

# Legal Framework, Management Ownership, and Bond Maturity

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## Abstract

We study how the legal framework and management ownership affect agency problems and consequently bond maturities. Earlier studies on the relationship between management ownership and bond maturities have produced quite ambiguous results. When taking country-level investor protection into account for a set of European countries, we find evidence for two distinctly different patterns of concave vs convex relationships between inside ownership and bond maturity in common and civil law countries, respectively. Such patterns may explain the mixed earlier results. Our results indicate that in common law countries, high inside ownership is associated with higher agency problems, bringing forth a concave relationship, whereas in civil law countries, due to initially lower investor protection, there are signs of a negative association between agency problems and inside ownership already at low ownership levels and a convex overall pattern. Stronger creditor protection is associated with a concave relationship.

## Keywords:

bond maturity, management ownership, insider ownership, investor protection, legal origin

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## 1. Introduction

This paper considers how the legal framework and management ownership influence bond maturity through their effect on agency problems. Prior literature shows that a firm's debt maturity choice is the result of many factors. Internal factors include asymmetric information and liquidity risk (Mitchell, 1991; Diamond 1991), taxes (Kane, Marcus and McDonald, 1985), and asset-maturity matching (Myers, 1977), while external factors include the availability and cost of debt as well as factors related to agency problems. Leverage itself and its maturity can also be seen as external corporate governance mechanisms (Jensen and Meckling, 1976; Grossman and Hart, 1982; Jensen, 1986; Barclay and Smith, 1995; Leland and Toft, 1996; Guedes and Opler, 1996; Stulz, 2000), as high leverage and short debt maturity can be used to reduce agency problems between owners/debtholders and the management. In more recent literature, the role of another corporate governance mechanism, that of management ownership, in reducing the classical agency problem, and that way influencing debt maturity, has been discussed and studied. The results are mixed as both a linear negative, and a concave relationship has been obtained (Datta, 2005; Marchica, 2008; Martínez-Solano, 2010). However, there is a gap in the literature regarding the role of the legal structure in the context of the management ownership and bond maturity relation.

We investigate how the level of legal investor protection affects bond maturity by analyzing the accommodation of agency problems in various corporate governance arrangements. Specifically, we study the shape (linearity/concavity/convexity) of the management ownership and debt maturity relation under the legal frameworks of common law and three different civil law ones. Using a panel data sample of 1693 European firms during the time-period of 2013 to 2017, and a 2SLS model for leverage and debt maturity, we find that the relationship between insider ownership and debt maturity varies between common and civil law countries, and the relationship can be either concave or convex. This partly explains the earlier mixed results. Our results indicate that agency problems from high insider ownership mainly arise among common law countries, while the agency problems related to weak investor protection are initially more dominant in civil law countries. It also turns out that stronger creditor protection is associated with a concave relationship.

We contribute to the literature on the interaction between different corporate governance mechanisms. Misanguy and Acharya (2014) find that the effectiveness of different corporate governance mechanisms depends on how they combine in the governance bundle. We utilize European data, where there is more variation in management ownership. This is important as the role of management ownership in reducing agency problems can be nonlinear, as an entrenchment problem may appear when ownership is high (Morck, Schleifer, and Vishny, 1988). Our results suggest that the legal framework has a central role, as management ownership can have a different functional relationship with bond maturity under different rules. Hence, this paper shows how external governance (law) significantly affects how internal corporate governance (management ownership) is related to bond maturity. Furthermore, contrary to prior studies in this area, but in line with La Porta et al. (1998), we study several different legal frameworks (different civil law families in addition to common law), which also contributes to research in debt maturity. Our results also contribute to the literature on debt maturity due to its European perspective.

The paper is structured as follows. In section 2, we review the related theory and derive hypotheses. In section 3, we present the data and methodology. Our results are reported in section 4, whereas section 5 offers a summary and conclusions.

## 2. Literature review and hypotheses

In this section, we will first review some more classical determinants of debt maturity, then discuss various agency problems and their interaction with debt maturity, as well as the rule of law as a governance mechanism. In the connection with this, we will present our hypotheses which are related to the rule of law. Finally, we will also briefly discuss some other suggested determinants for/variables potentially related to debt maturity.

### 2.1. Determinants of leverage and debt maturity

**Taxes.** Taxes are a classical determinant for leverage (Modigliani and Miller, 1963; Kraus and Litztenberger, 1973) due to the tax advantage of debt, but have also been proposed as a determinant for debt maturity. Kane, Marcus and McDonald (1985) present a model where the optimal debt maturity increases as the tax advantage of debt and the volatility of the firm decreases, and flotation costs increase. Empirical support has been provided, for example, by Stochs and Mauer (1996). Brick and Ravid (1985) argue that since tax benefits are higher when the term structure of interest rates is upward-sloping, firms have higher preferences for long-term debt then (see also Kim et al., 1995). However, Stochs and Mayer (1996) found a negative relationship between the slope of the yield curve and debt maturity, which may appear as a result of avoiding high interest rates. As we later review, the tax advantage of debt is present in many models including also other determinants for debt or debt maturity, and the trade-offs between such factors may produce various firm-specific optimums.

**Asset maturity matching.** Asset-liability maturity matching / duration matching is a key hedging strategy for interest rate risk, and is used especially by companies with financial assets, such as banks. Myers (1977) suggests maturity matching to control for agency problems (the underinvestment problem), and also to reduce transaction costs related to refinancing. Support for asset maturity as a determinant of debt maturity has been obtained in the empirical study by Hart and Moore (1994) and the survey by Graham and Harvey (2013).

**Asymmetric information and liquidity risk.** Given asymmetric info, short-term debt allows for a reduction of borrowing costs at refinancing but also increases refinancing risk. In the model of Diamond (1991a), this results in a non-monotonous relationship between rating and bond maturity, where low quality firms must borrow short-term, intermediate value firms face a higher refinancing risk and thus use longer-term debt, but good quality firms issue short-term debt. The predictions of the model should hold better when leverage i.e. liquidity risk is higher. Empirical support for predictions in line with Diamond (1991a) has been provided by Stochs and Mauer (1996), and Dennis et al. (2000). Also, Mitchell (1991) found support for the effects of asymmetric information as non-traded firms have shorter debt maturities. Goyal and Wang (2013) report that short-term debt is associated with lower asset volatility and a higher distance to default. Flannery (1986) suggests that long-term debt may under asymmetric information be more mispriced, tempting low quality firms to issue more of it when it is overpriced. Empirical support has been provided by Datta and Iskandar-Datta (2000).

**Agency problems.** Agency problems include those between owners and the management (agency problems of type one, or the so-called classical agency problem), and those between large owners, or large owners vs. minority owners (agency problems of type two). These agency problems can result in perk consumption, too low (or high) risk taking, and over/underin-

vestment.<sup>1</sup> There are also agency problems between debtholders and owners/management, problems that may result in, for example, risk shifting and under/overinvestment; we call these agency problems of type three. Debt and its short maturity have initially been seen as a solution to the agency problems of type one and two, as debtholders can act as monitors.<sup>2</sup> However, as pointed out by Datta, Iskandar-Datta and Raman (2005), given the separation between ownership and control, managers cannot be expected to always voluntarily choose the optimal debt and debt maturity levels, unless incentivized so (see also e.g. Grossman and Hart, 1982, and Novaes, 2003). Thus, these decisions in themselves are subject to agency problems. Next, we will discuss two corporate governance mechanisms: managerial ownership and the rule of law.

