Profi*); growth opportunities (*GrowthOp*); earnings volatility (*Risk*); effective tax rate (*EFT*); non-debt tax shields (*NDTS*).

Panel A: Summary statistics - subsidiaries of business groups subsample

Variables	N	Mean	Median	Std. Dev.	CV	Min	Max	Skewness	Kurtosis
Total debt ratio	7180	0.5750	0.5936	0.2126	0.3697	0.0000	0.9940	-0.29	2.34
Long term debt ratio	7180	0.0786	0.0373	0.1054	1.3408	0.0000	0.8135	2.22	8.83
Ind(business_groups)_Median	7180	0.5862	0.5864	0.1672	0.2853	0.0000	0.9900	2.23	26.98
Size (lnTA)	7180	9.4244	9.3209	1.2085	0.1282	5.3774	14.6762	0.44	3.31
Tangibility	7180	0.2600	0.1990	0.2295	0.8827	0.0000	0.9813	1.02	3.32
Profitability	7180	0.1117	0.0877	0.1094	0.9796	-0.5443	1.0855	1.91	11.69
Growth opportunities	6462	0.0584	0.0339	0.2584	4.4281	-0.9204	3.5971	4.11	40.56
Earnings volatility (risk)	6462	1.2921	0.3687	6.4092	4.9603	0.0002	228.8920	21.41	587.85
Effective tax rate	7180	0.3351	0.3250	0.1435	0.4283	0.0000	1.0000	0.89	6.75
Non-debt tax shield	7180	0.0351	0.0243	0.0355	1.0131	0.0000	0.4020	2.31	12.41

The comparable stand-alone firms subsample consists of 6,970 firm-year observations from the 2004 to 2013 Amadeus files.

Panel B: Summary statistics - comparable stand-alone subsample

Variables	N	Mean	Median	Std. Dev.	CV	Min	Max	Skewness	Kurtosis
Total debt ratio	6970	0.5636	0.5798	0.2098	0.3722	0.0200	0.9990	-0.301	2.3593
Long term debt ratio	6970	0.0987	0.0555	0.1183	1.1990	0.0000	0.7383	1.7903	6.5801
Ind(stand-alone)_Median	6970	0.5794	0.5888	0.1576	0.2720	0.0000	1.2601	-0.3332	4.4948
Size (lnTA)	6970	9.0776	9.0988	1.0036	0.1106	5.0143	12.3744	-0.0594	3.1115
Tangibility	6970	0.2703	0.2090	0.2279	0.8433	0.0000	0.9655	0.9434	3.0454
Profitability	6970	0.1016	0.0794	0.0934	0.9193	-0.2358	0.7917	2.0611	10.2883
Growth opportunities	6273	0.0840	0.0529	0.2631	3.1327	-0.7788	3.9904	4.4287	47.4374
Earnings volatility (risk)	6273	1.1709	0.3562	8.4687	7.2324	0.0000	573.9650	51.3844	3356.524
Effective tax rate	6970	0.3274	0.3170	0.1465	0.4476	0.0000	0.9986	0.8863	6.3218
Non-debt tax shield	6970	0.0333	0.0239	0.0329	0.9879	0.0000	0.3726	2.5663	14.2336

Table 7. Pearson correlation coefficients between variables

This table reports the Pearson correlation coefficients (and its statistical significance) between the variables used to test H2.a. Variables definitions are listed in table 6. *, ** and *** indicate significance of the coefficients at 10%, 5% and 1% level, respectively.

Panel A: Correlations - subsidiaries of business groups subsample

	Total debt ratio	Size (lnTA)	Tangibility	Profitability	Growth opportunities	Earnings volatility (risk)	Effective tax rate	Non-debt tax shield
Total debt ratio	1							
Size (lnTA)	-0.0722***	1						
Tangibility	-0.2343***	0.2260***	1					
Profitability	-0.1736***	-0.1026***	-0.0291**	1				
Growth opportunities	0.1374***	-0.0164	-0.0268**	0.0782***	1			
Earnings volatility (risk)	0.0853***	-0.0468***	-0.0744***	-0.0980***	0.0126	1		
Effective tax rate	0.1522***	-0.0021	-0.0502***	0.0193*	0.0198	-0.0454***	1	
Non-debt tax shield	-0.1218***	0.0229*	0.5069***	0.1104***	-0.0023	-0.0520***	0.0241**	1

