

NON-LINEAR RELATIONSHIP BETWEEN GROWTH OPPORTUNITIES AND BANK DEBT: A PANEL DATA ANALYSIS OF CHILEAN FIRMS*

RELACIÓN NO LINEAL ENTRE LAS OPORTUNIDADES DE CRECIMIENTO Y EL ENDEUDAMIENTO BANCARIO: ANÁLISIS DE DATOS DE PANEL PARA LAS EMPRESAS CHILENAS

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ABSTRACT

The aim of this paper is to analyze to what extent business growth opportunities influence decisions on bank debt. This objective is addressed by considering both the arguments of the positive agency theory and the institutional characteristics of the Chilean financial system. An empirical analysis considers the GMM system estimator applied to panel data of quoted Chilean firms for the period 1997 to 2008. The main advantage of this methodology is that it overcomes the heterogeneity and endogeneity problems. The main finding supports the hypothesis of the existence of a non-monotonic U-shaped relationship between growth opportunities and the level of bank debt. The initial negative relationship is explained by the costs associated with underinvestment problems, whilst the increasing part which reflects the positive relationship among growth opportunities and bank debt is based on the arguments of overinvestment costs. This result is robust to a number of alternative measures of growth opportunities.

Key words: Growth opportunities, bank debt, panel data, institutional environment.

RESUMEN

El objetivo de este trabajo es contrastar si la elección de recurrir a la banca como fuente de financiación viene determinada por las oportunidades de crecimiento. Dicho objetivo se encuentra sustentado por argumentos relacionados con la teoría financiera de la agencia y a la existencia de factores institucionales propios del sistema financiero chileno. El análisis empírico se lleva a cabo con el *GMM system estimator* para una muestra de empresas chilenas cotizadas para el período 1997-2008. La principal ventaja de esta metodología es permitir controlar los problemas de heterogeneidad y endogeneidad. Los principales resultados muestran la existencia de una relación no monotónica entre las oportunidades de crecimiento y el nivel de endeudamiento bancario. En primer lugar, existe una relación negativa que se encuentra explicada principalmente por los costos asociados a problemas de subinversión; mientras que la relación positiva entre oportunidades de crecimiento y deuda bancaria se encuentra argumentada por la presencia de problemas de sobreinversión. Estos resultados son robustos según varias medidas alternativas de las oportunidades de crecimiento.

Palabras clave: oportunidades de crecimiento, endeudamiento bancario, datos de panel, entorno institucional.

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1. Introduction

The starting point of modern financial theory is determined by the thesis of irrelevance of capital structure (Modigliani & Miller, 1958). However, if we recognize the existence of market imperfections, such irrelevance loses validity, since these imperfections will condition the different funding decisions for companies. This fact gives rise to the so-called puzzle of capital structure, where a significant amount of empirical evidence shows that some of the pieces have not yet been properly adjusted (Denis & Mihov, 2003; Harris & Raviv, 1991; Houston & James, 1996; Leary & Roberts, 2005).

Our aim with this work is to give some light on the funding decisions made by Chilean companies. More specifically, our work focuses on finding empirical regularities which allow identifying which aspects are relevant in recurring to banking funds for financing operations, given the main characteristics of the Chilean institutional environment (Jara-Bertin & Sánchez, 2012). Therefore, we analyze whether bank debt decisions are conditioned by several factors, such as growth opportunities.

Previous literature shows certain advantages of private borrowing in terms of efficiency in the activities of monitoring and control (Berlin & Loeys, 1988; Boyd & Prescott, 1986; Diamond, 1984), access to private information (Fama, 1985) and the efficiency in liquidation or renegotiation (Chemmanur & Fulghieri, 1994). On the other hand, there is empirical evidence which shows that some characteristics inherent to the companies can significantly condition their funding decisions, for example their size, leverage level, age and the amount of debt to be issued (Cantillo & Wright, 2000; Houston & James, 1996; Johnson, 1997a, 1997b; Krishnaswami & Subramaniam, 1999; López, 2005). However, in general, these empirical studies have not been accurate when trying to measure the effect of growth opportunities on the choice of bank debt.

Growth opportunities are particularly important, since literature has suggested that problems resulting from the asymmetric distribution of information become more critical in some companies that have growth opportunities. For example, small, new companies with

low levels of assets in place and with high growth opportunities are generally more risky due to the existence of high information asymmetries; therefore, bank debt may be the best solution given the advantages of monitoring and flexibility of this resource (Denis & Mihov, 2003). In contrast, larger firms with growth opportunities are less risky; they have the capacity to access the market at a lower cost or to finance their investment opportunities with equity or public debt, so they might choose these rather than incurring in bank debt (Houston & James, 1996; Krishnaswami, Spindt & Subramaniam, 1999).

Besides these considerations, in recent years, there has been a lot of literature focused on measuring the influence of the legal systems on companies' financial decisions. Recent evidence has shown the role played by legal and institutional environments in certain decisions made within the company, and in particular, financial decisions. Specifically, factors such as the evolution of the financial system in which companies operate, the degree of economic development of the country, the level of legal protection for shareholders and creditors, and law enforcement will condition the financial decisions of the company (Allen & Gale, 2001; Beck & Levine, 2002; La Porta, Lopez-de-Silanes, Shleifer & Vishny, 1997, 1998).

Our work focuses precisely on these aspects. On the one hand, we will try to analyze to what extent business growth opportunities influence the decision to use bank debt. On the other hand, we will try to study these issues specifically for the Chilean corporate system. In this sense, there are at least two institutional characteristics of the Chilean corporate system which make the analysis of the ownership structure of debt particularly interesting. Firstly, Chile is an emerging economy with a corporate system clearly oriented to banking, where the banks play a leading role in comparison with the capital markets (Fernández, González & Suárez, 2010; Fernández, 2005). Even those firms belonging to economic groups or holdings (diversified firms), which despite having developed internal capital markets, keep a close long-run relation with the banks or own a bank in their economic

groups (Majluf, Abarca, Rodríguez & Fuentes, 1998). This fact drastically reduces some conflicts such as the hold-up problem. Secondly, the ownership structure is highly concentrated, law enforcement is lower and legal protection to outside investors is weak; these characteristics promote the development of banking systems, giving them a greater legal protection to the detriment of market development.

In this way, our article follows other studies on Chilean firms' capital structure (Andrés de, San Martín, & Saona, 2004; Azofra, Saona, & Vallelado, 2004; Gallego & Loayza, 2000; Lefort & Walker, 1999-2000; Saona & Vallelado, 2010) and tries to complement them by analyzing bank debt decisions. This distinction is relevant since private bank debt is an economically important financing resource in the Chilean context, on the one hand, and exhibits different characteristics than other sources of funds, on the other hand.

To conduct this study, we have used a sample of 1,699 observations of non-financial companies traded on the *Bolsa de Santiago de Chile* in the period 1997-2008, forming panel data with an average of 7.26 observations per company. Our findings support the hypothesis of the existence of a non-monotonic U-shaped relationship between growth opportunities and the level of bank debt in Chilean companies. The initial negative relationship between growth opportunities and bank debt is supported by the costs associated with underinvestment problems, as well as the hold-up problem, while the increasing trend which reflects a positive relationship between growth opportunities and the level of bank debt, is based on the problem of overinvestment. Nevertheless, our results must be considered carefully due to other factors which might present a non-linear relationship with the level of bank debt, such as the firm size, collateral quality, or default risk, among others.

