Operating leverage and the cost of debt in European firms

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Abstract

The objective of this paper is to analyse the effect that operating leverage has on the determinants of the cost of debt of agri-food firms in Europe. We use panel data made up of 18,360 firms from 2009 to 2016 (146,880 observations). The main contribution is the study of the cost of external financing as a function of the cost structure because it directly influences the competitiveness of companies in a key sector of the European economy. We also study the country effect, taking into account the different policies and practices regarding the assumption of risks by firms. The results confirm that operating leverage affects the cost of debt both in isolation and through other risk factors that determine this cost. Thus, the effect that indebtedness, size, specificity or reputation have on the cost depends on the operating leverage of the firm and the country of origin.

Keywords: cost of debt, operating leverage, operational risk, European countries, agri-food firms

JEL Classification: G10, G31, G32

1. Introduction

The risk assumed by the creditors of a firm depends on the internal characteristics of the firm, the sector of activity in which it operates and the legal and economic environment of the country in which it resides. All these factors will lead to more or less variability in the profits and, therefore, to different probabilities of insolvency. The higher that probability, the higher the cost of the debt, since, as the risk the creditors assume increases, the higher the risk premium they will demand.

The firm characteristics that affect risk are determined by decisions about the financial structure and the asset structure. Decisions about the financial structure generate financial risk and decisions about assets generate operational risk. There is abundant literature that studies the effect of financial risk on the cost of debt and profitability of the firm. However, the effect of operational risk and operating leverage has received little attention. Also, most of the research carried out to date on the effect of operating leverage on the risk and profitability of the firm has been carried out on firms listed on financial markets and studies the effect on the betas and the expected returns of the firm's shares (Cao, 2015; García-Feijoo and Jorgensen, 2010; Houmes, MacArthur and Stranahan, 2012; Lev, 1974; Mandelker and Rhee, 1984; Novy-Marx, 2011; Zahng, 2005).

The operational risk depends on the type of assets used by the firm in its production process, since these determine the cost structure or the operating leverage. If we assume a structure with higher fixed costs and lower variable costs, the margin per unit sold will be high while the break-even point or minimum sales level to cover the fixed costs and generate a positive profit will also be high. Once this break-even point has been reached, an increase in the units sold will produce a greater increase in profits as the sales margin increases. Likewise, if sales fall below the break-even point, the losses will be greater. Therefore, operating leverage works in both directions and the drawback arises when the sales volume necessary to cover the fixed costs is not reached. At higher fixed costs, the break-even point is higher and the firm’s activity is more risky.

Operational risk also depends on the characteristics of the sector of activity such as the concentration of the sector, the elasticity of demand or the intensity of capital. Novy-Marx (2011) differentiates the effects of operating leverage on risk across different industries and within an industry. The author shows that the two variables are strongly correlated within an industry, and not between industries. The industry effect is fundamental and it is within each industry that it is necessary to analyse if the firm with the highest operating leverage generates more total risk and affects other sources of risk. Therefore, within a sector of activity, operating leverage is considered a good indicator of operational risk.

The objective of this paper is to analyse the effect that leverage and operational risk exert on the determinants of the cost that creditors demand from a firm to lend it funds. Among the main factors that affect the cost of debt are found the level of indebtedness, the size, the specificity of assets and products, and the reputation of the firms. These four factors affect risk, since financial risk is greater if the level of indebtedness is higher; the creditor has less information when the firm is small and young; the creditor has fewer guarantees if the specificity is greater. One of the novelties of this work is the consideration of the cross-effects between operating leverage and the other risk indicator variables.

We direct our study towards only one sector, the agri-food industry, and use a panel of economic-financial data from 2009 to 2016 from 18,360 European agri-food firms that were active during that period (a total of 146,880 observations). The reports issued by *FoodDrinkEurope*[1] (www.fooddrinkeurope.eu) for the year 2016 indicate that the sales volume of the European food industry exceeded 1.089 trillion euros, being the most important sector within the EU (representing 15.6% of the food and drink turnover in manufacturing). In addition, the EU continued to lead the world as the largest exporter of food and beverages with a figure of 98.1 billion euros and generated a total of 4.25 million jobs. Therefore, the work is aimed at a key and strategic sector of the European economy.

Finally, it is worth highlighting the consideration of the country effect, in which we first carry out the study for a sample of European companies, and then separate the countries with different practices and with different legal and economic environments with respect to the assumption of risks. To do this, we choose the countries with the

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[1] See the complete report at: https://www.fooddrinkeurope.eu/publication/data-trends-of-the-european-food-and-drink-industry-2016/

highest average GDP in Europe in the period considered and with the greatest weight in the European agri-food industry.

The results confirm that operating leverage affects the cost of debt and the determinants of that cost. Hence indebtedness, size, reputation or specificity affect the cost of debt, depending on the cost strategy followed by the firm and the country in which it operates.

The scheme that we follow is the following: in the second section we provide the theoretical underpinnings for our work and propose the hypotheses that we intend to contrast. In the third section we present the sample and the variables that we consider explanatory of the cost of debt. In the fourth section we lay out the empirical methodology. In the fifth section we analyse the results and, finally, in the sixth section, we present the most relevant conclusions, as well as future lines of research.

2. Theoretical framework and hypotheses

We want to analyse the importance of operational risk in determining the cost of debt, on the one hand, in isolation, and, on the other hand, indirectly through other risk factors such as indebtedness, size, specificity or reputation of the company. Operational risk also depends on the sector of activity, but when performing the study for a single sector, the operating leverage or cost structure is a good indicator of this risk.

Regarding the relationship between operating leverage and the cost of debt, the results of all the investigations carried out show that it is positive, that is, the higher the operating leverage, the greater the cost that firms bear when financing themselves with external resources. An important factor that will determine whether this relationship is greater or lesser is the firm's institutional and legal environment. Greater protection of the investor will lead to greater discipline on the part of the management of the firm. Cleassens, Djankov and Nenova (1999) demonstrate empirically that the legal, economic and institutional characteristics of a country affect the risk that firms are willing to assume and, therefore, the cost of debt. In countries where laws protect shareholders and investors to a greater extent (common law jurisdictions), firms assume lower risks, both financial and operational. Those authors consider that it will be different depending on the sector and the type of assets and products, but, in general, they go so far as to conclude that the greater the protection of investor rights, the lower the level of optimal leverage.

La Porta, López-de-Silanes, Shleifer and Vishny (1997) argue that countries with a common law origin are more efficient in the development of contracts and offer greater protection to external investors, both shareholders and creditors. These countries react more quickly to new situations and transmit much less uncertainty regarding the outcome of the resolution of a legal dispute. The countries whose laws have this origin are those that were once part of the British Empire. In contrast, there are countries with a civil origin of laws. One can distinguish the origin of the French civil code (France, Italy and Spain), the German (Germany and Poland) and the Scandinavian (Sweden).

