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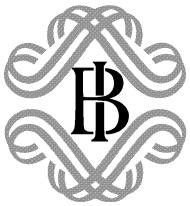
Do Better Institutions Mitigate Agency Problems? Evidence from Corporate Finance Choices

by Mariassunta Giannetti



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Sintesi

Il contenuto di questo lavoro esprime esclusivamente le opinioni dell'autore; pertanto, non rappresenta la posizione ufficiale della Banca d'Italia

Il lavoro analizza le scelte finanziarie delle imprese nei paesi dell'Unione europea utilizzando i dati di bilancio di un campione di imprese residenti nell'area dell'euro (esclusa la Germania) e del Regno Unito.

L'analisi econometrica mostra che il grado di *leverage* è correlato positivamente con la dimensione delle imprese e la capacità di fornire garanzie e negativamente con l'età e la redditività. La quota di debito a lungo termine è positivamente correlata con la durata degli investimenti e con la capacità delle imprese di fornire garanzie reali.

Il contesto istituzionale del paese di residenza dell'impresa è importante nel determinare la struttura finanziaria, soprattutto per le imprese più piccole e non quotate, per le quali l'accesso al mercato dei capitali è più difficile.

Le imprese risultano sistematicamente più indebitate nei paesi con mercati borsistici poco sviluppati. Inoltre, lo sviluppo dei mercati obbligazionari contribuisce ad allungare la scadenza delle passività delle imprese. La mancanza di garanzie reali, che caratterizza soprattutto le imprese che investono in attività immateriali, come la ricerca e sviluppo, riduce l'accesso al credito soltanto nei paesi che non proteggono adeguatamente i diritti dei creditori. Inoltre, l'efficienza delle istituzioni giudiziarie è importante sia per garantire l'accesso al credito, sia per allungarne la scadenza.

Il limitato sviluppo del mercato borsistico e l'inefficienza delle istituzioni giudiziarie possono, pertanto, contribuire a spiegare l'alto indebitamento e l'elevata quota di debito a breve delle imprese italiane.

DO BETTER INSTITUTIONS MITIGATE AGENCY PROBLEMS? EVIDENCE FROM CORPORATE FINANCE CHOICES

by Mariassunta Giannetti*

Abstract

This paper examines how firm characteristics, the legal system and financial development affect corporate finance decisions using a novel and unexplored data set containing balance sheet information for listed and unlisted companies. Contrary to the previous literature, by using data on unlisted companies of small dimension, the paper shows that institutions play an important role in determining the extent of agency problems in corporate finance decisions. In particular, it emerges that in countries with good accounting standards and above-average creditor protection, it is easier for firms investing in intangible assets to obtain loans. Therefore, institutions that are capable of effectively protecting lenders are good substitutes for collateral. The protection of creditor rights is also important for guaranteeing access to long-term debt for firms operating in sectors with highly volatile returns. In contrast, if the law does not guarantee creditor rights sufficiently, lenders prefer to issue short-term debt because they can use the threat not to renew the loan to limit entrepreneurs' opportunistic behavior. In this case, inefficiencies due to the excessive liquidation of projects in temporary difficulty may arise.

Ceteris paribus, firms are more leveraged in countries where the stock market is less developed. Moreover, unlisted firms appear systematically more indebted even after controlling for firm characteristics, such as profitability, size and the ability to provide collateral. Finally, institutions, which favor creditor rights and ensure stricter enforcement, are associated with higher leverage, but also with greater availability of long-term debt.

JEL classification: G32, O16, L14

Keywords: leverage, debt maturity, agency problems, enforcement, creditor rights

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Contents

1. Introduction[1]

One of the channels through which financial development may spur economic growth is by providing easier and cheaper access to external finance to firms with high growth potential. This paper investigates whether there are any financial system characteristics and institutional arrangements that more effectively deal with market imperfections. To this end, I examine whether corporate finance decisions, which depend on firm characteristics, differ across countries owning to differences in legal rules and the degree of financial market development.

The empirical literature on corporate finance has shown that financial decisions indeed depend on firm's attributes which proxy for the extent of agency problems, such as the availability of collateral (Titman and Wessels, 1988; Barclay and Smith, 1995). Cross-country comparisons of the determinants of corporate finance choices by focusing on large listed companies have failed to point out relevant differences (Rajan and Zingales, 1995). This paper shows that the importance of institutions in mitigating agency problems emerges most when observing smaller unlisted companies, since large listed companies with easier access to international capital markets are more alike and have access to similar sets of financial instruments. Data on smaller unlisted companies reveal that there exist institutional arrangements that make it easier to convey funds to R&D expenditure, advertising and other intangible assets, which are particularly important for firms' growth but which cannot be provided as collateral. In fact, in countries with good accounting standards and above-average creditor protection, it is easier for firms investing in intangible assets to obtain loans. Furthermore, the protection of creditor rights turns out to be important for guaranteeing access to long-term debt for firms operating in sectors with highly volatile returns. If the law does not guarantee creditor rights sufficiently, lenders may prefer short-term debt in order to control entrepreneurs' opportunistic behavior by threatening not to renew the loan. Better

[1] I thank participants at seminars at the Bank of Italy, Stockholm School of Economics (SITE), Universidad Carlos III de Madrid and, in particular, Thomas Hellman and Charles Himmelberg for comments. I also thank Eugenio Gaiotti, Andrea Generale, Fabio Panetta, Massimo Roccas and Carmelo Salleo. As usual, any errors and shortcomings are only mine and the views expressed do not reflect the responsibility of the Bank of Italy. Email: giannetm@tin.it

protection of creditor rights makes unnecessary to use debt maturity to control borrowers. Interestingly, the protection of creditor rights is important for guaranteeing access to credit and lengthening debt maturity only with regard to unlisted companies investing in intangible assets and with highly volatile returns; these sources of agency problems do not appear to be significant for the subsample of listed companies.

Firms are more levered in countries where the stock market is less developed and this makes bankruptcy more probable. Moreover, unlisted firms are systematically more indebted, even after controlling for firm characteristics such as profitability, size and the ability to provide collateral. Institutions, such as the degree of enforcement and investor protection are important even after controlling for the degree of financial market development. Legal rules favoring creditor rights and stricter enforcement are associated with higher leverage and also with greater availability of long-term debt.

This paper is closely related to recent research showing that legal rules, degree of investor protection and enforcement are important determinants of the size of capital markets, share returns, externally-financed firm growth and R&D expenditure (La Porta et al. 1997 and 1998; Demirguc-Kunt and Maksimovic, 1996 and 1998; Carlin and Mayer 1998; Lombardo and Pagano, 1999). However, these studies only examine the aggregate implications of laws and institutions. This holds also for Demirguc-Kunt and Maksimovic (1999) who examine how leverage and the maturity structure of debt differ across countries according to the level of financial market and institutional development. Even if they control for firm characteristics, they exploit only the cross-country variability. Consequently, they can only conclude that debt is on average of shorter maturity in countries where the quality of enforcement is lower but do not have anything to say on the effects of the quality of institutions on particular agency problems, because no attempt is made to address how the interaction between institutional differences (e.g. creditor protection) and cross-sectional firm characteristics (e.g. availability of collateral) affects agency problems and, consequently, financing decisions.

The objective of this paper is to fill this gap using a large data set containing listed and mainly unlisted firms from eight European countries. I examine how institutions affect leverage and debt maturity by exploring how the significance of different imperfections varies across countries that differ in institutions and equity and bond market development.

I first use firms' fixed effects regressions on leverage and debt maturity to study the interaction between firms' and financial systems' observable characteristics. Afterwards, I analyze the distribution of firms' fixed effects. These are a sort of "core leverage" and "core debt maturity", which cannot be explained by time-varying firm characteristics such as age, size and profitability. These "core measures" are used to examine differences in financial decisions across countries, across financial systems, across sectors and between listed and unlisted companies.

The paper is organized as follows. Section 2 summarizes the firm characteristics relevant to explain leverage and maturity structure based on the theoretical literature on corporate finance. Section 3 briefly describes the data set. The statistical model, the results and the sensitivity analysis are presented in Section 4. Section 5 concludes.

2. Institutions, agency problems and external finance

A rich theoretical literature exists on how asymmetric information affects firms' financing choices and the distortions that arise in investment financing when information is less than perfect and contracts are incomplete. [2] Firm characteristics, such as age, size and the share of tangible assets, are important proxies for the level of asymmetric information in borrower-lender relationships and, therefore, they affect financing choices. The importance of agency problems is likely to differ across countries according to their legal rules, the efficiency of their legal systems and the degree of financial development, in the same way as market capitalization and stock returns differ at the aggregate level (La Porta et al., 1997).