This paper has both corporate governance and policy level implications. At the corporate governance level, this work sheds additional light on the importance of the roles of screening and monitoring in the Chilean bank lending market, specifically addressing the under and overinvestment problems. At a policy level, this paper also helps to raise aware-

ness of the functions of banks in the broader credit market, and thus may help in evaluating policies designed to address concerns about the availability of business financing for the future growth opportunities of Chilean firms.

This article is organized in five sections. Following this introduction, in section 2, we review the literature on the nonlinear relationship between the ownership structure of debt and growth opportunities, and we go over the characteristics of the Chilean legal and institutional environment. The description of the sample, and the presentation of the methodology and variables used in the analysis are contained in Section 3, while in Section 4 we will discuss the results and some of their implications. Finally, the conclusions are included in Section 5.

2. Literature Review

2.1. A non-Linear Relationship between Bank Borrowing and Growth Opportunities

Choosing the source of external funds is a very important decision for non-financial firms. There are several options to obtain these resources. If we assume, according to the pecking order (Myers, 1984; Myers & Majluf, 1984), that these companies choose to borrow from external sources, then they have to decide whether it is more convenient to borrow from private lenders (banks and other private debt sources) or public lenders (bonds). This selection among sources of debt can be based on several factors such as the asymmetries of information and the agency costs (James & Smith, 2000; Jensen, 1986; López Iturriaga, 2005).

There are several theories which explain the firms' capital structure, but no consensus exists concerning the expected relationship between the firms' growth opportunities and the level of bank debt (Serrasqueiro & Nunes, 2010).

Considering the arguments of the asymmetries of information, one characteristic of public debt is that the number of lenders is very large, and this makes the ownership of debt very widespread, reducing the incentives of the bondholders to search for information in order to monitor the companies (Bessler, Drobetz & Grüninger, 2011; Boyd & Prescott, 1986). On the

contrary, private lenders, such as banks, which do not have to deal with the widespread ownership of debt (Berlin & Loeys, 1988; Blackwell & Kidwell, 1988; Diamond, 1984, 1991; Smith & Warner, 1979), will have more incentives to collect information about the companies to be able to monitor them more effectively (Nakamura, 1993), and to know the true firm's credit quality (Akerloff, 1970). Private debt implies, in general, a higher concentration of debt and a lower number of lenders; this increases the cost of default, since it will not be possible to distribute these costs between a larger number of lenders, as occurs with public debt. Private lenders will be more efficient and effective monitoring companies because they have access to private information about their future prospects; public lenders, instead, have to rely on public information (Krishnaswami et al., 1999).¹ Additionally, bank debt in those firms with less history and reputation can serve as a signaling mechanism about the true firm's credit quality and growth opportunities (Berlin & Loeys, 1988; James & Smith, 2000).

Given these incentives to search for information and to monitor the firm, many articles in the literature indicate that those companies with high levels of asymmetries of information should choose to borrow, in the first term, from private institutions (Rajan & Winton, 1995). The information asymmetries associated with growth opportunities are greater than those associated with the assets in place. Consequently, according to the signaling theory, the expected relationship between company growth opportunities and bank debt should be positive (Andrés de, López, Rodríguez & Vallelado, 2005).

Following the arguments of the strategic information approach, any equity issuance means, necessarily, that the corporation needs to provide some kind of information to the lenders. In this way, for those companies which present high levels of asymmetric information, it is extremely risky to use public debt to finance their portfolios of investment, because

this information provided can compromise the comparative advantage and the strategic investment plan. Therefore, those companies with strategic investment projects will not be willing to provide this information to prevent potential competitors from taking advantage of it. In these cases, the firms with profitable strategic plans or growth options will prefer to borrow from private lenders because they keep this information confidential and do not spread it to the market (Yosha, 1995).

Imperfect information can sometimes generate moral hazard² problems in debt contracts. In general, private lenders have a higher capacity to control and monitor corporations compared with smaller lenders, which are more specialized and dispersed, like those in the public market. Therefore, private debt, and specially bank debt, will once again have a positive impact in those cases where moral hazard problems are more significant (Chemmanur & Fulghieri, 1994; Johnson, 1997a).

Overall, the so-called moral hazard problems tend to occur in companies with similar characteristics; companies with greater investment opportunities and/or lower credit standing compared with companies with fewer growth opportunities and/or high credit standing (Hadlock & James, 2002; Krishnaswami et al., 1999). This is justified by the fact that larger growth opportunities bring greater information asymmetries, which would increase the likelihood of opportunistic behavior and hidden actions, so that a solution to these behaviors will depend on the degree of continuity, privacy and flexibility of the relations established with creditors. In this sense, it is more likely that companies will issue private debt because this has few creditors, concentrated and therefore suffers less from the free-rider problems compared to public debt. Therefore, all the above arguments suggest that firms with high growth opportunities will use bank debt firstly (Johnson, 1997b).

In spite of the previous direct relationship between growth opportunities and bank debt, Rajan (1992) highlighted the hold-up prob-

1 Houston and James (1996) show evidence to argue that private lenders monitor companies more effectively, and at the same time, are more efficient in valuing them than public lenders.

2 Information problems produced by *ex-post* costs.

lem which establishes an opposite relationship among these variables. The hold-up problem occurs when the close monitoring of banks allows them to access higher levels of a company's information, giving them a certain informational monopoly, which would place them above other potential creditors (James, 1987). A consequence of the hold-up problem is the opportunistic incentive and power given to banks to extract rents from the company. Rajan (1992) suggests that firms with growth opportunities are more susceptible to these hold-up problems compared with those companies which do not have such investment opportunities. This suggests that, to some extent, firms with growth opportunities will prefer to go to public debt markets rather than private ones, which would contradict the argument that firms with growth opportunities would have an interest in safeguarding the information asymmetries, and therefore, would prefer private debt (Yosha, 1995). In line with this approach, Houston and James (1996) found evidence that supports that hold-up costs are more severe for companies which borrow from a single bank in comparison with those who borrow from various financial institutions. In particular, they find that larger companies usually establish relationships with a greater number of bank lenders, while smaller companies usually establish relationships with only one bank. These results are consistent with those obtained by Rajan (1992), who found that a greater competition in the market for debt reduces the potential hold-up costs associated with private debt.

The empirical studies have so far predicted a linear relationship between capital structure and future growth opportunities. However, the evidence has not been entirely conclusive with respect to the impact of growth opportunities in the choice of the ownership of debt. There are different results; while some authors claim a positive relationship between growth opportunities and private debt (Krishnaswami et al., 1999), others show a negative relationship for those companies which have commitments to a single bank (Houston & James, 1996). Following Pandey (2004), this relationship could

be non-monotonic due to the underinvestment and overinvestment costs of growth opportunities. In this sense, according to the postulates of the asymmetries of information, there are two costs related to the growth opportunities which lead to an opposite relation to the level of debt (Morgado & Pindado, 2003; Stulz, 1990): i) the costs of underinvestment, and ii) the cost of overinvestment.

The underinvestment costs appear due to the limited liability of shareholders. In this case, shareholders are encouraged to invest in riskier investment projects than those initially defined in the loan conditions. Therefore, if the project succeeds, the benefits will be mainly enjoyed by the shareholders, but if the project fails, the loss is passed on to the creditor (Jensen & Meckling, 1976). This conflict is also known as the asset substitution problem. To avoid this problem, creditors will take some measures, such as raising interest rates, credit rationing or imposing limiting conditions in investment or financing terms to limit the capacity of the shareholders to develop their investment projects (Morgado & Pindado, 2003; Stiglitz & Weiss, 1981). This problem of asset substitution between shareholders and bondholders is, therefore, one of the mechanisms which lead to underinvestment.