Other studies that show the relationship between the legal environment and risk are those made by Simintzi, Vig, and Volpin (2015) or Serfling (2016), who observe that if the labour law is rigid, it causes greater operational risk, decreasing the optimum level of indebtedness, to compensate one type of risk for another. Legislation is also important in terms of transparency and the requirement for the disclosure of information by firms. Francis, Khurana and Pereira (2005) show that firms that need more external financing must maintain more transparent accounts, which reduces asymmetric information and leads to cheaper financing.

Cleassens, Djankov, and Nenova (1999) also point to the question of whether the financial system is based on banking or on the markets as being determinative in the relationship between risk and the cost of debt. These authors show that in banking-oriented countries, firms assume greater risk as they are less controlled by the markets. Allard, and Blavy (2011) conclude that economies based on financial markets recover faster from recessions than banking-oriented ones, so there is less risk involved when investing in firms in these countries. Depending on the development of the financial markets and the weight of the bank debt in the total debt of firms, countries are classified into one of two systems (Allard and Blavy, 2011; Demerguc-Kunt and Levine, 1999). The economies based on financial markets are Australia, Canada, Denmark, Finland, France, United Kingdom and the United States. On the other hand, Austria, Belgium, Germany, Italy, Japan, Holland, Norway, Portugal, Sweden and Spain are classified as banking economies.

In this paper we carry out separate analyses for different European countries since mixing firms together that operate in different legal and institutional environments can distort the results. In effect, the country will be decisive in the effect that operating leverage has on the cost of debt in an isolated way and also indirectly through other risk factors such as indebtedness, size, specificity and reputation.

Regarding the relationship between debt level and operating leverage, it is expected that, in general terms, the most indebted firms will be those with the lowest operating leverage in order to offset the two types of risk: financial and operational. According to Kahl, Lunn, and Nilsson (2014), firms with high levels of fixed operating costs are more conservative in their capital structure strategy, maintaining more liquidity and lower levels of indebtedness. But, on the other hand, firms use debt to increase fixed assets that cause higher fixed costs, so that greater indebtedness can be accompanied by a greater operational risk (Harjoto, 2017).

Most of the studies that compare operating and financial leverage with the risk of firms do so with listed firms and take the beta as an indicator of systematic risk. Houmes, MacArthur, and Stranahan (2012) note a positive relationship between operating leverage and the beta of firms in the transport sector, reaching the conclusion that operating leverage is more important in the definition of systematic risk than financial risk. In fact, the level of indebtedness does not turn out to be significant to explain the beta.

Based on the foregoing, we consider that, in general, the level of indebtedness increases the cost of debt, but to a lesser extent if the firm assumes greater operational risk.

> ***Hypothesis 1:*** *The higher the operating leverage, the lower the positive relationship between the level of indebtedness and the cost of debt of agri-food firms.*

In terms of size, there is evidence that it is a determinant of the cost of debt (Harjoto, 2017). Francis, Khurana, and Pereira (2005) observe a negative relationship between the two variables. The size reduces the risk and, therefore, the cost (Houmes, MacArthur and Stranahan, 2012; Sengupta, 1998; Ylhäinen, 2017).

Indeed, smaller firms support higher debt costs because they have less bargaining power and more information asymmetry, but that relationship can be diminished if they have little operating leverage. In the same way, the greater the size, the greater the bargaining power, the greater the prestige and the less the asymmetric information, all of which will allow firms to finance themselves at a lower cost. That ratio will be lower if the operating leverage is higher, as the risk is greater.

Therefore, among large companies, those with greater operational risk will have a higher cost of debt. In short, we consider that, the larger the size, the lower the cost of debt, but the negative effect is diluted with the highest operating leverage.

> ***Hypothesis 2:*** *The higher the operating leverage, the lower the negative relationship between size and the cost of debt of agri-food firms.*

Third, we consider the specificity of the firm's assets. The weight of intangible assets, such as advertising or R&D, in fixed assets is an indicator of the degree of innovation and specificity of the company. An investment is specific if its best alternative use entails a significant loss of value, thus representing less collateral for creditors. Guthrie (2011) considers that these investments do not have the option of abandonment and, therefore, they are riskier. Indeed, if the availability of collateral is lower, the risk is higher. Hence Van Binsbergen, Graham, and Yang (2010) note that the cost of debt is lower in firms with greater weight in tangible assets because, having more collateral, the creditor assumes less risk.

On the other hand, Hyytinen, and Pajarinen (2007) find no relationship between specificity and cost of debt when carrying out the study with Scottish firms. They conclude that as they are governed by the common law, they are less prone to take risks, and if they have a greater weight of intangible assets, that makes them riskier, which they will compensate for by having less debt. Harjoto (2017) also argues that companies with more intangible than tangible assets are riskier and less indebted to compensate for this higher risk.

The agri-food company is constantly innovating. Recent decades have seen radical innovation in terms of both the products and the processes of the industry (Community Research and Development Information Services).[2] As the agri-food sector has a great share of the European economy and is tremendously innovative, companies that innovate and invest in intangible assets usually receive some subsidy at the European and/or domestic level, which reduces the cost of financing.

[2] See the complete report at: https://cordis.europa.eu/news/rcn/8257_en.html

Therefore, although in general terms it is expected that specificity increases the risk and the cost, this effect can be cancelled out or reversed depending on the institutional and legal environment of the country. Greater protection of the investor will lead to greater discipline on the part of the management of the company, lowering the level of optimal leverage, such that some risks will be offset against others. On the other hand, in countries that allocate greater subsidies to innovative companies, increased investment in R&D may be accompanied by cheaper financing.

On the other hand, greater innovation can generate higher operative leverage, since it involves investment in fixed assets. In this way, the cross effect is expected to decrease the direct effect between specificity and cost. In general terms, we state the third hypothesis in the following way:

> ***Hypothesis 3:*** *The higher the operating leverage, the weaker the relationship between the degree of specificity of the assets and the cost of debt of agri-food firms. The sign of that relationship will be different depending on the legal and institutional environment of the country.*

Finally, we introduce age as an indicator of reputation. The more mature and larger firms have a lower average cost of debt, which some authors explain due to their less asymmetric information (Berger, Klapper and Udell, 2001; Hernández-Cánovas and Martínez-Solano, 2010). In contrast, young firms have less reputation and the level of ignorance about them on the part of the creditors is higher, which can cause greater difficulty in obtaining good financing conditions.

Indeed, age has been used in several corporate finance studies as an approximation of asymmetric information (Beck and Demirguc-Kunt, 2006; Ylhäinen, 2017). These studies conclude that the older the firm is, the lower its cost of debt. However, we consider that age will have a greater or lesser effect depending on the operating leverage that the firm is supporting, since mature firms with high leverage can see this negative age/cost of debt effect reduced due to the greater risk they take on.