I explore the impact of agency problems in different financial systems by focusing on two indicators of financial structure:

1. leverage, defined as the ratio of financial debt (which comprehend both bank loans and bond) to the book value of equity (including shareholders' funds, reserves and other provisions) plus financial debt;

[2] See Harris and Raviv (1991) for a comprehensive survey.

2. maturity structure of debt, defined as the ratio of short-term debt to external funds.

This section briefly examines the main theories of capital structure and identifies the attributes that are expected to affect firms' access to debt finance, measured by the debt-equity ratio and debt maturity. It also discusses how the relative importance and the effects of these factors are likely to differ across countries with different legal environments.

The relevant firm attributes, their expected relation to leverage and debt maturity and the proxies for financial system characteristics used in the empirical analysis are discussed below.

2.1 The determinants of leverage

2.1.1 Reputation

The reputation to be a good borrower is expected to make access to external funds[3] and, in particular, to debt cheaper and easier. Age is often considered a proxy for a borrower's reputation in debt markets because it takes time to build credit history and be recognized publicly as a good risk if there are adverse selection problems. Firm's maturity also helps to overcome moral hazard problems. Mature borrowers have incentives to choose less risky projects because once they have earned a reputation for creditworthiness, it is more costly for them to default, since their reputation is also at stake (Diamond, 1989). Therefore, if information asymmetries are relevant, leverage is expected to increase with firm age because mature firms are perceived as less risky and the premia they pay are therefore lower.

On the other hand, firms are likely to need more external funds to finance expansion at the beginning of their life cycle. As the entrepreneur accumulates wealth, external funds may be substituted with cheaper internal sources of funds, according to Myers' well-known pecking order theory of finance (Myers, 1977). In this case, a negative relation is expected between leverage and age. Determining which effect is more relevant is an empirical question.

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[3] Both emission of new equity and debt are considered external funds in the literature on corporate finance.

Even if the pecking order theory holds, the relation between leverage and age will also depend on the degree of bond market development which influences the availability and the cost of external funds. Bank debt costs significantly more than market debt; hence, firms may wish to substitute bank loans with bonds, when internal funds are not sufficient to finance their investment opportunities. The choice of different credit sources is influenced by the firm's reputation. As pointed out by Diamond (1991) and confirmed by several empirical studies (Fluck et al., 1997), there is a life-cycle effect in borrowing from intermediaries. New borrowers initially must borrow from banks because they lack reputation; they may issue debt directly only at a later stage, when the borrower credit record they acquired when being monitored by banks is used to predict their future actions when not monitored. The level of bond market development determines whether market debt is a real alternative and therefore influences corporate finance decisions. This is true even if firms do not actually use market debt, because the existence of this alternative influences the cost of bank debt in equilibrium.

Even if the data do not allow us to distinguish between borrowing through intermediaries and market debt, we can still analyze the effect of the life cycle on leverage. Ceteris paribus, in countries with deep bond markets, leverage should decrease by less with age once firms have acquired a sufficient reputation (i.e. they are sufficiently mature), because there are other sources of credit that are cheaper than bank loans.

To summarize, if the pecking order theory holds, leverage is expected to decrease with age in the first life-cycle phase, when bank debt is the only source of external funding. After a firm has accumulated a sufficient reputation, its behavior is expected to vary depending on whether the bond market is sufficiently developed. In countries with deep bond markets firms can substitute away from bank loans and use cheaper market debt. Therefore, they are expected to reduce their leverage by less than in countries where the bond market is very thin and there is only limited possibility to substitute bank loans with other sources of credit.

In the empirical analysis, in order to capture the effect of reputation on leverage, I introduce the logarithm and the square of the logarithm of firm age. In this way, I can capture non-linearities in the relationship between firm age and leverage and, in particular,

different impacts of age on leverage for young and mature firms. [4] Moreover, to evaluate how this effect differs across countries according to the degree of bond market capitalization, I distinguish countries with deep bond markets from countries with thin bond markets by using data on the ratio of bond market capitalization to GDP. In particular, since the exact level of bond market capitalization is not relevant for the objectives of this analysis, but it is only important whether or not market debt is a real option for firms, I use a dummy equal to one if the bond market capitalization is greater than the average of the sample countries. Since the relation between firm maturity and leverage is expected to differ across countries only after firms become sufficiently mature to issue market debt, the coefficient of the variable obtained by interacting this dummy with the square of the logarithm of firms' age alone (and not with the linear term) is expected to be positive and significant.

2.1.2 Firm size and risk

Riskier firms need to pay higher risk premia and are often subject to problems of credit rationing, as pointed out by Stiglitz and Weiss (1981). As a consequence, they are expected to be less indebted.

Since large firms are likely to be more diversified and less subject to problems of adverse selection, because they are more visible, a widely used proxy for firm risk is size.

Leverage may also be positively related to firm size because issuing and direct bankruptcy costs, which involve fixed costs, constitute a smaller share of firm value as the latter increases. However, for similar reasons involving greater transparency and the existence of fixed costs, large firms have easier access to equity markets and therefore can more easily use equity rather than debt to finance their investment opportunities. In this case, the correlation between leverage and size is expected to be negative. Once again, determining which effect is dominant is an empirical question that may also depend on whether or not a firm is listed and on the level of stock market development in the country of incorporation. In the empirical analysis, firm size is measured by the logarithm of the

[4] In this linear-quadratic approximation of the effects of age on leverage the linear term prevails for young firms and the quadratic for mature firms.

number of employees and its effect on leverage is analyzed distinguishing between private and public companies.

2.1.3 Collateral

Whatever the perception of external financiers as to the quality of a firm, the ability to provide collateral makes it easier to obtain loans. In the presence of asymmetric information, issuing debt secured by assets of known value helps to reduce its cost (Myers and Majluf, 1984). This causes distortions in investment financing because intangible assets, such as R&D expenditure, advertising costs and organizational and maintenance expenditure, cannot be used as collateral. Moreover, since this type of investment is not visible to outside lenders, entrepreneurs may be tempted to divert funds for personal gain and debt-holders may be fearful to be expropriated. As a consequence, firms investing more in intangible assets, which are often those with higher growth opportunities, have less access to credit.

Are there any characteristics of financial systems that make credit more easily available to firms investing in intangible assets and help abate this agency problem? There should be a smaller need for collateral in countries where accounting standards are high. Higher accounting standards should mitigate adverse selection problems and therefore firms investing more in intangible assets should have easier access to debt. However, for any given level of asymmetric information, lenders' ability to recover their loans remains an important factor. If creditors are inadequately protected by the law and the judicial system, they still may wish to secure their loans with collateral, thus discriminating against firms investing in intangible assets.

To account for these cross-country differences in the empirical analysis, the ratio of intangible assets to total assets, which is used to measure the intangibility of the assets of a firm, is interacted with a measure of the quality of creditor protection.

2.1.4 Growth opportunities

Growth opportunities may be considered as assets that cannot be secured.

Ideally, financial systems should convey funds to firms with high growth opportunities. Therefore, in countries where the stock market is undercapitalized and firms seldom issue new capital, high growth prospects should be positively correlated with leverage.

On the other hand, debt creates agency problems between debt-holders and shareholders because equity-controlled firms may invest suboptimally to expropriate wealth from debt-holders. As noted by Jensen and Meckling (1976) and Myers (1977), equity-holders may have incentives to invest in high-risk projects, which do not maximize the present value of profits, or profitable investment opportunities may be forgone because they are unprofitable for very leveraged firms. Furthermore, firms in growing industries may have even more flexibility in their choices of future investment and the agency problem between borrowers and lenders may be accentuated. This may result in a negative correlation between growth opportunities and leverage, as has been found in several empirical studies (see, for instance, Lang et al., 1996).

This type of agency problem should be less important for firms in which ownership, as measured by the equity share held by the first shareholder, is more concentrated. In fact, controlling shareholders are likely to reap private benefits from control and to internalize the negative effects of a higher probability of bankruptcy from investment in excessively risky projects. Moreover, they may want to avoid the issue of new shares for fears to lose the firm's control.

In what follows, firms' growth opportunities at time t will be measured alternatively by the growth rate of value added and the growth rate of sales between t and $t+1$. As this variable may be endogenous and therefore cause inconsistency of the estimates, I also use the average growth rate of firms in the same sector and the same country of firm i to study the relation between growth opportunities and leverage. These variables will be used in conjunction with stock market capitalization and ownership concentration measured by the first shareholder share. In particular, if the opportunity to issue new capital, measured by the stock market capitalization to GDP, is relevant, one would expect a negative impact on leverage of the variable obtained by interacting the measure of growth opportunity with stock market capitalization. In contrast, firms in which ownership is more concentrated should increase leverage if their growth opportunities improve.