The conflict between shareholders and bondholders also gives rise to a problem of underinvestment by moral hazard. Given the priority of bondholders in case of liquidation, shareholders may find themselves in a situation where creditors appropriate part of the value created. Therefore, shareholders will have an incentive to not undertake or to abandon positive NPV projects whenever the NPV is lower than the amount of debt issued (Myers, 1977). In particular, private creditors will try to prevent those suboptimal investment policies through several mechanisms, such as debt covenants, the reduction of the stated periods of loan, and greater supervision and control. Therefore, according to these arguments, underinvestment problems might cause a negative relationship between growth opportunities and bank borrowing.

The overinvestment costs arise from the conflict between managers and shareholders. When

the information is asymmetrically distributed, managers may use the free cash flow to undertake negative NPV projects in their own best interest (Jensen, 1986).³ Managers will have incentives to overinvest because of the pecuniary and non-pecuniary benefits associated with the larger dimension of the firm (Jensen, 1986). In this case, shareholders will pursue their managers to use higher levels of debt, and especially private debt, because in doing so, managers are obligated to afford periodical payments which reduce the free cash flow available for the consumption of perquisites. Therefore, the overinvestment costs would cause a positive relationship between growth opportunities and private debt.

Considering these arguments, the relationship between growth opportunities and bank debt might, therefore, be non-monotonic and its behavior will depend on which of the two effects is stronger. Briefly, on the one hand, the moral hazard problem arguments and the use of private debt as a disciplining mechanism support a positive relation between growth opportunities and bank debt, in the same way as the overinvestment problem. On the other hand, the hold-up problem, which allows banks to have an informational monopoly, as well as the underinvestment problems indicate a negative relationship between growth opportunities and bank debt.

In terms of prediction, Diamond (1991) and Rajan (1992) observed a non-monotonic relationship between the quality of the company and the type of debt. The models that have been proposed in the literature generally predict that higher quality firms will issue debt through the market, while those of medium quality will use bank debt. Moreover, firms with higher default risk will prefer to borrow through financial institutions as debt renegotiations can avoid inefficient liquidations (Detragiache, Garella & Guiso, 2000). For a sample of Malaysian firms, Pandey (2004) finds a cubic relationship between growth opportunities and debt. The

same phenomenon is observed by Serrasqueiro and Nunes (2010) for Portuguese companies.

Thus, according to the previous arguments, the hypothesis to be tested is that there is a non-monotonic relationship between growth opportunities and bank debt.

2.2. The Legal and Institutional Environment in the Chilean Case

The analysis of factors that could potentially affect the ownership of debt cannot be separated from the analysis of institutional factors of financial markets. In this regard, the legal and institutional environment facilitates the identification of networks of relationships between companies and banks, which can influence debt decisions. In line with this, financial systems can be classified into two main groups depending on their orientation and on the relative weight that the financial intermediation has (Allen & Gale, 2001). On the one hand, there is a market-oriented Anglo-Saxon system in which resources are directly channeled through the capital markets rather than through financial intermediation (e.g. USA, UK, Canada, etc.). On the other hand, there are other countries like Chile, Japan and some European countries (e.g. Germany, France, Italy, and Spain) where there is a strong financial system, for which financial intermediation plays a critical role. Overall, since both systems show significant differences in the relative importance of banking, capital structure decisions of companies in both systems also reflect large disparities (Rajan & Winton, 1995; Rajan & Zingales, 1998).

Despite the empirical support that the classification of bank-oriented systems versus market-oriented has received in recent years, there are new approaches based on each country's legal origin (La Porta et al., 1997, 1998; Levine, 1998; Levine, Loayza, & Beck, 2000), which certainly gives us a better framework for analysis. This approach distinguishes two main groups; countries ruled by the customary legal system or common-law and those ruled by the civil-law system. In common-law systems, laws are made by judges and then incorporated into legislature, while in civil-law, countries' laws are dictated in parliaments and legislative bod-

³ Note that free cash flow is cash flow that is left over after all valuable projects have been funded; hence, managers tend to waste these funds instead of paying them to shareholders.

ies. Consequently, each legal origin leads to system-specific profiles which differ in many ways; for instance, external investor rights and rights of creditors, law enforcement, the quality of accounting standards and the accounting process in general, ownership structure, market development and per capita income (La Porta, Lopez-de-Silanes, Shleifer & Vishny, 2000). For example, in common-law systems there is a greater investor protection through greater applicability of laws and better quality of accounting standards, also capital markets are more developed, whilst in countries with French civil-law systems, legal protection to external investors is lower.

The firm's financial decisions also reflect such differences across legal systems (Bartholdy, Boyle & Stover, 1997; Utrero, 2007). In this sense, literature has generally shown that a lower degree of legal protection to outside investors is associated with a higher degree of concentration of corporate ownership and the formation of economic groups (Himmelberg, Hubbard & Palia, 1999). In other words, better legal protection to investors results in more developed markets, and indirectly leads to an increase in productivity due to the better allocation of resources (La Porta et al., 2000). Similarly, higher creditor protection encourages the development of banking systems (Levine, 1998).

Chile, as a country framed within the emerging economies with a French civil-law system (Demirgüç-Kunt & Maksimovic, 2002; La Porta, Lopez-de-Silanes & Shleifer, 1999; Lefort & González, 2008; Lefort & Walker, 1999-2000), provides weak protection to external investors, presenting a high ownership concentration primarily in the hands of individual shareholders or holdings. This gives rise to pyramidal structures, resulting in a quite similar model to that of continental European countries (Lefort & González, 2008; Lefort & Walker, 2000). Despite the great growth experienced by the capital markets in recent decades, the legal system has not given sufficient protection to investors to avoid these concentration levels. On the contrary, the Chilean legal system has traditionally operated in a reactive way towards increasing the flexibility of the stock market and the protection of existing pension

systems administrators (Iglesias, 1999, 2000; Saona, 2009).

With regard to the selection of the source for financing growth opportunities, the legal protection of the creditor has led Chile to present a clearly bank oriented financial system, where banks play a leading role compared with capital markets when financing corporations' investment portfolios (Fernandez, 2005, 2006; Gallego & Loayza, 2000; Hernández & Walker, 1993). Therefore, considering the financial system in Chile and the weak protection to creditors, a non-monotonic relationship between growth opportunities and bank debt could be expected. On the one hand, since growth opportunities are not easy to collateralize, banks will reduce the supply of funds to finance these growth opportunities. On the other hand, bank financing in Chile is the main source of funds compared to the capital markets and public debt. Therefore, when the level of growth opportunities is substantially high, firms with deficit of funds will firstly issue private debt through banks with a higher cost of capital, because this is the main source of external funds in Chile. Once this source of funds is exhausted, the firm will issue public debt and finally new common equity, following the postulates of the pecking order theory (Myers, 1984). These two effects lead to a U-shaped non-monotonic relationship between growth opportunities and bank debt for Chilean firms. This coincides with the hypothesis developed in the previous section.