> ***Hypothesis 4:*** *The higher the operating leverage, the lower the negative relationship between age and the cost of debt of agri-food firms.*

This present study is carried out on a sample of European agri-food firms with different cultures, different levels of investor protection and different behaviours regarding the assumption of risks, which will affect the fulfilment of the stated hypotheses. It is expected that, in general, the most market-oriented countries with the highest level of protection will take on fewer risks, since they could affect the cost of debt to a greater extent.

3. Sample and variables

3.1. Sample

The data used in this study have been obtained from several sources. First, the economic-financial data for each country have been extracted from the ORBIS database of *Bureau van Dijk*. Secondly, the Gross Domestic Product (GDP) series for each country has been obtained from EUROSTAT.

The sample is made up of firms from the agri-food sector (*European Classification of Economic Activities*, NACE Rev. 2: codes[3] 10 and 11) of European countries that were active during the 2009-2016 period. The countries with the highest average GDP in the analysed period were selected, that is, France, Italy, Poland, Spain, Sweden and the UK.[4]

Furthermore, the series of variables used have been filtered to eliminate, firstly, the observations with errors in the financial statements, and secondly, the extreme observations that exceeded 95% or those that were below 5% in all the distributions. This double filtering process, depending on the country, has meant the loss of approximately between 12.8% and 19.3% of the original sample. Finally, the panel data consists of 18,360 European firms with a total of 146,880 observations.

The sample shows a disparity in the number of firms in each country due to the different availability of data and the different demands regarding the presentation of financial statements (see Table 3).

3.2. Cost of debt

The cost of debt is the variable that we intend to explain (dependent), and since it is not directly observable, we have to estimate it. In the same way that various earlier works such as Francis, Khurana, and Pereira (2005), Hyytinen, and Pajarinen (2007) or Ylhäinen (2017) have done so, we estimate it by dividing the interest paid for the

[3] Manufacture of food products and manufacture of beverages, respectively.
[4] Germany has been excluded since, during the study period, most of the German firms were not required to present annual accounts.

debt incurred by the average of the debt with cost at the beginning and at the end of the period.

In Table 1: Panel A, we provide the evolution of the cost of debt of the different countries considered throughout the analysis period. We observe that for the complete sample represented by the Europe group, the average cost of debt is 2.07%. France is the country where companies, on average, manage to finance their investments at the lowest cost (1.70%), compared to Sweden that has, on average, the highest cost (3.44%). In general, and for the sample group of countries, the cost of debt has decreased since 2012. The most pronounced decrease has been experienced by Sweden and Poland. Poland has gone from being the country with the second highest cost to become the lowest (it is also reflected in the high dispersion of its data).

--- Table 1 here ---

These first results indicate that the pattern of behaviour of the cost of debt has not been homogeneous among the different countries of Europe. The recent crisis has had effects on these very different economies, and each country has adopted its own economic and monetary policies to mitigate these effects. On the other hand, many firms have embraced the EU's rural development policies[5] that grant subsidies to those that transform and market agricultural products, and which aim to improve the competitiveness of agri-food sector. It is notable that among the countries under study, the country that receives the least European subsidies is Sweden, which could explain, at least in part, the higher costs that Swedish companies have borne.

In addition to these subsidies at the European level, agri-food firms have received other subsidies linked to the country where they carry out their activity. This could have caused a cheapening, in average terms, of the cost of debt of the firms from countries with high subsidies. It is worth mentioning the existence of the OSEO[6] platform in France, which is a public company with no equivalent in Europe, whose mission is to finance innovation and the growth of companies. In 2009 alone, OSEO made more than 100,000 interventions that allowed innovative SMEs to obtain some 25 million euros of financing. In addition, among the sectors that receive the most aid

[5] See the complete report: European Court of Auditors, Special Report No1, 2013, at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52013SA0001&from=ES

[6] See the report on the financing of innovation in France at: https://es.ambafrance.org/Oseo-la-financiacion-de-la

and subsidies is the agri-food sector, which is mostly made up of SMEs. French agri-food companies have borne the lowest cost of debt (Table 1: Panel A) and, as we will see in the next section, they are the ones that have made the largest investment in R&D over the study period.

For all this, the cost of external financing that European agri-food firms have shouldered has behaved in an uneven manner in the different countries considered. These differences are what lead us to study the determinants of the cost of debt separately, i.e. country by country.

3.3. Explanatory variables

In Table 2 we provide the set of variables that we have used in our study and in Table 3 their descriptive statistics. The main variable that we consider to explain the cost of external financing is operating leverage, since it is one of the main sources of risk borne by the creditors of companies and has had little attention in the literature. To measure it, we use the relationship between net fixed assets and total assets (OLM).

Measuring the operating leverage of a firm is not easy because operating accounts do not distinguish between the different costs that the activity of the firm generates and, therefore, data on fixed and variable costs are not available. Numerous authoritative works have used the relationship between net fixed assets and total assets as a proxy for the cost structure and the operating leverage, arguing that high levels of fixed assets generate high fixed costs (Cao, 2015; Harjoto, 2017; Houmes, MacArthur and Stranahan, 2012; O'Brien and Vanderheiden, 1987).

--- Table 2 here ---

The other measure most used in the financial literature is the degree of operating leverage (DOL), which is calculated by dividing the variation in Earnings Before Interest and Taxes (EBIT) by the variation in sales[7] (Harjoto, 2017; Houmes, MacArthur and Stranahan, 2012). Houmes, MacArthur, and Stranahan (2012) study the impact of operating leverage on systematic risk in listed firms with the two measures mentioned. They compare the results obtained by using the degree of operating leverage with those obtained by using the ratio between net fixed assets and

[7] Kahl, Lunn, and Nilsson (2014) criticizes this measure as an indicator of risk because managers can influence depreciation, which can be manipulated and which depends on past investments and, therefore, does not represent current costs.

total assets. They conclude that the weight of net fixed assets over total assets determines the beta of the assets more significantly.

The other main variables are found in Table 2. We use the variable LEV as an indicator of financial leverage, and the logarithm of the total assets as an indicator of size, LTOTASS. We use the variable INTANG as a measure of the specificity of the assets and the innovation, since a greater proportion of investment in intangible assets means more investment in R&D and in more specific assets. Next, we use AGE as a measure of reputation and is the number of years that firms have been carrying out their activity. Finally, we have considered the economic growth of each country through the variable GPDGRW that shows the variation that its GDP experiences each year. This variable, in addition to making it possible to know the importance of the economic situation, can also be used as an indicator of the country effect, since the order of countries based on this macroeconomic data does not vary throughout the period considered (see Table 1: Panel B).

Finally, we introduce control variables that have shown a high degree of explanatory power for the cost of debt: interest coverage (INTCOV), liquidity (LIQUID) and cash flow (CASH).