Panel B: Correlations - comparable stand-alone subsample

	Total debt ratio	Size (lnTA)	Tangibility	Profitability	Growth opportunities	Earnings volatility (risk)	Effective tax rate	Non-debt tax shield
Total debt ratio	1							
Size (lnTA)	-0.1802***	1						
Tangibility	-0.2183***	0.2978***	1					
Profitability	-0.2098***	-0.1271***	-0.1059***	1				
Growth opportunities	0.1294***	-0.0827***	-0.0508***	0.1495***	1			
Earnings volatility (risk)	0.0406***	0.0031	-0.0264**	-0.025**	0.0498***	1		
Effective tax rate	0.1758***	0.0486***	-0.0276**	-0.0145	0.0215*	0.0372***	1	
Non-debt tax shield	-0.1348***	0.1085***	0.5451***	-0.003	-0.0027	-0.0045	-0.0262**	1

Table 8. Regression on the 'determinants' of the cost of capital – H1

This table reports the results obtained from estimating Eq. (1). OLS coefficients are presented.

$$Kc_i = \beta_1 EquityBetaDecile1_i + ... + \beta_{10} EquityBetaDecile10_i + \beta_{11} BG_i + \beta_{12} Size_i + \beta_{13} Tang_i + \beta_{14} ITaxation_i + \beta_{15} FinLev_i + \varepsilon_i$$

The data were draw from the 2004 to 2013 Amadeus files. Variables definitions are presented in subsection *3.2.2*. Values enclosed in parentheses are the *t* statistics for coefficients. *, ** and *** indicate significance of the coefficients at 10%, 5% and 1% level, respectively.

Parameter estimates from a regression on the 'determinants' of the cost of capital				
Independent Variable	SubSample 1	SubSample 2	SubSample 1 and SubSample 2	SubSample 1 and SubSample 2, applying PSW
EquityBetaDecile1	0.08166	0.11402	0.10227	0.10261
	(8.41)***	(7.59)***	(12.89)***	(12.51)***
EquityBetaDecile2	0.08461	0.10614	0.09937	0.09891
	(8.69)***	(6.23)***	(11.42)***	(12.38)***
EquityBetaDecile3	0.08584	0.10321	0.10167	0.10126
	(9.88)***	(7.32)***	(13.96)***	(15.19)***
EquityBetaDecile4	0.07445	0.09136	0.08888	0.08923
	(8.79)***	(5.82)***	(11.86)***	(12.50)***
EquityBetaDecile5	0.07887	0.08895	0.09095	0.09110
	(7.79)***	(5.59)***	(11.24)***	(11.91)***
EquityBetaDecile6	0.09137	0.08810	0.09759	0.09791
	(10.03)***	(5.32)***	(12.43)***	(13.05)***
EquityBetaDecile7	0.08140	0.08611	0.09036	0.09001
	(7.98)***	(5.29)***	(11.10)***	(11.56)***
EquityBetaDecile8	0.08250	0.08187	0.09065	0.09105
	(9.18)***	(5.46)***	(12.37)***	(13.04)***
EquityBetaDecile9	0.08965	0.07901	0.09468	0.09428
	(10.61)***	(4.76)***	(12.47)***	(13.25)***
EquityBetaDecile10	0.08312	0.07705	0.08881	0.08985
	(9.10)***	(4.57)***	(11.21)***	(12.17)***
BG			-0.00158	-0.00148
			(-1.12)	(-1.04)
Size	-0.00097	-0.00247	-0.00229	-0.00229
	(-1.26)	(-1.44)	(-2.93)***	(-3.08)***
Tangibility	-0.01199	0.00306	-0.01135	-0.01173
	(-2.97)***	(0.74)	(-3.81)***	(-3.95)***
Implicit Taxation	-0.07221	-0.04217	-0.06401	-0.06580
	(-8.19)***	(-3.45)***	(-8.86)***	(-7.79)***
Financial Leverage Ratio	0.00173	-0.02068	0.00190	0.00374
	(0.43)	(-2.87)***	(0.57)	(1.00)
N	1022	1022	2044	2044
F-Statistic	307.76***	520.82***	622.03***	603.90***
R^2	0.7130	0.7853	0.7405	0.7399

Table 9. Parametric and non-parametric tests for equality of means and medians between the variables used to test H1 in the subsidiaries of business groups and stand-alone subsamples – Robustness H1

