Firms' capital structure under Akerlof's separating equilibrium*

La estructura de capital de las empresas y el teorema de separación de Akerlof

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ABSTRACT We use a sample of seven countries, for the period 2001-2006 to test the hypotheses related to the separating theorem proposed by Akerlof (1970) applied to firms' capital structure. We develop an empirical integrated model of capital structure that takes into account the trade-off, the pecking order and the market timing theories. We conclude that: 1. Being part of the market index is a guarantee of the quality of the firm which reduces the need for debt; 2. Indexed companies with growth opportunities use less debt to finance their investments to avoid debt overhang; 3. Non-indexed firms with a deficit of funds for financing their investments face higher financial constraints than indexed firms with a deficit of funds in particular in bearish markets, and 4. The capital structure of non-indexed firms is more influenced by market timing than the capital structure of indexed firms.

KEYWORDS Capital structure; Signaling theory; Indexed firms; Ownership structure; Panel data.

RESUMEN Utilizamos una muestra de empresas de siete países para el período 2001-2006 para probar un conjunto de hipótesis relacionadas con el teorema de separación propuesto por Akerlof (1970) aplicado a la estructura de capital. Desarrollamos un modelo empírico integrado de estructura de capital que considera las teorías del *trade-off*, *pecking order* y del *maket timing*. Concluimos que: 1. Pertenecer al índice de mercado es garantía de la calidad de la empresa que reduce las necesidades de recurrir al endeudamiento; 2. Las empresas indexadas con oportunidades de crecimiento usan menos deuda para financiar sus inversiones y así evitar el control de la deuda; 3. Las empresas no indexadas con déficit de fondos para financiar sus inversiones enfrentan mayores restricciones financieras que las indexadas, en particular en los mercados bajistas, y 4. El *maket timing* influye en mayor medida en la estructura de capital de las empresas no indexadas que en la de las indexadas.

PALABRAS CLAVE Estructura de capital; Teoría de señalización; Empresas indexadas; Estructura de propiedad; Datos de panel.

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1. INTRODUCTION

The theories on firm capital structure assume that managers hold better information about the future stream of cash flows than investors (Azofra, 1986; Harris and Raviv, 1991). Therefore, the relationship between borrowers and creditors takes place in an arena of «incomplete knowledge» about the intentions of the borrowers in the use of cash flows.

Our goal is to analyse how firm capital structure is affected when the firm is a member of the market index of the most-traded stocks. Being part of the market index could be considered by investors and creditors as a warranty of the quality of the firm's securities that firms which are not part of the market index cannot offer. Thus, the market index creates the conditions for a signaling (separating) equilibrium between indexed and non-indexed firms. It is also referred to as a market with differentiation.

The present research contributes to the literature in that this is the first study which bases its analysis on the differences in the capital structure decisions of indexed and non-indexed firms. This work sheds light on the extent to which indexation itself represents a signaling mechanism about the quality of the firm; it confirms previous findings about the relation between transparency and capital structure decisions (Aggarwal and Aung, 2009). In our investigation, we develop an empirical integrated model of capital structure which considers three theories about capital structure: trade-off, pecking order and market timing. We use a suitable econometric technique to deal with the problems of individual heterogeneity and endogeneity between the dependent.

We find, first, that the extent to which firms are a permanent part of the market index is a guarantee of the quality of the firm due to an increase in the visibility of the company. Second, we observe that indexed companies with growth opportunities use less debt to finance their investments to avoid debt overhang. Third, we find that non-indexed firms with a deficit of funds face higher financial constraints than indexed firms with a deficit of funds, which is particularly relevant in bearish markets; and finally, the market timing postulates have more influence on the capital structure decisions of non-indexed firms than on indexed firms.

This article is organised as follows: following the introduction, section two introduces the literature review and the hypotheses; the third section discusses the sample, the variables and the methodology of the study; section four includes the main results; and finally, in section five we present the main conclusions.

2. THEORETICAL FRAMEWORK

Since the work of Modigliani and Miller (1958) many studies have focused on how much leverage a firm should take on, and how this debt should be composed. Our focus in this paper is on changes in leverage associated with the asymmetries of information that occur when companies' financial assets are traded in secondary markets. There are several theories that explain the capital structure choice by companies. Three of these theories are: trade-off, pecking order, and market timing. However, none of them explicitly acknowledges the influence of secondary markets on information asymmetry. These theories are the departure point in our analysis which is augmented by additional variables: the investors' perception of firm quality, the influence of ownership structure, and the legal and institutional conditions under which the firms operate.

2.1. The trade-off theory

The trade-off and pecking order theories are considered the two main competing theories about capital structure decisions. Therefore, intuition suggests testing the implicit hypotheses behind these theories separately; however there are some empirical works which have tested these theories and demonstrated that they are complimentary pieces of the same puzzle (Tong and Green, 2005; Cotei and Farhat, 2009; Serrasqueiro and Nunes, 2010).

The trade-off theory postulates that in a fixed period, under conditions of perfect capital markets, the debt ratio ($TD_{i,t}$) of a firm *i*, during the current period *t*, should be equal to the target debt ratio in the same period ($TD^*_{i,t}$). However, in the absence of perfect capital markets, due to asymmetric information, the following process of adjustment should exist:

$$TD_{i,t} - TD_{i,t-1} = \lambda\,(TD^*_{i,t} - TD_{i,t-1}) \tag{1}$$

In this equation λ corresponds to the speed of adjustment to the target. According to the trade-off theory, this coefficient of adjustment is close to 1, thus, $\lambda \approx 1$.

A firm's target debt ratio can be obtained from the regression-based proxy (Farhat*, et al.*, 2009), in which the debt ratio is regressed over several firm factors suggested by the trade-off theory and previous empirical studies (Fama and French, 2002; Flannery and Rangan, 2006; Hovakimian*, et al.*, 2001; Korajczyk and Levy, 2003; Rajan and Zingales, 1995). The regression model is:

$$TD^*_{i,t} = \beta_0 + \sum_{j=1}^{n} \beta_j X_{j,i,t} + \varepsilon_{i,t}. \tag{2}$$

where X_j are the firm factors that explain the optimal capital structure. Following the trade-off postulates, we can substitute (2) into (1) and, reordering the terms in function of $TD_{i,t}$, we have the dynamic trade-off model:

$$TD_{i,t} = \lambda \cdot \beta_0 + (1-\lambda) \cdot TD_{i,t-1} + \lambda \cdot \left(\sum_{j=1}^{n} \beta_j X_{j,i,t}\right) + v_{i,t}. \tag{3}$$

With $v_{i,t} = \varepsilon_{i,t} - (1-\lambda) \cdot \varepsilon_{i,t-1}$, the variables included in the vector X_j are [(1)]: *a)* the growth opportunities, GO (Andrés de*, et al.*, 2004; Bevan and Danbolt, 2002; Danbolt*, et al.*, 2002; Johnson, 1997a, b; Miguel and Pindado, 2001; Ozkan, 2002; Ozkan and Ozkan, 2004; Rajan and Zingales, 1995); *b)* the size of the company, SIZE (Johnson, 1997a; Ozkan and Ozkan, 2004); *c)* the probability of bankruptcy, BKCY (Altman, 1968; Andrés de*, et al.*, 2005), and *d)* the distance of the firm debt position from the industry average

(1) We use the independent variables included in vector X_j as contemporaneous variables according to the previous empirical literature (Dang, 2010; Drobetz and Wanzenried, 2006).

leverage, DIFD (Flannery and Rangan, 2006; Elsas and Florysiak, 2011)[2].Thus, the extended dynamic model is:

$$TD_{i,t} = \alpha_0 + \alpha_1 \cdot TD_{i,t-1} + \alpha_2 \cdot GO_{i,t} + \alpha_3 \cdot SIZE_{i,t} + \alpha_4 \cdot BKCY_{i,t} + \alpha_5 \cdot DIFD_{i,t} + v_{i,t} \quad (4)$$

With:

$\alpha_0 = \lambda\beta_0$

$\alpha_1 = (1 - \lambda)$

$\alpha_j = \lambda\beta_j, for j > 1$

$v_{i,t} = \varepsilon_{i,t} -(1 - \lambda) \cdot \varepsilon_{i,t-1}$

2.2. The pecking order theory

The second theory we integrate into our analysis is the pecking order theory. This theory argues that the existence of asymmetric information between managers and investors —shareholders and creditors—, leads to an undervaluation of the securities issued by firms. This increases the financing cost of external sources in comparison with internally generated funds and leads firms to follow a hierarchy, with a preference for internal over external finance, and for debt over equity (Myers, 1984a, b; Myers and Majluf,1984). This theory has been widely tested (Chirinko and Singha, 2000; Frank and Goyal, 2003; Hovakimian*, et al.*, 2002; Korajczyk and Levy, 2003; Lemmon*, et al.*, 2008; Shyam-Sunder and Myers, 1999). The pecking order theory predicts that debt grows when investment exceeds internal funds and falls when investment is less than internal funds. We follow a slightly modified version of the primary model used by Shyam-Sunder and Myers (1999) in levels for the total debt instead of in first differences as:

$$TD_{i,t} = \alpha_0 + \alpha_1 DEF_{i,t} \varepsilon_{i,t} \quad (5)$$

Where *DEF* is a variable that measures the financing deficit of firm *i* in year *t*. Shyam-Sunder and Myers (1999) define financing deficit (*DEF*) as:

$$DEF_{i,t} = DIV_{i,t} + I_{i,t} + \Delta WC_{i,t} + R_{i,t-1} - C_{i,t} = \Delta LTD_{i,t} + \Delta E_{i,t} \quad (6)$$

In this equation $DIV_{i,t}$ is the cash dividend of firm *i* at time *t*; $I_{i,t}$ is the net investment of firm *i* at time *t*; $\Delta WC_{i,t}$ is the change in working capital of firm *i* at time *t*; $R_{i,t-1}$ is the current portion of long term debt at the beginning of the period; $C_{i,t}$ is the cash flow after interest and taxes of firm *i* at time *t*; $\Delta LTD_{i,t}$ is the long-term debt issued for firm *i* at time *t*; and $\Delta E_{i,t}$ is the net equity issued for firm *i* at time *t*. Equation (6) suggests that firms finance their deficit of funds following this order: 1. Internal funds; 2. Debt, and 3. Equity, allowing for substitution between debt and equity.