3. Variables and Methodology

3.1. Source of Information and Variables

In order to empirically test the research hypothesis, the study is performed using unbalanced panel data of quoted non-financial Chilean firms on the Santiago de Chile Stock Exchange. The panel consists of 1,699 firm-year observations for the 1997 to 2008 period, with an average of 7.26 year-observations per firm. The dataset has been obtained from the audited financial statements and stock quotations at the end of the fiscal year filed into the FECU Data Base (*Ficha Estadística Codificada Uniforme*) provided by the Chilean National Commission

of Equities Securities and Markets (*Superintendencia de Valores y Seguros*). The sample covers the largest nonfinancial firms, with an average market capitalization over \$228 thousand million Chilean pesos. The sample includes 234 firms which represent more than 95% of the Chilean nonfinancial quoted firms. The industrial sectors (observations) considered in the analysis are: agriculture (127), food (145), trade and services (656), construction (104), transport and communications (122), textile (105), energy and chemistry (215), and extractive industry (225).

The dependent variable is measured by two proxies. The first one corresponds to bank debt concentration (BDTD), which measures the private borrowing as a fraction of total liabilities (García-Teruel, Martínez-Solano & Sánchez-Ballesta, 2009), while the second proxy for the dependent variable is the bank debt over total assets (BDTA), which is used to assess the robustness of the analysis (Saona & Vallelado, 2010). In this case, the dependent variable measures the extent to which the total portfolio of investment (measured through total assets) is financed with private borrowing.

The independent variables, which are widely used in the literature about capital structure decisions, are:

The firm's investment opportunity set. Due to the fact that this variable is typically unobservable by outsiders, a common practice is to rely on proxy variables. Following Adam and Goyal (2008), we have chosen four of the most commonly used proxy variables for a firm's growth opportunities:

(i) The market-to-book assets ratio (Q1), computed as the quotient between the market capitalization plus the total debt over total assets (usually called Tobin's Q ratio).⁴ This is

4 The theoretical definition of Tobin's Q coefficient is the ratio of market value of the firm to the replacement cost of assets. However, Chung and Pruitt (1994) have compared the values of Q obtained by the method of Lindenberg and Ross (1981) with the market-to-book ratio, obtaining that at least 96,6% of the variability of Tobin's Q is explained by the market-to-book ratio. Moreover, Billett et al. (2007) argue that the market-to-book ratio is the best proxy for growth opportunities, showing that it has the highest correlation with a firm's actual investment opportunities, reflecting the information in other proxies, and is least affected by confounding factors. In fact,

perhaps the most commonly used proxy for growth opportunities. Following Myers (1977), the book value of assets is a proxy for assets in place, whereas the market value of assets is a proxy for both assets in place and investment opportunities. Thus, a high Q1 ratio indicates a firm has many future growth opportunities relative to its assets already in place.

(ii) The market-to-book equity ratio (Q2), estimated as the market capitalization over equity. The market value of equity measures the present value of all future cash flows to equity holders from both assets in place and future investment opportunities, whereas the book value of equity only represents the accumulated value generated from existing assets. Therefore, the Q2 proxy measures the mix of cash flows from assets in place and future growth opportunities.

(iii) The earnings-price ratio (Q3). Actually, this ratio is an inverse measure of growth opportunities, which indicates that the higher the ratio, the larger the proportion of equity value that is attributable to assets in place relative to growth opportunities. According to Adam and Goyal (2008), this inference assumes that the current earnings proxy for cash flows corresponds to assets in place, whereas a firm's market value of equity reflects the present value of all future cash flows, that is, cash flows from assets in place and future investment opportunities.

(iv) The ratio of capital expenditure over the net book value of plant, property, and equipment (Q4). According to Adam and Goyal (2008), capital expenditure is largely discretionary and leads to the acquisition of new investment opportunities. For instance, by developing a mineral reserve, a firm acquires the option to extract the metal. Firms that invest more acquire more growth opportunities relative to their existing assets than do firms that invest less.

We use all these variables as alternative measures of the firm's growth opportunities because this has been one of the most con-

Perfect and Wiles (1994) show that the correlation coefficient between the market to book ratio and the Tobin's Q is about 96%. The results reported by Adam and Goyal (2008) show that, on a relative scale, the market-to-book assets ratio has the highest information content with respect to investment opportunities.

fictive variables explaining the firm's capital structure decisions and this is a critical variable for the aim of this paper. Nevertheless, the variable which we trust the most is Q1, basically for two reasons. Firstly, it is the most used proxy for growth opportunities in the empirical literature; and secondly, studies which test and contrast other alternative proxies for growth opportunities arrive to the conclusion that the Q1 measure explains to a very large extent, the market value of the firm to replacement value of assets (Adam & Goyal, 2008; Billet et al., 2007; Chung & Pruitt, 1994; Danbolt et al., 2002; Perfect & Wiles, 1994).

The size of the firm has been measured as the natural logarithmic transformation of total assets (LNTAB). Large firms tend to be more diversified, have more bargaining power and a lower risk of inefficient liquidation –bankruptcy costs– (Bharath, Pasquariello & Wu, 2009; Ozkan & Ozkan, 2004; Titman & Wessels, 1988). In general, borrowing from the market involves incurring in costs of production and distribution of information that can be extremely high for smaller firms (Dennis & Sharpe, 2005). Therefore, these businesses may find that private debt is less costly because this type of debt has fewer creditors. However, since the cost of borrowing in the market is high but fixed, it is appropriate only for high levels of debt. This explains why large companies are faced with a greater propensity to issue public debt in comparison with smaller ones (Fitzpatrick & Ogden, 2011). Therefore, we would expect larger firms to issue less private debt than smaller firms.

The quality of the investment projects has been measured by the return on assets (ROA) as the earnings before taxes over total assets. The firm's profitability has been considered as a positive signal of its current investment portfolio and cash flows (Saona, 2010; Wald, 1999). Thus, a negative relationship between ROA and bank borrowing might be expected, because firms will use firstly the funds generated internally through a higher profitability (retained earnings) and only afterwards will issue new bank debt (Seifert & Gonenc, 2010; Shyam-Sunder & Myers, 1999).

The collateral is defined as the assets subject to be used in default and financial constraints.

The collateral is usually related to the asset structure in a liquidation process. Hence, the larger the tangible assets are, the higher the guarantees of paying off the debt. We use the ratio between fixed assets and total assets (FATA) as a measure of both tangibility of assets and the debt capacity of the firm (Flannery & Rangan, 2006; Rajan & Winton, 1995).

We have also included a set of control variables which are usually mentioned in the literature. For instance, *the insolvency risk* is measured by the value of Altman's Z-Score (Z).⁵Based on the construction of this variable, the higher the Z-score, the lower will be the probability of insolvency. This variable should have a negative relationship with the firm's leverage. We have introduced the distance from the firm debt position to the industry average leverage (DIFD). This ratio has been estimated as the difference between the leverage of a firm (total debt over total assets) and the industry average leverage. We included other two variables; reputation and the existence of internal capital markets. Reputation (LNAGE) was measured as the number of years since foundation, while the *existence of internal capital markets* proxy (DIV) was measured by a dummy variable that takes the value of 1 if the firm is diversified (Campa & Kedia, 2002; Lang & Stulz, 1994).

Dummy variables which describe the industrial sector where the firm operates and temporal dummy variables were also included.⁶Finally, in order to reduce the effects of outliers, all ratios/variables have been winsorized at the 1st and 99th percentile. This technique replaces the values in the 1% upper and lower tails by the next value counting inwards from the extremes.