2.1.5 Free cash flow vs. pecking order theories

According to the "pecking order" theory of financing of Myers (1984), the availability of internal funds is expected to be negatively correlated with leverage because firms first try to finance new investment internally and, only after, with debt since this is costlier due to market imperfections.

However, if there are conflicts of interest between managers, whose objective is the expansion of the firm, and shareholders, whose objective is to maximize a firm's value, high cash flow firms and, in general, firms with large amounts of internal funds may be more leveraged because this reduces the free cash flow and, therefore, limits the opportunities of managers to finance value-reducing investment (Jensen, 1986).

To evaluate which effect prevails, the availability of internal funds will be determined alternatively by measures of profitability, as the return on assets and the return on equity, and measures of the availability of internal funds, such as the ratio of the cash flow to fixed assets.

2.1.6 Tax distortions

Finally, tax distortions, such as tax deductions, must be considered. In fact, besides minimizing financing costs, profit maximizing firms aim to maximize tax shields and this may introduce distortions in the choice between debt and equity. High non-debt tax shields, such as depreciation deductions and tax credits, may be considered substitutes for the tax benefits of debt financing and should discourage firms to request loans. Consequently, such tax shields should be associated with lower debt/equity ratios (Titman and Wessels, 1988). In the empirical specification, non-debt-tax-shields have been proxied by the ratio of depreciation to value added net of labor costs.

2.2 Debt maturity and return volatility

Given the degree of leverage, what determines debt maturity? According to the traditional approach, the maturity of liabilities should be matched to the maturity of assets. In

fact, financing long-term projects with short-term debt may cause illiquidity problems and the premature liquidation of profitable projects. Myers (1977) provides another reason why value-maximizing firms should match the maturity of their assets and liabilities. At the end of an asset's life, the firm faces a reinvestment decision. Issuing debt that matures at the same time helps to reestablish the appropriate investment incentives when new investment is required and to avoid underinvestment due to excessive indebtedness and conflicts of interest between debt-holders and shareholders.

Ceteris paribus, firms with more tangible assets, which can secure loans, should have easier access to long-term debt.

The literature on incomplete contracts offers another appealing explanation of the choice of debt maturity. According to this theory, the debt contract is a device used to transfer control from shareholders to debt-holders in the states of the world in which the firm does not make repayments. Short-term debt is thought to help lenders to limit opportunistic behavior in bad states of the world because they can acquire control by denying loan renewals. In this way, lenders can limit the possibility that managers dissipate the firm's assets. On the other hand, lenders are probably less informed about the firm's prospects than managers or entrepreneurs. Therefore, they may confuse temporary illiquidity with insolvency and force an inefficient liquidation of a firm that otherwise would be profitable in the long run (Rajan, 1992). Long-term debt ensures firms that credit lines will not dry up when they experience temporary difficulties that otherwise could result in permanent liquidation.

The resolution of this trade-off may depend on the uncertainty to which a firm's business is subject and on degree to which institutions protect creditor rights. In sectors with volatile returns, firms are more likely to incur losses and creditors may prefer to lend short-term if they feel that their rights are at risk. In contrast, if the legal system protects creditor rights, lenders may not need to shorten debt maturity as volatility rises and this would help to avoid the inefficiencies deriving from the excessive liquidation of projects in temporary difficulty.

In what follows, the variance of the return on assets in the firm's country and sector at time t is used to measure a firm's return volatility at time t. I will analyze how the

coefficient of this variable varies across countries, according to the quality of protection of creditor rights. If the degree of protection is relevant, higher volatility should be associated with longer debt maturity in countries where creditor rights are better protected.

Finally, the relation between leverage and debt maturity is analyzed in order to answer the following question. Are highly indebted firms forced to accept short-term debt, or the more indebted firms are the ones who can get loans more advantageously? In Section 4, I try to respond to all these question.

3. Data

Information on firms is from the 1997 version of Amadeus (Analyze Major Database from European Sources) Database by Bureau Van Dijk. These data are complemented with proxies for investor rights around the world and measures of the depth of market capitalization taken from La Porta et al. (1998) and Rajan and Zingales (1999).

3.1 Firm level data

Amadeus provides balance sheet information for firms with minimal size requirements (either sales greater than 10 million euros or more than 150 employees or total assets greater than 10 million euros) from 1993 to 1997 for 26 European countries. The database contains information on about 150,000 non-financial firms. Bureau Van Dijk standardizes balance sheets information in order to achieve uniformity and to enable cross border analysis.

Besides Amadeus, Bureau Van Dijk offers a collection of databases which includes Bankscope and Global Researcher and are commonly used by banks and consultancies for credit management, research of potential markets, competitors analysis and merger and acquisitions analysis. Bureau Van Dijk claims to provide its product also to business schools, which use the databases for research information without online charges.

The panel of firms in Amadeus is very unbalanced and many observations are missing. Since I want to focus on specific items of the balance sheet, I restrict my analysis to eight European countries for which there is more detailed information. These are Belgium, France, Ireland, Italy, the Netherlands, Portugal, Spain and UK.

A preliminary analysis of all the firms for which total liabilities and financial debt are reported and greater then zero shows that there are no major differences in the value-weighted average leverage across countries (Table 1), in accordance to the findings of Rajan and Zingales (1995). Interestingly, the differences are more striking within countries between listed and unlisted companies. Differences in debt maturity are pronounced both across countries and between listed and unlisted companies, as the weighted average of short-term debt to total financial debt demonstrates in Table 2. The value-weighted average return on assets also varies significantly across countries (Table 2).

These descriptive statistics must be interpreted very cautiously because the number of firms considered differ al lot across countries and their characteristics vary substantially: the firms differ considerably in size and the sample is not necessarily representative of the distribution of size within the population. This heterogeneity among firms may be the determinant of different corporate finance choices rather than the capability of a given financial system to deal with market imperfection. Therefore, the international comparison of capital structures is meaningful only after controlling for firm characteristics.

For this reason, in the econometric analysis, I focus on the subsample of firms for which at least intangible assets, the number of employees, and sales are reported. As shown in Table 3, this considerably reduce the number of the firms used in the econometric analysis to 33,855 firms, which are not necessarily present for all the five years. I rely on unconsolidated balance sheets and in any case the observations on firms with an unconsolidated companion are less than 3 per cent.

Firm size, measured by the number of employees, varies greatly across countries: the median number of employees is 65 in Italy as against 125 in the UK. There is also a lot of variance in firm characteristics, as shown in Table 4, which summarizes the average age, the ratio of intangible assets to total assets, the real growth rate of sales, the real growth rate of value added, the return on assets, the ratio of current liabilities to total liabilities, and leverage for all the firms used in the empirical analysis, grouped by country (the standard deviation is reported in parenthesis).

3.2 Indicators of the legal environment and financial development

As mentioned above, the institutional variables are taken from two principal sources: the variables which proxy for different legal rules and the quality of enforcement are from La Porta et al. (1998), while the proxies of financial development are from Rajan and Zingales (1999). In addition to using indicators of financial development which measure the availability of financial instruments such as market debt and which therefore have an impact on corporate finance decisions, I also use variables that proxy for the quality of laws and regulation and the promptness of their enforcement, which may have an independent effect on the relevance of different sources of agency problems. [5]

Financial development is measured by the ratio of stock market capitalization to GDP and bond market capitalization[6] to GDP. All values refer to 1996. One of the advantages of using firm level data is that the problem of the endogeneity of financial development does not arise, as this can certainly be considered exogenous with respect to the individual firm.

The institutional variables include the quality of a country's accounting standards measuring the rigor of company reports, the protection of creditor rights warranted by a country's laws and regulations, which provides a measure of how easily creditors can repossess collateral and the control of the firm in case of default, and a measure of enforcement, which is important because laws and regulations protect creditors only to the extent that they are actually enforced. All these are presented in Table 5. Details on how these indicators are constructed can be found in La Porta et al. (1998).

According to the classification of La Porta et al., the financial systems of the firms in my sample are of English and French origin. Notwithstanding all countries in the sample are high-income industrial countries with developed financial systems and a relatively high degree of enforcement, institutional differences do exist. For example, Italy has very underdeveloped bond and stock markets, average protection of creditor rights and good accounting standards (above the average of the countries in the sample). On the other hand, the UK has highly capitalized markets, excellent accounting standards and highly protected

[5] This is true even if, as has been shown, legal rules are correlated with the level of financial development.