(2) In order to test the robustness of our estimations, following Faulkender and Smith (2007) among others, we have used other variables: amortization and depreciation over total assets, and the fixed assets over total assets, but those variables were not statistically significant in any regression. Therefore, we decided not to include these variables in the empirical model.

By following the pecking order theory, firms will prefer to finance their projects with internally generated cash flows. Thus, the firms' financial decisions depend not only on their deficit of funds but also on firm profitability. Therefore, we complement the empirical pecking order model (5) with a variable that measures profitability (ROA). Thus,

$$TD_{i,t} = \alpha_0 + \alpha_1 DEF_{i,t} + \alpha_2 ROA_{i,t} + \varepsilon_{i,t} \quad (7)$$

In agreement with the arguments of Tong and Green (2005), Cotei and Farhat (2009), and Serrasqueiro and Nunes (2010) we integrate the two theories in our model by adding the financing deficit (DEF) and the profitability (ROA) variables to the partial adjustment model of equation (4) as:

$$TD_{i,t} = \alpha_0 + \alpha_1 \cdot TD_{i,t-1} + \alpha_2 \cdot GO_{i,t} + \alpha_3 \cdot SIZE_{i,t} + \alpha_4 \cdot BKCY_{i,t} + \alpha_5 \cdot DIFD_{i,t} + \alpha_6 \cdot DEF_{i,t} + \alpha_7 \cdot ROA_{i,t} + v_{i,t} \quad (8)$$

2.3. The market timing theory

The third theory we consider is market timing. The market timing theory posits that corporate executives issue securities depending on the time-varying relative costs of equity and debt; in the presence of asymmetries of information, managers will time the market if they have the right incentives. Following Farhat *et al.* (2009) the empirical model to test this theory is:

$$TD_{i,t} = \alpha_0 + \alpha_1 MT_{i,t} \varepsilon_{i,t} \quad (9)$$

We integrate the market timing postulates in our empirical model including an MT variable in the partial adjustment model developed in equation (8).

$$TD_{i,t} = \alpha_0 + \alpha_1 \cdot TD_{i,t-1} + \alpha_2 \cdot GO_{i,t} + \alpha_3 \cdot SIZE_{i,t} + \alpha_4 \cdot BKCY_{i,t} + \alpha_5 \cdot DIFD_{i,t} + \alpha_6 \cdot DEF_{i,t} + \alpha_7 \cdot ROA_{i,t} + \alpha_8 \cdot MT_{i,t} + v_{i,t} \quad (10)$$

All these theories take into account the relevance of information on operating decisions which conditions the role of debt. When the information conveyed by issuing debt does not determine the firm's operating decisions, the firm would prefer to issue zero debt or to hold excess cash reserves (Dang, 2010). Nevertheless, if the information provided by issuing debt is a key element of a firm's operating decisions, then a firm issues debt. Firms rely less upon debt financing if their information dissemination improves over time, either because they become more transparent or because they increase their visibility. Lesmond *et al.* (2008) document that increases in leverage are associated with increases in information asymmetry of the firm's remaining equity. Information disclosure occurs in the secondary markets for those securities that are traded continuously and the stock price tends to be more informative than the bond price. Therefore, the relevance of a company in the secondary markets will influence its capital structure.

2.4. The role of guarantees in the signaling equilibrium

To solve the adverse selection problem due to asymmetric information, Akerlof (1970) postulates that better quality firms should offer guarantees to their creditors and investors to create a signaling equilibrium instead of maintaining a joint equilibrium. These guarantees must satisfy two conditions for creating a signaling equilibrium, (which is also known as a separating equilibrium). The first of these conditions is the compatibility of incentives, which occurs when low quality borrowers do not have the same incentive to offer a warranty for the goods they sell (debt). The second condition is the individual rationality: high quality borrowers are in a better condition in the signaling equilibrium than in the joint equilibrium.

The main objective in a signaling equilibrium is that the buyers assign a higher value to an issuance and thus pay a higher price (low interest rates) on debt and/or equity for a higher quality firm; whereas in the joint equilibrium, buyers of debt and/or equity value all issuances in the market identically. The membership in a most-traded-shares index can be related to Heinkel's (1982) proposal of a costless signaling equilibrium, in which sellers incur no deadweight losses and are as well off as they would be in a world of symmetric information. This equilibrium is not subject to the instability problems which may exist in the costly signaling equilibrium.

From our point of view, market indexes of most-traded shares create the conditions for a separating equilibrium between indexed and non-indexed firms. The higher visibility, transparency and reputation of those firms which belong to the index of the most-traded shares in the national capital markets, lead to a lower information gap (reduced information asymmetry and increased transparency) between managers and outsiders (Faulkender and Petersen, 2006).

Transferring the ideas in the seminal work of Akerlof (1970) «The market for lemons», to the study of firms' capital structure, we consider national stock market indexes as the ingredient that signals quality and reduces uncertainty. A firm's insiders know better than outside investors whether the firm is of good or bad quality. Issuing debt (or any other security) in capital markets entails a cost. Initially, the market does not know whether the issuing firms are of good quality or bad quality because usually the information is revealed later. For projects of good quality to be financed, information transfer must occur. In that case, only good quality firms will be willing to incur information transfer costs in order to increase their value in the market (Ravid, 1996). In contrast, poor quality firms will not be willing to mimic this behaviour and outside investors will be able to differentiate between these kinds of firms.

Following this rationale, one should expect a higher price (lower cost) for the debt issued by firms which belong to the market index, and a less leveraged capital structure of indexed companies. These firms do not need to use debt (as a device to reduce information asymmetry) to signal the quality of their assets: being in the market index increases transparency as the number of outsiders interested in the companies increases. For these companies, stock prices are more informative than bond prices when they have to make a decision between issuing new stocks and issuing new debt. In fact, Faulkender and Petersen (2006) provide evidence that access to credit markets is quite important because of the higher visibility of quoted indexed firms.

The literature identifies a number of advantages for a quoted firm, especially when the firm is a member of the index of the most-traded stocks (Schoubben and Van Hulle, 2004). Markets allow efficient risk sharing, provide more informative stock prices, and quickly disseminate all the available public information about the firm. The information contained in stock prices helps to improve allocation of investments and creates opportunities for setting up effective managerial compensation plans. Furthermore, the stock markets can also provide disciplining devices through hostile takeovers and the threat of firing managers from their current positions (Schoubben and Van Hulle, 2004).

This conclusion is also in line with the credit rationing theory (Stiglitz and Weiss, 1981). In this case, the adverse selection aspect of interest rates is a consequence of different borrowers having different probabilities of repaying their loans. Thus, the interest rate a certain borrower is willing to pay may act as a screening device. Those who are willing to pay high interest rates perceive their probability of repaying the loan to be low.

Therefore, we include in our integrated model the variable *PERM* which measures the relative permanence in the market index by a certain company to consider the separation —signaling— equilibrium:

$$TD_{i,t} = \alpha_0 + \alpha_1 \cdot TD_{i,t-1} + \alpha_2 \cdot GO_{i,t} + \alpha_3 \cdot SIZE_{i,t} + \alpha_4 \cdot BKCY_{i,t} + \alpha_5 \cdot DIFD_{i,t} + \alpha_6 \cdot DEF_{i,t} + \alpha_7 \cdot ROA_{i,t} + \alpha_8 \cdot MT_{i,t} + \alpha_9 \cdot PERM_i + v_{i,t} \quad (11)$$

2.5. The ownership structure and the institutional setting

Dominant owners and relationship based lenders (controlling banks) are comfortable with lower levels of transparency or are equipped with the right instruments to deal with an asymmetric information environment; however, external equity providers prefer high levels of transparency or a minimally asymmetric information environment in order to increase firm value by reducing agency costs. When a firm reduces the agency costs of equity by becoming a member of the most-traded firms' index, everything else being equal, the firm increases the attractiveness of equity against debt financing.

Aggarwal and Aung (2009) find that when transparency reduces owner-manager agency costs (such as higher number of analysts' reports), it is associated with lower corporate debt levels. Furthermore, the asymmetries of information play a more important role for large firms, which require more outside financing, and for firms in services and in high technology industries, where the agency issues are likely to be more severe (Aggarwal and Aung, 2009). Lower quality firms cannot mimic higher quality firms by taking on more debt because they have higher expected bankruptcy costs at any debt level.

In agreement with this reasoning, we control for the ownership structure of companies in our integrated model (variable *OWN*). The presence or absence of shareholders with large stakes in a company influences the agency costs and asymmetric information problems. The empirical model with the new variable is:

$$TD_{i,t} = \alpha_0 + \alpha_1 \cdot TD_{i,t-1} + \alpha_2 \cdot GO_{i,t} + \alpha_3 \cdot SIZE_{i,t} + \alpha_4 \cdot BKCY_{i,t} + \alpha_5 \cdot DIFD_{i,t} + \alpha_6 \cdot DEF_{i,t} + \alpha_7 \cdot ROA_{i,t} + \alpha_8 \cdot MT_{i,t} + \alpha_9 \cdot PERM_i + \alpha_{10}\, OWN_i + v_{i,t} \quad (12)$$

Finally, as Aggarwal and Aung (2009) point out, asymmetric information problems can also be affected by the information disclosure environment in a country. To take into account the institutional differences among countries (*c*) we include in our model the institutional variable, *INSTITUTIONAL*.