The use of these explanatory variables in the regression process could cause problems of multicollinearity given the high degree of interrelation that can be established between them. To detect these problems and to take the appropriate measures, we apply the Variance Inflation Factor (VIF). Taking the results of Table 3 for the complete European sample, we confirm the absence of multicollinearity problems, since the VIF values[8] range between 1.0025 and 1.2545, with an average of 1.1425.

--- Table 3 here ---

4. Methodology

Taking the empirical evidence consulted as a reference, we will analyse the determinants of the cost of debt of European agri-food firms by means of dynamic panel data. This will allow us to control for the existence of unobservable heterogeneity that is greater with cross-sectional data (Baltagi, 2001; Wooldridge, 2002).

[8] Neter, Wasserman, and Kutner (1989) point out that individual values for VIF greater than ten indicate problems of multicollinearity, as well as an average value greater than six.

We model the cost of debt (COD) for the European countries considered through the following theoretical model:

$$\text{COD}_{\text{jt}} = \varphi + \sum_{\pi=1} \gamma_{\pi} \cdot \text{X}_{\pi\text{jt}} + \varepsilon_{\text{jt}} \tag{1}$$

Where X is a vector of the π explanatory variables, γ_{π} are the unknown estimated parameters, and ε_{jt} the random perturbation.

We present our econometric approach for the theoretical model described in equation (1), which integrates the specific explanatory variables, the cross-effects of these with the operating leverage and the control variables. The estimation and contrast of this model adopts the following structure:

$$\begin{aligned} \text{COD}_{\text{jt}} = {} & \delta_0 + \delta_1\text{OLM}_{\text{jt}} + \delta_2\text{LEV}_{\text{jt}} + \delta_3\text{LTOTASS}_{\text{jt}} + \delta_4\text{INTANG}_{\text{jt}} \\ & + \delta_5\text{AGE}_{\text{jt}} + \delta_6\text{GDPGRW}_{\text{jt}} + (\delta_7\text{LEV}_{\text{jt}} + \delta_8\text{LTOTASS}_{\text{jt}} \\ & + \delta_9\text{INTANG}_{\text{jt}} + \delta_{10}\text{AGE}_{\text{jt}})*\text{OLM}_{\text{jt}} + \delta_{11}\text{INTCOV}_{\text{jt}} \\ & + \delta_{12}\text{LIQUID}_{\text{jt}}\delta_{13}\text{CASH}_{\text{jt}} + \varepsilon_{\text{jt}} \end{aligned} \tag{2}$$

where COD_{jt} represents the cost of the debt for the firm j (j=1, …, J) in the time period t (t=1, ..., T), calculated as the quotient between the interest paid for the incurred debt and the average of the debt with cost at the beginning and the end of the period in which the interest has accumulated; δ_0 represents the intercept (constant term) of the regression; δ_j represents the estimated values of the cross-section regression coefficients with the following breakdown: the main variables ∀j=OLM, LEV, LTOTASS, INTANG, AGE and GDPGRW; the variables crossed with OLM: ∀j=(LEV*OLM), (LTOTASS*OLM), (INTANG*OLM) and (AGE*OLM); and the control variables ∀j=INTCOV, LIQUID and CASH. Finally, ε_{jt} are the random perturbations.

Regarding the coefficient of each crossed variable, if it is of the same sign as that of the main variable, the effect of said variable on the cost of debt is enlarged the greater the operating leverage. On the other hand, if the coefficient of the crossed variable is opposite to that of the main variable, the effect of that variable is reduced as the operating leverage increases.

To deepen our study, we propose some econometric variants, so we will estimate and contrast three models. In this way we will study the effect of operating leverage on cost, both in isolation, and indirectly through the other risk factors proposed. These models will be regressed firstly for panel data that integrates all the countries in the sample (Europe), and then regressed individually for each of the countries considered (France, Italy, Poland, Spain, Sweden and the UK).

Thus, Model 1 only includes the control variables (INTCOV, LIQUID and CASH) and OLM, which allows us to know their explanatory capacity. Model 2 includes all the main variables (OLM, LEV, LTOTASS, INTANG, AGE and GDPGRW) along with the control variables. We intend to ascertain the explanatory increase that these risk indicator variables have over our key variable OLM. Finally, Model 3 is the most complete model since it encompasses all the variables enunciated in equation (2), that is, the control variables, the main variables (except OLM) and the cross-effect variables (LEV*OLM, LTOTASS*OLM, INTANG*OLM and AGE*OLM). This last model will allow us to ascertain the effect produced by operating leverage on the main variables and, therefore, to know the degree of compliance with the hypotheses previously raised.

The parameters have been estimated incorporating instrumental variables by the *Generalized Method of Moments* (GMM) to the equation in first differences. This methodology has been chosen because it allows us to control the possible problems of endogeneity that may arise, since the random disturbances that affect the decisions on the levels of the cost of debt can also affect other characteristics of the firms.

This procedure was developed by Arellano and Bond (1991) and presents two levels of application depending on the nature of the random disturbance. If the residuals are homocedastic, the GMM estimate in one stage would be the most appropriate. If, on the other hand, there is heterocedasticity, the estimator of the instrumental variables in one stage will remain consistent, but the estimation in two stages increases the efficiency.

As measures of the goodness of fit, we propose the adjusted R^2, the Wald test set of coefficients equal to each other and equal to zero (under the null hypothesis that $\delta_1 = \delta_2 = \ldots = \delta_6 = 0$), the estimation error calculated from the sum of the mean of the square of the errors (errors due to the bias of the estimator) plus the variance, and the significance of the total set of the mean of the error equal to zero on the residuals (under the null hypothesis that E(ε)=0). Additionally, to test the consistency of the estimates, the second-order serial correlation absence test (m2 test) also proposed by Arellano, and Bond (1991) was used. In turn, we used the test of Sargan (1958) on the over-identification of restrictions (under the null hypothesis that the instruments used are valid) to verify the absence of correlation between the instruments and the error term.

Once the data and the variables have been analysed, we observe that Wald's contrast justifies the joint explanatory power of the parameters, and the contrast of mean equal to zero allows us to accept the hypothesis of unbiasedness of the errors (see the lower part of Tables 4 and 5). On the other hand, the results of the m2 test indicate the absence of second-order serial correlation since the instruments used in the GMM estimates are not correlated with the error term, both for the complete European sample and for the countries separately. Also, the Sargan test cannot be rejected and, consequently, the instruments incorporated in the GMM regression are valid.

5. Results

Table 4 presents the results of the estimation of the three models for the complete European sample, and in Table 5 for each country separately. The results from all the analyses carried out show us that a positive relationship exists between operating leverage and the cost of debt (Models 1 and 2). Therefore, the cost structure, measured with OLM, is shown to be a significant source of risk and is a fundamental determinant of the cost of debt in all countries, indicating that the higher the operating leverage, the higher the cost.