A – with Rf, ERP, K_E and K_C estimated using the annualized real return rates on bills, on equities and the equity risk premium, for each of the ten European Union countries in the euro area, from Dimson *et al.* (2016) database for the period 1966-2015

	Mean					
	Subsidiaries subsample	Stand-alone subsample	Two sided t-test (Equality Test)	One sided t-test (statistically significant difference in the means) for:	Wilcoxon-Mann-Whitney test	Wilcoxon-Mann-Whitney test - probability
Asset beta (industry)	0.4115	0.4115	0.0000		-0.156	0.499
Debt to equity ratio (mean)	3.3692	2.8866	4.7271***	diff > 0***	-2.193**	0.489
Tax rate (mean)	0.3403	0.3334	3.6247***	diff > 0***	-7.401***	0.462
Equity beta	1.2731	1.1906	3.5041***	diff > 0***	-1.923*	0.490
Equity to total Assets (mean)	0.4059	0.4084	-0.7407		0.375	0.502
Debt to total Assets (mean)	0.5941	0.5916	0.7407		-0.375	0.498
ERP	0.0348	0.0358	-4.4734***	diff < 0***	5.848***	0.529
Rf	0.0234	0.0231	2.5623***	diff > 0***	2.660***	0.513
Cost of equity	0.0691	0.0665	2.5731***	diff > 0***	1.149	0.506
Cost of debt	0.0684	0.0704	-2.2102**	diff < 0**	7.566***	0.552
Cost of capital	0.0497	0.0510	-2.5741***	diff < 0***	4.843***	0.533

	Median		
	Subsidiaries subsample	Stand-alone subsample	Wilcoxon-Mann-Whitney test
Asset beta (industry)	0.4271	0.4271	0.0402
Debt to equity ratio (mean)	1.8614	1.6777	21.9349***
Tax rate (mean)	0.3254	0.3166	62.0424***
Equity beta	0.8756	0.8647	1.7239
Equity to total Assets (mean)	0.3811	0.3867	1.2886
Debt to total Assets (mean)	0.6189	0.6133	5.6551**
ERP	0.0374	0.0374	18.5178***
Rf	0.0211	0.0211	0.9122
Cost of equity	0.0556	0.0561	0.3637
Cost of debt	0.0540	0.0592	70.2351***
Cost of capital	0.0452	0.0478	36.2037***

B – with leveraging as the ratio of the interest paying debt to financial capital (interest paying debt plus equity)

	Mean					
	Subsidiaries subsample	Stand-alone subsample	Two sided t-test (Equality Test)	One sided t-test (statistically significant difference in the means) for:	Wilcoxon-Mann-Whitney test	Wilcoxon-Mann-Whitney test - probability
Asset beta (industry)	0.4274	0.4274	0.0000		0.000	0.500
Debt to equity ratio	2.5952	2.6703	-0.3475		-1.782*	0.481
Tax rate	0.3333	0.2863	9.8143***	diff > 0***	-10.689***	0.386
Equity beta	1.1647	1.2524	-1.2059	diff < 0*	0.319	0.503
Equity to total Assets	0.6989	0.6903	0.8692		-1.078	0.487
Debt to total Assets	0.3011	0.3097	-0.8692		1.078	0.513
ERP	0.0427	0.0490	-8.8298***	diff < 0***	6.890***	0.574
Rf	0.0177	0.0174	0.6374		-0.855	0.491
Cost of equity	0.0664	0.0754	-2.8590***	diff < 0***	7.704***	0.582
Cost of debt	0.0655	0.0688	-1.1067	diff < 0*	3.401***	0.544
Cost of capital	0.0515	0.0571	-4.7694***	diff < 0***	6.981***	0.589

	Median		
	Subsidiaries subsample	Stand-alone subsample	Wilcoxon-Mann-Whitney test
Asset beta (industry)	0.4210	0.4210	0.0014
Debt to equity ratio	1.6455	1.5538	2.3027
Tax rate	0.3235	0.3000	94.7521***
Equity beta	0.8210	0.8186	0.0014
Equity to total Assets	0.7321	0.7248	0.7551
Debt to total Assets	0.2679	0.2752	0.7551
ERP	0.0437	0.0512	26.0883***
Rf	0.0200	0.0174	0.0344
Cost of equity	0.0526	0.0579	31.2342***
Cost of debt	0.0483	0.0517	5.0304**
Cost of capital	0.0459	0.0513	22.4051***