Therefore, we complement the integrated model of equation (12) with additional variables to consider the separation-signaling equilibrium, the influence of the ownership structure, and the environment where firms operate in the capital structure of firms. Our final empirical integrated model is:

$$\begin{aligned} TD_{i,t} &= \alpha_0 + \alpha_1 \cdot TD_{i,t-1} + \alpha_2 \cdot GO_{i,t} + \alpha_3 \cdot SIZE_{i,t} + \alpha_4 \cdot BKCY_{i,t} + \alpha_5 \cdot DIFD_{i,t} + \alpha_6 \cdot DEF_{i,t} \\ &+ \alpha_7 \cdot ROA_{i,t} + \alpha_8 \cdot MT_{i,t} + \alpha_9 \cdot PERM_i + \alpha_{10}\, OWN_i + \alpha_{11}\, INSTITUTIONAL_C + v_{i,t} \end{aligned} \tag{13}$$

2.6. Research hypotheses

Once we have designed the empirical integrated model to analyse the influence of financial markets' asymmetric information on a firm's capital structure, our goal is to test the following four hypotheses:

H1: There is a negative relation between a firm's permanence in the stock index of the most-traded firms and its leverage due to lower asymmetry of information and higher transparency.

The market is a constant evaluator of the managerial performance. Indexed firms' managers are scrutinized by a large number of observers, including professional financial analysts, prospective investors, and creditors, which means that their asymmetries of information are lower than in the case of non-indexed firms. Indexed firm managers are also more risk adverse about future investment projects because most of their wealth is within the firm. Finally, the indexed firm managers are less financially constrained than non-indexed firm managers.

A firm that belongs to a market index of the most-traded stocks offers its investors, stockholders, and creditors a warranty of the quality of its assets that differentiates it from those firms outside the market index. In other words, this is one of many ways to convey information to capital markets. Such a situation is equivalent to the separating equilibrium proposed by Akerlof (1970). Therefore, those firms that belong to the index do not need high levels of debt for signaling the quality of their assets; there is a warranty provided by the market index to which they belong.

H2: Indexed firms with growth opportunities will prefer to finance their new opportunities with equity instead of debt to avoid debt overhang problems. Non-indexed firms need to finance their growth opportunities issuing debt to signal the quality of their opportunities.

Growth opportunities are intangible in nature and cannot be collateralized. Thus, growing firms should have lower leverage from the agency perspective. Growing companies have continuous large cash flow needs, and therefore have more problems because of the pressure of additional debt servicing. As growth may serve as an alternative quality signal, the signaling perspective would hypothesize less need for leverage for high quality firms.

Firms with highly profitable growth opportunities may lose their value if those opportunities are known by their main competitors (Cantillo and Wright, 2000; Azofra, et al, 2007). Indexed firms do not need to issue short-term debt to show positive signals about their growth opportunities because being indexed is already a positive signal of the firm's quality. Indexed firms rely less upon debt financing because their informational environment improves over time, making equity financing more desirable after using internally generated funds thus avoiding debt overhang (Korajczyk and Levy, 2003).

H3: The lower transparency and visibility of non-indexed firms make them more financially constrained than indexed firms. We expect a significantly negative relationship between the deficit of funds and leverage for non-indexed firms.

Those firms with a deficit of funds to finance their investments face a weak competitive position and a higher likelihood of bankruptcy. Under those conditions, creditors will restrict their money supply to these firms, in particular to those with higher asymmetries of information. The financial constraints involved in the deficit of funds make the asymmetries of information even more significant for non-indexed firms.

H4: Non-indexed firms will take advantage of market timing for their leverage position to avoid financial restrictions. Thus, we should observe a positive relation between market timing and debt for the group of non-indexed firms.

During bull markets, with increasing stock prices, the firms' market-value of assets rises, thereby leading to an increase in the leverage capacity (Welch, 2004). In this environment, the separating equilibrium supposes a different situation for indexed and non-indexed firms. The indexed firms do not need to increase their debt to disclose additional information to the financial markets because they are already transparent. However, non-indexed firms can use the wealth effect caused by higher stock prices, and increase their debt level; they provide a better guarantee for their loans as a result of the higher market value of their assets. Therefore, whenever we observe bull markets, the stock prices of non-indexed firms (low capitalization companies) usually increase substantially more than those of indexed firms (high capitalization companies) in what is known as the size effect. Non-indexed firms take advantage of their favourable market conditions to issue more securities (equity and debt) when prices are going up and they suffer fewer financial restrictions in comparison to what occurs during bear markets. The separating equilibrium makes indexed firms less dependent on market conditions to define their optimal capital structure. Indexed firms are well-known in the market and they are less dependent on timing the markets to avoid financial restrictions.

3. DATA, VARIABLES, AND METHODOLOGY

3.1. DATA

For the empirical analysis, we build an unbalanced panel of quoted firms using the Global Vantage (COMPUSTAT) Data Base. The unbalanced panel data contains 1,865 firms from the seven countries with the largest stock markets [(3)]: Spain, the United States, the United Kingdom, Germany, France, Belgium, and Australia. The period of analysis is from year 2001 to year 2006. For each firm we have at least five years of

(3) We have not included Japan and Italy because of lack of data on stock index membership. In the case of China, its stock markets are rather new in comparison with the rest of countries in the sample; Chinese companies are also in a particular institutional environment not comparable with the rest of countries.

firm observations for a total of 9,404 firm-year observations. The time structure of the panel used in the regression analysis is shown in Table 1. Financial firms were excluded from the sample because their capital structures are likely to be significantly different from the capital structure of non-financial firms which could bias the results. Firms with missing values for relevant variables were also excluded. We also excluded those firms with no debt or an extremely low volume of debt on their balance sheet (less than 5% of total assets at book value) because they could bias our results (Dang, 2010). In addition, we have winsorized the sample at its 5% upper and lower tails to control for outliers.

TABLE 1

TIME STRUCTURE OF THE PANEL

The table includes the time structure of the panel used in the regression analysis.

Companies	*Firm year observations*		*Firms (Obs)*	*% Obs*
	5	*6*		
Indexed companies (obs)	310 (1,550)	34 (204)	344 (1,754)	18.65
Non-indexed companies (obs)	1,476 (7,380)	45 (270)	1,521 (7,650)	81.35
Total companies (obs)	1,786 (8,930)	79 (3,474)	1,865 (9,404)	100.00

3.2. VARIABLES MEASUREMENT

The variables included in our integrated signaling model of capital structure in equation (13) are measured according to the following descriptions:

The proxy used for leverage (*TD*) is computed as the quotient between total debt and total assets at book value. Following Aggarwal and Aunt (2009) we have chosen book values because empirical models give similar findings to those based on market values. Hovakimian *et al.* (2001) find that the choice between book and market values does not influence empirical results significantly and Bowman (1980) shows that the correlation between book leverage and market leverage is very high. Our data shows a high correlation between book leverage and market leverage (table 5).

Growth opportunities (*GO*) are estimated with the market-to-book ratio. This ratio is defined as the market value of assets normalized by the book value of assets, where the market value of assets is the book value of assets less common equity (book value) plus the stock market capitalization (Andrés de*, et al.*, 2005; Bevan and Danbolt, 2002; Danbolt*, et al.*, 2002; Johnson, 1997a, b; 1996; Miguel and Pindado, 2001; Ozkan, 2002; Ozkan and Ozkan, 2004; Rajan and Zingales, 1995) [4].

The size of the companies (*SIZE*) is measured by the logarithmic transformation of total assets at book value since it is the usual solution when working with variables which do not have negative values and high variability (De Haas and Peeters, 2006).

(4) Theoretically Tobin's Q measures firm growth opportunities. Tobin's Q uses the cost of the reposition of assets which is difficult to calculate. For this reason, the growth opportunities have usually been approximated by the ratio of the market value to the book value of assets (Barclay*, et al.*, 2003; Johnson, 1997a, b). Chung and Pruitt (1994) have compared the values of Q obtained by the method of Lindenberg and Ross (1981) with an approximate Q, obtaining the result that at least 96.6% of the variability of Tobin's Q is explained by the quotient between the market value and the book value of the assets.

The probability of bankruptcy (BKCY) is estimated with the Altman's Z-Score according to the following equation (Altman, 1968): Z = 1.2 (turnover fund/total asset) +1.4 (retained earnings/total assets) +3.3 (profit before interest and taxes/total asset) +0.6 (equity at market value/total liabilities) +1.0 (revenues/total assets).

The difference in the firm debt position from the industry average leverage (*DIFD*) is calculated at book values as debt over total equity by firm and year minus debt over total equity by industry and year. We use the Global Vantage (*COMPUSTAT*) industry codes to classify each company within an industry.

Deficit of funds (*DEF*) is estimated following Shyam-Sunder and Myers (1999) as the current portion of long term debt at the start of the period plus variation of fixed assets between the present year and the previous year, plus the variation of the working capital between the present year and the previous year, minus the cash flow of the period (net income plus depreciation and minus the dividend paid), and then all scaled by the total assets.

To measure the profitability we use the return on assets ratio (*ROA*) computed as the operating income over total assets at book value. The proxy for the market timing variable (*MT*) is the market value of the firm in the period *t* scaled by the market value of the previous period, *t–1* (Farhat*, et al.*, 2009).

PERM measures the presence or permanence of firms in the index of most-traded stocks. Through this variable, we want to measure the set of positive signals and the lower asymmetric information that indexed firms have in comparison to non-indexed firms. We compute *PERM* as the ratio of the number of years the company has been in the national market index of most-traded stocks divided by the number of years we have data about that company. Its maximum value is 1 if a company is in the market index every year and 0 when a quoted company has never been in the market index during the period of analysis. We use the following indexes of the most-traded stocks for each country: IBEX 35 for Spanish firms, S&P 500 for firms of the US, the FTSE 100 for firms of the UK, the DAX 30 for German firms, the CAC 40 for French firms, the BEL 20 for Belgian firms, and the ASX 200 for Australian firms.

The variable for ownership structure is *OWN*. We use the percentage of shares in the hands of the controlling stockholder plus the proportion of shares owned by the managers. This is a dummy variable which takes the value of 1 if the ownership concentration in a company by the controlling stockholder plus the managers during the period of study is higher than 10%, otherwise the value is 0.

Finally, we introduce the institutional environment using twenty-six variables that measure the relevance of the banking system and the capital market development in each country, as well as issues related to legal developments about investor protection, risk of expropriation, and accounting standards. The list of variables is in table 2. Introducing twenty-six variables in our empirical model at the same time reduces the degree of freedom and weakens our estimators; these variables are highly correlated among them. We decided to summarize the information of all these variables doing a principal component analysis. As a result, these twenty-six variables can be summarized in six factors which explain 90.5% of the total variance. These factors are introduced in the regression model to control for institutional environment (see table 2) (5).