*Managerial ownership and leverage.* Managerial ownership is an internal corporate governance mechanism typically seen as a solution to agency problems of type one, although its effect on higher levels has been questioned (Morck et al., 1988). When higher management ownership reduces agency problems of type one, it can simultaneously increase agency problems of type three, the one between shareholders and debtholders (Jensen and Meckling, 1976).<sup>3</sup> The effect of management ownership on debt can depend on its level. Prior research suggests that firms choose lower debt levels in the absence of management ownership, incentive programs and good corporate governance (Berger, Ofek and Yermack, 1997) and a takeover threat (Novaes, 2003). At positive but low levels of management ownership, the effect of aligning the owners' and managers' interests may incentivize managers for more risk taking, resulting in higher levels of debt (as the management's aversion for liquidity risk is reduced). However, if an entrenchment effect kicks in at high levels of managerial ownership, the result may be the opposite. These effects are not unambiguous. Grossman and Hart (1982) explain high debt use when managers are in control by high leverage reducing the risk of hostile takeovers (see also Novaes, 2003), and by high leverage facilitating larger firm size and value, thereby increasing management benefits (through, for example, incentive structures or perk consumption / empire building).

*Managerial ownership and debt maturity.* Managerial ownership relates to debt maturity largely in the same way as it relates to debt level, although these two (debt and debt maturity)

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<sup>1</sup> Managerial overconfidence is also a problem in this category and may affect debt maturity choice. Huang et al. (2016) suggest that overconfident managers may use more short-term debt, as they overestimate the firm's ability to refinance. In contrast, Hackbarth (2008) suggests that managerial overconfidence may reduce the underinvestment problem and thereby increases creditors' willingness to provide longer term debt. Atuallah et al. (2018) found support for a positive relationship between debt maturity and managerial overconfidence.

<sup>2</sup> These problems can be big especially in growth firms. Barclay and Smith (1995) found support for a higher use of short maturity debt in growth firms. Also, the results of Johnson (2003) support the underinvestment problem as a determinant for debt maturity.

<sup>3</sup> This same holds for managerial incentives, as pointed out by Brockman, Martin and Unlu (2010). Managerial incentive programs typically increase the deltas and/or vegas of managerial wealth, which have opposite effects on their willingness to take risks. Brockman et al. (2010) find support for debt maturity as a mitigator of agency costs of debt in the form of negative (positive) relationships between manager portfolio deltas (vegas) and short-maturity debt. Higher risk taking may be good for the shareholders but negative for the debtholders.

can be substitutes, which may lead to opposite relationships.<sup>4 5</sup> A shorter debt maturity gives an option to renegotiate debt and reduce borrowing costs, but also increases liquidity and default risks. Short-term debt gives creditors better possibilities to monitor the firm (Rajan and Winton, 1995) as it implies more frequent interaction with the investors in the debt market, and reduces the risks of risk shifting (Barnea, Haugen, and Senbet, 1980) and suboptimal investing, thereby reducing agency costs of type three. In the same way, as argued for managerial ownership and leverage, while low levels of managerial ownership may be related to shorter debt maturity (as a result of incentivizing managers for more risk taking), a potential entrenchment effect may through increased risk aversion reverse the relationship at high levels of managerial ownership. Prior studies of the relationship between managerial ownership and debt maturity have yielded contradictory results. While Datta et al. (2005) and Guney and Ozkan (2005) found, for U.S. and U.K. firms, a negative relationship in line with what could be expected when reducing agency problems of type one at lower levels of managerial ownership, Marchica (2008) found support for a convex, U-shaped relationship, between the proportion of short-term debt and managerial ownership. As a convex relationship between the proportion of short-term debt and managerial ownership is the same as a concave one between the proportion of long-term debt (or debt maturity as a variable) and managerial ownership, Garzía-Teruel and Martínez-Solano (2010) also found support for a similar one on Spanish data. This concave debt maturity-managerial ownership relationship may result from an increasing aversion for liquidity/refinancing risk at the low end, and compensation (signalling) for the entrenchment effect in the form of higher voluntary monitoring (lower debt maturity) at high ownership levels. Garzía-Teruel and Martínez-Solano (2010) also discuss a convex relationship between ownership and debt maturity. This would include a negative relationship due to reduced agency costs at the initial increases in ownership, as managers through managerial ownership are incentivized to use the typically favorable lower interest rates at shorter maturities despite refinancing risk, but longer debt maturities at the high end of managerial ownership, as then entrenched management tries to reduce risks. This convex relationship has not prior to our study obtained empirical support.

**The rule of law.** Following La Porta et al. (1998), the importance of the legal environment and the shareholder protection it gives, i.e. the shareholder and creditor rights as well as law enforcement, has been studied as an external corporate governance mechanism. The legal environment has been shown to influence corporate decisions and the access to external capital and investments (Giannetti 2003; Turk Ariss, 2016). Better investor protection can manifest itself in many ways and can be either a complement or a substitute for other governance mechanisms (La Porta et al., 1999). Fan et al. (2012) studied how the environment influences the capital structure and debt maturity and found that more corrupt countries and countries with weaker law used more and shorter-term debt. Explicit bankruptcy codes promoted the use of debt and longer-term debt. They also found support for taxes as a determinant.

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<sup>4</sup> An interesting example of the interactions between debt and debt maturity is given by the model of Leland and Toft (1996). In a setup with endogenous default risk, the paper studies the interaction of tax advantages of debt, default risk, and agency costs on the debt and debt maturity choices. Their results suggest that in the presence of agency costs, riskier firms should use less and shorter-term debt. Firms with higher costs of financial distress would prefer longer term debt. For firms with growth opportunities, the tax advantages of debt are reduced and they may prefer shorter term debt, as found in the study of Barclay and Smith (1995a).

<sup>5</sup> Dennis et al. (2000) strongly argue that the debt contract features should be analysed jointly, as they appear to have significant interdependencies driven by, for example, asymmetric information and agency problems. They find a negative relationship between debt maturity and leverage, as either or can be used to mitigate the agency costs of underinvestment.

According to La Porta et al. (1998), common law countries have typically better *shareholder protection* than civil law ones, and of the civil law countries, the French civil law has the lowest protection. The index used by La Porta et al. (1998) has later been updated. Spamann (2008) reports that the conclusion about common law still holds for the new index, and that among the civil law forms, the German civil law has better shareholder protection than the Scandinavian, and that the French has the lowest one. For *creditor rights*, La Porta et al. (1998) found better protection in common law countries, and of the civil law countries, Germany scored the highest. Concerning *law enforcement*, Scandinavia was best, closely followed by the German civil law countries, common law countries, and the French civil law ones.

Rule of law may influence leverage levels and debt maturity directly. In countries with weaker investor protection, short-term debt and instruments that give the management less freedom can be expected to dominate (Fan et al., 2012). Based on the comparison of the legal families in La Porta et al. (1998) and supported by the empirical results by Fan et al. (2012), firms in common law countries can be expected to use more equity and long-term debt. Although similar comparative studies have not been made within the groups of civil law countries, based on La Porta et al. (1998) and Fan et al. (2012) one can expect that firms in German and Scandinavian civil law countries have better access to long-term debt as compared to firms in countries with French civil law.<sup>6</sup>

Rule of law may also influence debt and debt maturity in interaction with some other corporate governance variable, i.e. enhance or reduce its importance (act as a complement or a substitute). In itself, stronger *shareholder rights* would be expected to be associated with lower agency problems of type one, and thus potentially substitute for other ways to reduce agency problems of type one in countries with strong shareholder rights. Stronger *creditor rights* can in turn be expected to reduce debtholders' needs to use other mechanisms to protect their rights, and to reduce agency problems of type 3. This may lead to liquidity risk rather than agency problems of type three being what determines loan maturities in strong creditor right countries.

In common law countries, agency problems are typically smaller and ownership is less concentrated as there are smaller benefits from concentrated ownership. In such a case, management ownership might no longer act as a mechanism to further reduce agency problems. That might lead to a situation where the liquidity risk aversion aspect of management ownership might dominate and produce a positive relationship between debt maturity and managerial ownership at the low end of ownership levels, in line with Marchica (2008) for the U.K. At the high end, the entrenchment effect that still always potentially exists would change or flatten the slope, and thus produce the observed concave relationship.