--- Table 4 here ---

The difference between Model 1 and Model 2 is that the first includes only the control variables and OLM, while in the second the other main variables are added, all indicating some type of risk. The goodness of fit (measured by R^2) and the statistical significance of the results increase only slightly when introducing these variables, which indicates that operating leverage is the main determinant of the cost of debt. Applying the study to a single sector of activity demonstrates, as stated in the theoretical framework, that operational risk is a determinant of risk within an industry (Novy-Marx, 2011).

It is observed, on the one hand, that these variables do not affect the cost in the same way in all the countries studied. The result from Poland stands out (Table 5, Model 2), since OLM is the only statistically significant variable. Poland is the country that has experienced the highest growth in the period under consideration, including the crisis years (Tabla 1: Panel B) and many Polish agri-food companies have made many investments in fixed assets, increasing their operational leverage. Indeed, agri-food firms have, on average, greater operating leverage than the other European firms and lower level of indebtedness (Table 3). Therefore, the higher operating risk has been offset by lower financial risk.

--- Table 5 here ---

The goodness of fit and significance of the analyses is greatest for British companies. This result can be explained by the fact that the United Kingdom is governed by the common law and has a market-oriented economy, which is why, as argued above, British companies that assume greater risks are more penalised by the requirement of a higher risk premium.

Model 3, by introducing the cross-effects of OLM with the main variables, allows us to know the relationship that operating leverage has with the other sources of risk and to explain to what extent the hypotheses proposed in this work are supported. It is the model that offers the highest R^2 and with the lowest measurement error for all countries. Likewise, we ascertain (through Wald's contrast) that, in general, the variables jointly and actively contribute to explaining the cost of debt. This result allows us to conclude that the cost structure supported by companies will influence the decisions that agri-food companies make about the level of indebtedness or about investments, since together these will determine the cost of financing.

We observe a positive effect between the level of indebtedness (LEV) and the cost of debt in the complete sample (Table 4, Model 3) and the variable crossed with OLM of the opposite sign. This result confirms the acceptance of *Hypothesis 1*, in other words, the higher the operating leverage, the lower the positive relationship between indebtedness and cost of debt. When analysing this variable by country, it is worth noting that the results in France are opposite (Table 5: Model 3). This result can be explained because the French agri-food company takes on debt to increase its investment in intangible fixed assets. In this way, the two types of risk are increased at the same time, with operational risk determining the cost of debt to a greater extent. In a previous section, we presented the innovative effort that France is making by subsidising innovative companies through cheaper financing. This fact helps to explain why the most indebted companies are the most subsidised, while they are also the ones that invest the most in fixed assets. Indeed, France is the country in which the companies in the sector have made the largest investments in R&D (FIAB[9], 2015) and the average weight of the intangible asset is much greater than in the rest of the countries (see Table 3).

Additionally, in Poland, the level of indebtedness is not a determinant of the cost of debt (Table 5: Model 3). The results are in line with those obtained in other studies in which it is concluded that operating leverage can determine the firm's risk to a greater extent, decreasing and even nullifying the effect of financial risk (Houmes, MacArthur and Stranahan, 2012).

The ratio between the size of the asset (LTOTASS) and the cost of debt is negative in the whole European sample, but this effect is lower if the operating leverage is greater, since the sign is the opposite when the two variables are crossed. Therefore, smaller firms bear higher debt costs because they have less bargaining power and more information asymmetry, but that relationship is diminished if they have little operating leverage, which supports *Hypothesis 2*. In the same way, the greater the size, the lower the cost of debt, but this negative effect is diluted in those big firms with greater operating leverage. The same result is obtained in all countries except Poland, where, as we have already indicated, only OLM is statistically significant.

The relationship between the specificity and innovation variable (INTANG) and the cost of debt is negative in the whole European sample (Table 4: Models 2 and 3). In other words, the greater the weight of the intangible assets in the assets of the firm, the lower the cost of debt. In general, as we have seen earlier, firms in the agri-food sector that invest in R&D obtain subsidies both in Europe and linked to their own countries, which could explain this result. But, given that incentive policies are very different in each country, the results obtained with this variable are very different in the analysis by country (see Table 5).

[9] See the full report of FIAB (Spanish Federation of Food and Beverage Industries) of 2015 at: http://fiab.es/wp-content/uploads/2017/12/Informe-Económico-2015.pdf

In Spain and Italy the increase in specificity increases the cost of financing and, therefore, *Hypothesis 3* is accepted, i.e. the relationship between the INTANG variables and the cost of debt is lower the greater the operating leverage (Table 5: Model 3). However, in France, which is the country with the companies that have obtained the largest subsidies and have made the greatest investment in R&D (FIAB, 2015 and Table 3), *Hypothesis 3* is not supported and the relationship between INTANG and COD is negative, such that the companies with the highest specific investments are those that support less cost.

On the other hand, in the United Kingdom there is no relationship between these variables. This is the same result obtained by Hyytinen and Pajarinen (2007) when carrying out the study with Scottish firms, which also operate in a common law jurisdiction.

Age (AGE) has a negative effect on the cost of debt in the European sample, so that, as expected, younger firms bear higher costs when financing their productive activity with debt. But the cross effect of the opposite sign shows that this negative relationship is lower the greater the operating leverage (Table 4: Model 3). We can affirm, as stated in *Hypothesis 4*, that the greater the operating leverage, the lower the negative relationship between age and cost of debt. In the analyses of Model 3 by country (Table 5), *Hypothesis 4* is only supported in Italy. In the majority of the countries, age is not statistically significant, which can be explained because within each country age is a fairly homogeneous variable and it ceases to be determinative.

GDP growth (GDPGRW) is statistically significant with a negative sign in the three models (Table 4), which shows that if the country is growing, the cost of debt decreases. Finally, regarding the control variables, it can be stated that, in general, the European firms that bear the lowest cost are those that have covered the debt interest with profits (INTCOV) to a greater extent and that have more cash (CASH). Regarding the variable with which we measure liquidity (LIQUID), it gives us a positive result. This result is explained because within the current assets are the outstanding receivables. The agri-food sector offers, in general, longer collection periods and, in addition, during the crisis period that our study includes, it has suffered high payment default levels, which means that the higher the current assets compared to the current liabilities, the higher the cost of debt. When viewing the result by country (Table 5), this relationship between LIQUID and COD is different in Sweden (Table 5, Models 2 and 3). This result is explained, as Grau and Reig (2018) argue, by the fact that Sweden is the country that offers the fewest payment deferrals and in which the least payment default occurs.

6. Conclusions

The cost of debt of firms depends on the operational and financial risk assumed by their creditors. Among the determinants of economic risk is the cost structure or operating leverage, since higher fixed costs in relation to variable costs mean greater variability in profits.

The objective of this paper is to study the effect of operating leverage on the cost of debt and on the other sources of risk that determine this cost (indebtedness, size, specificity and reputation). This research is applied to the agri-food industry (18,360 firms), which is a key and strategic sector of the economy in Europe, with data from 2009 to 2016 and for a number of European countries: France, Italy, Poland, Spain, Sweden and the UK.