Table 2

Institutional variables and principal components analysis to summarize the information on institutional environment

The table includes the correlation between each factor and the original variables. The six factors obtained from the principal component analysis summarize over 90% of the information present in the twenty-six institutional variables selected to define the legal and institutional framework in each country.

	Original variables	***Components matrix***					
		F 1	***F 2***	***F 3***	***F 4***	***F 5***	***F 6***
Relevance of banking in each country	*LIQUID LIABILITIES / GDP*	-0.74	0.56	0.34	0.31	0.13	0.09
	BANK ASSETS / GDP	-0.86	0.42	0.03	0.07	-0.18	-0.17
	OTHER FINANCIAL INSTITUTIONS ASSETS / GDP	0.92	0.13	0.25	0.14	0.18	0.06
	PRIVATE CREDIT BY BANKS / GDP	-0.68	0.67	-0.21	-0.74	-0.12	-0.14
	PRIVATE CREDIT BY BANKS AND OTHER F. I. / GDP	0.61	0.72	0.15	0.12	0.12	-0.04
	BANK DEPOSITS / GDP	-0.65	0.63	0.38	-0.01	0.20	0.08
	FINANCIAL SYSTEM DEPOSITS / GDP	-0.65	0.63	0.38	-0.01	0.20	0.08
	BANK CREDIT / BANK DEPOSITS	-0.38	0.20	-0.74	-0.14	-0.40	-0.28
	NET INTEREST MARGIN	0.67	0.28	0.09	0.37	-0.33	0.10
	BANK CONCENTRATION	-0.75	-0.43	-0.28	-0.04	0.11	0.12
	BANK ROA	0.22	0.18	0.51	-0.67	-0.34	0.05
	BANK ROE	0.21	0.17	0.54	-0.53	-0.38	0.06
	BANK COST-INCOME RATIO	-0.13	-0.27	-0.52	0.61	0.39	0.14
	BANK Z-SCORE	-0.09	0.03	0.05	0.37	-0.54	0.66
Capital markets development	*STOCK MARKET CAPITALIZATION / GDP*	0.52	0.54	-0.22	-0.43	0.21	0.29
	STOCK MARKET TOTAL VALUE TRADED / GDP	0.63	0.68	-0.11	0.16	0.02	0.13
	STOCK MARKET TURNOVER RATIO	0.35	0.53	-0.10	0.63	-0.20	-0.13
	NO. OF LISTED COMPANIES PER 10K POPULATION	-0.17	0.21	-0.74	-0.20	0.06	0.29
	PRIVATE BOND MARKET CAPITALIZATION / GDP	0.89	-0.04	0.31	0.05	0.05	-0.10
	PUBLIC BOND MARKET CAPITALIZATION / GDP	-0.14	-0.54	0.66	0.14	0.05	0.25
	INTERNATIONAL DEBT ISSUES / GDP	-0.76	0.07	0.55	-0.06	0.66	0.02
Institutional indexes	*INVESTOR PROTECTION*	0.69	0.54	-0.44	-0.10	0.11	0.02
	RULE OF LAW	0.43	-0.48	0.30	-0.42	0.38	0.02
	CREDITOR RIGHTS	-0.55	0.64	0.25	0.14	0.31	0.11
	RISK OF EXPROPRIATION	0.38	0.28	0.70	0.39	0.05	-0.30
	ACCOUNTING STANDARDS	0.31	0.50	-0.49	-0.49	0.20	0.03
Variance explained by each factor		32.42%	20.50%	17.24%	10.43%	6.03%	3.88%
Cummulative total variance		32.42%	52.92%	70.16%	80.59%	86.62%	90.50%

3.3. Methodology

Panel data methodology is the most efficient tool to use when the sample is a mixture of time-series and cross-sectional data. The main advantage of the panel data methodology is that it allows us to overcome the unobservable and constant heterogeneity of each firm —competitive advantages and strategies, management quality and style, etc.— (Himmelberg, *et al.*, 1999; López and Rodríguez, 2008). Moreover, panel data contains higher informative contents, higher variability, less colinearity between the variables, more grades of freedom, and higher efficiency. Arellano and Bover (1990) argue that the panel data analysis allows assessment of the dynamicity of the adjustments and is

(5) The other way to measure institutional environment is using dummy variables for each country. We conclude that using the factors allows us to introduce more detailed differences among countries than using just the country dummy variables. As a robust analysis we repeated the regressions using the country dummy variables instead of the institutional factors without qualitative differences. The country dummy variables are not statistically significant whereas the first two of the institutional factors are statistically significant.

better in the identification and measurement of those effects which are not observable either with the cross-sectional analysis or the time-series analysis. Nevertheless, we face the common problem of simultaneity, given that some of the independent variables included in our integrated model, such as the growth opportunities, the deficit of funds, profitability, or the probability of bankruptcy can be determined simultaneously by the dependent variable. Therefore, we need to apply an econometric model which allows us to deal with constant heterogeneity and with endogeneity.

When the unobserved effect is correlated to independent variables, pooled OLS regression produces estimations that are biased and inconsistent. We can overcome this econometric issue by using either the first differences or the fixed effects (within) estimators (Nickell, 1981). However, if the strict exogeneity of the independent variables' condition fails, either the first differences or the fixed effects (within) estimators are inconsistent and have different probability limits. The general approach for estimating models that do not satisfy strict exogeneity is to use a transformation to eliminate the unobservable effects and instruments to deal with endogeneity (Wooldrigde, 2002). Thus, we use the two-step system estimator (SE) with adjusted standard errors for potential heteroskedasticity as proposed by Blundell and Bond (1998). This econometric method considers the unobserved effect transforming the variables into first differences, and uses the generalized method of moments (GMM) to deal with endogeneity problems. Those differences are reflected in the quality of the instruments involved (Levine*, et al.*, 2000). Specifically, the lagged values (in our case the dependent variable, *TD*) frequently involve weak instruments for the prediction of changes in the financial structure of firms.[6] The existence of weak instruments can lead to a poor asymptotic precision in finite samples (Alonso-Borrego and Arellano, 1999). Therefore, in this dynamic model it is also necessary to use an estimator that lessens this problem, substituting the specification in differences for the original regression specified in levels such as the system estimator (Blundell and Bond, 1998). Performing the model in this way, the system estimator involves two kinds of equations with their own instruments. The first category of equations is in levels, and its instruments are the lagged differences in the dependent and the independent variables. The second category of equations consists of equations in first differences with the levels of the dependent variable and the independent variables as instruments (Bond, 2002; Wooldrigde, 2002). For our case, by using the GMM method we can build instruments for those variables that are potentially endogenous (growth opportunities, deficit of funds, profitability and bankruptcy). In addition, this estimation method lets us deal with the issue of simultaneity between some explanatory variables (endogenous) and the dependent variable because the coefficients of endogenous variables are estimated using their values in previous years as instruments. Moreover, by using the dynamic dimension of panel data we can check out the response processes across time and identify how the different determinants included in our empirical integrated model explain the capital structure of the firm.

To test the model specifications' validity, we use the Hansen/Sargan test of over-identification of restrictions which examines the lack of correlation between the

(6) For the econometric estimations we adopt a dynamic analysis of the capital structure. We do so because a static analysis is unable to explain the dynamic nature of the capital structure (Fama and French, 2002; De Haas and Peeters, 2006). Moreover, Frank and Goyal (2003) argue that the capital structure of firms may be conditioned by a series of dynamic elements, which would advise against the application of a static model. An example of this is reflected in taxes and the cost of bankruptcy.

instruments and the error term. The AR1 and AR2 statistics measure the first- and second-order serial correlation. Given the use of first-difference transformations, we expect some degree of first-order serial correlation, although this correlation does not invalidate our results. However, the presence of second-order serial correlation does signal omitted variables. We also compute the F-test of joint significance for all independent variables. In addition, we use the adjustment for small samples proposed by Windmeijer (2005) when the sample is divided into the indexed and non-indexed firm subsamples. Since our sample size is not very large, the Windmeijer proposal improves the robustness of our results and avoids any potential downward bias in the estimated asymptotic standard errors.

4. RESULTS

4.1. Univariate statistics

Out of the 9,404 firm-year observations more than 81% correspond to non-indexed firms (7,650 firm-year observations). The reason for this split is because we consider only those market indexes in each country that include the most-traded stocks. As we see in table 3, the average firm in our sample has a debt to assets-at-book-value ratio of 56.42%, higher for the indexed firms and lower for non-indexed firms. However the debt-to-assets ratio at market value of non-indexed firms is higher than that of the indexed firms. It appears that the leverage of non-indexed firms is more affected by the mood of the stock market. There is a high correlation between the different variables to measure leverage: debt over total assets-at-book-value, long-term debt over total assets-at-book-value, and debt over total assets at market value (see table 5).

Moreover, the firms show that they have an internal funds deficit of about 2.57% of the total assets. We do not find a statistically significant difference for this variable between indexed and non-indexed firms (see table 4). On the other hand, there are statistically significant differences between indexed and non-indexed firms in growth opportunities, size, difference from the average industry leverage, profitability, market timing and ownership structure (table 4). On average, indexed firms are larger, less profitable but more leveraged than the industry, have more growth opportunities, and appear less worried about timing the market than non-indexed firms. This data indicates the existence of differences between indexed and non-indexed firms that justifies the conditions for the separating equilibrium.

The results show that once the firms join the group of indexed firms, they tend to remain in that group, which is a sign of the importance that firms give membership in the index. For example, Table 4 shows that the PERM value for the indexed firms is 92.89%. This result leads us to conclude that the turnover in this group is quite low and that the indexed firms' list remains constant over time.