For civil law countries, the agency problems of type one are bigger, and the negative relationship driven by reduced agency problems and thus longer debt maturity, as discussed in

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<sup>6</sup> The development of the financial markets may also play a big role. According to the European Commission (2017), the market for very long-term debt is underdeveloped in most continental European countries as compared to the U.K. and U.S. The market is also very fragmented and there are many obstacles (European Commission, 2018). As the French and German debt markets are better developed as compared to the Scandinavian market, it is possible that debt maturity is longer in the first two.

Datta et al. (2005), might instead be the result. Alternatively, the relationship could be convex<sup>7</sup> as suggested by Garzía-Teruel and Martínez-Solano (2010). Among civil law countries, this kind of relationship might be especially profound in the Scandinavian countries and in German law countries, as they have better creditor rights as compared to French civil law countries. In the latter, the relationship between debt maturity and managerial ownership could for a longer level of managerial ownership (or all the way, i.e. a linear relationship) stay negative.

Based on the discussion above, we present the following research hypotheses:

*Hypothesis 1:* The relationship between debt maturity and managerial ownership is concave in common law countries.

*Hypothesis 2:* The relationship between debt maturity and managerial ownership is convex in civil law countries with stronger creditor rights and law enforcement.

*Hypothesis 3:* The relationship between debt maturity and managerial ownership is tilted towards a linear negative one in civil law countries with weaker creditor rights (Scandinavia and France as compared to Germany) and law enforcement (Germany and France as compared to Scandinavia). Especially, the relationship is expected to be clearly a negative one in countries with French civil law, as it ranks low both in creditor rights and law enforcement.

## 2.2. Other determinants/proxies

In this section, we discuss briefly some other variables that have been studied in relation to debt maturity.

*Growth opportunities.* The views on the effects of growth opportunities are mixed. On one hand, the liquidity risk argument by Diamond (1991) predicts that firms with long-term investment opportunities would prefer to hedge against liquidity risk by long-term debt. On the other hand, Titman (1992) argues that if growth firms have both a greater likelihood of bankruptcy and better growth opportunities, they can benefit from short-term debt. Thus, growth opportunity could be inversely related to debt maturity.

*Firm size.* As larger firms may have lower information asymmetry, as well as more tangible assets relative to growth opportunities, they may have easier access to long-term debt markets. Small firms may also suffer more from various agency problems (Barnea, Haugen and Senbet, 1980 and 1985). These would result in a positive relationship between firm size and debt maturity (Antoniou, 2006).

*Corporate governance.* Corporate governance aims at reducing agency costs of especially type one, and in this role, harmonizing the preferences of managers with those of the owners. Tosun and Senbet (2019) found that stronger corporate governance through more *independent*

<sup>7</sup> A convex relationship might especially exist for the Scandinavian and German civil law countries, where creditor protection is high. This would include a negative relationship due to reduced agency costs at the initial increases in ownership. At very high management ownership, the effect from manager's portfolio delta, which is negative for short-term debt (Brookman et al., 2010) is likely to dominate effects from vega, since the ownership might largely be through common stocks instead of e.g. options. The managers would then prefer long-term debt. Moreover, at very high levels of management ownership, the managers' risk aversion might be higher, especially if their wealth in the firm constitutes a high proportion of their total wealth (Korkeamäki et al., 2017), in which case the risks of risk shifting (which creditors are afraid of) might be smaller. Thus, at higher levels of management ownership, managers might prefer long-term debt, and creditors might be willing to, under high creditor protection rights, finance such firms long-term.

*boards* reduces the need for other control measures, and the firm then uses more long-term debt. As *large owners* can also act as monitors of the management, a similar substitution effect may take place in firms with large owners. Empirical support has been provided by e.g. Arslan and Karan (2006), Marchia (2008), and García-Terunel and Martínez-Solano (2010). As large owners can also increase agency problems of type two, increased use of short-term debt (as a signalling device) can appear at higher ownership levels, especially in Europe where large owners are more common. The results of García-Terunel and Martínez-Solano (2010) are in line with such an effect. Also, the owner type may matter. Our focus in this paper is on managerial ownership.

*Gender.* La Rocca et al. (2020) studied the role of managerial gender and debt maturity. The hypothesis was that females are less overoptimistic and overconfident, and thus more cautious in monetary matters, and would thus prefer a more flexible debt structure, with short-term debt, in order to avoid missing growth opportunities and potential underinvestment. They obtained results in line with their prediction. Graham et al. (2013) on the other hand, found that male managers use more short-term debt, which they explain with over-optimism.

### 3. Data

#### 3.1. Sample

The sample consists of listed European nonfinancial firms with SIC codes ranging from 2000–5999 for the years 2013–2017. Companies must be listed on one of the stock exchanges of the included countries. The initial selection includes 2114 companies representing 10,570 observations. After dropping observations with missing information, the final unbalanced panel consists of 1693 companies and 8155 firm-year observations.

Insider ownership data are collected from FactSet by identifying the top five people in management and summing up their total holdings in the company for each year. Financial data also come from FactSet, while ownership data on large holdings have been obtained from Orbis. Data on government bond interest rates have been obtained from the OECD (2020).

The geographical distribution of the sample is presented in Table 1. The UK represents about a quarter of the sample, and together with Ireland forms the common law countries. Over a third of the sample firms come from French civil law countries, and about a fifth of the companies are from France. Scandinavian civil law countries account for about a quarter of the sample and German civil law accounts for the remaining 13.9% of the sample. Thus, all legal families are well represented in the sample. It should be noted that 97% of the common law sample firms are British.



**Table 1.** Country and legal origin distribution of the sample firms

COUNTRY	NR FIRMS	FRACTION	LEGAL FAMILY
Great Britain	426	25.2 %	Common law
Ireland	12	0.7 %	25.9 %
France	330	19.5 %	French civil law
Italy	147	8.7 %	35.6 %
Belgium	54	3.2 %	
Netherlands	45	2.7 %	
Portugal	26	1.5 %	
Switzerland	116	6.9 %	German civil law
Germany	84	5.0 %	13.9 %
Austria	35	2.1 %	
Sweden	211	12.5 %	Scandinavian civil law
Norway	76	4.5 %	24.7 %
Finland	73	4.3 %	
Denmark	58	3.4 %	
Sum	1693	100%	100%

### 3.2. Dependent variable

The dependent variable Long-term liabilities is the proportion of interest-bearing liabilities that fall due after one year. Such a variable has been used in several previous studies including Fan, Titman and Twite (2012), Marchica (2008) and García-Teruel and Martínez-Solano (2010).

### 3.3. Independent variables

Management’s insider ownership (Insider %) is defined as total insider ownership among the five highest-ranking persons in the company’s management, measured as their holdings of the company’s shares divided by the total number of shares. The same definition has also been used by Datta et al. (2005). To further consider a possible non-linear relationship with the maturity structure of loans, this variable will also be squared, similar to Marchica (2008) and García-Teruel and Martínez-Solano (2010). Management ownership is expected to have three possible connections with the maturity structure of loans: a negative linear, a concave or a convex.

Legal variables include the dummy of Common law, which will further be divided into French, German, and Scandinavian for the three different forms of civil law. To measure investor protection, a dummy variable for the ADRI index will be constructed (ADRI), which takes the value of one for those countries that have a higher value than the median in Djankov et al. (2008). To measure creditor protection, a similar dummy variable will be constructed for the CPI index (CPI), which takes the value of one if the country has a higher value than the median in La Porta et al. (1998). As a measure law enforcement (ENF), a dummy variable that equals one if a company can undergo a legally supervised reorganization is used in accordance with Djankov, Hart, McLiesh and Shleifer (2008).