[6] Data refer only to the market for corporate bonds.

creditor rights relative to the other countries; in France creditor rights are poorly protected, the markets for bonds and equity are thin and accounting standards are high. These institutional differences are sufficient to capture possible differences in the behavior of firms with similar characteristics across countries because I can exploit also the cross-firm variability. In this way, I can check if there are significant differences in the impact of certain firm characteristics (such as the lack of collateral) across countries with high creditor protection, like the UK, and low creditor protection, like France. In what follows, I use the values of the previous indicators of institutional development and also the dummy variables associated with these indicators, which group countries above and below the average of the samples used in Rajan and Zingales (1999) and La Porta et al. (1998).

4. Estimation method and results

As discussed in Section 2, leverage is expected to be influenced by firm characteristics, which proxy for the extent of various market imperfections, such as age, size, profitability, non-debt-tax-shields, investment in intangible assets, and growth opportunities; debt maturity should be explained by leverage itself, the time horizon of firm investment, the ability to provide collateral and the sectoral variability of earnings. These variables are interacted with the indicators of institutional and financial development in order to evaluate their impact on different agency problems, as explained in Section 2.

The system of equations I estimate is the following:

(1) $$Leverage_{it} = \alpha_{0i} + \alpha_1 age_{\text{it}} + \alpha_2 age_{\text{it}}^{\ 2} + \alpha_3 \frac{\text{intangible assets}_{\text{it}}}{\text{fixed assets}_{\text{it}}} + \alpha_4 growth_{\text{it+1}} + \alpha_5 size_{\text{it}} + \\ + \alpha_4 (tax\ shields)_{\text{it}} + \varepsilon_{1\text{it}}$$

(2) $$Maturity_{it} = \beta_{0i} + \beta_1 (\text{Return Volatility})_{\text{it}} + \beta_2 (maturity\ of\ assets)_{\text{it}} + \beta_3 leverage_{\text{it}} + \\ \beta_4 collateral_{\text{it}} + \varepsilon_{2it},$$

where $i = 1,...,N$ refers to individuals, $t = 1,...,T$ to time periods. The error terms $\varepsilon_{1\text{it}}$ and ε_{2it} are independently and identically distributed and uncorrelated with the explicative variables.

To take into account firm cross-sectional differences that are not observed or invariant over time, such as the geographical location and the productive sector, I use firm fixed effects in both equations. These firm specific effects also help to control for data problems due to the way in which balance sheets are reclassified in Amadeus. Even if there are cross-country biases in the way in which provisions are treated, they are not likely to vary much over time and, therefore, the conclusions regarding the effects of firm characteristics on corporate finance decisions are not affected.

The fixed effects estimator provides unbiased estimates of the parameters of interest by taking all the variables in deviation from the individual mean and exploiting only the within group variability. I also take into account that firms' leverage and the ratio of short-term debt to the total external funds are jointly determined. Therefore, ordinary least squares in the equation for debt maturity may be inconsistent since leverage may be correlated with the residuals. To account for these endogeneity problems, I estimate the equation for debt maturity using two stages least squares.

Finally, since most of the variance of leverage and debt maturity is accounted for by the variation in individual fixed effects, I also study how fixed effects vary across countries according to the level of financial development and enforcement and between listed and unlisted companies. The coefficient of the firm specific intercept, which can be recovered from the fixed effects estimates[7], may depend on firm time-invariant characteristics as follows:

$$\begin{aligned} \alpha_{0i} &= a_o + a_1' Z_1 + u_1 \\ \beta_{0i} &= b_o + b_1' Z_2 + u_2, \end{aligned} \tag{3}$$

where Z_1 and Z_2 are two matrices of time-invariant explicative variables of dimension $g_1 \times N$ and $g_2 \times N$, respectively, and a_1 and b_1 are the vectors of the parameters of interest with dimension $g_1 \times 1$ and $g_2 \times 1$, respectively. Ordinary least squares provide consistent

[7] After estimating the equation $y_{it} = \alpha_i + \beta x_{it} + \varepsilon_{it}$ using the fixed effects estimator, the estimates of the individual fixed effects may be recovered as follows: $\hat{\alpha}_i = \bar{y}_i - \hat{\beta}\bar{x}_i$, where $\bar{y}_i$ and $\bar{x}_i$ are individual time averages.

estimates of the coefficient of the time invariant variables as *N* goes to infinity, as long as the error terms, u_1 and u_2, are not correlated with the explicative variables. [8]

I also estimate the equations for leverage and debt maturity using the lagged values of the explicative variables in order to check for eventual endogeneity problems. Since the results are qualitatively similar, I present estimates using the contemporaneous values of firm characteristics; otherwise, the time series variability would decline further, which would be problematic since the fixed effect estimator only depends on the time series variability of the observations.

The results are presented in the following two subsections. Ordinary least squares estimations of the equations of interest are also presented for comparison purposes. [9]

4.1 Leverage

The estimates of the coefficients of the equation for leverage are presented in Tables 6 to 9. Besides fixed effect estimates, ordinary least squares estimates are presented for comparison.

For the most part, the coefficient estimates are of the expected sign and significant and it is always possible to reject the null that the individual fixed effects are not significant with a level of confidence of more than 1 per cent. Moreover, data seem to support the view that the financial system characteristics affect the extent of agency problems.

The determinants of leverage and the differences across different financial systems are described below.

In almost all the specifications both the coefficients of age and age square are negative and statistically significant. They are also economically relevant: the percentages of the standard deviation of leverage explained by the linear and the quadratic term are 11 per

[8] A detailed description of this two-stage method to estimate the effect of time-invariant individual characteristics may be found in Hsiao (1986). Hausman and Taylor (1981) apply this methodology to estimate the returns to education.

cent and 42 per cent, respectively. Therefore, the data support Myers' pecking order theory rather than the reputation acquisition effect. In fact, mature firms use relatively less debt and substitute away from debt at an increasing pace as they age (the square of the logarithm of age is negative and significant). They do not seem to take advantage of their acquired reputation as they become more mature, but prefer either to use internal wealth to decrease leverage or to issue new capital, if they go public.

Interestingly, as expected, mature firms reduce leverage faster in countries where bond markets are not highly capitalized. The coefficient of the logarithm of the square of firm age interacted with the dummy that is equal to 1 for firms incorporated in countries with highly capitalized bond markets is positive and significant in all the specifications. [10] Therefore, if highly capitalized bond markets exist, as in the UK and in the Netherlands, firms have the option to issue market debt when they are sufficiently mature and leverage decreases more slowly, either because the relatively costlier bank loans are substituted with bonds or simply because the mere existence of an outside option decreases bank rates. As the theoretical models on the choice between bank loans and market debt based on reputation predict, the effect of a highly capitalized bond market is irrelevant in the early stage of a firm's life, since the dummy that distinguishes across countries with different bond market capitalization is not significant, if interacted with the linear term. [11]

The ability to provide collateral seems important to guarantee access to credit. The coefficient of the ratio of intangible assets to total assets is negative and significant (Table 6, column 5). Firms with mostly intangible assets are also less leveraged in countries with good accounting standards. High accounting standards, which reduce asymmetric information between borrowers and lenders, are not sufficient to mitigate the agency problems due to the lack of collateral: if I interact the share of intangible assets over total assets with the

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[9] Estimates obtained using the between estimator, which is equivalent to an ordinary least squares regression using cross-firm averages, were qualitatively similar to OLS estimates and, therefore, have been omitted.

[10] This variable, like the previous two, is not only statistically significant, but also economically relevant, as its beta coefficient is 43 per cent.

[11] Estimates are omitted for brevity.

accounting standards dummy, I obtain a positive but not significant coefficient (Table 6, column 3). [12]

In contrast, in financial systems whose legal rules are of English origin, like the UK, intangible capital intensive enterprises are not discriminated against; in fact, the coefficient of the ratio of intangible assets to fixed assets interacted with the dummy English origin is positive, significant and partially offsets the negative coefficient of the ratio of intangible assets to fixed assets (Table 6, column 4). Further investigation reveals that good creditor protection favors investment in intangible assets (UK is characterized by very high accounting standards and excellent protection of creditor rights). [13] If I create a dummy that is equal to 1 if the index of protection of creditor rights is above average and zero otherwise and if I interact it with the share of intangible assets, I obtain a coefficient that is positive and significant (Table 6, column 2). These effects are also economically significant: if the level of tangible assets to total assets increases by one standard deviation, leverage decreases by more than 7 per cent in countries with poor protection of creditor rights and by 3.9 per cent in the others. Since associating countries like Italy with the UK with regard to the protection of creditor rights may be very controversial, I also use the value of the index of La Porta et al. (1998) instead of the dummy variable as an interaction variable; the results remain qualitatively unchanged. Since most of the countries in the sample have good protection of creditor rights, the negative correlation between the ratio of intangible assets to fixed assets and leverage seems to be due principally to French firms. This result coupled with the fact that the stock market capitalization is quite low suggests that funding investment in intangible assets may be difficult in France.