4.2. Regression analysis

The multivariate analysis is divided into two parts. In the first part we perform a regression analysis of the integrated signaling model of capital structure over the whole

TABLE 3
DESCRIPTIVE STATISTICS

The table includes the mean, median, the standard deviation, minimum, and maximum of the following variables: debt on total assets (*TD*), long term debt on total assets (*LTD*), debt on equity at market value (*DEMV*), market value of assets on book value of assets (*GO*), deficit of funds for financing the variations in the working capital and in the fixed assets (DEF), the natural logarithm of the total assets (*SIZE*), the difference between the firm debt on equity and the industry debt on equity (*DIFD*), the return on the total assets (*ROA*), the Altman Z-Score (*BKCY*), the ratio of permanence of each firm in the index of the most-traded companies (*PERM*), the market timing variable (*MT*), and the ownership variable (*OWN*) that takes value 1 if the company has at least one shareholder with a participation in the capital higher than 5% and 0 otherwise.

Variable	Firms	Obs	Mean	Std. Dev.	Min	Max
TD	Indexed	1,754	0.6025	0.1624	0.1036	0.9391
	Non-indexed	7,650	0.5567	0.1714	0.0249	0.9538
	Overall	9,404	0.5642	0.1708	0.0249	0.9538
LTD	Indexed	1,754	0.1999	0.1179	0.0000	0.6346
	Non-indexed	7,650	0.1529	0.1348	0.0000	0.7092
	Overall	9,404	0.1606	0.1333	0.0000	0.7092
DEMV	Indexed	1,754	0.4190	0.2107	0.0172	0.9999
	Non-indexed	7,650	0.4739	0.2234	0.0154	1.0000
	Overall	9,404	0.4619	0.2191	0.0154	1.0000
GO	Indexed	1,754	1.7821	0.9300	0.5724	10.2627
	Non-indexed	7,650	1.4105	0.7276	0.3075	12.3977
	Overall	9,404	1.4713	0.7766	0.3075	12.3977
DEF	Indexed	1,754	0.0220	0.1922	-1.1997	0.9522
	Non-indexed	7,650	0.0265	0.2307	-1.2559	0.9658
	Overall	9,404	0.0257	0.2248	-1.2559	0.9658
SIZE	Indexed	1,754	8.9015	1.4632	2.6844	13.7461
	Non-indexed	7,650	5.7958	1.8648	0.9151	13.7676
	Overall	9,404	6.3037	2.1397	0.9151	13.7676
DIFD	Indexed	1,754	0.2543	1.4875	-2.3608	6.0000
	Non-indexed	7,650	-0.0682	1.3906	-2.6734	6.0000
	Overall	9,404	-0.0155	1.4117	-2.6734	6.0000
ROA	Indexed	1,754	1.0463	0.7225	-0.0122	4.8136
	Non-indexed	7,650	1.2591	0.7770	-0.0065	11.5919
	Overall	9,404	1.2243	0.7723	-0.0122	11.5919
BKCY	Indexed	1,754	3.2683	2.6371	-0.1984	32.1567
	Non-indexed	7,650	3.1098	2.5912	-1.7995	41.4896
	Overall	9,404	3.1357	2.5992	-1.7995	41.4896
PERM	Indexed	1,754	0.9289	0.1488	0.1667	1.0000
	Non-indexed	7,650	0.0091	0.0624	0.0000	0.8571
	Overall	9,404	0.1595	0.3502	0.0000	1.0000
MT	Indexed	1,754	1.2367	0.3991	0.0000	5.2421
	Non-indexed	7,650	1.3308	0.6734	0.0000	8.1351
	Overall	9,404	1.3154	0.6376	0.0000	8.1351
OWN	Indexed	1,754	0.4343	0.4960	0.0000	1.0000
	Non-indexed	7,650	0.3234	0.4678	0.0000	1.0000
	Overall	9,404	0.3416	0.4743	0.0000	1.0000

Table 4

Mean difference test for the indexed and non-indexed firms.

The table includes the mean difference test for the following variables: debt on total assets (*TD*), long term debt on total assets (*LTD*), debt on total assets at market value (*DEMV*), market value of assets on book value of assets (*GO*), deficit of funds for financing the variations in the working capital and in the fixed assets (*DEF*), the natural logarithm of the total assets (*SIZE*), the difference between the firm debt on equity and the industry debt on equity (*DIFD*), the return on the total assets (*ROA*), the Altman Z-Score (*BKCY*), the ratio of permanence of each firm in the index of the most traded companies (*PERM*), the market timing variable (*MT*), and the ownership variable (*OWN*) that takes value 1 if the company has at least one shareholder with a participation in the capital higher than 5% and 0 otherwise.

Variable	*Indexed*	*Non-indexed*	*Difference*	*P-value*
TD	0.6025	0.5567	0.0457	0.0000
LTD	0.1999	0.1529	0.0470	0.0000
DEMV	0.4190	0.4739	-0.0549	0.0000
GO	1.7821	1.4105	0.3717	0.0000
DEF	0.0220	0.0265	-0.0045	0.6109
SIZE	8.9015	5.7958	3.1057	0.0000
DIFD	0.2543	-0.0682	0.3225	0.0000
ROA	1.0463	1.2591	-0.2129	0.0000
BKCY	3.2683	3.1098	0.1585	0.1220
PERM	0.9289	0.0091	0.9199	0.0000
MT	1.2367	1.3308	-0.0942	0.0002
OWN	0.4343	0.3234	0.1109	0.0000

Table 5

Correlation matrix

The variables included in the matrix are: The total debt over total assets (*TD*), long term debt over total assets (*LTD*), total debt over total assets at market value (*DEMV*), the growth opportunities (*GO*), deficit of funds (*DEF*), the size of the company (*SIZE*), the return on assets (*ROA*), the probability of bankruptcy measured with the Altman's Z-Score (*BKCY*), the difference between the firm debt equity ratio and the industry average debt equity ratio (*DIFD*), the market timing variable (*MT*) and the permanence ratio of the company in the stock index (*PERM*). In parenthesis is the p-value of statistical significance.

	TD	LTD	DEMV	GO	DEF	SIZE	ROA	BKCY	DIFD	OWN	MT	PERM
TD	1.0000											
LTD	0.6948	1.0000										
	(0.0000)											
DEMV	0.6861	0.3120	1.0000									
	(0.0000)	(0.0000)										
GO	-0.2626	-0.1605	-0.6206	1.0000								
	(0.0000)	(0.0000)	(0.0000)									
DEF	-0.0013	0.1731	-0.0526	0.0899	1.0000							
	(0.9294)	(0.0000)	(0.0003)	(0.0000)								
SIZE	0.2652	0.3283	0.1160	0.0955	0.1621	1.0000						
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)							
ROA	0.0833	-0.2688	0.0097	0.0081	-0.0687	-0.1866	1.0000					
	(0.0000)	(0.0000)	(0.5066)	(0.5799)	(0.0000)	(0.0000)						
BKCY	-0.5463	-0.3556	-0.6131	0.6921	0.0623	-0.1224	0.2595	1.0000				
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)					
DIFD	0.8399	0.3499	0.5889	-0.1776	0.0070	0.2086	0.0619	-0.3644	1.0000			
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.6317)	(0.0000)	(0.0000)	(0.0000)				
OWN	-0.0037	-0.0025	-0.0257	0.0537	-0.0204	0.0689	-0.0469	0.0141	0.0073	1.0000		
	(0.8008)	(0.8647)	(0.0785)	(0.0002)	(0.1610)	(0.0000)	(0.0013)	(0.3333)	(0.6162)			
MT	-0.0337	0.0079	-0.1539	0.1733	0.1380	-0.0841	0.0369	0.1336	-0.0285	-0.0284	1.0000	
	(0.0209)	(0.5871)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0115)	(0.0000)	(0.0508)	(0.0513)		
PERM	0.1015	0.1365	-0.0890	0.1841	-0.0051	0.5542	-0.1062	0.0206	0.0821	0.0869	-0.0581	1.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.7250)	(0.0000)	(0.0000)	(0.1569)	(0.0000)	(0.0000)	(0.0001)	

sample to test our first hypothesis, *H1*. In the second part, we regress our empirical integrated model of capital structure separately over the subsamples of indexed and non-indexed firms to test our hypotheses, *H2*, *H3*, and *H4*.

The most relevant result from our analysis is the significant relation between the permanence ratio in the index (*PERM*) and the debt level (table 6). We report four regressions. In the first regression we exclude *SIZE* and *BKCY* to avoid multicolineary problems and *OWN* because it is not significant. The second regression includes *SIZE* as it is highly correlated to *PERM* (see table 5). The third regression includes *BKCY* as it is highly correlated to GO. Finally, in the fourth regression we include *OWN*. We repeat the same analysis but exclude those firms that have not been permanently in the market index (586 out of 1,754 firm-year observations) during the period of analysis (last four columns of table 6). We can see that the Hansen test of over-identification of restrictions, which tests the joint validity of the chosen instruments, allows us to accept the null hypothesis that the models are properly identified, and include the instruments used for solving the problems of simultaneity. Furthermore, we have tested and found that the error term does not have problems of second order identification through the second order autocorrelation-test.

Table 6

Regression results over the whole sample: System estimator

The table shows the regression results for the empirical integrated model of capital structure.

$$TD_{i,t} = \alpha_0 + \alpha_1 \cdot TD_{i,t-1} + \alpha_2 \cdot GO_{i,t} + \alpha_3 \cdot SIZE_{i,t} + \alpha_4 \cdot BKCY_{i,t} + \alpha_5 \cdot DIFD_{i,t} + \alpha_6 \cdot DEF_{i,t} + \alpha_7 \cdot ROA_{i,t} + \alpha_8 \cdot MT_{i,t} + \alpha_9 \cdot PERM_i + \alpha_{10}\, OWN_i + \alpha_{11}\, INSTITUTIONAL_C + \alpha_{12}\, TEMP_t + v_{i,t}$$

Where *i* refers to companies, *t* to the years, and *c* to the countries. The dependent variable is the total debt over total assets (*TD*), and the independent variables are the growth opportunities (*GO*), deficit of funds (*DEF*), the size of the company (*SIZE*), the return on assets (*ROA*), the probability of bankruptcy measured with the Altman's Z-Score (*BKCY*), the difference between the firm debt equity ratio and the industry average debt equity ratio (DIFD), the permanence ratio of the company in the stock index (*PERM*), the market timing variable (MT), and the dummy variable for ownership (*OWN*). TEMP refers to the time dummies. There is one dummy for each of the years between 2001 and 2006. INSTITUTIONAL refers to the six institutional dummies created from a principal components analysis with 26 variables that measure institutional characteristics of each country that have been summarized in six factors that explain 90.5% of the total variance. Statistical significance: *** at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. The estimators of the year dummies and of the institutional factors are not reported for the sake of brevity. The first figure is the estimation, the figure in parenthesis the p value and the last figure the standard error.