### 3.4. Other independent variables

Large shareholders are defined as outside owners with a holding of at least 5%. Since most companies have at least one owner of this size, this study will focus on the owner who is the largest in the company, in line with, for example, Garcial-Teruel and Martínez-Solano (2010). Two dummy variables are constructed, one that assumes the value one if the largest owner is an individual or family (FAM) and one that assumes the value 1 if the largest owner is the state (GOV). Large owners are expected to reduce agency problems through higher monitoring and therefore be associated with longer maturities on debts, but in some cases, the major owners themselves can give rise to agency problems of all types. Family ownership can have either a positive or a negative relation with debt maturity. State-owned companies are expected to be more restrictive, and may choose liabilities with longer maturities, which reduces type 2 agency problems (Smith, 1986). State-owned firms are also expected to have better access to financing, through better guarantees for repayment, which reduces the need for monitoring (Borisova et al., 2012).

The debt/equity ratio (D/E) is calculated as the total number of liabilities divided by the market value of the company's equity. This variable is expected to be endogenous in relation to the maturity structure of loans, and will therefore be estimated in the first regression according to the 2SLS method, which is presented in more detail in the method section. This variable is expected to be strongly positive because highly indebted companies want to control their risks better with long-term debt (Diamond, 1991).

Growth opportunities are defined as the market-to-book ratio (M/B), which is calculated as the market value of equity divided by the book value of equity. Growing companies have higher M/B ratios. The relationship between growth opportunities and the maturity structure of loans is expected to be negative in line with Myers' (1977) theory of current liabilities facilitated by the underinvestment problem, which is expected to be greater among growth companies with more investment opportunities. Growth opportunities are similarly expected to explain the debt / equity ratio.

The company market value, i.e.  $\ln(C\_value)$ , captures the size of the company and is defined as the natural logarithm of the market value of equity plus the book value of debt. The value of the company is assumed to have a positive effect on the maturity structure of loans, due to economies of scale and costs for loans. Large companies can more easily issue debt, and especially bonds, than small companies. The cost for private debt, for example from banks, is clearly lower for small companies, and they more often have non-public debt. Small companies are therefore expected to have debt with shorter maturities. Factors such as better credit quality of larger companies also affect the availability of long-term liabilities (Titman and Wessels, 1988). The size of the company is expected to influence the company's indebtedness, in that they have lower bankruptcy costs and thus higher optimal indebtedness through diversification, or that they can use more equity due to fewer problems with information asymmetry (Myers and Majluf, 1984). This variable has repeatedly been shown to be a determinant of the maturity structure of corporate loans in previous empirical studies. (e.g., Barclay and Smith, 1995; Stohs and Mauer, 1996; Datta et al, 2005).

The maturity structure of assets ( $A\_duration$ ) is defined as  $(\text{Tangible fixed assets (gross)} / \text{total assets}) \times (\text{Tangible fixed assets (gross)} / \text{depreciation costs}) + (\text{current assets} / \text{total assets}) \times (\text{current assets} / \text{costs of goods sold})$ . The definition has been used in several previous studies (see, e.g., Stochs and Mauer (1996), Johnson (2003) and Datta et al. (2005)) and refers to the matching principle of Myers (1977). A positive relationship is expected for the variable if com-

panies try to match the maturity of liabilities with the maturity of assets. The natural logarithm of the variable is used in the regressions ( $\ln(A\_duration)$ ).

Asset volatility ( $A\_vola$ ) is defined as the volatility of the company's stock multiplied by the ratio of the market values of equity to assets. Firms with higher asset volatility are associated with higher credit risk, and may therefore have more restrictions in raising long-term debt (Diamond, 1991). A negative sign for asset volatility as a determinant for long-term liabilities as well as for D/E is thus expected. Asset volatility may, however, also have a positive relationship with long-term liabilities, as firms with more volatile assets may more often face problems with amortizations and therefore prefer long-term debt (Johnson, 2003). We use the natural logarithm of the variable in the regressions ( $\ln(A\_vola)$ ).

Abnormal income is defined as  $(Income\ at\ time\ t+1 - Income\ at\ t) / (Price \times total\ number\ of\ shares\ at\ t)$ . This variable takes into account information asymmetry, which predicts that companies with better information about the future prefer short-term liabilities. Higher quality companies are also expected to have a larger share of voluntary monitoring through short-term liabilities as in Flannery (1986). This variable is thus expected to be negatively associated with the maturity of liabilities. This variable is also expected to explain the debt / equity ratio based on Ross' (1977) signal theory.

The interest rate term structure ( $Term\_S$ ) is defined as the difference between the end-of-month return on a 10-year and a 3-month government bond at the end of the month for the year-end period. The interest rate structure refers to the impact of taxes, and Brick and Ravid (1985) argue that when the forward structure of interest rates is upward, the long-term liabilities increase the company's value through the acceleration of tax shields obtained by the higher long-term interest rates, suggesting an expected positive relationship of long-term liabilities. The tax explanation has received support in some previous studies, but, for example, Barclay and Smith (1995) found no effect of taxes on the maturity structure of corporate debt. Emery (2001) explains this by saying that companies are not interested in the tax aspects associated with the maturity structure of loans, but that they prefer to use current liabilities to avoid the higher forward premium between current and non-current liabilities, which would suggest a negative relationship between forward structure and the maturity of the debts.

The dummy variable REG takes the value of one if the company is regulated in some way. The dummy is defined in the same way as in Datta et al. (2005) and Barclay and Smith (1995). The dummy variable takes the value of one if the company is active in the following industries: railways (SIC 4011), transport (4210 and 4213), airlines (4512), telecommunications (4812 and 4813), and gas and electricity (4900 to 4939). Smith (1986) argues that management in regulated companies has less freedom regarding future investment choices, compared to management in unregulated companies. This reduction in investment freedom reduces the problem of underinvestment, which promotes the use of long-term debt. Barclay and Smith (1995) also found evidence for this theory and showed that regulated companies have a larger share of long-term liabilities than unregulated companies.

Credit quality is measured with a dummy variable Z that assumes a value of one if Altman's (1968) Z-score is greater than 1.81, as a value below this is considered to describe a company in financial difficulties. Altman's Z-score is calculated as  $1.2 \times ((current\ assets - current\ liabilities) / total\ assets) + 1.4 \times (Retained\ earnings / Total\ assets) + 3.3 \times (EBIT / Total\ assets) + 0.6 \times (the\ market\ value\ of\ equity / total\ debt) + 1 \times (Turnover / Total\ assets)$ . The variable measures credit quality and the relationship with the maturity structure and is expected to have a positive relation with the maturity of liabilities and indebtedness in general (Johnson, 2003).

In addition to the management insider ownership, other management characteristics in the company are controlled for. The management characteristics refer to the theory of excessive self-confidence and the variable CEO board takes the value of one if the CEO is also on the board. The CEO female takes the value of one if the CEO is a woman, and zero otherwise. A CEO who is also a member of the board is associated with a higher degree of excessive self-confidence, and women with lower. Excessive self-confidence can have both a negative and positive relationship with the maturity of debt and debt / equity ratio (Hackbarth, 2008; Huang et al., 2016).

Two dummy variables for loss equalizations (NOL) or tax deductions (ITC) in the balance sheet are used. These variables have been used in Datta et al. (2005) and Johnson (2003) as explanatory variables for the debt ratio in the first regression, as we do in our study. This variable is also used to explain the share of long-term liabilities as in Johnson (2003), as the tax liabilities increase in value with an upward-term structure of interest rates. These variables are expected to make indebtedness less attractive as they reduce the value of tax shields (DeAngelo and Masulis, 1980).

The share of fixed assets (Fixed assets) is calculated as tangible fixed assets (net) in relation to total assets. This variable is used only in the first-stage regression as an explanatory variable for the debt/equity ratio. Larger shares of fixed assets mean that the risk of asset substitution is lower, which reduces agency costs of loans and increases the optimal level of indebtedness (Williamson, 1988). Fixed assets also facilitate the liquidation of the company, which reduces the liquidation cost and also increases the optimal debt ratio (Harris and Raviv, 1990).