Table 10. Regression on the 'determinants' of the cost of capital – robustness H1

Parameter estimates from a regression on the 'determinants' of the cost of capital

Independent Variable	SubSample 1	SubSample 2	SubSample 1 and SubSample 2	SubSample 1	SubSample 2	SubSample 1 and SubSample 2
EquityBetaDecile1	0.10650	0.14288	0.10678	0.10150	0.11405	0.11748
	(32.65)***	(46.51)***	(45.87)***	(15.94)***	(15.28)***	(21.83)***
EquityBetaDecile2	0.10959	0.13263	0.10206	0.10305	0.09075	0.10636
	(31.76)***	(47.52)***	(47.90)***	(15.52)***	(11.68)***	(20.15)***
EquityBetaDecile3	0.08642	0.12755	0.09012	0.10620	0.08413	0.10905
	(26.34)***	(45.89)***	(39.53)***	(16.09)***	(12.90)***	(23.26)***
EquityBetaDecile4	0.08497	0.11532	0.08314	0.09434	0.07682	0.09895
	(28.17)***	(42.75)***	(39.13)***	(15.55)***	(11.28)***	(20.75)***
EquityBetaDecile5	0.08174	0.11332	0.08120	0.09877	0.06988	0.09930
	(27.17)***	(43.31)***	(37.92)***	(14.74)***	(10.48)***	(19.89)***
EquityBetaDecile6	0.08324	0.10733	0.07880	0.11714	0.06684	0.10876
	(28.41)***	(38.74)***	(35.05)***	(18.08)***	(9.59)***	(21.92)***
EquityBetaDecile7	0.07584	0.10330	0.07556	0.10467	0.06274	0.09831
	(27.11)***	(39.02)***	(34.91)***	(14.59)***	(9.03)***	(19.12)***
EquityBetaDecile8	0.07485	0.09966	0.07433	0.09841	0.05797	0.09573
	(28.59)***	(38.75)***	(34.80)***	(15.91)***	(9.35)***	(20.80)***
EquityBetaDecile9	0.07389	0.09560	0.07291	0.10857	0.05322	0.10166
	(26.78)***	(35.00)***	(31.65)***	(17.90)***	(7.72)***	(20.56)***
EquityBetaDecile10	0.07050	0.09651	0.07277	0.11037	0.05080	0.09974
	(26.04)***	(34.26)***	(30.67)***	(16.23)***	(7.28)***	(19.00)***
BG			-0.00125			-0.00195
			(-2.79)***			(-1.78)*
Size	-0.00044	-0.00234	-0.00124	-0.00290	0.00018	-0.00291
	(-1.64)*	(-7.78)***	(-5.40)***	(-4.53)***	(0.25)	(-5.57)***
Tangibility	-0.01048	-0.00129	-0.00066	-0.02081	0.00073	-0.02056
	(-7.33)***	(-1.05)	(-0.61)	(-5.87)***	(0.21)	(-8.17)***
Implicit Taxation	-0.03306	-0.03463	-0.04009	-0.06799	-0.03238	-0.05777
	(-12.55)***	(-20.29)***	(-26.82)***	(-12.62)***	(-3.83)***	(-11.85)***
Financial Leverage Ratio	-0.02732	-0.04962	-0.02591	0.01336	-0.02965	0.01125
	(-7.03)***	(-20.31)***	(-20.27)***	(4.17)***	(-7.07)***	(4.43)***
N	3220	4030	5800	1022	1022	2044
F-Statistic	2468.03***	3590.66***	4382.52***	433.85***	1088.08***	1025.46***
R^2	0.8906	0.9190	0.9089	0.8328	0.9150	0.8518

Table 11. Parameter estimates from cross-sectional regression on the determinants of target debt ratio – H2.a

This table reports the results obtained from estimating equation $\left[{}^{D}\!/_{A}\right]^{*}_{it} = \beta_0 + \sum_{j=1}^{n} \beta_j X_{itj} + \varepsilon_{it}$. OLS coefficients are presented. The data are draw from the 2004 to 2013 Amadeus files. Variables definitions are listed in table 6. Values enclosed in parentheses are the *t* statistics for coefficients. *, ** and *** indicate significance of the coefficients at 10%, 5% and 1% level, respectively.