Variables	*Whole sample*				*Firms with PERM equals 1 or 0*			
Constant	0.2248 ***	0.2821 ***	0.3639 ***	0.2954 ***	0.2945 ***	0.3054 ***	0.2622 ***	0.3048 ***
	(0.0010)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
	0.0680	0.0624	0.0928	0.0708	0.0502	0.0514	0.0741	0.0497
TD_{t-1}	0.6518 ***	0.5515 ***	0.3506 *	0.4874 ***	0.4912 ***	0.5189 ***	0.5681 ***	0.5005 ***
	(0.0000)	(0.0000)	(0.0910)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
	0.1275	0.1290	0.2075	0.1038	0.0885	0.1198	0.1558	0.0870
GO	-0.0143 **	-0.0085 *	-0.0074 **	-0.0045 *	-0.0067 **	-0.0041 *	-0.0070 **	-0.0042 ***
	(0.0120)	(0.0988)	(0.0307)	(0.0525)	(0.0159)	(0.0660)	(0.0124)	(0.0080)
	0.0057	0.0059	0.0072	0.0070	0.0047	0.0046	0.0045	0.0051
DEF	0.0040	-0.0196 **	-0.0314 *	-0.0325 ***	-0.0322 ***	-0.0201 **	-0.0288 **	-0.0323 ***
	(0.7590)	(0.0219)	(0.0510)	(0.0010)	(0.0040)	(0.0213)	(0.0270)	(0.0000)
	0.0130	0.0159	0.0161	0.0095	0.0112	0.0162	0.0130	0.0089

(Continue in next page)

TABLE 6 (CONT.)
REGRESSION RESULTS OVER THE WHOLE SAMPLE: SYSTEM ESTIMATOR

ROA	0.0062	0.0138	0.0196	0.0114	0.0152 **	0.0096 *	0.0069 *	0.0102
	(0.3310)	(0.4880)	(0.5350)	(0.4640)	(0.0269)	(0.0516)	(0.0719)	(0.3280)
	0.0064	0.0199	0.0316	0.0156	0.0138	0.0148	0.0190	0.0104
DIFD	0.0345 ***	0.0807 ***	0.0720 ***	0.0727 ***	0.0748 ***	0.0784 ***	0.0756 ***	0.0757 ***
	(0.0060)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
	0.0125	0.0146	0.0144	0.0101	0.0112	0.0136	0.0112	0.0101
PERM	-0.0082 *	-0.0744 **	-0.1417 *	-0.0898 **	-0.0147 *	-0.0190 *	-0.0248 *	-0.0039 *
	(0.0770)	(0.0482)	(0.0610)	(0.0334)	(0.0530)	(0.0845)	(0.0800)	(0.0973)
	0.0528	0.1058	0.1259	0.0929	0.0796	0.0972	0.0982	0.1155
MT	-0.0045	0.0121 **	-0.0090	0.0097 **	0.0081 **	0.0100 *	0.0083 **	0.0099 *
	(0.3200)	(0.0310)	(0.1570)	(0.0390)	(0.0138)	(0.0960)	(0.0127)	(0.0700)
	0.0045	0.0056	0.0063	0.0047	0.0055	0.0060	0.0055	0.0055
SIZE		0.0038 **				0.0029 **		
		(0.0142)				(0.0200)		
		0.0026				0.0022		
BKCY			-0.0033 *				-0.0026 *	
			(0.0568)				(0.0550)	
			0.0058				0.0043	
OWN				-0.0131				-0.0240
				(0.7840)				(0.5770)
				0.0477				0.0430
AR1	-4.39	-4.38	-2.87	-4.56	-4.52	-4.2	-4.01	-4.45
	(0.000)	(0.000)	(0.004)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
AR2	0.09	0.9	0.83	0.8	0.19	0.02	0.01	0.41
	(0.930)	(0.369)	(0.406)	(0.422)	(0.850)	(0.986)	(0.991)	(0.681)
Sargan	23.23	15.25	23.02	19.29	15.35	13.2	14.94	13.39
	(0.332)	(0.292)	(0.041)	(0.115)	(0.355)	(0.432)	(0.311)	(0.418)
Hansen	18.71	12.99	14.72	13.8	11.53	10.73	11.05	11.41
	(0.604)	(0.449)	(0.325)	(0.388)	(0.644)	(0.634)	(0.606)	(0.576)
OBS	9,404	9,404	9,404	9,404	8,818	8,818	8,818	8,818

We observe, as hypothesized, that the longer the presence in the stock index (*PERM*), the lower the leverage in book value. This result supports our first hypothesis that being part of the index serves those firms as a signal of warranty and higher transparency to investors, creditors, and shareholders. Thus, firms that either permanently belong to the index (*PERM = 1*), or have been added to the index during the period of analysis (*0 < PERM < 1*), do not need high levels of debt to signal the quality of their assets. Another explanation is that being part of the index means higher transparency which reduces the asymmetry of information allowing firms to reduce their cost of capital when issuing new shares.

We observe a positive relation between the difference in companies' leverage from the average industry leverage and the proportion of debt. Thus, companies are aware of the existence of a target debt ratio and they try to be as close as possible to that target. The coefficient estimated for the variable which measures debt (TD_{t-1}) is equal to $1 - \lambda$ which corresponds to the adjustment cost to the target debt ratio. As a consequence of this, the coefficient λ measures the speed of adjustment to the optimal debt ratio. Our results indicate that the speed of adjustment for the companies in our sample to the optimal debt ratio is about 0.5 (with a maximum of 0.65 and a minimum of 0.35); that is to say, that they approach their optimum capital structure at the rate of 50% per year. This indicates that the costs of adjustment to the target debt ratio allow the companies to adjust to their optimal debt ratio in 2 years [(7)].

Additional results reported in table 6 indicate that the agency problems of growth opportunities make it more difficult to finance those growth opportunities with debt. We observe that the larger the size of the firm, the more leveraged they are. This result is consistent with previous research (Johnson, 1997a, b; Rajan and Zingales, 1995).

To test hypotheses *H2*, *H3* and *H4* we split up our sample into two subsamples: the subsample of indexed firms (1,754 observations) and the subsample of non-indexed firms (7,650 observations). The results for indexed firms are in table 7 and the results for non-indexed firms are in table 8.

Table 7

Regression results for the indexed firms: System estimator

The table shows the regression results for the empirical integrated model of capital structure.

$$TD_{i,t} = \alpha_0 + \alpha_1 \cdot TD_{i,t-1} + \alpha_2 \cdot GO_{i,t} + \alpha_3 \cdot SIZE_{i,t} + \alpha_4 \cdot BKCY_{i,t} + \alpha_5 \cdot DIFD_{i,t} + \alpha_6 \cdot DEF_{i,t} + \alpha_7 \cdot ROA_{i,t} + \alpha_8 \cdot MT_{i,t}$$
$$+ \alpha_9\, OWN_i + \alpha_{10}\, INSTITUTIONAL_C + \alpha_{11}\, TEMP_t + v_{i,t}$$

Where *i* refers to companies, *t* to the years, and *c* to the countries. The dependent variable is the total debt over total assets (*TD*), and the independent variables are the growth opportunities (*GO*), deficit of funds (*DEF*), the size of the company (*SIZE*), the return on assets (*ROA*), the probability of bankruptcy measured with the Altman's Z-Score (*BKCY*), the difference between the firm debt equity ratio and the industry average debt equity ratio (*DIFD*), the market timing variable (*MT*), and the dummy variable for ownership (*OWN*). *TEMP* refers to the time dummies. There is one dummy for each of the years between 2001 and 2006. *INSTITUTIONAL* refers to the six institutional dummies created from a principal components analysis with 26 variables that measure institutional characteristics of each country that have been summarized in six factors that explain 90.5% of the total variance. Statistical significance: *** at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. The estimators of the year dummies and of the institutional factors are not reported for the sake of brevity. The first figure is the estimation, the figure in parenthesis the p value and the last figure the standard error.

Variables	Observations with PERM>0				Observations with PERM=1			
Constant	0.3018***	0.2319***	0.4090***	0.3222***	0.2080**	0.2577	0.2426	0.2570
	(0.0000)	(0.0050)	(0.0000)	(0.0000)	(0.0430)	(0.5610)	(0.2360)	(0.3660)
	0.0633	0.0822	0.0601	0.0759	0.1025	0.4423	0.2043	0.2842
TD_{t-1}	0.4466***	0.3730***	0.4813**	0.3671**	0.6727***	0.5852**	0.5038*	0.6624***
	(0.0000)	(0.0010)	(0.0480)	(0.0180)	(0.0000)	(0.0125)	(0.0559)	(0.0000)
	0.0807	0.1106	0.1151	0.1544	0.1638	0.3809	0.8602	0.1842
GO	-0.0096**	-0.0135*	-0.0123	-0.0125**	-0.0591	-0.0765**	-0.0023*	-0.0648*
	(0.0116)	(0.0730)	(0.1240)	(0.0161)	(0.3100)	(0.0253)	(0.0993)	(0.0536)
	0.0061	0.0075	0.0080	0.0089	0.0607	0.0667	0.2798	0.1046
DEF	-0.0112	0.0351**	0.0124*	0.0009	0.0625**	0.1074**	0.0346*	0.0516**
	(0.7250)	(0.0361)	(0.0506)	(0.9790)	(0.0340)	(0.0484)	(0.0795)	(0.0485)
	0.0317	0.0385	0.0186	0.0326	0.0654	0.1534	0.1333	0.0737
ROA	0.0527***	0.0805***	0.0825***	0.0703***	0.0027	0.0048	0.0559	-0.0126
	(0.0000)	(0.0020)	(0.0000)	(0.0010)	(0.9100)	(0.9640)	(0.8340)	(0.8140)
	0.0096	0.0260	0.0124	0.0214	0.0241	0.1061	0.2661	0.0535

(Continue in next page)

(7) The period of adjustment is computed as: 1 year / 0.5 = 2 years. The range for the period of adjustment will be 1.54 to 2.86 years.