Future growth opportunities may be considered another intangible asset requiring external finance. Contrary to previous studies, fixed effects estimates show that firms become more leveraged as their growth opportunities improve. This effect is weaker, the higher the stock market capitalization, which is apparent from the negative and significant

[12] In addition to Ireland and Portugal, I also tried to include Belgium and Italy among the countries with low accounting standards, as indicated in Table 5, and to use the actual value of this indicator instead of the dummy variable; the coefficient of the interaction term was never significant.

coefficient of the variable obtained by interacting stock market capitalization and the growth rate. The higher the stock market capitalization, the greater possibility firms have to issue new shares instead of debt to finance their investment opportunities. High-growth firms are less indebted in English origin financial systems (estimates omitted). This explains why the existing studies on the relation between growth and leverage, which have used mainly samples of large US companies, find a negative correlation between growth and leverage. The results are qualitatively invariant whether I use the real growth rate of sales or that of value added to measure growth opportunities (Table 7). Moreover, restricting the sample to firms for which information on the ownership share of the main shareholder is available, it appears that firms with more concentrated ownership are more inclined to finance growth with debt. In column 2 of Table 7, the coefficient of the rate of growth of value added interacted with a measure of the ownership share of the main shareholder is positive and significant.

These results might be criticized because the growth rate of the individual firm may be endogenous: firms which obtain more credit may be able to grow more, even if ex ante they did not have better growth opportunities. To overcome this problem, I measure growth opportunities using the average growth rate at time *t* of all the firms in the same sector and in the same country of firm *i*. The results are qualitatively invariant but the variance explained by the model decreases (Table 7, column 3). This supports my view that the results are not spurious owing to inconsistency problems.

Interestingly, if one recovers the cross-sectional variability from ordinary least squares regressions, the negative effects of future growth on leverage emerges as noted by several previous empirical studies (see, for instance, Lang et al., 1996), also after controlling for endogeneity problems, by using the average growth rate in the sector at time *t*. Therefore, even if firms use debt to exploit growth opportunities, on a cross-sectional basis, the firms that grow more are also those with smaller leverage. Surprisingly, in countries with highly capitalized stock markets, high-growth firms are more indebted when cross-sectional variability is used. This is due to the subsample of unlisted firms since the ordinary least

[13] Note that in my sample all the countries with high accounting standards also have high creditor protection, but the converse is not true. Therefore, I cannot identify whether high accounting standards are

squares coefficient is significant only for this subsample (Table 8), which cannot issue new equity. Therefore, high stock market capitalization has an indirect effect on unlisted firms' leverage, as it seems to make more credit available to firms which do not recur to the stock market to raise capital.

Discrepancies between fixed-effects and OLS estimates also emerge in the coefficient of firm size, measured by the logarithm of the number of employees. The coefficient of the number of employees is significant and positive in all the specifications when the fixed effect estimator is used. Moreover, there are no relevant differences between listed and unlisted firms (estimates have been omitted for brevity). Since fixed-effects regressions only exploit the time-series variability in the sample but ignore the information deriving from systematic differences across firms, this result implies that leverage grows as firm size increases. In contrast, from the ordinary least squares estimation, which more heavily weights cross-section variability, the coefficient of size is negative and significant. Moreover, it appears that this is due to differences between listed and unlisted companies because, distinguishing between the two, the coefficient of the number of employees is positive and significant for listed companies, but negative and smaller in absolute value for the unlisted companies. The negative coefficient of pooled OLS regressions uncovers the systematic differences between public and private companies. Unlisted firms are usually smaller and generally more indebted, as one would expect, since they cannot issue new capital to finance their investment opportunities. Moreover, on a cross-sectional basis, there does not seem to be any improvement in the evaluation of their risk by outside investors as they grow in size: the data show a negative partial correlation between size and leverage. The opposite holds for listed companies. The larger the firm, the more levered it is. Therefore, they seem to exploit the economies of scale due to their size by issuing new debt rather than equity. Using the fixed effect estimator, systematic differences between private and public companies are captured by the fixed effects and the positive relation between size and leverage emerges.

Profitability, measured either by the return on assets or the return on equity and the ratio of cash flow to total assets, is always negatively correlated with leverage (for brevity,

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necessary to reduce agency problems for firms investing in intangible assets.

estimates have been presented only for the return on assets). As noted above, this is perfectly consistent with pecking order theories, as firms prefer to use internal finance before turning to external funds. In fact, internal finance is always cheaper, since it is not subject to agency problems. There is no support for the competing theories of free cash flow.

I also control for non-debt related corporate tax shields, proxied by depreciation to value added net of labor costs; the coefficient is always insignificant and close to zero.

The signs of the coefficients and, usually, also their significance remain qualitatively similar if I run the regressions for sub-samples of firms that differ in size (Table 9). In particular, I group the firms by number of employees, distinguishing between firms with fewer then 50 employees, firms with at least 50 but fewer than 200 employees, firms with 200 to 1000 employees and firms with more than 1000 employees. Interestingly, the share of intangible assets is not significantly negatively correlated with leverage for companies with more than 1000 employees and for listed companies.

I also group the firms by sectors (Table 9). All the previous results still hold for firms in the more "advanced" sectors (i.e. sectors with high growth opportunities and where investment in intangible assets is important). In contrast, when more traditional sectors, such as agriculture or paper product, where intangible assets are less important, are considered individually, the previous results no longer hold.

Finally, I check if there are any countries that disproportionately influence the previous results by dropping each country one by one. No differences emerge when I exclude smaller countries or UK. However, Italy and France, the two most represented countries, do influence the results. This is not surprising. Italy, for instance, has the lowest ratio of stock market capitalization to GDP in the sample and in order to study the effects of stock market capitalization on corporate finance decisions in such a small sample of countries, the observations on Italy are necessary.

In all the previous regressions, most of the variance is explained by the variation in individual fixed effects. Hence, there are systematic cross-sectional differences in leverage across firms and, possibly across countries that do not depend on the time varying firm attributes considered. It may be useful to analyze how this "core leverage", measured by the coefficients of firm dummies, depends on country and firm characteristics that do not vary

over time. As shown in Table 11, the most important variable in explaining the variance of individual fixed effects is stock market capitalization: as the beta coefficient (the bold numbers in Table 11) makes clear, if stock market capitalization increases by one standard deviation, ”core leverage” decreases by more than half of its standard deviation. This confirms the expectation that if firms are able to issue new shares they use less debt to finance investment.

Ceteris paribus, firms are less indebted if the banking system is highly concentrated, maybe in order to escape banks' market power. Not surprisingly, leverage is higher in countries with highly capitalized bond markets and listed firms are systematically less indebted then unlisted companies, as is consistent with studies that find that firms usually reduce their leverage after going public (Pagano, Panetta and Zingales, 1998) by issuing new capital.

Finally, as expected, firms are able to obtain more debt finance in countries where creditors' rights are better protected and enforcement of law is higher.

I introduce sectoral dummies: these are generally significant, but the fit of the regression increases only marginally (R^2 increases less than 2 per cent).

As a robustness check[14], I regress the individual fixed effects on country and sectoral dummies alone (without introducing variables which proxy for the quality of financial institutions). Interestingly this provides almost the same fit (the value of R^2 is comparable), but it is less parsimonious and does not help identify the possible determinants of the differences in leverage.

Interestingly, all the results on the sign and significance of coefficients of both first and second stage regressions hold if I estimate an equation with time-varying and time-invariant firm characteristics by ordinary least squares.

[14] All the estimates on robustness are omitted for brevity.

4.2 Maturity structure

To gauge the differences in financing decisions across countries not only is leverage important, but also the maturity structure of debt. As has been noted above, the ability of lenders to exercise control differs with short-term and long-term debt. Moreover, investment choices may vary according to the maturity of the funds a financial system can provide and this influences aggregate growth which is higher if long term funds are available, as shown by Demirguc-Kunt and Maksimovic (1998).

The coefficient estimates are presented in Table 10. According to the traditional theory, debt maturity must match asset maturity. Indeed, the coefficient of the ratio of fixed assets to total assets, used to measure the maturity of assets, is significant and has the expected sign: firms do try to match the maturity of their assets with that of liabilities. However, this is not the only determinant of debt maturity. There are other firm characteristics that are significant. Data seem to suggest that firms that are able to obtain more loans because of their reputations as "good borrowers" also have easier access to long-term finance: high leveraged firms have relatively less short-term debt. The estimation method allows us to exclude that this is because firms tend to be more indebted if they have access to long-term debt. In fact, I estimate the equation for debt maturity using two-stages least squares. The use of the exogenous variables as instruments for leverage also ensures that the correlation is not due to a spurious common shock.