Panel A: Parameter estimates from cross-sectional regression on the determinants of target debt ratio - subsidiaries of business groups subsample

Independent Variable	
Constant	0.5842
	(23.84)***
IndMed	0.0553
	(3.68)***
Size (lnTA)	-0.0037
	(-1.69)*
Tangibility	-0.2043
	(-15.83)***
Profitability	-0.3615
	(-15.63)***
Growth opportunities	0.1166
	(12.17)***
Earnings volatility (risk)	0.0018
	(4.63)***
Effective tax rate	0.2098
	(11.98)***
Non-debt tax shield	0.0659
	(0.80)
N	6462
F-Statistic	120.94***
Adjusted-R^2	0.1983

Panel B: Parameter estimates from cross-sectional regression on the determinants of target debt ratio - comparable stand-alone subsample

Independent Variable	
Constant	0.6581
	(24.73)***
IndMed	0.2440
	(15.83)***
Size (lnTA)	-0.0248
	(-9.60)***
Tangibility	-0.1603
	(-12.35)***
Profitability	-0.5677
	(-21.43)***
Growth opportunities	0.1148
	(12.51)***
Earnings volatility (risk)	0.0002
	(0.70)
Effective tax rate	0.2431
	(14.64)***
Non-debt tax shield	-0.1103
	(-1.26)
N	6273
F-Statistic	198.36***
Adjusted-R^2	0.1883

Table 12. Parameter estimates from panel regressions on the determinants of target debt ratio – Eq. (2) - H3

Panel A: Parameter estimates from panel regressions on the determinants of target debt ratio - subsidiaries of business groups subsample								
		Panel Data Fixed	Blundell & Bond			LSDVC	xtbcfe	
Independent Variable	Pooled OLS	Effects Model		95%			Wboot	Csd
Constant	0.0471	-0.0789						
	(4.28)***	(-2.12)**						
Leverage $_{(t-1)}$	0.9004	0.5629	0.8332	0.7899	0.8765	0.6837	0.6985	0.7115
	(175.15)***	(53.76)***	(37.83)***			(59.02)***	(27.38)***	(23.50)***
Ind(business_groups) Median	0.0052	0.0113	0.023			0.0137	0.0128	0.0128
	(0.83)	(1.14)	(2.51)**			(1.23)	(1.01)	(1.20)
Size (lnTA)	0.0014	0.0417	0.0045			0.0313	0.0414	0.0405
	(1.55)	(10.65)***	(3.27)***			(7.13)***	(5.84)***	(4.69)***
Tangibility	-0.0233	-0.0528	-0.0376			-0.0525	-0.0534	-0.0546
	(-4.27)***	(-4.50)***	(-3.35)***			(-4.37)***	(-2.60)***	(-2.63)***
Profitability	-0.1253	-0.2996	-0.2382			-0.2896	-0.2914	-0.2943
	(-12.87)***	(-19.41)***	(-8.12)***			(-16.91)***	(-8.72)***	(-9.89)***
Growth opportunities	0.0505	0.0478	0.0436			0.0514	0.0561	0.0563
	(12.45)***	(12.11)***	(6.01)***			(11.53)***	(8.24)***	(7.98)***
Earnings volatility (risk)	0.0002	0.0002	0.0002			0.0001	0.00006	0.00006
	(1.38)	(0.84)	(1.44)			(0.55)	(0.38)	(0.24)
Effective tax rate	0.0207	0.0109	0.0267			0.0117	0.0134	0.0125
	(2.80)***	(1.16)	(2.71)***			(1.04)	(1.20)*	(1.21)
Non-debt tax shield	-0.0214	-0.2146	-0.1036			-0.2682	-0.3077	-0.312
	(-0.63)	(-3.52)***	(-1.39)			(-3.90)***	(-2.30)**	(-2.65)***
Adj. Speed (SOA)	9.96%	43.71%	16.68%			31.63%	30.15%	28.85%
Observations	6462	6462	6462			5744	5744	5744
F-Statistic	2165.71	276.96	10553.49					
	[0.000]	[0.000]	[0.000]					
Wald-Statistic	24970.66	2083.15						
	[0.000]	[0.000]						
Sargan	6684.56		163.91					
	[0.000]		[0.000]					
AR(2) test	1.89		1.87					
	[0.059]		[0.062]					
Year dummies	Yes	Yes	Yes				Yes	Yes