The first conclusion that can be drawn from the results obtained is the importance of operating leverage as a determinant of the cost of debt of European agri-food firms. It turns out to be the main determining factor in all the countries and analyses carried out, and we can affirm that the greater the weight of fixed costs compared to variable costs, the greater the cost of debt.

To obtain this result it has been crucial to consider one single sector of activity, that of agri-food, given that the determinants of the risk and the cost of debt will be different depending on the type of product and the elasticity of its demand. By not mixing firms from different sectors in the same study, the results offer much clearer evidence. The agri-food sector is characterized by being a very competitive sector with little demand elasticity and, therefore, lower demand risk compared to other sectors. This explains why the increase in fixed costs and operating leverage can affect the cost of debt to a greater extent than other sources of risk that can have a greater effect in other industries.

Another conclusion of the work is the importance that the legal and institutional environment has had on the determinants of the cost of debt. This conclusion has been reached after carrying out the country-by-country analysis. As stated in the text, in countries that, like the UK, in addition to being governed by the common law, also have a market-oriented economy, have more information and possess systems that protect investors, so companies are less likely to assume risks. The results obtained allow us to affirm that the explanatory capacity of the proposed variables is much greater for the British firms, demonstrating that those British firms that assume more risks are the most penalised with the requirement of a higher risk premium. In contrast, in countries that have in common the fact of being governed by civil law and that they are more oriented towards banking, the effect of risk on the cost of debt has been less significant, as is the case of Spain and Italy.

In view of the results obtained and given the importance of operating leverage in the determination of cost, it has been very useful to study the cross-effects between this variable and other factors that are determinant of risk. Indeed, the conclusion is reached that depending on the operating leverage and depending on the country, the importance of the variables such as indebtedness, size, specificity or reputation on the cost of debt varies.

The financial risk measured by the level of indebtedness affects the cost of debt, but to a lesser extent than the operational risk. The agri-food sector, being a key sector in the European economy, has been subject to special aid programs distributed in volume unevenly across countries. If we add to this the national subsidy programs, the level of indebtedness is not a clear determinant of the cost of debt in European agri-food firms, since some subsidised companies become more indebted with cheaper loans.

Of note is the result obtained with the size variable, measured by the volume of assets of the firm. It is decisive in all the analyses carried out, indicating that small firms are more risky and they are required to pay more interest on their debts; although this effect is mitigated if the firms do not have a very leveraged cost structure. This result highlights once again the difficulty of small firms to obtain financing under the same conditions as large firms and the interest of governments in improving this situation and eliminating these differences.

Regarding the specificity of the assets, it has been interesting to verify that the importance of this risk factor on the cost of debt depends on the level of support for innovation made by policy makers. It has been observed that the higher risk of these specific investments does not translate into higher costs in the countries that have made the most efforts in this field.

The results obtained in this research have important implications for the managers of the firms and for those responsible for agri-food industrial policy, both in Europe and at the local level of each country. Not mixing firms from different sectors allows conclusions to be drawn that can help entrepreneurs in the sector and policy makers to make decisions that improve the results of these firms and, therefore, the economic growth of the countries.

We believe that our research could be expanded by incorporating a greater number of countries into the mix and grouping them according to the origins of their legal systems and by whether they are oriented towards banking or the market. In this way we can compare the cost strategies that companies follow and their effects, depending on the institutional and legal environment.

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Table 1

Panel A: Cost of Debt by country

	2009	2010	2011	2012	2013	2014	2015	2016	Mean	Std. Dev.
EUROPE	0.0240	0.0206	0.0221	0.0225	0.0211	0.0204	0.0183	0.0164	0.0207	0.0024
France	0.0209	0.0191	0.0201	0.0174	0.0160	0.0151	0.0139	0.0133	0.0170	0.0029
Italy	0.0221	0.0184	0.0204	0.0222	0.0218	0.0215	0.0207	0.0186	0.0206	0.0015
Poland	0.0300	0.0245	0.0243	0.0300	0.0232	0.0239	0.0163	0.0095	0.0227	0.0068
Spain	0.0263	0.0220	0.0233	0.0239	0.0225	0.0216	0.0185	0.0164	0.0218	0.0031
Sweden	0.0345	0.0347	0.0400	0.0426	0.0366	0.0322	0.0291	0.0256	0.0344	0.0055
U. Kingdom	0.0242	0.0235	0.0225	0.0240	0.0205	0.0215	0.0174	0.0154	0.0211	0.0032

Panel B: GDP growth (base year 2010; Source EUROSTAT)

	2009	2010	2011	2012	2013	2014	2015	2016
France	98.1	100	102.1	102.3	102.9	103.8	104.9	106.2
Italy	98.3	100	100.6	97.7	96.1	96.2	97.1	97.9
Poland	96.5	100	105	106.7	108.2	111.7	116	119.4
Spain	100	100	99	96.1	94.5	95.8	99.1	102.3
Sweden	94.3	100	102.7	102.4	103.6	106.3	111.1	114.7
U. Kingdom	98.3	100	101.5	103	105.1	108.3	110.8	113

Table 2

Description of the Explanatory Variables

Parameters	Description
	Dependent Variable
COD	*Cost of Debt: Interest expense$_t$ / average of the beginning and end total debt$_t$*
	Main Explanatory Variables
OLM	*Operating Leverage Mesure: Net Fixed Assets / Assets.*
LEV	*Leverage: (Net Liabilities + Fixed Liabilities) / (Total Liabilities + Equity).*
LTOTASS	*Total Assets: Logarithm of the Assets.*
INTANG	*Intangible: Intangible Assets / Assets.*
AGE	*Age: Number of active years.*
GDPGRW	*GDP Growth: ($GDP_t - GDP_{2010}$) / GDP_{2010}.*
	Control Variables
INTCOV	*Interest Coverage: EBIT / Interest expense.*
LIQUID	*Liquidity: (Current Assets – Stocks) / Current Liabilities.*
CASH	*Flow Available: Cash Flow / Operating Income.*

Table 3

Statistical Descriptive for variables

Panel A. EUROPE										
N=18360	COD	OLM	LEV	TOTASS	INTANG	AGE	GDPGRW	INTCOV	LIQUID	CASH
Mean	0.02066	0.42497	0.60216	19,987.71	0.05318	23.50006	0.00019	210.6346	1.32630	5.57824
Std. Dev.	0.02917	0.24096	0.29708	424,207.4	0.14316	16.97458	0.02338	7,873.23	2.21052	10.0479
Jarque-Bera	2.57E+10**	5.84E+03**	3.38E+06**	1.16E+11**	1.38E+06**	4.34E+05**	5.93E+03**	2.02E+12**	1.65E+08**	2.52E+06**
FIV (mean: 1.1425)	---	1.1886	1.2545	1.1881	1.1617	1.1799	1.0128	1.0025	1.1957	1.0992