Profitability is defined as return on assets (ROA) and is calculated as profit before interest, tax, depreciation, and amortization (EBITDA) divided by total assets. This variable is used only in the first-stage regression as an explanatory variable of the debt / equity ratio, similar to, for example, Johnson (2003) and Datta et al. (2005). This variable can affect in two different ways, negatively according to the pecking order theory which expects more profitable companies to finance themselves more often with retained earnings rather than debt (Myers, 1984), and positively according to Jensen's (1986) free cash flow hypothesis, because higher debt in the context of larger free cash flows increases the value of the company.

### 3.5. Descriptive statistics

The variables in Table 2 are defined in Section 3. The variables to which winsorizing has been applied are asset maturity, M/B and abnormal income, all at a 0.5 percent level, which means changed values of a total of 82 observations per variable, 41 in each tail. The natural logarithm has been taken from the company's value (*C\_value*), the maturity of the assets and the volatility of the assets to obtain more normally distributed variables and a more logical interpretation in later analyses. Their original values are also presented in the table. The values are presented in decimal form, with the exception of volatility and management's insider ownership, which are in percentages.

The proportion of loans maturing after one year or later is 57%, while the median is 68%. Compared with Datta et al. (2005) whose samples are from the United States, these values are lower than their average of 79%. The values are closer to the research done in European markets, for example in the UK by Marchica (2008) and Guney and Ozkan (2005), as well as the research by Fan et al. (2012) which was made in 39 countries around the world. García-Teruel and Martínez-Solano (2010) had a clearly lower average of about 30% in their study on the Spanish market.

Among the main explanatory variables, management ownership (insider %) is on average about 3 percent. This figure is close to Datta et al. (2005), while it is lower than in studies such as García-Teruel and Martínez-Solano (2010). At least half of the companies in the sample have a

**Table 2.** Descriptive statistics

	MEAN	MEDIAN	ST.DEV.	KURTOSIS	SKEWNESS	MINIMUM	MAXIMUM
<i>Dependent variable:</i>							
Maturity	0.5717	0.6815	0.3568	-1.2072	-0.5105	0.0000	1.0000
<i>Corporate governance variables:</i>							
Insider (%)	3.3866	0.0013	11.1747	22.7480	4.5654	0.0000	94.6683
Insider (dec.)	0.0339	0.0000	0.1117	22.7480	4.5654	0.0000	0.9467
Insider <sup>2</sup>	0.0136	0.0000	0.0691	59.5517	7.1822	0.0000	0.8962
Common law	0.2592	0.0000					
Scandinavian	0.2438	0.0000					
French	0.3527	0.0000					
German	0.1443	0.0000					
CPI	0.3605	0.0000					
ADRI	0.6777	1.0000					
ENF	0.1436	0.0000					
<i>Control variables:</i>							
D/E	0.1651	0.1233	0.1637	1.8727	1.3457	0.0000	0.9477
Company value	5610.0195	338.9325	239.0634	78.5690	7.9129	0.1330	364819.0934
Ln (C_value)	5.9884	5.8258	2.3717	-0.4285	0.2390	-2.0171	12.8072
M/B	2.9800	1.9300	6.7000	48.4800	2.7600	-50.7600	69.3400
Asset duration	28.5925	9.2776	156.7002	221.6361	14.3897	0.1477	2589.2574
Ln(A_duration)	2.1440	2.2276	1.3415	1.1503	0.0698	-1.9123	7.8591
Abnormal income	-0.0014	0.0236	1.4906	421.4700	-1.1678	-36.905	46.543
Fixed assets	0.8017	0.8650	0.1970	0.5300	-1.1000	0.0314	1.0000
ROA	0.0377	0.0878	0.4206	1732.5609	-33.4292	-24.4890	4.5085
Term_S	1.2832	1.0613	0.6878	7.4898	2.0817	0.2355	5.7666
A_vola	10.1779	4.9135	126.0755	2043.1685	43.1264	0.0030	7225.9697
Ln(A_vola)	1.6179	1.5920	0.7866	7.1978	0.2684	-5.8233	8.8854
FAM	0.2963						
GOV	0.0405						
Z	0.6972						
NOL	0.7225						
ITC	0.0503						
REG	0.0742						
CEO_board	0.2298						
CEO_female	0.0625						

very low value of management ownership, which can be seen in the median, which has a value of 0.0013 percent.

Among the indices that reflect legal protection, 68% of the sample is above the median in the ADRI index. 36% of companies are above the median in the CPI index and 14% of companies are in countries most likely to undergo a legally supervised reorganization in the event of bankruptcy. These values show that there is a variety of legal protections among the countries, even if they are considered developed economies.

The debt / equity ratio averages about 17%, which is close to previous studies (e.g., Datta et al. (2005), Guney and Ozkan (2005) and Marchica (2008)). Differences can be seen from García-Teruel and Martínez-Solano (2010) where their Spanish sample had a debt/equity ratio of almost 50%. Families and private individuals are the largest shareholders in almost 30% of all companies, and 4% of the companies are mostly owned by the government, which is similar to Faccio and Lang’s (2002) sample. Approximately 30% of the observations have a low credit rating measured by Altman’s Z-score. 23% of the CEOs also sit on the board and 6% of the sample companies have women as CEOs.

We also analyzed the correlation between our variables (not reported here). Among the variables that are included in the same models for long-term liabilities, the highest correlation is 0.55 and it is between the company’s value and abnormal income. Among the variables that capture ownership characteristics, we find that long-term liabilities are negatively correlated with management’s insider ownership and family ownership, while state ownership has a positive relationship. A positive correlation (here 0.32) between long-term liabilities and indebtedness is similar to that in previous studies (see, for example, Datta et al, 2005) and underlines the possibility that these variables may be endogenous in relation to each other. They have further very similar correlations in relation to the theoretically important control variables, which further supports the choice to treat indebtedness and long-term liabilities as endogenous and use a 2SLS model.

### 3.6. Model

The debt/equity ratio model estimated in the first step regression is presented below. To correctly identify the equations, the variables fixed assets and ROA are excluded from the second stage regression like Johnson (2003), who argues that no theoretical studies on the maturity structure of loans predict a relationship between these variables. The debt / equity model is specified as follows:

$$D/E_{i,t} = \beta_0 + \beta_1 \text{Insider}_{i,t} + \beta_2 (\text{Insider})^2_{i,t} + \beta_3 \text{FAM}_{i,t} + \beta_4 \text{GOV}_{i,t} + \beta_5 \text{Ln}(\text{C\_value})_{i,t} + \beta_6 \text{M/B}_{i,t} + \beta_7 \text{Abnormal income}_{i,t} + \beta_8 \text{Fixed assets}_{i,t} + \beta_9 \text{ROA}_{i,t} + \beta_{10} \text{NOL}_{i,t} + \beta_{11} \text{ITC}_{i,t} + \beta_{12} \text{Z}_{i,t} + \beta_{13} \text{REG}_{i,t} + \beta_{14} \text{Term S}_{i,t} + \beta_{15} \text{Ln}(\text{A\_vola})_{i,t} + \varepsilon_{i,t} \quad (1)$$