5 Altman's Z-score is determined by the following equation (Altman, 1968): $Z = (1.2 \text{ working capital} + 1.4 \text{ retained earnings} + 3.3 \text{ EBIT} + 1.0 \text{ sales}) / \text{total asset} + (0.6 \text{ equity at market value}) / \text{total liabilities}$.

6 For space saving reasons, the dummy variables for both the industrial sector and time were excluded from the tables. Recall that these are control variables only, and their exclusion from the regressions might bias the main results, and therefore, the conclusions. The main findings about these dummies say that most recent years are more significant than past years, as well as the industries with more representative number of firms. The results including these dummy variables are available from the authors upon request.

Equation (1) describes the model to be estimated, which is in line with others widely used in the empirical literature (Andrés de et al., 2005; Hooks, 2003; Saona, 2011; Saona & Valledado, 2005, 2010).

$$\begin{aligned}
 BDTD_{it} = & \beta_0 + \beta_1 Q_{it} + \beta_2 Q_{it}^2 + \beta_3 LNTAB_{it} \\
 & \beta_4 ROA_{it} + \beta_5 FATA_{it} + \beta_6 Z_{it} \\
 & \beta_7 DIFD_{it} + \beta_8 LNAGE_{it} + \beta_9 DIV_{it} \quad (1) \\
 & \beta_{10} TIMEDUM_t + \beta_{11} INDDUM_i \\
 & \eta_i + \eta_t + \epsilon_{it}
 \end{aligned}$$

Where η_i represents the individual effect of each i firm, η_t is the temporal effect for the t periods considered in this study, and ϵ_{it} is the stochastic error. The individual effect is assumed to be constant over time and corresponds to the characteristics of the firms considered individually, such as the managerial style, the patterns of financial decisions, etc. On the other hand, the temporal effect includes all the factors which affect all firms in the sample simultaneously and with the same intensity, such as the macroeconomic variables, legal, and institutional setting. The stochastic error takes into account the measurement errors as well as the omission of some independent variables in our model.

All empirical studies must deal with sample selection bias problems. In our case, we minimize sample selection bias by using all nonfinancial firms with data available over a period long enough for us to observe firms' evolution through time, but not long enough to encounter structural changes.

3.2. Methodology

In this section, we summarize the methodology used in the analysis. Due to the panel structure of our data, which is a combination of cross sectional and time series information, we have estimated the model using the generalized method of moments (GMM). The panel data methodology allows us to control for two basic problems in these kinds of studies: the heterogeneity problem and the endogeneity problem (Arellano, 2002).

The relationships between the firms' characteristics and the financial decisions must be

interpreted carefully because of the possibility of observing spurious connections. One of the factors that contribute to the appearance of this kind of relation is the endogeneity problem. An exogenous variable is that whose values are given and are not affected by the variable to be explained, which is said to be endogenous. As a result, there is an endogeneity problem when some of the explanatory variables are not strictly exogenous. Therefore, to be able to control for the endogeneity in equation (1) we have used the GMM system estimator proposed by Blundell and Bond (1998) and Bond (2002).

The GMM system estimator is an enhanced estimator of the first-difference GMM estimator, which is based on the endogeneity of the instruments, and allows us to eliminate the bias derived from the fixed and specific effects of each firm considered individually.⁷ Due to the possible weakness of the instruments (Alonso-Borrego & Arellano, 1999), the GMM system estimator returns the most efficient and consistent estimations. These estimators are derived under the following assumptions: i) there is no serial correlation in the disturbance error, and ii) there is no correlation between the disturbance term and the individual effect. In this context, the election of the instruments is a key decision in handling the endogeneity problem. Therefore, these instruments are based on the contemporary and lagged values of the independent variables which are not strictly exogenous. In our case, the only variable that presents this problem is growth opportunities.

The consistency of the GMM system estimator critically depends on the absence of second-order serial autocorrelation in the residuals and on the validity of the instruments (Arellano, 2002; Arellano & Bond, 1991, 1998). The AR1 and AR2 statistics measure first- and second-order serial correlation. Since first-difference transformations have been used, some level of first-order serial correlation is expected. However, this correlation does not invalidate the results.

According to the previous empirical literature on capital structure decisions, the growth

⁷ For further detail about the differences and advantages of the GMM system estimator compared to the first-difference GMM estimator, see Roodman (2009).

opportunities seem to be an endogenous variable (Bevan & Danbolt, 2004; Billett, King & Maver, 2007; Danbolt, Hirst & Jones, 2002; Dang, 2010; Goyal, Lehn & Racic, 2002; Krishnaswami & Subramaniam, 1999; López & Sogorb, 2008; Moon & Tandon, 2007; Saona, 2010; Saona & Vallelado, 2005; Serrasqueiro & Nunes, 2010). We require, at least, a two year lag to allow the explanatory variable to be introduced as an instrument. We test the validity of the instruments using the Hansen test for overidentifying restrictions, which checks the validity of the selected instruments (Arellano, 2002; Hansen, 1996). To test multicollinearity problems, we also run the variance inflation factor (VIF) as a test for each regression in tables 3 and 4. Our VIF scores are below 2, and thus, we confirm that collinearity does not bias our results (Belsley, Kuh & Roy, 2004; Kutner, Neter, Nachtsheim & Li, 2005). Finally, the Wald-test of joint significance for all the dependent variables is computed.

4. Results

4.1. Descriptive Analysis

This part of the analysis describes the situation of a typical firm. Table 1 shows the mean, standard deviation, minimum and maximum values for the different variables.

The table includes the descriptive statistics of the variables used in the empirical analysis. BDTD is the bank debt over total debt, whilst BDTA is the bank debt over total assets which correspond to the two alternative dependent variables. The independent variables are growth opportunities measured through four different proxies (Q1, Q2, Q3, and Q4); the company size (LNTAB); profitability (ROA); collateral (FATA); the insolvency risk (Z); the distance from the firm debt position to the industry average leverage (DIFD); the firm's reputation (LNAGE); and a proxy for internal capital markets (DIV).

It can be seen that, in terms of private leverage, a typical firm has issued about 34.1% of its debt through a bank or a financial intermediary (BDTD). Nevertheless, 12.2% of the total assets are financed with private debt (BDTA). As we have already mentioned in the previous section, since there is no general agreement about the different proxies used in other empirical studies, we have decided to use a number of alternative proxies for growth opportunities. The widely used proxy for growth opportunities is the market to book ratio (Q1). A very similar measure might be the market to equity ratio also (Q2). In these two cases, the mean coefficient is higher than 1, which means that a typical firm in Chile has future growth opportunities. For

TABLE 1. Descriptive Statistics

Variable	Description	Mean	Std. Dev.	Min	Max
BDTD	Bank Debt / Total Debt	0.341	0.311	0.000	1.000
BDTA	Bank Debt / Total Assets	0.122	0.137	0.000	0.761
Q1	Market to Book Ratio = (Total Debt + Mk. Capitz.) / Total Assets	1.534	5.122	0.004	96.136
Q2	Market to Book Equity Ratio = Market Capitalization / Equity	1.415	2.326	0.000	20.000
Q3	EP ratio	0.053	0.485	-3.819	11.594
Q4	Capital Expenditure / Net Book Value of PPE	0.021	0.238	-0.980	1.000
LNTAB	Ln(Total Assets)	17.645	2.173	9.941	23.284
ROA	EBIT / Total Assets	0.061	0.304	-0.279	0.939
FATA	Fixed Assets / Total Assets	0.354	0.316	0.000	1.000
Z	Altman's Z-Score	3.790	5.485	-10.438	39.920
DIFD	Firm's Debt Ratio - Industry's Debt Ratio	-0.034	0.209	-0.579	0.873
LNAGE	Ln(AGE) where AGE is years since the foundation of the firm	3.389	0.944	0.000	5.056
DIV	Takes 1 if firm is diversified and 0 otherwise	0.388	0.487	0.000	1.000

Q3 (EP ratio), though, a ratio higher than 1 indicates that a larger proportion of equity value is attributable to assets in place relative to growth opportunities. As it can be seen in Table 1, the average coefficient for Q3 is lower than 1, meaning that, as it occurred with Q1 and Q2, a typical firm has growth opportunities. Q4 also supports the fact that an average firm in Chile has growth opportunities because the coefficient is positive. Recall that for Q4, the coefficient might be positive or negative. If it is positive, the company has growth opportunities, whilst if it is negative, there are no growth opportunities.