Panel B. France									
N=4244	COD	OLM	LEV	TOTASS	INTANG	AGE	INTCOV	LIQUID	CASH
Mean	0.01696	0.44133	0.57477	28,532.46	0.16150	25.06456	117.1385	1.18555	6.14339
Std. Dev.	0.02712	0.24646	0.25941	655,192.4	0.24301	18.616	1,915.256	1.28073	6.12276
Jarque-Bera	1.19E+11**	1.89E+03**	4.37E+05**	7.11E+09**	1.13E+04**	4.51E+04**	1.64E+10**	1.66E+07**	1.11E+05**
FIV (mean: 1.4690)	---	2.2355	1.324	1.264	2.194	1.217	1.0044	1.344	1.1693
Panel C. Italy									
N=5691	COD	OLM	LEV	TOTASS	INTANG	AGE	INTCOV	LIQUID	CASH
Mean	0.02074	0.37043	0.61017	9,390.646	0.03376	24.91047	221.2604	1.20676	5.70227
Std. Dev.	0.03459	0.23146	0.24044	72,727.86	0.07588	17.38196	4,067.937	1.74017	10.3127
Jarque-Bera	5.55E+08**	2.00E+03**	5.51E+02**	2.12E+10**	1.66E+06**	2.40E+04**	4.57E+10**	9.30E+07**	7.48E+05**
FIV (mean: 1.1760)	---	1.1792	1.4125	1.1421	1.0728	1.1572	1.0092	1.322	1.1131
Panel D. Poland									
N=428	COD	OLM	LEV	TOTASS	INTANG	AGE	INTCOV	LIQUID	CASH
Mean	0.02269	0.51961	0.51941	17,672.18	0.00870	23.9602	58.8288	0.93825	6.16884
Std. Dev.	0.06290	0.19079	0.20464	51,800	0.03945	24.0563	351.000	0.79984	5.90301
Jarque-Bera	7.26E+06**	4.64E+01**	2.44E+01**	1.26E+06**	1.25E+06**	3.15E+04**	6.21E+06**	1.11E+05**	2.76E+03**
FIV (mean: 1.3294)	---	1.3778	1.7909	1.2124	1.0663	1.0633	1.063	1.7143	1.3476

This table presents the typical descriptive statistics for the variables defined in panel data of 2009-2016, the Jarque-Bera test for contrasting normality, and the Variance Inflation Factor (VIF) to diagnose the presence/absence of multicollinearity.

**p<0.01, *p<0.05, ^p<0.1.

Table 3 (Continued)

Panel E. Spain									
N=7100	COD	OLM	LEV	TOTASS	INTANG	AGE	INTCOV	LIQUID	CASH
Mean	0.02181	0.45320	0.61711	6,513.755	0.00854	20.43638	290.9819	1.56145	5.06966
Std. Dev.	0.02037	0.24158	0.36014	49,391.71	0.04208	12.34017	12,205.26	3.03079	12.0182
Jarque-Bera	1.26E+06**	1.99E+03**	1.42E+06**	1.38E+10**	5.38E+07**	2.85E+05**	1.59E+11**	2.24E+07**	5.68E+05**
FIV (mean: 1.1244)	---	1.0742	1.2685	1.1984	1.0192	1.1692	1.0021	1.1645	1.0991
Panel F. Sweden									
N=470	COD	OLM	LEV	TOTASS	INTANG	AGE	INTCOV	LIQUID	CASH
Mean	0.03439	0.44990	0.63705	17,094.92	0.01100	24.12979	10.31303	1.13278	5.05398
Std. Dev.	0.02901	0.23374	0.27571	95,761.78	0.07169	19.63037	46.96227	0.98720	9.24506
Jarque-Bera	2.50E+05**	9.40E+01**	1.16E+04**	2.40E+06**	1.41E+06**	1.17E+04**	1.50E+06**	8.44E+04**	4.85E+04**
FIV (mean: 1.2712)	---	1.2000	1.4833	1.4097	1.0213	1.2855	1.0987	1.5024	1.1691
Panel G. United Kingdom									
N=427	COD	OLM	LEV	TOTASS	INTANG	AGE	INTCOV	LIQUID	CASH
Mean	0.02112	0.42025	0.57537	295,081.7	0.03311	36.49297	99.18306	1.19824	6.34362
Std. Dev.	0.02895	0.21788	0.29260	1,767,904	0.09179	30.08333	650.1150	0.97801	6.81544
Jarque-Bera	2.27E+06**	1.05E+02**	3.12E+04**	4.86E+06**	5.83E+04**	2.91E+03**	4.71E+07**	6.04E+04**	7.99E+04**
FIV (mean: 1.2915)	---	1.3187	1.4283	1.3724	1.2011	1.2646	1.0257	1.4406	1.2808

Table 4

Determinants of cost of debt in Europe

	EUROPE		
	Model 1	Model 2	Model 3
Main Variables			
c	0.0151**	0.0190**	0.0244**
	(72.69636)	(34.5030)	(46.8796)
OLM	0.0132**	0.0139**	
	(34.1129)	(33.7654)	
LEV		-0.0001	0.0072**
		(-0.347182)	(11.4476)
LTOTASS		-0.0011**	-0.0039**
		(-9.2078)	(-22.0689)
INTANG		-0.0058**	-0.0055^
		(-8.7514)	(-1.8599)
AGE		-1.06E-05*	-0.0001**
		(-1.9865)	(-5.4505)
GDPGRW	-0.1222**	-0.1058**	-0.1050**
	(-9.3948)	(-7.9501)	(-7.9011)
Cross Effects			
LEV*OLM			-0.0148**
			(-13.7926)
LTOTASS*OLM			0.0063**
			(21.0274)
INTANG*OLM			0.0017
			(0.4486)
AGE*OLM			0.0001**
			(5.2582)
Control Variables			
INTCOV	-1.14E-07**	-4.12E-07**	-3.90E-07**
	(-4.4569)	(-4.4349)	(-4.2039)
LIQUID	0.0006**	0.0006**	0.0007**
	(11.8359)	(9.7349)	(11.4905)
CASH	-0.00012**	-0.0001**	-0.0001**
	(-7.91839)	(-7.0050)	(-7.0476)
R^2 adjusted	0.2251	0.2349	0.2645
Wald ($\delta_1 = \ldots = \delta_6 = 0$)	34,564.12**	64,891.44**	66,841.62**
$E(\varepsilon)=0$	364.9684**	609.1847**	645.3674**
Estimation error	1.4157	1.2188	1.2036
m2 Test	0.79	0.67	0.63
Sargan Test	81.05(73)	85.42(79)	88.36(79)
p–Hausman	0.3458	0.3347	0.5214