The other models show second-step regressions, in which the relationship between management’s insider ownership, legal origins and the maturity of loans is examined. Model two below presents the control variables in their entirety, and a non-linear relationship between insider ownership and the maturity of loans will also be taken into account. Models three and four examine the relationship between legal origins and different indices for investor protection. These models are specified as follows:

$$\begin{aligned} \text{Long-term liabilities}_{i,t} = & \beta_0 + \beta_1 \text{Insider}_{i,t} + \beta_2 (\text{Insider})^2_{i,t} + \beta_3 \text{D/E (estimated)}_{i,t} + \beta_4 \text{FAM}_{i,t} + \beta_5 \text{GOV}_{i,t} + \\ & \beta_6 \text{Ln (C\_value)}_{i,t} + \beta_7 \text{(M/B)}_{i,t} + \beta_8 \text{Abnormal income}_{i,t} + \beta_9 \text{A\_duration}_{i,t} + \beta_{10} \text{Z}_{i,t} + \beta_{11} \text{REG}_{i,t} + \beta_{12} \text{Term\_S}_{i,t} + \\ & \beta_{13} \text{CEO\_board}_{i,t} + \beta_{14} \text{CEO\_female}_{i,t} + \beta_{15} \text{Ln(A\_vola)}_{i,t} + \beta_{16} \text{NOL}_{i,t} + \beta_{17} \text{ITC}_{i,t} + \beta_{18-30} \text{Country}_i + \beta_{31-67} \text{Industry}_i + \\ & \beta_{68-71} \text{Year}_t + \varepsilon_{i,t} \end{aligned} \quad (2)$$

where 13 country dummies, 37 industry dummies, as well as 4 year dummies have been included as well. We also estimate models using our legal origin variables (the dummy Common law, or alternatively French, German, and Scandinavian) as well as our investor protection variables (ADRI, CPI and ENF), and our set of controls (CONTROL) from our prior model as follows:

$$\text{Long-term liabilities}_{i,t} = \beta_0 + \beta_1 \text{Insider}_{i,t} + \beta_2 \text{Legal origin}_i + \text{CONTROL}_{i,t} + \varepsilon_{i,t} \quad (3)$$

and

$$\text{Long-term liabilities}_{i,t} = \beta_0 + \beta_1 \text{Insider}_{i,t} + \beta_2 \text{Investor protection}_i + \text{CONTROL}_{i,t} + \varepsilon_{i,t} \quad (4)$$

## 4. Regression results

### 4.1. Insider ownership

Table 3 presents the results from model (2) using long-term liabilities as the dependent variable. Columns 1 and 3 of Table 3 show that the relationship between insider ownership and long-term liabilities (using fixed or random effects) is statistically significant at the five percent level with a negative coefficient, in line with Datta et al (2005). The relationship thus indicates that the management reduces the proportion of long-term liabilities as insider ownership increases. This is in line with Jensen (1986), i.e. that agency problems of type one decrease with increasing insider ownership, while agency problems of type two increase. From the models in columns 2 and 4 in Table 3, we see that a non-linear relationship, which was presented, for example, by García-Teruel and Martínez-Solano (2010), does not receive support in this sample. Our results, therefore, support a negative, linear relationship between insider ownership and the use of long-term liabilities. The economic significance is also substantial as an increase in insider ownership from the median (0.0013%) to the 95th percentile (22.35%) decreases the share of long-term liabilities by approximately 7.33 percentage points in model one, which is estimated with a fixed effect i.e. column 1 of Table 3.

**Table 3.** Insider ownership

The table presents the results for the second stage regression with the dependent variable which is the proportion of long-term liabilities, defined as the proportion of liabilities that fall due after one year divided by total liabilities. D/E has been estimated as a dependent variable in the first stage regression. The 2SLS method has been estimated with a fixed effect (country level) and a random effects model. The table presents the parameter estimates and the robust standard errors (HAC) of the parameters at panel level in parentheses, estimated using Arellano's (1987) method. \*, \*\* and \*\*\* indicate significance levels of 10%, 5% and 1%, respectively.

	OLS		RANDOM EFFECTS	
	(1)	(2)	(3)	(4)
Constant			-2.846** (1.387)	-2.839** (1.39)
Insider	-0.328** (0.153)	-0.488 (0.334)	-0.459** (0.2)	-0.66 (0.469)
Insider <sup>2</sup>		0.272 (0.556)		0.343 (0.663)
D/E (estimated)	5.329*** (1.304)	5.346*** (1.312)	6.696*** (2.328)	6.725*** (2.349)
FAM	-0.02 (0.029)	-0.018 (0.029)	-0.023 (0.035)	-0.021 (0.035)
GOV	0.364*** (0.116)	0.366*** (0.116)	0.464** (0.181)	0.466** (0.183)
Ln(C_value)	0.055*** (0.007)	0.055*** (0.007)	0.057*** (0.01)	0.057*** (0.01)
M/B	0.004** (0.002)	0.004** (0.002)	0.012** (0.006)	0.012** (0.006)
Ln(A_duration)	-0.063*** (0.019)	-0.063*** (0.019)	-0.086** (0.034)	-0.087** (0.034)
Abnormal income	0.019** (0.009)	0.019** (0.009)	0.018 (0.02)	0.018 (0.02)
Z	0.693*** (0.186)	0.695*** (0.187)	1.076*** (0.405)	1.08*** (0.408)
REG	-0.219** (0.102)	-0.218** (0.101)	-0.272* (0.144)	-0.271* (0.144)
Term_S	-0.015 (0.018)	-0.015 (0.018)	-0.303 (0.329)	-0.307 (0.331)
Ln(A_vola)	0.387*** (0.103)	0.389*** (0.104)	0.487*** (0.184)	0.49*** (0.186)
NOL	-0.066* (0.036)	-0.066* (0.037)	-0.102* (0.058)	-0.103* (0.058)
ITC	0.149*** (0.053)	0.15*** (0.053)	0.253** (0.111)	0.256** (0.112)
CEO_board	-0.003 (0.038)	-0.002 (0.039)	-0.001 (0.045)	0 (0.045)
CEO_female	0.072 (0.052)	0.072 (0.052)	0.101 (0.078)	0.101 (0.079)



Industry	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Adj. R2	0.119	0.119	0.161	0.160
F/Chi2	50.30***	49.55***	127.061***	126.04***
Observations	8155	8155	8155	8155

#### 4.2. Legal differences

Three model specifications are estimated to examine the relationship between long-term liabilities and legal differences (Table 4). These models are estimated using both OLS (columns 1 to 3) and random effects (columns 4 to 6). The two first model specifications are versions of our model three, defining legal origin in two different ways: a common law dummy (columns 1 and 4), or using three different civil law dummies (columns 2 and 5). The third model specification takes into account investor protection (columns 3 and 6).

**Table 4.** Legal differences

The table presents the results for the second stage regression with the dependent variable which is the proportion of long-term liabilities, defined as the proportion of liabilities that fall due after one year divided by total liabilities. D/E has been estimated as a dependent variable in the first stage regression. The 2SLS method has been estimated with OLS and random effects. The table presents the parameter estimates and the robust standard errors (HAC) of the parameters at panel level in parentheses, estimated using Arellano's (1987) method. \*, \*\* and \*\*\* indicate significance levels of 10%, 5% and 1%, respectively.