This table summarizes SOA estimations generated by the five single estimation methods: (1) OLS; (2) standard fixed effects estimation; (3) Blundell and Bond (1998) system GMM; (4) Bruno (2005) and Kiviet (1995) least squares dummy variable correction LSDVC (since the differences in the initial estimators have only a marginal impact on the LSDVC estimates, we used the AH Anderson and Hsiao (1981) initialization); and, (5) Everaert and Pozzi (2007) and De Vos *et al.* (2015) bootstrap-based bias-corrected FE (BCFE) with two resampling schemes: 'wboot' performs a wild bootstrap that allows for general heteroscedasticity; and, 'csd' for resampling identically over cross-sections (cross-sectional dependence, balanced panels only). The data are draw from the 2004 to 2013 Amadeus files. The first pair of rows provides estimated coefficients for λ, (and t statistic), relating to lagged dependent variable - leverage ratio (except for the model OLS and FE were the lagged dependent variable is provide in the third row), where the speed of adjustment is $\gamma = 1 - \lambda$. The following 8 pairs of rows provide estimated coefficients (and associated t or z statistics, depending on the estimated model) for the firm characteristic variables. Variables definitions are listed in tables 2 and 6. The final two pairs of rows report results for the Sargan test for the null hypothesis of instruments that are uncorrelated with the disturbances and instruments that are valid (over-identifying restrictions) and AR(2) test for the null hypothesis of no second-order serial correlation. *, ** and *** indicate significance at 10%, 5% and 1%, respectively. Values enclosed in parentheses are the *t* or *z* statistics for coefficients, and values in square brackets are the *p*-values for test statistics.

Panel B: Parameter estimates from panel regressions on the determinants of target debt ratio - comparable stand-alone subsample

Independent Variable	Pooled OLS	Panel Data Fixed Effects Model	Blundell & Bond	95%		LSDVC	xtbcfe Wboot	xtbcfe Csd
Constant	0.0369	-0.2807						
	(3.68)***	(-9.03)***						
Leverage $_{(t-1)}$	0.931	0.6027	0.8656	0.8323	0.8988	0.7030	0.6848	0.6789
	(208.12)***	(60.55)***	(51.11)***			(43.53)***	(26.85)***	(23.95)***
Ind(stand-alone)_Median	0.0116	0.0319	0.0280			0.0281	0.0261	0.0244
	(2.09)**	(3.55)***	(2.50)**			(2.38)**	(2.00)**	(2.04)**
Size (lnTA)	0.015	0.0564	0.0053			0.0464	0.055	0.0538
	(1.61)*	(16.65)***	(3.69)***			(13.08)***	(8.51)***	(8.00)***
Tangibility	-0.0207	-0.038	-0.0399			-0.035	-0.0349	-0.0352
	(-4.47)***	(-3.57)***	(-4.93)***			(-2.76)***	(-1.84)*	(-1.74)*
Profitability	-0.1757	-0.3641	-0.2825			-0.3543	-0.3519	-0.3526
	(-18.25)***	(-25.02)***	(-12.70)***			(-20.50)***	(-9.75)***	(-11.71)***
Growth opportunities	0.0295	0.0315	0.0245			0.0326	0.0366	0.0369
	(8.88)***	(9.85)***	(4.04)***			(9.15)***	(5.54)***	(5.64)***
Earnings volatility (risk)	0.000005	0.00007	0.00002			0.00006	0.000009	0.00001
	(0.05)	(0.69)	(0.33)			(0.45)	(0.03)	(0.04)
Effective tax rate	0.0131	0.0194	0.0181			0.0169	0.0117	0.0119
	(2.19)**	(2.37)**	(2.28)**			(2.00)**	(1.22)	(1.78)*
Non-debt tax shield	-0.1695	-0.3757	-0.2927			-0.4029	-0.446	-0.4598
	(-5.47)***	(-6.74)***	(-5.24)***			(-6.22)***	(-4.30)**	(-4.79)***
Adj. Speed (SOA)	6.90%	39.73%	13.44%			29.70%	31.52%	32.11%
Observations	6273	6273	6273			5576	5576	5576
F-Statistic	3343.34	405.63	13889.49					
	[0.000]	[0.000]	[0.000]					
Wald-Statistic	57090.37	2547.54						
	[0.000]	[0.000]						
Sargan	6533.93		234.25					
	[0.000]		[0.000]					
AR(2) test	1.67		0.72					
	[0.095]		[0.47]					
Year dummies	Yes	Yes	Yes				Yes	Yes