Furthermore, the ability to provide collateral, measured by the ratio of tangible assets to fixed assets, lengthens debt maturity.

Debt maturity is also expected to depend on the volatility of firms' returns. The way in which the trade-off between excessive liquidation, which is more likely when debt is short-term and returns are highly volatile, and creditors' fears of asset dissipation, which is favored by long-term debt, is resolved is an empirical question. The answer may well depend on institutions. The effect of volatility on the ratio of short-term debt to total liabilities is positive but not significant when one pools all the firms of the sample without distinguishing by country or by the degree of protection of creditor rights. Interestingly, when one distinguishes by country according to the degree of creditor protection, debt maturity decreases as the volatility of the return on assets increases (the coefficient is positive and

significant) only in countries where creditors' rights are relatively less protected. In contrast, in countries where creditor protection is above average, the volatility of returns has no effect on debt maturity. In fact, the coefficient of the variable defined as the variance of the return on assets multiplied by a dummy equal to *1* if creditors' protection is above average is negative and significant. Moreover, the hypothesis that its magnitude is equal in absolute value to the coefficient of the variance of returns cannot be rejected. Therefore, in countries with high creditor protection, volatility has no effect on debt maturity. This helps firms to access long-term debt in sectors with high return variability and to avoid problems of excessive liquidation. These results remain qualitatively unchanged if I use the level of the index of protection of creditor rights rather than a dummy variable as the interaction variable.

Interestingly, the subsample of listed companies seems less subject to agency problems. In this case, the availability of collateral, as measured by the share of tangible assets to total assets, is not significant and it is not possible to identify any negative effect of volatility on maturity, even in countries with low creditor protection. The results are invariant when I group firms by size, as I did for the equation for leverage, even though the effect of the variance of returns on maturity is not significant for large firms (those with more than 1000 employees); the results are omitted for brevity. Furthermore, neither the sign nor the significance of the coefficients changes when countries are individually omitted to check for robustness.

In the equation for maturity structure, as in that for leverage, most of the variance remains unexplained (R^2 is 4.5 per cent) and is accounted by variation in the individual fixed effects. Therefore, the analysis of the individual fixed effects seems necessary in this case as well.

From the regression of fixed effects on firm and country characteristics, which are invariant over time, it emerges that in countries with deeper stock markets firms obtain less long-term debt: the higher the stock market capitalization, the more equity is an effective substitute for long-term debt. Furthermore, the debt maturity of listed companies is always longer. This may be due to the fact that listed companies are more likely to choose public debt to bank debt, which usually has shorter maturity. Moreover, publicly quoted firms are usually more transparent because they must disclose more information in order to be listed

and because share prices reveal information to creditors. This makes listed companies less risky and explains their ability to obtain more long-term debt. Therefore, in countries with highly developed stock markets, access to long-term debt becomes even more difficult for unlisted companies.

As a general rule, debt maturity is longer in countries where recourse to market debt is greater and in countries where banks are less concentrated. The finding that the ratio of bond market capitalization to GDP is positively correlated with debt maturity may also be due to the fact that bonds substitute bank loans, which are mostly short-term, because frequent renewal decisions allow intermediaries to maximize the effectiveness of monitoring, an activity in which banks have a comparative advantage over other private lenders.

The proxies for legal institutions and, in particular, for the capability of investors to protect their investments, are significant even after controlling for the degree of financial development. Debt maturity is longer when laws are better enforced and creditor rights better protected. This result confirms the findings of Demirguc-Kunt and Maksimovic (1999).

As in the equation for leverage, variables which proxy for differences in financial and legal institutions explain core maturity as well as country dummies and they are more parsimonious. Moreover, all the results of first and second stage regressions are confirmed by the OLS estimation of the equation for debt maturity with both time-varying and time-invariant firm characteristics.

5. Conclusions

This paper examines how firm characteristics, the legal rules and financial development affect corporate finance decisions in eight European countries. Several important differences regarding the availability of finance to firms investing in intangible assets and debt maturity emerge. Firms that invest more intensively in intangible assets are less penalized for lack of collateral in countries with good creditor protection and high accounting standards. Well-protected creditor rights also help to lengthen debt maturity for firms in sectors with highly volatile returns, and thus may help to avoid distortions due to the

excessive liquidation of firms in temporary difficulty, which is often associated with frequent short-term debt renewal decisions.

Highly protected creditor rights may improve financing opportunities primarily for unlisted companies, as lack of collateral and volatility of returns do not seem to affect the financing choices of public companies significantly.

Furthermore, the analysis helps to identity some features of the financial system that seem to be responsible for the observed patterns of corporate finance decisions. The low quality of law enforcement in Italy is definitely a contributory factor to the very short maturity of Italian firms' liabilities; in France, the low quality of creditor protection makes it more difficult for firms investing in intangible assets, such as R&D, to obtain debt finance.

The analysis could be valuably extended to a larger sample of countries. The consideration of both developing and developed countries would increase the cross-country variance and would provide a greater range of institutional differences to study how the extent of agency problems depends on institutions.

Moreover many issues regarding the choice between bank loans and market debt remain unexplored because the data set does not provide this information. However, this paper provides an indirect analysis of the choice between market debt and bank loans over the firm's life cycle. It emerges that in countries where the bond market is underdeveloped, leverage decreases faster as firms become older. Very likely, this is due to the fact that firms cannot substitute more expensive bank loans with market debt. Further investigation of this point deserves attention, since low bond market capitalization, which is often coupled with an undercapitalized stock market, may constrain firm growth owning to a lack of cheap sources of external finance.

Table 1

COMPARISON OF THE EXTENT OF LEVERAGE ACROSS DIFFERENT COUNTRIES

Leverage measures are calculated for all firms in the database in 1997. Debt to capital is the book value of debt divided by the sum of the book value of debt and equity. Aggregate ratios are obtained by summing the numerator across all reporting firms in the country and dividing by the denominator summed across the same firms. The number of firms per category in each country is within parenthesis.

	Debt to Capital		
	All companies	Listed companies	Non listed companies
Belgium	0.51 (no. of firms:: 6452)	0.33 (no. of firms: 109)	0.55 (no. of firms: 6198)
France	0.49 (no. of firms:: 18551)	0.40 (no. of firms: 633)	0.50 (no. of firms:16766)
Ireland	0.58 (no. of firms: 182)	–	0.58 (no. of firms: 178)
Italy	0.54 (no. of firms::14927)	0.40 (no. of firms:90)	0.56 (no. of firms: 13666)
Netherlands	0.46 (no. of firms:: 1135)	0.33 (no. of firms: 2)	0.55 (no. of firms: 1052)
Portugal	0.56 (no. of firms:: 2078)	0.35 (no. of firms: 8)	0.55 (no. of firms: 1906)
Spain	0.51 (no. of firms:: 10118)	0.44 (no. of firms: 165)	0.52 (no. of firms: 9190)
United Kingdom	0.65 (no. of firms:: 13756)	0.27 (no. of firms: 99)	0.67 (no. of firms: 12611)

Table 2

DEBT MATURITY AND PROFITABILITY

All measures are calculated for all firms in the database in 1997. Short-term debt to total debt is the book value of current financial debt divided by the sum of the book value of debt. The return on assets (ROA) is the ratio of after-tax profit and interest to total assets. Aggregate ratios are obtained by summing the numerator across all reporting firms in the country and dividing by the denominator summed across the same firms.

	Short-term debt to Total financial debt (All companies)	Short-term debt to total financial debt (Listed companies)	Short-term debt to total financial debt (Non Listed companies)	ROA
Belgium	0.60	0.57	0.61	0.04
France	0.63	0.52	0.66	0.20
Ireland	0.57	NA	0.57	0.05
Italy	0.96	0.90	0.96	0.02
Netherlands	0.43	0.19	0.50	0.06
Portugal	0.54	0.64	0.54	0.02
Spain	0.60	0.42	0.66	0.05
United Kingdom	0.80	0.61	0.80	0.04

Table 3

DISTRIBUTION OF THE NUMBER OF EMPLOYEES FOR FIRMS IN AMADEUS BY COUNTRY

Percentiles	Belgium (no. of firms : 149)	France (no. of firms : 14541)	Ireland (no. of firms : 183)	Italy (no. of firms : 7137)	Netherlands (no. Of firms : 925)	Portugal (no. Of firms : 584)	Spain (no. of firms : 240)	United Kingdom (no. of firms : 10060)
1 %	3	4	5	4	2	10	2	4
5 %	5	10	9	10	5	21	9.5	11
10 %	12	20	18	15	14	32	16.5	21
25 %	24	42	39	30	43	72	32.5	51
50 %	102	91	99	65	114	136.5	88	125
75 %	476	206	196	138	254	268.5	168.5	273
90 %	1452	496	495	278	540	542	322.5	667
95 %	2771	904	638	444	877	892	541.5	1252
99 %	12537	3067	2933	1397	2233	2640	2820	4579

Table 4

DESCRIPTIVE STATISTICS

Non-weighted average and standard deviation (in parentheses) of the main variables in Amadeus. Sample: all firms in Amadeus used for the econometric analysis from 1993 to 1997.