It can be observed that the return on assets (ROA) is about 6.1% for a typical firm, and that the structure of assets is composed of 35.4% of fixed assets (FATA) as a measure of the tangibility of the firms' assets. Finally, an average Chilean firm has a little bit more than 40 years since its foundation, and with an average leverage ratio

which is usually lower than the one recorded in the industry to which the firm belongs.

When we consider the correlation coefficients between the main variables (Table 2), we observe, firstly, that there is a negative correlation between Q1, Q2 and Q3 and the bank debt (BDTD), which suggests that the financial intermediaries are more aware about the potential agency problems that the future investment opportunities involve due to the discretionary behavior adopted by managers when they have future growth options.

The matrix includes the correlation coefficients and the statistical significance in parenthesis among the variables used in the econometric analysis. BDTD is the bank debt over total debt, whilst BDTA is the bank debt over total assets which correspond to the two alternative dependent variables. The independent variables are growth opportunities measured

TABLE 2. Correlation Coefficients

Variables	BDTD	BDTA	Q1	Q2	Q3	Q4	LNTAB	ROA	FATA	Z	DIFD	LNAGE
BDTA	0.746 (0.000)	1.000										
Q1	-0.083 (0.001)	0.016 (0.499)	1.000									
Q2	-0.073 (0.003)	0.055 (0.024)	0.784 (0.000)	1.000								
Q3	-0.070 (0.006)	-0.139 (0.000)	0.010 (0.693)	0.006 (0.810)	1.000							
Q4	0.017 (0.558)	0.067 (0.018)	0.083 (0.003)	0.077 (0.006)	0.047 (0.111)	1.000						
LNTAB	0.013 (0.597)	0.011 (0.650)	0.227 (0.000)	0.215 (0.000)	0.023 (0.378)	0.080 (0.005)	1.000					
ROA	-0.085 (0.001)	-0.098 (0.000)	0.145 (0.000)	0.102 (0.000)	0.561 (0.000)	0.093 (0.001)	0.056 (0.020)	1.000				
FATA	0.123 (0.000)	0.257 (0.000)	0.047 (0.054)	0.063 (0.010)	-0.066 (0.011)	0.107 (0.000)	-0.176 (0.000)	-0.030 (0.215)	1.000			
Z	-0.236 (0.000)	-0.326 (0.000)	0.271 (0.000)	0.140 (0.000)	0.120 (0.000)	-0.002 (0.949)	0.020 (0.407)	0.255 (0.000)	-0.207 (0.000)	1.000		
DIFD	0.132 (0.000)	0.487 (0.000)	0.061 (0.013)	0.136 (0.000)	-0.130 (0.000)	0.031 (0.272)	0.018 (0.460)	-0.096 (0.000)	0.156 (0.000)	-0.462 (0.000)	1.000	
LNAGE	-0.103 (0.252)	-0.038 (0.122)	0.116 (0.000)	0.073 (0.003)	0.021 (0.424)	0.002 (0.958)	0.138 (0.000)	0.000 (0.992)	0.090 (0.000)	-0.028 (0.245)	0.005 (0.827)	1.000
DIV	0.065 (0.007)	0.053 (0.028)	-0.045 (0.066)	-0.007 (0.760)	0.017 (0.514)	-0.065 (0.022)	-0.065 (0.008)	0.025 (0.302)	0.009 (0.725)	-0.038 (0.121)	0.011 (0.644)	0.028 (0.245)

through four different proxies (Q1, Q2, Q3, and Q4); the company size (LNTAB); profitability (ROA); collateral (FATA); the insolvency risk (Z); the distance from the firm debt position to the industry average leverage (DIFD); the firm's reputation (LNAGE); and a proxy for internal capital markets (DIV).

Despite the positive correlation between the firm's size (LNTAB) and the private leverage shown in Table 2, we can observe that the coefficient of correlation is very low and not statistically significant. According to what we have mentioned above, the expected relation should be negative and statistically significant, indicating that larger firms have easier access than small firms to capital markets and other sources of funds other than bank debt. This relation will be further discussed in the multivariate analysis.

Finally, more profitable firms tend to use less private debt to finance their operations. In other words, the higher the return on assets, the higher the retained earnings which are reinvested into the company, and thus the need for external funds, such as private debt, is lower. This is what seems to occur with Chilean firms according to Table 2.

4.2. Multivariate Analysis

In this part of the analysis we empirically test our research hypothesis. This analysis is based on the results shown in Table 3. As it can be seen in the different regressions, there are no problems of correlation of the second order, and the instruments used in the estimation are properly defined according to the Sargan and Hansen tests. Moreover, the variables considered in each regression are statistically significant as a whole (see Wald test), and the results do not show problems of multicollineality according to the VIF test.

The main findings show that there is a non-monotonic U-shaped relationship between the growth opportunities and the proportion of bank debt. This negative and then positive relationship between growth opportunities and bank debt is found for all the alternative measures of growth opportunities (Q1, Q2, and Q4 in Table 3). Remember however, that Q3 is the reciprocal proxy for growth opportunities mea-

sured as the earning-price ratio. In this case, the relation between this ratio and the bank borrowing is first positive and then negative, which also supports our research hypothesis.

The non-monotonic relationship between growth options and bank borrowing can be explained by different arguments. Firstly, the negative relation between growth opportunities and bank debt (the decreasing part of the U-shaped relation found) might be explained by the agency theory and the postulates of the asymmetries of information.

Estimated coefficients and standard errors (below the coefficients) are based on the GMM system estimator for the equation (1). The dependent variable is the bank debt over total debt (BDTD). The independent variables are growth opportunities measured through four different proxies (Q1, Q2, Q3, and Q4); the company size (LNTAB); profitability (ROA); collateral (FATA); the insolvency risk (Z); the distance from the firm debt position to the industry average leverage (DIFD); the firm's reputation (LNAGE); and a proxy for internal capital markets (DIV).