	OLS			RANDOM EFFECTS		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-2.067*** (0.617)	-2.058*** (0.676)	-2.064*** (0.628)	-3.24** (1.358)	-3.536** (1.709)	-3.299** (1.38)
Insider %	-0.326** (0.147)	-0.35** (0.164)	-0.314** (0.151)	-0.446** (0.197)	-0.536** (0.26)	-0.432** (0.194)
Common law	0.151*** (0.052)			0.192** (0.086)		
Scandinavian		-0.253*** (0.085)			-0.377** (0.176)	
German		-0.014 (0.048)			-0.005 (0.067)	
French		-0.124** (0.06)			-0.161 (0.099)	
ADRI			-0.04 (0.035)			-0.076 (0.049)
CPI			0.104** (0.043)			0.137** (0.065)
ENF			-0.121** (0.055)			-0.133* (0.075)
D/E (estimated)	5.107*** (1.245)	5.492*** (1.509)	5.184*** (1.327)	6.455*** (2.294)	7.731** (3.249)	6.489*** (2.321)
FAM	0.005 (0.029)	-0.006 (0.03)	-0.003 (0.029)	0.01 (0.036)	-0.005 (0.041)	-0.002 (0.035)
GOV	0.34*** (0.107)	0.357*** (0.12)	0.323*** (0.105)	0.443** (0.175)	0.518** (0.233)	0.413** (0.164)
Ln(C_value)	0.056*** (0.007)	0.054*** (0.007)	0.058*** (0.007)	0.057*** (0.009)	0.055*** (0.011)	0.06*** (0.01)
M/B	0.004** (0.002)	0.005** (0.002)	0.004** (0.002)	0.012* (0.006)	0.016* (0.009)	0.01* (0.006)
Ln(A_duration)	-0.052*** (0.016)	-0.065*** (0.021)	-0.056*** (0.018)	-0.069** (0.028)	-0.097** (0.045)	-0.076** (0.031)
Abnormal income	0.019** (0.008)	0.02** (0.009)	0.019** (0.009)	0.021 (0.02)	0.018 (0.023)	0.022 (0.02)
Z	0.674*** (0.181)	0.732*** (0.219)	0.683*** (0.192)	1.043*** (0.402)	1.274** (0.571)	1.05*** (0.406)
REG	-0.231** (0.101)	-0.233** (0.11)	-0.219** (0.101)	-0.286* (0.147)	-0.322* (0.184)	-0.27* (0.143)
Term_S	-0.091*** (0.027)	-0.081*** (0.027)	-0.071*** (0.024)	-0.104*** (0.04)	-0.094** (0.048)	-0.07** (0.034)
Ln(A_vola)	0.36*** (0.096)	0.399*** (0.119)	0.374*** (0.105)	0.446** (0.173)	0.562** (0.254)	0.465** (0.182)
NOL	-0.07** (0.036)	-0.072* (0.039)	-0.076** (0.038)	-0.102* (0.056)	-0.112 (0.069)	-0.113* (0.059)

ITC	0.163*** (0.048)	0.158*** (0.053)	0.178*** (0.053)	0.274*** (0.104)	0.270** (0.127)	0.309*** (0.115)
CEO_board	0.043 (0.032)	-0.004 (0.037)	0.012 (0.031)	0.061 (0.041)	-0.011 (0.05)	0.023 (0.038)
CEO_female	0.058 (0.047)	0.079 (0.054)	0.07 (0.051)	0.082 (0.074)	0.126 (0.1)	0.098 (0.078)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Country	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R2	0.122	0.117	0.119	0.162	0.149	0.160
F/Chi2	3.90***	3.32***	3.70***	124.53***	90.17***	125.24***
Observations	8155	8155	8155	8155	8155	8155

In all estimations, management ownership is statistically significant at the 5 percent level with similar coefficients as previously presented. In the model with one legal dummy, common law is statistically significant at the one percentage level using OLS and at the five percent level in the random effect estimate. The relationship is thus the same as in previous studies (e.g., Fan et al., 2012) and is supported by the underlying hypothesis that countries with better investor protection and better-developed markets, which are characterized by common law countries to a greater extent than civil law countries, also have better conditions for the use of long-term liabilities. In the models defining legal origin using three different civil law dummies, all the civil law dummies have negative coefficients, of which Scandinavian and French civil law are significant at the one and five percent levels, respectively, in the OLS model, while only Scandinavian civil law is significant in the random effect model. German civil law is statistically insignificant in all models. These results further highlight the differences between the civil law countries. The coefficient for French civil law is half that of Scandinavian law. This means that the countries with Scandinavian civil law have the lowest proportions of long-term debt as compared to other civil law countries, and the legal origins in general. Thus, it can be stated that there is a further difference between legal families within civil law countries regarding the use of long-term debt.

In the specifications in columns 3 and 6, different investor protection indices (ADRI, CPI, and ENF) are taken into account. In these models, the coefficients for the CPI and ENF are significant, while the coefficient for the ADRI index is insignificant. CPI takes into account the legal protection of lenders and shows that long-term liabilities are increasingly used in countries with higher protection for lenders. ENF takes into account whether one is likely to use a legally supervised process when reorganizing a company, and the negative relationship is contrary to the hypothesis which Fan et al. (2012) presented in their study. These links highlight the importance of specific investor protection and its impact on the use of long-term liabilities.

#### 4.3. The relationship between insider ownership and maturity structure among different legal origins

To further study how the relationship between management ownership and different legal protections, the sample is divided into sub-samples which are presented in Table 5. The model we estimate is model 2, including both insider ownership and its squared form, i.e. the model

**Table 5.** Insider ownership and debt duration for various legal categories

The table presents the results for the second stage regression with the dependent variable, which is the proportion of long-term liabilities, defined as the proportion of liabilities that fall due after one year divided by total liabilities. D/E has been estimated as a dependent variable in the first stage regression. The 2SLS method has been estimated using the merged OLS. The table presents the parameter estimates and the robust standard errors (HAC) of the parameters at panel level in parentheses, estimated using Arellano's (1987) method. \*, \*\* and \*\*\* indicate significance levels of 10%, 5% and 1%, respectively.

	1	2	3	4	5	6
	COMMON	CIVIL LAW	SCANDINAVIAN	FRENCH	GERMAN	HIGH CPI
Constant	-2.37** (1.122)	-2.000*** (0.39)	-3.917*** (0.824)	-1.631*** (0.626)	-0.924 (0.57)	-2.589** (1.214)
Insider	1.782*** (0.649)	-0.949*** (0.267)	-2.698*** (0.767)	-1.195** (0.552)	0.471 (0.42)	0.566* (0.343)
Insider2	-4.098*** (1.514)	1.026*** (0.359)	3.624*** (1.083)	1.471* (0.794)	-0.856 (0.681)	-1.617* (0.903)
D/E (estimated)	5.166*** (1.951)	5.323*** (0.854)	6.267*** (1.265)	6.525*** (2.076)	2.905*** (1.056)	4.911** (2.026)
FAM	-0.114*** (0.042)	-0.008 (0.019)	0.07 (0.047)	-0.056* (0.033)	-0.036 (0.03)	-0.0210 (0.026)
GOV	0.22 (0.165)	0.399*** (0.075)	0.21*** (0.076)	0.463*** (0.161)	0.352** (0.137)	0.544 (0.218)
Ln(C_value)	0.037*** (0.011)	0.058*** (0.006)	0.054*** (0.009)	0.052*** (0.009)	0.052*** (0.01)	0.06*** (0.006)
M/B	0.004* (0.002)	0.004*** (0.002)	0.003 (0.003)	0.005* (0.003)	0.002 (0.002)	0.0040 (0.003)
Ln(A_duration)	-0.032*** (0.012)	-0.07*** (0.015)	-0.075*** (0.022)	-0.082** (0.033)	0.031** (0.014)	-0.031*** (0.01)
Abnormal income	0.022 (0.016)	0.018** (0.008)	0.04** (0.016)	0.005 (0.007)	0.029*** (0.011)	0.041 (0.021)
Z	0.567** (0.244)	0.714*** (0.123)	0.821*** (0.186)	0.814*** (0.273)	0.438** (0.187)	0.607** (0.289)
REG	0.13* (0.077)	-0.354*** (0.083)	-0.164* (0.097)	-0.469*** (0.178)	0.017 (0.079)	0.0540 (0.059)
Term_S	0.007 (0.203)	-0.066** (0.032)	-0.085 (0.09)	-0.07 (0.057)	0.028 (0.102)	0.102 (0.097)
Ln(A_vola)	0.276* (0.143)	0.405*** (0.071)	0.673*** (0.149)	0.4*** (0.124)	0.225** (0.099)	0.346** (0.172)
NOL	0.053 (0.042)	-0.102*** (0.029)	0.151*** (0.052)	-0.3*** (0.081)	-0.03 (0.041)	0.003 (0.028)
ITC	0.127 (0.093)	0.197*** (0.041)	0.5* (0.302)	0.187*** (0.062)	0.138 (0.097)	0.103 (0.091)
CEO_board	-0.119** (0.060)	0.006 (0.022)	-0.344*** (0.133)	0.0301 (0.032)	0.004 (0.030)	0.013 (0.045)
CEO_female	-0.008 (0.049)	0.101*** (0.038)	0.158** (0.064)	0.086 (0.074)	0.054 (0.076)	0.006 (0.044)
Industry	Yes	Yes	Yes	Yes	No	Yes
Country	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R2	0.243	0.092	0.118	0.040	0.151	0.190
F/Chi2	18.57***	6.46***	7.00***	9.45***	6.61***	11.93***
Observations	2114	6041	1988	2876	1177	2940

testing for the linearity in the relationship between long-term debt and managerial ownership. The sub-samples are limited to the companies that belong to the respective legal origin and groups regarding legal strength.