Table 7 (cont.)
Regression results for the indexed firms: System estimator

DIFD	0.0805 ***	0.0693 ***	0.0483 ***	0.0896 ***	0.0005	-0.0015	0.0193	0.0005
	(0.0000)	(0.0010)	(0.0050)	(0.0000)	(0.9940)	(0.9840)	(0.8140)	(0.9950)
	0.0165	0.0198	0.0172	0.0220	0.0643	0.0775	0.0821	0.0818
MT	0.0212	0.0457 *	0.0447 ***	0.0190	0.0396	0.0395	0.0273	0.0452
	(0.1600)	(0.0900)	(0.0000)	(0.2860)	(0.4410)	(0.5590)	(0.6440)	(0.5560)
	0.0151	0.0269	0.0106	0.0178	0.0513	0.0674	0.0591	0.0767
SIZE		0.0075				0.0007		
		(0.2580)				(0.9860)		
		0.0066				0.0392		
BKCY			-0.0218 ***				-0.0223 *	
			(0.0030)				(0.0841)	
			0.0072				0.1110	
OWN				0.0359				-0.0790
				(0.5790)				(0.8620)
				0.0647				0.4528
AR1	-2.6 ***	-2.41 **	-2.65 ***	-2.25 **	-1.65 *	-0.61	-1.25 **	-0.47
	(0.009)	(0.016)	(0.008)	(0.024)	(0.099)	(0.543)	(0.011)	(0.638)
AR2	-0.1	-0.5	-1.02	-0.5	-0.99	-0.85	-0.16	-0.31
	(0.917)	(0.614)	(0.306)	(0.615)	(0.321)	(0.398)	(0.870)	(0.756)
Sargan	9.58	9.18	4.85	7.31	8.36	3.05	10.65	2.27
	(0.385)	(0.327)	(0.773)	(0.504)	(0.790)	(0.384)	(0.140)	(0.518)
Hansen	7.69	6.46	2.3	4.4	0.05	3.47	3.5	4.2
	(0.565)	(0.596)	(0.971)	(0.819)	(0.933)	(0.274)	(0.400)	(0.830)
OBS	1,754	1,754	1,754	1,754	1,168	1,168	1,168	1,168

We observe that the growth opportunities of indexed firms that have been in the market index either during the entire period (*PERM* = 1) or during some of the years included in our study (*PERM* > 0) show a significant negative relationship with debt level. This result confirms our hypothesis *H2* that postulates that being a part of the market index changes the order of use of the sources of funds. Indexed firms have more transparency and lower asymmetric information which reduces the need for the use of debt to signal the quality of their growth opportunities; these firms are also the largest which means they have fewer financial restrictions. Thus, the companies in the index can choose the source of funds with the lowest cost; as the asymmetric information is reduced, the cost of equity decreases more than the cost of debt. indexed firms can avoid the overhang problem, reducing the debt level and financing their growth opportunities with new equity. Our results confirm this reasoning as we observe a negative relation between growth opportunities and leverage for indexed firms (table 7) and a positive relation for non-indexed firms (table 8). The coefficient estimated for those companies that belong to the index throughout the entire period of study (*PERM* = 1) is larger than in the case in which we include all the companies that have been in the index during some of the years studied (*PERM > 0*). Non-indexed firms are forced to use debt as a signaling devise about the existence of future growth options. In contrast, indexed firms are already placed in the signaling equilibrium and do not need to convey positive signals about their quality through higher debt levels.

TABLE 8

REGRESSION RESULTS FOR THE NON-INDEXED FIRMS: SYSTEM ESTIMATOR

The table shows the regression results for the empirical integrated model of capital structure.

$$TD_{i,t} = \alpha_0 + \alpha_1 \cdot TD_{i,t-1} + \alpha_2 \cdot GO_{i,t} + \alpha_3 \cdot SIZE_{i,t} + \alpha_4 \cdot BKCY_{i,t} + \alpha_5 \cdot DIFD_{i,t} + \alpha_6 \cdot DEF_{i,t} + \alpha_7 \cdot ROA_{i,t} + \alpha_8 \cdot MT_{i,t}$$
$$+ \alpha_9\, OWN_i + \alpha_{10}\, INSTITUTIONAL_C + \alpha_{11}\, TEMP_t + v_{i,t}$$

Where *i* refers to companies, *t* to the years, and *c* to the countries. The dependent variable is the total debt over total assets (*TD*), and the independent variables are the growth opportunities (*GO*), deficit of funds (*DEF*), the size of the company (*SIZE*), the return on assets (*ROA*), the probability of bankruptcy measured with the Altman's Z-Score (*BKCY*), the difference between the firm debt equity ratio and the industry average debt equity ratio (DIFD), the market timing variable (*MT*), and the dummy variable for ownership (*OWN*). *TEMP* refers to the time dummies. There is one dummy for each of the years between 2001 and 2006. *INSTITUTIONA*L refers to the six institutional dummies created from a principal components analysis with 26 variables that measure institutional characteristics of each country that have been summarized in six factors that explain 90.5% of the total variance. Statistical significance: *** at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. The estimators of the year dummies and of the institutional factors are not reported for the sake of brevity. The first figure is the estimation, the figure in parenthesis the p value and the last figure the standard error.

Variables	***Firms with PERM=0***			
Constant	0.3495 ***	0.3630 ***	0.3454 ***	0.3715 ***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
	0.0613	0.0625	0.0663	0.0681
TD_{t-1}	0.4160 ***	0.4424 ***	0.4240 ***	0.4199 ***
	(0.0000)	(0.0000)	(0.0010)	(0.0010)
	0.1091	0.1083	0.1294	0.1258
GO	0.0085 **	0.0066 *	0.0087 **	0.0075 *
	(0.0230)	(0.0980)	(0.0160)	(0.0940)
	0.0037	0.0041	0.0036	0.0046
DEF	-0.0378 ***	-0.0264 *	-0.0375 ***	-0.0403 ***
	(0.0020)	(0.0880)	(0.0030)	(0.0000)
	0.0119	0.0154	0.0127	0.0114
ROA	0.0069	-0.0012	0.0064	-0.0086
	(0.7170)	(0.9600)	(0.7930)	(0.5450)
	0.0190	0.0235	0.0246	0.0143
DIFD	0.0821 ***	0.0848 ***	0.0824 ***	0.0793 ***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
	0.0132	0.0139	0.0136	0.0147
MT	0.0085 *	0.0100 *	0.0088	0.0079 **
	(0.0700)	(0.0660)	(0.1100)	(0.0115)
	0.0053	0.0054	0.0055	0.0050
SIZE		-0.0028		
		(0.1960)		
		0.0022		
BKCY			0.0005	
			(0.8970)	
			0.0036	
OWN				-0.0286
				(0.5860)
				0.0526
AR1	-3.8	-3.67	-3.58	-3.69
	(0.000)	(0.000)	(0.000)	(0.000)
AR2	0.49	0.22	0.46	0.51
	(0.623)	(0.823)	(0.642)	(0.608)
Sargan	16.74	14.91	16.4	13.32
	(0.335)	(0.385)	(0.290)	(0.502)
Hansen	11.49	11.47	11.3	11
	(0.717)	(0.649)	(0.663)	(0.686)
OBS	7,650	7,650	7,650	7,650

In our hypothesis *H3* we posited that non-indexed firms would suffer more financial constraints in comparison to indexed firms; this hypothesis is supported by our results. As can be observed in table 8, non-indexed firms reduce their debt level when their deficit of funds increases while the indexed firms appear to issue more debt to finance their deficit of funds, especially those firms that have permanently been in the market index (*PERM* = 1, see table 7). Recall that indexed firms are in the separating (or signaling) equilibrium whilst non-indexed firms are in the joint equilibrium. Therefore, the findings show that the former ones use this comparative advantage in financing their deficit of funds with external debt, even considering that its relative cost is higher than the cost of common equity. However, for non-indexed firms, due to greater problems of asymmetries of information and lower transparency, creditors are more reluctant to finance firms with a deficit of funds.

Finally, hypothesis H4 is supported by our results. We do find a significant and positive relation between market timing and leverage for the non-indexed firms that does not appear for the indexed firms that have consistently been in the index (*PERM* = 1). Thus, non-indexed firms will take advantage of markets when prices go up to increase their leverage whereas they will be financially constrained in bearish markets.

To check the robustness of the results, we consider an alternative measure for the dependent variable: total debt over total assets at market value (*DEMV*). In this case, the results are qualitatively similar and consistent with the current results displayed in the tables. Additionally, we re-estimated the different regressions considering our original dependent variable (*TD*) and the new dependent variable used for robustness reasons (*DEMV*) but this time the two of them are winsorized at their 5% upper and lower tails. Once again, the results are similar and consistent to those previously reported (8).

5. CONCLUSIONS

Investors distinguish between companies inside and outside of the market indexes of the most-traded companies in each country. One of the reasons for such differentiation is to invest in firms that are the most liquid, transparent, and have the fewest problems of asymmetric information in each national market. The market index satisfies the conditions established by Akerlof (1970) for the existence of the separating equilibrium that helps to solve the adverse selection problem. It also permits differentiation in the financial policy followed by each of these two groups of companies. Consequently, we should observe differences in the capital structures of indexed and non-indexed firms.

We propose four hypotheses for testing the differences in the capital structure of indexed and non-indexed firms. To test our hypotheses we develop an empirical integrated model of capital structure that takes into account the trade-off, pecking order, and market timing theories. The hypotheses are tested over a sample of 1,865 non-financial companies from the seven countries with the largest stock markets during the period 2001-2006.