In this case, managers of firms with growth opportunities will be more willing to invest in highly risky projects when the investment is financed with external funds (bank debt, for instance). Given the limited liability of shareholders, they are encouraged to invest in riskier investments projects than those initially defined in the loan conditions. This is due to the fact that riskier projects are expected to give larger benefits than will be mainly enjoyed by the shareholders, whereas if large losses occur, these will be passed on to bond holders (Jensen & Meckling, 1976). In this case, the well-known problem of asset substitution arises. When post-contract asymmetric information exists, and given the impossibility of developing full contracts, such asymmetry of information could induce costs for shareholders, since banks discount the prospective substitution of assets (Morgado & Pinedo, 2003). Thus, whether it be by increasing interest rates, credit rationing, or by imposing tighter conditions in investment or financing terms, limits to the capacity of shareholders to develop their investment projects might arise (Stiglitz & Weiss, 1981). This problem of asset

TABLE 3. Quadratic Relationship between Growth Opportunities and Bank Debt

Variables	SYS	SYS	SYS	SYS
	Coeff.	Coeff.	Coeff.	Coeff.
	St. Dev.	St. Dev.	St. Dev.	St. Dev.
Intercept	1.0336 ***	0.8605 ***	0.8938 ***	1.0067 ***
	0.0860	0.0616	0.0307	0.3286
Q1	-0.0969 ***			
	0.0025			
Q1 ²	0.0147 ***			
	0.0004			
Q2		-0.1120 **		
		0.0012		
Q2 ²		0.0124 ***		
		0.0001		
Q3			0.1287 ***	
			0.0010	
Q3 ²			-0.0090 ***	
			0.0003	
Q4				-0.0995 ***
				0.0355
Q4 ²				0.1111 **
				0.0446
LNTAB	-0.0324 ***	-0.0289 ***	-0.0276 ***	-0.0345 **
	0.0052	0.0038	0.0016	0.0153
ROA	-0.2227 ***	-0.2973 ***	-0.1616 ***	-0.2914 ***
	0.0037	0.0122	0.0049	0.0818
FATA	-0.0701 ***	-0.0219 *	-0.4504 ***	-0.6768 ***
	0.0175	0.0168	0.0060	0.1541
Z	-0.0108 ***	-0.0263 ***	-0.0156 ***	-0.0153 ***
	0.0017	0.0011	0.0003	0.0020
DIFD	-0.1020 ***	-0.1738 ***	-0.0679 ***	-0.3525 ***
	0.0083	0.0068	0.0041	0.1033
LNAGE	0.0078	0.0267 ***	0.0314 ***	0.0823 *
	0.0155	0.0081	0.0037	0.0474
DIV	0.1002 ***	0.0637 ***	0.0357 ***	0.0200 *
	0.0160	0.0139	0.0052	0.1266
Time Dummy	Yes	Yes	Yes	Yes
IndustryDummy	Yes	Yes	Yes	Yes
AR1	-3.3100 ***	-2.6900 ***	-2.2500 **	-3.5600 ***
AR2	-1.23	0.04	-1.21	-0.71
Sargan	235.44	138.44	239.89	152.78
Hansen	82.29	78.43	87.55	46.83
Wald	648454 ***	15667.72 ***	4.55E+04 ***	2.07E+02 ***
VIF	1.87	1.65	1.81	1.16
OBS	1699	1694	1094	1256

***Stands for a confidence level higher than 99%; **For a level higher than 95% and * for a level higher than 90%.

substitution between shareholders and banks is, therefore, one of the mechanisms that lead to underinvestment, which supports the negative relationship among growth opportunities and the concentration of bank debt. The same relation might be observed under the hold-up problem, whose consequence is the opportu-

nistic incentive for banks to extract rents from the company. Rajan (1992) suggests that firms with growth opportunities are more susceptible to these hold-up problems, and this encourages managers to reduce the level of bank debt as growth opportunities rise. On the other hand, the direct relation between growth

opportunities and bank debt is supported by the overinvestment problem. In this case, the overinvestment process arises from the conflict between managers and shareholders. When the information is asymmetrically distributed, and taking into account that the mechanisms used to align the interests between shareholders and managers may not be fully efficient, managers may use the free cash flow to undertake negative NPV projects in their own best interest (Jensen, 1986). Managers will have incentives to overinvest because of the pecuniary and non-pecuniary benefits associated with the larger dimension of the firm (Stulz, 1990). Thus, it might be concluded that companies with substantial growth opportunities have advantages in turning to bank debt as a way of disciplining managerial behavior, so reducing the costs of free cash flow, and contributing to a positive relationship between growth opportunities and bank debt.

Moreover, the trade-off theory establishes that debt increases the likelihood of bankruptcy, which might imply a future reduction of growth opportunities, which leads to observe a negative relationship between future growth options and level of debt (Chirinko & Singha, 2000; Shyam-Sunder & Myers, 1999). However, according to Ross (1977), creditors and banks recognize companies with high growth opportunities and grant them lower cost of debt. This would lead to a positive relationship between the future growth opportunities and the level of bank debt.

Therefore, the empirical results for Chile show that when quoted firms have problems of underinvestment, their ability to issue bank debt is reduced. By their very nature, banks are more aware than bondholders about the companies' future prospects. Banks have also better access to private information about the investment portfolio of the companies. As a result, these financial intermediaries restrict the credit, increasing the after tax cost of debt when they observe that their wealth could be expropriated if the firm undergoes higher risk projects. Thus, these arguments support the underinvestment problems of asset substitution, which considers the negative relationship among growth opportunities and the concen-

tration of bank debt until the growth opportunities achieve their critical level.

Once this effect has achieved the critical level of growth opportunities, the overinvestment problem appears, and shareholders incur higher levels of debt in order to oversee their managers by reducing the free cash flow available for perquisite consumption. It means that the capital structure decisions, and specifically the bank debt decisions, are used as a corporate governance mechanism. Bank creditors are better placed than arm's-length creditors to deal with managerial discretion for several reasons. Firstly, bank intermediaries have greater control of a firm than bondholders because of the concentration of bank debt ownership (Fama, 1985; James, 1987). Secondly, banks have more capacity than individual investors for both obtaining information about the firm's future investment projects and supervising managerial decisions (Saona & Vallelado, 2010).

Considering the arguments of the institutional environment in Chile, the results obtained show that firms with valuable investment opportunities can fund them with bank debt as long as banks are more likely to solve efficiently the agency problems generated by these growth opportunities. In particular, the role played by financial intermediaries in Chile, as one of the most important corporate governance mechanisms, supports the fact that firms with high levels of growth opportunities issue bank debt to finance these options. On the other hand, the civil-law regime in Chile is characterized by weak mechanisms to protect the interests of creditors. Consequently, when firms have a low level of growth options, banks will rationalize the credit to finance these growth options because of the higher risk of moral hazard problems. Credit rationing will be the mechanism adopted by banks when the institutional framework does not efficiently protect their interests. These institutional arguments also support the non-monotonic relationship between bank debt and growth opportunities in the Chilean scenario.

In addition to everything mentioned before, it can be observed that there is a negative relationship between the size of the com-

pany (LNTAB) and the level of bank debt. This means that larger firms are more likely to take advantage of the capital markets' conditions in issuing alternative sources of funds different from bank debt (e.g. public debt). Since large companies are usually better known in capital markets, there are fewer asymmetries of information between the firm's managers and investors, so that large firms can more easily borrow from capital markets than smaller firms (Titman & Wessels, 1988). For smaller firms, with higher asymmetries of information, the only source of external funds will be private debt.

Profitability (ROA) also seems to have a negative relationship with the level of bank debt. In this case, more profitable firms follow the pecking order theory, financing their operations with retained earnings, and appealing to external funds, such as private debt, only when the internal funds have been exhausted.