The results in this table are interesting because they show different linear or non-linear relationships in different subsamples, except for the subsample containing countries with German civil law where no significant relationship is found. These non-linear relationships point in different directions; for low proportions of insider ownership among civil law countries (column 2 of Table 5), the relationship is initially significantly negative, but becomes less so for high values of insider ownership as the significantly positive squared term indicates. For common law countries (column 1 of Table 5), the relationships are also significant but reversed. The turning point of the function i.e. the point where the maturity of debt begins to decrease is reached with insider ownership at approximately 21.7% for common law countries. For civil law countries, the maturity only begins to increase with insider ownership of approximately 46.2%, all other things being equal. The connection between civil law countries can thus be described as convex and among common law countries as concave. The connection between common law countries is the same as, for example, Marchica (2008) found in her study, while the convex connection for civil law countries has not been found before. These different relationships between legal backgrounds also help to explain the insignificant, non-linear relationship of insider ownership for our model three in columns 2 and 4 in Table 3.

The results for the Scandinavian and French civil law countries in columns 3 and 4 of Table 5 also reveal a significant convex relationship. Among countries with Scandinavian civil law, the functional relationship between insider ownership and the maturity of debt has its turning point, i.e. becomes positive as a whole, at insider ownership level of approximately 37.2%, while the corresponding point for French civil law is 40.6%, all other things being equal.

Among countries with higher creditor protection (column 6 of Table 5), the relationship is concave, and the joint effect becomes negative at an insider ownership level of approximately 17.5%, all other things being equal. The other sub-samples (not reported here) for countries with higher values on the ADRI index, and for countries where a legally supervised liquidation process is most likely to apply (ENF), respectively, have insignificant values for the squared term, which indicates that there is no support for a non-linear relationship. Instead, a weakly significant and linear negative relationship is present.

#### 4.4. Control variables

The control variables generally show similar results as in previous research that has studied determinants of the maturity structure (see, for example, Johnson, 2003; Datta et al., 2005). According to the analyses, the problems of multicollinearity are limited to the variables for debt / equity ratio, volatility and the Z-value. The debt/equity ratio has, as predicted, a strong positive relationship with long-term liabilities. When we, in order to take multicollinearity into account, exclude the variables highly correlated with the debt/equity ratio, the coefficient for the debt/equity ratio remains a strongly positive one. When doing the same, in turn, for the volatility and the Z-value, volatility also has a significant positive coefficient, as does the dummy variable for the Z-value, both of which can be supported by underlying theories. The sign of both variables changes when excluding D/E, which means that these variables should be interpreted with caution.

Large family ownership has virtually no significant relationship with long-term debt, similar to Garcíá-Teruel and Martínez-Solano (2010), except among common-law countries and

weakly among countries with French civil law, where the relationship is negative. The state as a major player has, in line with our predictions, a strongly significant positive relationship in most models. Company value follows our expectations and has a positive coefficient. The incremental economic impact of the variable calculated from model 2 is that a 100 percent increase in the company's value increases the share of long-term liabilities by 5.5 percentage points, all other things being equal.

The M/B and the variable for the maturity of the assets show different signs than expected, and are positive and negative, respectively. The growth variable is insignificant in several of the sub-samples. The results of these variables, therefore, contradict Myers' (1977) theories about the underinvestment problem and the matching motive driving debt maturity choice. Our results for the growth variable are similar to those from previous studies by Johnson (2003), Datta et al. (2005) and Stohs and Mauer (1996). The variable for the maturity of the assets proved to be insignificant in, for example, Datta et al. (2005) and Marchica (2008), while previous studies that present a significant negative relationship (like we do) are few. Unexpected revenues that measure Flannery's (1986) information asymmetry are positive and significant in all but the random effects estimations and in some of the sub-samples, contradicting the theory of information asymmetry, which predicts that companies with better information about the future prefer short-time liabilities. The variable for regulation is generally significantly negative in the models with some insignificant results in the subsamples in Table 5, which goes against our expectations. In Datta et al. (2005), the regulation dummy was negative but insignificant.

The variable for the forward structure of interest rates is significantly negative in all models except for some of the sub-samples in Table 5, and the variable for loss equalization is significant at the 10 percent level with a negative sign. Tax deductions are generally highly significant and positive in all models except in certain sub-samples. These variables are broadly in line with Johnson (2003) and a strongly negative coefficient for the term structure was also presented in Datta et al. (2005) and it suggests that the tax hypotheses are not well-explained for the maturity of liabilities. The variables for other characteristics of management, such as CEO or women on the board, are generally insignificant and thus poorly explain the choice of maturity of the company's debts, but exceptions can be seen in some of the sub-samples for common, civil, and Scandinavian legal origins, where the significant results are negative and positive, respectively.

## 5. Conclusions

We find that the relationship between insider ownership and debt maturity varies between common and civil law countries and that the relationship can be concave and convex, respectively. The results indicate that the agency problems mainly arise with high insider ownership among common law countries, while the agency problems as a result of weaker investor protection are more prevalent already at low levels of managerial ownership in civil law countries. Furthermore, stronger creditor protection enhances the concave relationship.

This paper shows how insider ownership affects the maturity structure of loans and adds to the existing literature on what the connection is when conditioning on various legal regimes and international differences in investor protection. Unlike Datta et al. (2005), Marchica (2008) and Garcíá-Teruel and Martínez-Solano (2010), we document several, either negative linear, or non-linear (convex or concave), relationships depending on the country (legal regime) in which the company is located. These differences in relationships are in line with

the idea that strong investor protection acts as a substitute for other corporate governance mechanisms to address agency problems, such as monitoring through short-term liabilities, which in turn affects how the relationship between insider ownership and maturity structure is expressed. This also serves to some extent as an explanation for the various rather ambiguous results in previous research.

About 97% of the companies in the S&P 500 have some kind of requirement for how many shares the management should own in the company. In addition to the view that firm performance may increase as management's interests become more aligned with the shareholders', also the debt maturity choice seems linked to insider ownership. Regardless of the form of the connection, our results imply that managerial ownership has, at least in some ranges of ownership, a positive effect on debt maturity. This holds especially for civil law countries and countries with poorer creditor protection, as there is a greater need for corporate governance in such cases. However, the non-linear relationships also indicate that the positive impact of insider ownership on debt maturity is waning at higher ownership levels. Naturally, it is ambiguous whether a longer debt maturity is optimal even in a world without agency costs, as the question is about a trade-off between refinancing costs and refinancing risks, among others. However, while our results indicate that legal factors mix into the debt maturity choice problem, they also suggest that countries have the potential to promote access to long-term capital by developing investor protection. Such development efforts might result in better access to external capital, and higher economic growth.

Future research could further study the driving factors for the various links between insider ownership, other corporate governance mechanisms, and the maturity structure of loans. In addition, as prior studies have mainly focused on developed economies, studies that consider international differences among emerging economies would also be justified. Ownership, investor protection and financing opportunities look different in emerging economies, as documented in prior studies (see, for example, La Porta et al., 1998; Faccio and Lang, 2002; Djankov et al., 2008).

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