The regression results permit us to accept all our hypotheses. Thus, we observe that the longer the company is present in the national market index of most-traded firms, the lower its leverage. From this result, we conclude that being part of the market index

(8) These results are available upon request to the authors.

serves as a warranty for investors about the quality of the company as it increases transparency and reduces asymmetric information. This warranty is not available for non-indexed firms. Indexed companies with growth opportunities show less leveraged capital structures than non-indexed firms. For these firms, equity issues are more attractive than debt issues as the cost of equity decreases in a higher proportion to the cost of new debt when investors perceive more transparency and lower asymmetric information. The greater problems of asymmetric information that investors find in non-indexed firms increase the financial restrictions faced by these companies to finance their investments, particularly in bear markets. Finally, non-indexed firms are more influenced by the timing of the market. During periods of bullish markets, non-indexed firms find more relaxed conditions to finance their investments; whereas when markets become bearish they face tougher financial conditions in comparison with indexed companies that observe more consistency between the different phases in stock market movement.

As a future line of research, we are interested in exploring the differences in the speed of adjustment to the optimal debt ratio between indexed and non-indexed companies.

REFERENCES

Aggarwal, R., and Aung. N. 2009. International variations in transparency and capital structure: Evidence from European firms. *Journal of International Financial Management and Accounting* 20: 1-34.

Akerlof, G. 1970. The market for «lemons»: Quality uncertainty and the market mechanism. *The Quarterly Journal of Economics* 84: 488-500.

Alonso-Borrego, C., and Arellano, M. 1999. Symmetrically normalized instrumental variable estimation using panel data. *Journal of Business & Economic Statistics* 17: 36-49.

Altman, E. 1968. Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The Journal of Finance* 23: 589-609.

Andrés de, P.; López, F.; Rodríguez, J., and Vallelado, E. 2005. Determinants of bank debt in a continental financial system. Evidence from Spanish companies. *Financial Review* 40: 305-333.

Andrés de, P.; San Martín, P., and Saona, P. 2004. Decisiones financieras en la empresa chilena: Una mirada a través de las oportunidades de crecimiento. *Revista Abante* 7: 3-34.

Arellano, M., and Bover, O. 1990. La econometría de datos de panel. *Investigaciones Económicas (Segunda Época)* 14: 3-45.

Azofra, V. 1986. Bases para un modelo explicativo de la estructura de capital de la empresa. *Spanish Journal of Finance and Accounting*. XVI (49): 193-222.

Azofra, V.; Saona, P., and Vallelado, E. 2007. Oportunidades de Crecimiento y Estructura de Propiedad como Determinantes del Apalancamiento de las Empresas Españolas. *Spanish Journal of Finance and Accounting*. XXXVI (133): 11-30.

Barclay, M.; Max, L., and Smith, C. 2003. The joint determination of leverage and maturity. *Journal of Corporate Finance* 9: 149-167.

Bevan, A., and Danbolt, J. 2002. Capital structure and its determinants in the United Kingdom: A compositional analysis. *Applied Financial Economics* 12: 159-182.

Blundell, R., and Bond, S. 1998. Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics* 87: 115-143.

Bond, S. 2002. Dynamic panel data models: A guide to micro data methods and practice. *Portuguese Economic Journal* 1: 141-162.

Bowman, R. 1980, The importance of a market-value measurement of debt in assessing leverage, *Journal of Accounting Research* 18, 242-254.

Cantillo, M., and Wright, J. 2000. How do firms choose their lenders? An empirical investigation. *Review of Financial Studies* 13: 155-189.

Cotei, C., and Farhat; J. 2009. The trade-off theory and the pecking order theory: Are they mutually exclusive?, *North American Journal of Finance and Banking Research* 3 (3):1-16

Chirinko, R., and Singha, A. 2000. Testing static tradeoff against pecking order models of capital structure: A critical comment. *Journal of Financial Economics* 58: 417-425.

Chung, K., and Pruitt, S. 1994. A simple approximation of Tobin's q. *Financial Management* 23: 70-74.

Danbolt, J.; Hirst, I., and Jones; E. 2002. Measuring growth opportunities. *Applied Financial Economics* 12: 203-212.

Dang, V. 2010. Leverage, debt maturity and firm investment: An empirical analysis. *Journal of Business Finance & Accounting* 38 (1-2): 225-258.

De Haas, R., and Peeters. M. 2006. The dynamic adjustment towards target capital structures of firms in transition economies. *Economics of Transition* 14: 133-169.

Drobetz, W., and Wanzenried, G. 2006. What determines the speed of adjustment to the target capital structure? *Applied Financial Economics* 16: 941-958.

Elsas, R., and Florysiak, D. 2011, Heterogeneity in the speed of adjustment toward target leverage. *International Review of Finance* 11, 181-211.

Fama, E., and French, K. 2002. Testing trade-off and pecking order predictions about dividend and debt. *Review of Financial Studies* 15: 1-33.

Farhat, J.; Cotei, C., and Abugri, B. 2009. Testing trade-off and pecking order models under different institutional environments, Working Paper, *SSRN eLibrary*. Available at 1-28. http://ssrn.com/abstract=1404596.

Faulkender, M., and Petersen, M. 2006. Does the source of capital affect capital structure? *Review of Financial Studies* 19: 45-79.

Faulkender, M., and Smith, J. 2007, Are adjustment costs impeding realization of target capital structure? Working paper, Olin School of Business 1-36

Flannery, M., and RANGAN, K. 2006. Partial adjustment toward target capital structures. *Journal of Financial Economics* 79: 469-506.

Frank, M., and Goyal, V. 2003. Testing the pecking order theory of capital structure. *Journal of Financial Economics* 67: 217-248.

Harris, M., and Raviv, A. 1991. The theory of capital structure. *The Journal of Finance* 46: 297-355.

Heinkel, R. 1982. A theory of capital structure relevance under imperfect information. *The Journal of Finance* 37: 1141-1150.

Himmelberg, Ch.; Hubbard, R., and Palia, D. 1999. Understanding the determinants of managerial ownership and the link between ownership and performance. *Journal of Financial Economics* 53: 353-384.

Hovakimian, A.; Opler, T., and Titman, S. 2001. The debt-equity choice. *Journal of Financial and Quantitative Analysis* 36: 1-24.

— 2002. The capital structure choice: New evidence for a dynamic trade off model. *Journal of Applied Corporate Finance* 15: 24-30.

Johnson, S. 1997a. The effect of bank debt on optimal capital structure. *Financial Management* 26: 47-56.

Johnson, S. 1997b. An empirical analysis of the determinants of corporate debt ownership structure. *Journal of Financial and Quantitative Analysis* 32: 47-69.

Korajczyk, R., and Levy, A. 2003. Capital structure choice: Macroeconomic conditions and financial constraints. *Journal of Financial Economics* 68: 75-109.

Lemmon, M. L.; Roberts, M. R., and Zender, J. F. 2008. Back to the beginning: Persistence and the cross-section of corporate capital structure. *The Journal of Finance* 63: 1.575-1.608.

Lesmond, D.; O'Connor, P., and Senbet, L. 2008. Capital structure and equity liquidity, *Robert H. Smith School Research Paper No. RHS 06-067 and SSRN eLibrary*. Available at http://ssrn.com/abstract=1107660

Levine, R.; Loayza, N., and Beck, T. 2000. Financial intermediation and growth: Causality and causes. *Journal of Monetary Economics* 46: 31-77.

Lindenberg, E., and Ross, S. 1981. Tobin's q ratio and industrial organization. *Journal of Business* 54: 1-32.

López, F., and Rodríguez, J. 2008. Capital structure and institutional setting: A decompositional and international analysis. *Applied Economics* 40: 1851-1864.

Miguel, A., and Pindado, J. 2001. Determinants of capital structure: New evidence from Spanish panel data. *Journal of Corporate Finance* 7: 77-99.

Modigliani, F., and Miller, M. 1958. The cost of capital, corporation finance and the theory of investment. *American Economic Review* 68: 261-297.

Myers, S. 1984a. Capital structure puzzle. *The Journal of Finance* 39: 575-593.

— 1984b. Finance theory and financial strategy. *Interfaces* 14: 126-137.

Myers, S., and Majluf, N. 1984. Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics* 13: 187-221.

Nickell, S. 1981. Biases in dynamic models with fixed effects. *Econometrica* 49: 1.417-1.426.

Ozkan, A. 2002. The determinants of corporate debt maturity: Evidence from U.K. firms. *Applied Financial Economics* 12: 19-24.

Ozkan, A., and Ozkan, N. 2004. Corporate cash holdings: An empirical investigation of U.K companies. *Journal of Banking & Finance* 28: 2.103-2.134.

Pagano, M.; Panetta, F., and Zingales, P. 1998. Why do companies go public? An empirical analysis. *The Journal of Finance* 53: 27-64.

Rajan, R., and Zingales. L. 1995. What do we know about capital structure? Some evidence from international data. *The Journal of Finance* 50: 1.421-1.460.

Ravid, A. 1996, Debt maturity: A survey. *Financial Markets, Institutions and Instruments* 5: 3-69.

Schoubben, F., and Van Hulle, C. 2004. The determinants of leverage: Differences between quoted and non quoted firms. *Tijdschrift voor Economie en Management* XLIX: 589-621.

Serrasqueiro, Z., and Nunes, P. 2010. Are trade-off and pecking order theories mutually exclusive in explaining capital structure decisions? *African Journal of Business Management* 4: 2.216-2.230.

Shyam-Sunder, L., and Myers, S. 1999. Testing static trade-off against pecking order models of capital structure. *Journal of Financial Economics* 51: 219-244.

Stiglitz, J. E., and Weiss, A. 1981. Credit rationing in markets with imperfect information. *The American Economic Review* 71: 393-410.

Tong, G., and Green, C. 2005. Pecking order or trade-off hypothesis? Evidence on the capital structure of Chinese companies. *Applied Economics* 37: 2179 - 2189.

Welch, I. 2004. Capital structure and stock returns. *Journal of Political Economy* 112: 106-131.

Windmeijer, F. 2005, A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of Econometrics* 126: 25-51.