There is a negative relationship between fixed assets (FATA) and the level of bank debt, which is consistent with theories based on information asymmetry (Denis & Mihov, 2003; Holstrom & Tirole, 1997). Hence, firms with a higher degree of information asymmetry (lower collateral in the form of fixed assets) will borrow privately, while firms with lower information asymmetry (those with higher fixed assets as collateral) prefer public debt or less private debt. In this case, firms with collateral time the market conditions, borrowing public debt and using collateral as a scale economy amortizing the fixed cost of 'arm's-length debt. However, when the firms do not have a considerable collateral guarantee, they have to incur private bank debt to finance their operations.

The positive relationship between the insolvency risk (Z) and the level of bank debt is confirmed, which involves higher problems of asset substitution. In this case, managers will try to transfer the risk from shareholders to creditors, and more specifically banks, incurring high risk projects.

We observe that the higher the difference between the firm's leverage and its industry's leverage, the lower the proportion of bank debt in its balance sheet. It seems to be that when the firm's leverage is further away from the one

recorded in its industry, banks are more reluctant to finance the operations of the firm with private debt. One of the main advantages of banks relative to bondholders is that the former are more aware of the current financial situation of the company. In this case, banks can use this informative advantage applying measures of credit rationing when the leverage of the firm is beyond the leverage of its industry. Reputation seems to have a positive relationship with bank debt concentration. This finding is in line with previous studies (Datta, Iskandar & Patel, 1999; Diamond, 1984, 1991; Ozkan & Ozkan, 2004) which argue that firms try to build up a solid reputation with their private lenders in order to reduce the cost of capital. In this sense, reputed Chilean firms tend to demand external funds with both lower cost and better contractual conditions than firms with lower reputation. Therefore, the higher the number of years since the foundation of the company, the higher is the level of bank debt.

Finally, the existence of internal capital market in Chilean firms (DIV), which is fostered by the creation of economic groups or holdings, also reveals a positive and statistically significant relationship with bank debt. It seems that the internal capital markets derived from diversified businesses do not reduce but increase and ease the issuance of bank debt. In particular, it can be argued that pyramidal ownership structures of Chilean firms with financial and non-financial organizations allow them to issue bank debt at more favorable conditions. Lending banks trust more on getting back the funds if the company is both more diversified and has more chance to have internal capital markets.

4.3. Robustness Analysis

To study the robustness of the results obtained we have re-estimated the models using an alternative dependent variable. In this case, we replaced the dependent variable measured as *bank debt over total debt* (BDTD) by *bank debt over total assets* (BDTA). The results of the regressions performed to test the existence of a non-monotonic relationship between bank borrowing and growth opportunities are summarized in Table 4.

TABLE 4. Robustness Analysis: Quadratic Relationship between Growth Opportunities and Bank Debt

Variables	SYS	SYS	SYS	SYS
	Coeff.	Coeff.	Coeff.	Coeff.
	St. Dev.	St. Dev.	St. Dev.	St. Dev.
Intercept	0.3388 ***	0.2851 ***	0.6298 ***	0.7364 ***
	0.0200	0.0149	0.0099	0.0889
Q1	-0.0094 ***			
	0.0008			
Q1 ²	0.0005 ***			
	0.0001			
Q2		-0.0091 ***		
		0.0006		
Q2 ²		0.0006 ***		
		0.0001		
Q3			0.0829 ***	
			0.0005	
Q3 ²			-0.0061 ***	
			0.0001	
Q4				-0.0319 **
				0.0136
Q4 ²				0.0859 ***
				0.0174
LNTAB	-0.0141 ***	-0.0106 ***	-0.0289 ***	-0.0270 ***
	0.0015	0.0008	0.0006	0.0041
ROA	-0.0707 ***	-0.1453 ***	-0.1262 ***	-0.0649 **
	0.0023	0.0034	0.0023	0.0317
FATA	-0.0246 ***	-0.0235 ***	-0.3015 ***	-0.3463 ***
	0.0033	0.0058	0.0028	0.0612
Z1	-0.0044 ***	-0.0139 ***	-0.0039 ***	-0.0039 ***
	0.0007	0.0006	0.0000	0.0014
DIFD	0.1558 ***	0.0506	0.1471 ***	0.0405
	0.0033	0.0027	0.0012	0.0340
LNAGE	0.0204 ***	0.0229 ***	0.0081 ***	0.0741 ***
	0.0042	0.0026	0.0002	0.0187
DIV	0.0319 ***	0.0278 ***	0.0768 ***	-0.0026
	0.0062	0.0045	0.0030	0.0557
Time Dummy	Yes	Yes	Yes	Yes
IndustryDummy	Yes	Yes	Yes	Yes
AR1	-2.10 **	-2.18 ***	-2.20 ***	-2.57 ***
AR2	0.29	1.12	-0.83	-0.96
Sargan	149.08	345.35	361.19	221.72
Hansen	86.15	93.46	88.93	46.34
Wald	1.73E+06 ***	3.13E+04 ***	2.26E+05 ***	3.44E+02 ***
VIF	1.87	1.65	1.88	1.16
OBS	1,694	1,694	1,094	1,256

*** Stands for a confidence level higher than 99%; ** for a level higher than 95% and * for a level higher than 90%.

Estimated coefficients and standard errors (below the coefficients) are based on the GMM system estimator for the equation (1). The dependent variable is the bank debt over total assets (BDTA). The independent variables are growth opportunities measured through four different

proxies (Q1, Q2, Q3, and Q4); the company size (LNTAB); profitability (ROA); collateral (FATA); the insolvency risk (Z); the distance from the firm debt position to the industry average leverage (DIFD); the firm's reputation (LNAGE); and a proxy for internal capital markets (DIV).

In the four columns of Table 4, we observe that there is a clear quadratic relationship between the level of bank debt as a fraction of total assets and the different proxies for the growth opportunities. In general, the results obtained for this alternative dependent variable are in agreement with our findings in the first part of this study. Nevertheless, we have to highlight that the distance from the firm's debt position to the industry average leverage (DIFD) has changed sign in this case. The main disadvantage of BDTA is that it does not consider the bank debt concentration but the extent to which total assets are financed with bank debt. Therefore, this subtle difference between BDTD and BDTA drives this change in sign for DIFD. Consequently, the higher the distance from the firm's debt position to the industry average leverage, the higher the proportion of bank debt over total assets. Overall, this provides a good robustness check of the results.

5. Conclusions

The scope of this paper is the analysis of the financial decisions, and more specifically, the study of the effect of growth opportunities on the private debt decisions. Private debt (or bank debt) and public debt (or corporate bonds) are the two most important external sources of funds. This paper focuses on the first one, bank debt, for Chilean companies. We have used the arguments of agency theory and the postulates of the asymmetries of information, as well as the institutional framework arguments, to study the non-linear relationship between the growth opportunities and bank debt.

Our study shows that, as opposed to some results in previous empirical literature, we have found empirical evidence which indicates that the relationship between future growth opportunities and bank borrowing is non-monotonic for Chilean firms. This finding is consistent in the four alternative proxies used to measure the growth opportunities. This relation takes a U-shaped form which is explained,

on the one hand, by both the underinvestment problems (for the negative part of the relationship), and then by the overinvestment problems (for the positive part of the relationship). On the other hand, the arguments of the hold-up problem also offer strong support for the negative part of the relationship among the future growth opportunities and bank borrowing. In this case, the consequences of this problem are the opportunistic incentives to banks to extract rents from the companies, which lead to a disincentive to use bank debt for financing the future growth options. Additionally, the positive part of the relationship was also explained by the free cash flow arguments. In this case, the discretionary behavior of managers might be better controlled through reducing the excess of cash, or in other words, increasing the level of bank debt.

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