	Belgium	France	Ireland	Italy	Netherlands	Portugal	Spain	UK
Age	26.50	24.27	21.50	20.66	26.33	23.80	20.6	25.59
	(22.09)	*(18.71)*	*(16.80)*	*(14.78)*	*(22.26)*	*(18.67)*	*(15.5)*	*(21.17)*
Intangible assets to fixed assets	0.01	0.03	0.00	0.02	0.01	0.01	0.028	0.01
	(0.05)	*(0.08)*	*(0.03)*	*(0.05)*	*(0.06)*	*(0.04)*	*(0.068).*	*(0.05)*
Growth rate of sales	0.04	0.08	0.18	0.12	-0.00	0.21	0.13	0.09
	(0.58)	*(0.76)*	*(0.44)*	*(0.77)*	*(0.76)*	*(0.63)*	*(0.82)*	*(0.53)*
Growth rate of value added	-0.00	0.03	0.19	0.10	-0.03	0.11	NA	0.10
	(0.50)	*(0.44)*	*(0.54)*	*(0.69)*	*(0.44)*	*(0.62)*		*(0.56)*
ROA	0.03	0.04	0.07	0.01	0.10	0.02	0.04	0.06
	(0.08)	*(0.08)*	*(0.13)*	*(0.06)*	*(4.92)*	*(0.06)*	*(0.09)*	*(0.19)*
Short-term debt to external funds	0.78	0.80	0.78	0.80	0.71	0.83	0.84	0.84
	(0.25)	*(0.23)*	*(0.26)*	*(0.17)*	*(0.32)*	*(0.21)*	*(0.21)*	*(0.23)*
Leverage	0.56	0.52	0.53	0.61	0.59	0.54	0.52	0.59
	(0.26)	*(0.23)*	*(0.27)*	*(0.22)*	*(0.28)*	*(0.21)*	*(0.25)*	*(0.24)*

Table 5

INSTITUTIONAL AND FINANCIAL DEVELOPMENT VARIABLES

Source: La Porta et al. (1998) and Rajan and Zingales (1999). The dummy ACCSTD is equal to 1 if the quality o accounting standard is above the average of the sample of La Porta et al. (1998). CRED is the creditor protectior dummy, which is equal to 1 in high creditor protection countries. Countries are considered to have high protectior of creditors' rights if they are above the average of the La Porta et al. (1998) sample. Stock and bond marke capitalization are in ratio to GDP. The dummy BOND is equal to 1 in countries with high bond marke capitalization. Rajan and Zingales' data refer to 1996 end-of-year data.

	Enforce-ment	Accounting Standards	Accounting Standards Dummy (ACCSTD)	Creditor Protection Index	Creditors Protection (CRED)	Bond Market Capitaliza tion	Bond Market Capitaliza-tion Dummy (BOND)	Stock market Capitaliza-tion
English Origin								
Ireland	8.74	57	0	1	0	NA	0	0.49
United Kingdom	9.402	78	1	4	1	0.22	1	1.31
French Origin								
Belgium	9	61	1	2	1	0.01	0	0.46
France	9.486	69	1	0	0	0.11	0	0.39
Italy	7.946	62	1	2	1	0.03	0	0.21
Netherlands	9.866	64	1	2	1	0.35	1	0.99
Portugal	7.806	36	0	1	0	0.06	0	0.23
Spain	7.87	64	1	2	1	0.02	0	0.43

Table 6

THE DETERMINANTS OF LEVERAGE

Leverage is regressed on proxies for firm reputation (age), size (logarithm of the number of employees), the degree of intangibility of assets, measured by the ratio of intangible assets to total assets (INTANG), the growth rate of sales (GSALES), profitability (ROA) and non-debt-tax-shields (NDTS). To identify the effect across countries, various dummies are introduced and interacted with the independent variables. All dummies are described in Table 5. CRED is the creditor protection dummy. The English origin dummy is equal to 1 for countries whose legal rule is of English origin (UK and Ireland). Estimates of the equation for leverage are calculated by applying ordinary least squares estimates to the pooled sample (OLS) and by introducing firm dummies (fixed effects estimates).

	OLS (1)	Fixed effects (2)	Fixed effects (3)	Fixed effects (4)	Fixed effects (5)
Log(age)	-0.010	-0.030	-0.030	-0.30	-0.026
	(-2.86)	*(-4.68)*	*(-4.63)*	*(-4.62)*	*(-3.978)*
Log(age)^2	-0.008	-0.021	-0.022	-0.022	-0.015
	(-11.30)	*(-9.87)*	*(-10.912)*	*(-10.10)*	*(-7.444)*
Log(age) ^{2}* bond	0.003	0.019	0.019	0.019	
	(20.25)	*(9.81)*	*(9.974)*	*(10.17)*	
Log (employees)	-0.001	0.013	0.013	0.013	0.013
	(-2.58)	*(11.62)*	*(11.55)*	*(11.56)*	*(11.88)*
INTANG	-0.354	-0.278	-0.029	-0.16	-0.13
	(-23.667)	*(-10.198)*	*(-1.945)*	*(-7.63)*	*(-7.387)*
INTANG * CRED * ACCSTD	0.376	0.263			
	(16.63)	*(7.243)*			
INTANG * ACCSTD			0.163		
			(1.083)		
INTANG *English origin				0.115	
				(2.94)	
GSALES	-0.024	0.005	0.005	0.005	-0.0018
	(-12.58)	*(3.574)*	*(3.59)*	*(3.49)*	*(-2.19)*
GSALES * stock market capitalization					
	0.034	-0.011	-0.101	-0.010	
	(12.14)	*(-5.74)*	*(-5.882)*	*(-5.62)*	
ROA	-0.598	-0.355	-0.355	-0.355	-0.35
	(-71.48)	*(-53.06)*	*(-53.1)*	*(-53.08)*	*(-52.845)*
NDTS	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.76)	*(-1.28)*	*(-1.27)*	*(-1.28)*	*(-1.294)*
Constant	0.685	0.743	0.74	0.745	0.73
	(128.72)	*(80.57)*	*(80.27)*	*(80.27)*	*(79.649)*
	Obs. 107195	Obs. 107195	Obs. 107195	Obs. 107195	Obs. 107195
	R^2 *=0.08*	R^2 *=0.06*	R^2 *=0.06*	R^2 *=0.06*	R^2 *=0.05*

Table 7

LEVERAGE AND GROWTH OPPORTUNITIES

Leverage is regressed on proxies for firm reputation (age), size (logarithm the number of employees), the degree of intangibility of assets, measured by the ratio of intangible assets to total assets (INTANG), the growth rate of value added, profitability (ROA) and non-debt-tax-shields (NDTS). To identify the effect across countries various dummies are introduced and interacted with the independent variables. All dummies are described in Table 5. CRED is the creditor protection dummy. The English origin dummy is equal to 1 for countries whose legal rule is of English origin (UK and Ireland). Estimates of the equation for leverage are calculated by introducing firms dummies (fixed effects estimates).

	Fixed Effects	Fixed Effects	Fixed Effects, Checking for the endogeneity of growth opportunities
	(1)	(2)	(3)
Log(age)	-0.012	0.018	-0.04
	(-1.75)	*(1.605)*	*(-6.49)*
$Log(age)^2$	-0.034	-0.048	-0.013
	(-15.01)	*(-13.49)*	*(-6.61*
$Log(age)^2$* bond	0.026	0.046	0.007
	(12.42)	*(8.00)*	*(4.28)*
Log (employees)	0.015	0.0115	0.014
	(12.33)	*(6.01)*	*(12.51)*
INTANG	-0.30	-0.30	-0.26
	(-10.65)	*(-9.15)*	*(-9.04)*
INTANG * CRED * ACCSTD	0.283	0.23	0.34
	(7.29)	*(3.339)*	*(8.93)*
Growth rate of value added	0.015	0.00	-0.02
	(11.34)	*(0.16)*	*(-9.4)*
Growth rate of value added * stock market capitalization	-0.013	-0.039	0.014
	(-7.63)	*(-7.75)*	*(4.62)*
Growth rate of value added *first shareholder		0.006	
		(4.09)	
ROA	-0.462	-0.56	-0.016
	(-51.65)	*(-35.48)*	*(-11.3)*
NDTS	0.000	-0.000	0.000
	(0.21)	*(-0.13)*	*(0.75)*
Constant	0.795	0.869	0.733
	79.27	*(54.95)*	*(82.25)*
	Obs. 93248	Obs. 36306	Obs. 107135
	R^2 *=0.073*	R^2 *=0.10*	R^2 *=0.016*

Table 8

ORDINARY LEAST SQUARES REGRESSIONS FOR LEVERAGE

Leverage is regressed on proxies for firm reputation (age), size (logarithm of the number of employees), the degree of intangibility of assets, measured by the ratio of intangible assets to total assets (INTANG), the growth rate of sales, profitability (ROA) and non-debt-tax-shields (NDTS). To identify the effect across countries, various dummies are introduced and interacted with the independent variables. All dummies are described in Table 5. CRED is the creditor protection dummy. Estimates of the equation for leverage have been done by applying ordinary least squares estimates to the pooled sample (OLS).

	Non Listed Companies	Listed Companies	Checking for Endogeneity of growth opportunities
Log(age)	-0.015 *(-4.13)*	-0.072 *(-2.50)*	-0.008 *(-1.87)*
$Log(age)^2$	-0.007 *(-9.46)*	0.005 *(0.96)*	-0.007 *(-9.99)*
$Log(age)^2$* bond	0.003 *(17.155)*	0.002 *(1.28)*	0.002 *(12.48)*
Log(employees)	-0.001 *(-2.62)*	0.024 *(9.97)*	0.000 *(-1.318)*
INTANG	-0.36 *(-24.05)*	0.004 *(0.05)*	-0.350 *(-23.58)*
INTANG * CRED * ACCSTD	0.384 *(16.774)*	-0.023 *(-0.15)*	0.51 *(21.49)*
Growth rate of sales	-0.026 *(-13.23)*	0.01 *(0.8)*	-0.007 *(3.49)*
Growth rate of sales * stock market capitalization	0.036 *(12.66)*	-0.015 *(0.527)*	0.008 *(2.16)*
ROA	-0.596 *(-70.46)*	-0.528 *(-10.405)*	-0.046 *(-20.117)*
NDTS	-0.000 *(-0.69)*	-0.001 *(-0.35)*	0.000 *(3.535)*
Constant	0.690 *(128.62)*	0.49 *(11.1)*	0.656 *(118.69)*
	Obs. 106418	Obs. 2083	Obs. 122635
	R^2 *=0.08*	R^2 *=0.11*	R^2 *=0.04*

Table 9

REGRESSIONS FOR LEVERAGE BY FIRM SIZE AND FOR FIRMS IN "ADVANCED SECTORS"

Leverage is regressed on proxies for firm reputation (age), size (logarithm the number of employees), the degree of intangibility of assets, measured by the ratio of intangible assets to total assets (INTANG), the growth rate of sales (GSALES), profitability (ROA) and non-debt-tax-shields (NDTS). To identify the effect across countries various dummies are introduced and interacted with the independent variables. All dummies are described in Table 5. CRED is the creditor protection dummy. Estimates of the equation for leverage have been done by applying by introducing firms dummies (Fixed effects estimates).

	Firms with less than 50 employees	Firms with more than 50 employees and less than 200	Firms with more than 200 employees and less than 1000	Firms with more than 1000 employees	Advanced Sectors Only
Log(age)	-0.05	-0.021	0.013	0.063	-0.046
	(4.212)	*(-1.85)*	*(0.86)*	*(2.00)*	*(-5.59)*
$Log(age)^2$	-0.023	-0.030	-0.034	-0.047	-0.019
	(-5.90)	*(-8.48)*	*(-6.29)*	*(-4.27)*	*(-7.049)*
$Log(age)^2$* bond	0.025	0.013	0.012	0.014	0.030
	(7.26)	*(4.04)*	*(2.56)*	*(1.38)*	*(11.76)*
Log(employees)	0.027	0.046	0.060	0.06	0.013
	(8.84)	*(10.31)*	*(9.28)*	*(5.55)*	*(9.61)*
INTANG	-0.33	-0.35	-0.25	-0.21	-0.398
	(-5.92)	*(-6.28)*	*(-4.13)*	*(-0.906)*	*(-9.323)*
INTANG * CRED * ACCSTD	0.226	0.34	0.247	0.067	0.31
	(2.93)	*(4.83)*	*(3.14)*	*(0.275)*	*(5.24)*
Growth rate of sales	0.010	0.004	0.007	-0.002	0.009
	(4.41)	*(1.7)*	*(1.86)*	*(-0.327)*	*(5.48)*
Growth rate of sales * stock market capitalization	-0.014	-0.001	-0.008	-0.006	-0.019
	(-4.40)	*(-0.46)*	*(-1.642)*	*(-0.726)*	*(-8.09)*
ROA	-0.395	-0.346	-0.35	-0.29	-0.395
	(-29.42)	*(-32.14)*	*(-25.16)*	*(-12.00)*	*(-42.44)*
NDTS	0.000	-0.000	0.000	0.000	-0.000
	(1.41)	*(-1.97)*	*(1.615)*	*(1.32)*	*(-1.51)*
Constant	0.773	0.650	0.470	0.33	0.744
	(53.44)	*(29.32)*	*(11.55)*	*(3.38)*	*(62.62)*
	Obs. 36229	Obs. 43811	Obs. 22296	Obs. 4859	Obs. 65454
	R^2 *=0.06*	R^2 *=0.06*	R^2 *=0.064*	R^2 *=0.08*	R^2 *=0.059*

Table 10

THE DETERMINANTS OF DEBT MATURITY

The dependent variable is defined as short-term financial debt to external funds. Time dummies and individual fixed effects are included in the regressions. CRED is the creditor protection dummy.

	Fixed Effects	Fixed Effects	Fixed effects using the actual value of the indicator of creditor rights	OLS	Fixed Effects, Listed Companies Only
Leverage	-0.2	-0.2	-0.18	-0.013	-0.641
	(-7.8)	*(-8.045)*	*(-15.1)*	*(-3.96)*	*(-4.608)*
Volatility at time *t*	0.106	0.0016	0.082	0.24	0.428
	(2.108)	*(1.143)*	*(-3.6)*	*(12.92)*	*(0.924)*
Cred * volatility at time *t*	-0.104		-0.038	-0.231	-0.482
	(-2.08)		*(-3.427)*	*(-13.14)*	*(-1.024)*
Fixed assets / total assets	-0.22	-0.22	-0.22	-0.217	-0.21
	(-37.33)	*(-37.07)*	*(-7.79)*	*(-15.07)*	*(-4.9)*
Tangible assets / fixed assets	-0.099	-0.099	-0.18	-0.086	-0.054
	(-8.67)	*(-14.605)*	*(-12.00)*	*(-16.31)*	*(-0.848)*
	Obs. 107174	Obs. 107174	Obs. 107174	Obs. 107174	Obs. 2046
	R^2 *=0.03*	R^2 *=0.02*	R^2 *=0.02*	R^2 *=0.3*	R^2 *=0.02*

Table 11

ANALYSIS OF INDIVIDUAL FIXED EFFECTS

The dependent variable is the coefficient of the firms' dummies in the equation for leverage and debt maturity, respectively. Sectoral dummies have been included in the regression. The t-statistics are presented among brackets and the number in bold characters is the beta-coefficient, which measures the economic significance of the estimates.

	"Core Leverage"	"Core Maturity"
Listed Companies	-0.06 **-0.03** *(-5.747)*	-0.12 **-0.10** *(-16.776)*
Enforcement	0.04 **0.11** *(4.104)*	-0.24 **-0.92** *(-2.905)*
Creditor Rights Protection Index	0.03 **0.24** *(8.47)*	-0.09 **-0.28** *(-1.92)*
Stock Market Capitalization to GDP	-0.27 **-0.56** *(-12.3)*	0.34 **1.03** *(3.655)*
Banking System Concentration	-0.2 **-0.12** *(-6.41)*	0.64 **0.53** *(1.983)*
Bond Market Capitalization to GDP	0.18 **0.067** *(2.201)*	-0.71 **-0.37** *(-2.783)*
	Obs. 27685	Obs. 27685
	R^2 *=0.11*	R^2 *=0.107*

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