The data in this table correspond to two-steps regression results of GMM model in first differences, described in the equation (2), where the dependent variable is cost of debt (COD) of the European firms. The main variables are: OLM (Net Fixed Assets / Total Assets), LEV (Total Debts / Total Assets), LTOTASS (logarithm of the Total Assets), INTANG (Intangible Assets / Total Assets), AGE (number of active years), and GDPGRW (GDP increase). The cross effects correspond to the main variables multiplied by operating leverage mesure. The control variables are: INTCOV (EBIT/Interest expense), LIQUID (Current Assets-Stocks/Current Liabilities) and CASH (Cash Flow/Operating Income). t-Statistic in brackets. As measures of the goodness of fit, we propose the adjusted R^2, the Wald test set of coefficients equal to each other and equal to zero (under the null hypothesis that $\delta_1=\delta_2= \ldots =\delta_6=0$, the estimation error calculated from the sum of the mean of the square of the errors (errors due to the bias of the estimator) plus the variance, and the significance of the total set of the mean of the error equal to zero on the residuals (under the null hypothesis that $E(\varepsilon)=0$). In addition, m2 is a test for second-order serial autocorrelation in residuals in first differences, distributed asymptotically as N(0,1) under the null hypothesis of no serial correlation. The Sargan Test is a test of over-identifying restrictions distributed asymptotically under the null hypothesis of validity of instruments as Chi-squared: degrees of freedom in brackets. p–Hausman is the p–value in Hausman's (1978) test. In this case, the estimations for instrumental variables and OLS are compared. Acceptance of the null hypotheses implies no endogeneity problems.

**$p<0.01$, *$p<0.05$, ^$p<0.1$.

Table 5

Determinants of cost of debt by country

	France			Italy			Poland		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Main Variables									
c	0.0065**	0.0066**	0.0190**	0.0143**	0.0197**	0.0243**	0.0124**	0.0116	0.0273*
	(13.1107)	(4.8314)	(14.2512)	(36.6627)	(14.7265)	(19.2377)	(2.5742)	(0.8383)	(2.2537)
OLM	0.0197**	0.0297**		0.0169**	0.0176**		0.0264**	0.0262**	
	(24.1696)	(25.3192)		(20.3289)	(19.7224)		(3.1927)	(3.0463)	
LEV		-4.25E-05	-0.0055**		0.0051**	0.0124**		0.0020	-0.0053
		(-0.0464)	(-3.5089)		(4.8463)	(7.9557)		(0.2005)	(-0.3038)
LTOTASS		-0.0004^	-0.0032**		-0.0028**	-0.0055**		0.0002	-0.0035
		(-1.7379)	(-8.6713)		(-10.6832)	(-15.0816)		(0.0766)	(-1.0194)
INTANG		-0.0146**	-0.0147**		0.0173**	0.0614**		0.0221	0.1759
		(-12.8276)	(-3.7778)		(6.8279)	(7.5390)		(0.6360)	(0.5484)
AGE		-1.43E-05	3.09E-05		-1.97E-05*	-5.35E-05**		-5.54E-05	5.83E-05
		(-1.4823)	(1.4928)		(-1.9074)	(-2.7562)		(-1.0602)	0.423758
Cross Effects									
LEV*OLM			0.0121**			-0.0187**			0.0122
			(4.5599)			(-6.4266)			(0.4221)
LTOTASS*OLM			0.0069**			0.0079**			0.0066
			(10.1463)			(11.5968)			(1.2831)
INTANG*OLM			0.0046			-0.0725**			-0.2349
			(0.9788)			(-5.3366)			(-0.4819)
AGE*OLM			-0.0001**			0.0001**			-0.0002
			(-2.5863)			(2.4071)			(-0.8884)
Control Variables									
INTCOV	-9.44E-07**	-9.24E-07**	-9.47E-07**	-8.95E-	-8.57E-07**	-8.28E-07**	-1.24E-05	-1.25E-05	-1.25E-04
	(-5.7959)	(-5.6762)	(-5.8117)	(-9.1999)	(-8.8208)	(-8.5077)	(-1.4906)	(-1.4414)	-1.438988
LIQUID	0.0007**	0.0007**	0.0004	0.0010**	0.0013**	0.0014**	-0.0016	-0.0013	-0.0018
	(3.3434)	(2.7728)	(1.5516)	(6.7619)	(7.1490)	(7.4714)	(-0.8033)	(-0.5357)	(-0.7336)
CASH	0.0001^	2.98E-05	4.36E-05	-0.0002**	-0.0002**	-0.0002**	-0.0003	-0.0003	-0.0003
	(1.7916)	(0.6494)	(0.9445)	(-6.3253)	(-5.7388)	(-5.2964)	(-1.0592)	(-0.9533)	(-0.9161)
R^2 adjusted	0.2549	0.2493	0.2864	0.2496	0.2599	0.2732	0.2503	0.2593	0.2766
Wald (δ_1= … =δ_6=0)	12,574.66**	12,612.36**	11,512.61**	34,564.12**	64,891.44**	66,841.62**	4,564.12*	4,891.44*	5,841.62*
$E(\varepsilon)=0$	147.3264**	204.6974**	198.6451**	452.6647**	561.3674**	463.6647**	34.0368*	36.6457*	31.6974*
Estimation error	1.1641	1.1552	0.9644	2.3641	1.6587	1.6077	2.6974	1.8744	1.0587
m2 Test	0.97	0.8	0.65	0.85	0.7	0.68	0.96	0.91	0.90
Sargan Test	63.37(68)	79.29(72)	90.31(72)	77.18(49)	91.29(49)	92.91(50)	61.25(50)	66.75(50)	67.88(51)
p–Hausman	0.4574	0.4522	0.4867	0.7557	0.7474	0.7928	0.1547	0.1674	0.1698

Table 5 (Continued)

	Spain			Sweden			United Kingdom		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Main Variables									
c	0.0193**	0.0219**	0.0234**	0.0251**	0.0583**	0.0675**	0.0028^	-0.0220**	-0.0063
	(81.7823)	(37.5696)	(43.0611)	(14.5386)	(13.2946)	(17.0999)	(1.6829)	(-5.0353)	(-1.5838)
OLM	0.0036**	0.0036**		0.0226**	0.0202**		0.0337**	0.0318**	
	(8.2249)	(7.9961)		(7.3203)	(6.5549)		(11.3648)	(10.4044)	
LEV		-0.0014**	0.0050**		-0.0129**	0.0029		0.0131**	0.0258**
		(-4.1589)	(8.2354)		(-4.1891)	(0.6851)		(5.3931)	(5.3311)
LTOTASS		-0.0004**	-0.0025**		-0.0073**	-0.0148**		0.0026**	-0.0022^
		(-3.0729)	(-11.2296)		(-9.9421)	(-11.6328)		(3.0314)	(-1.8696)
INTANG		0.0052*	0.0214*		0.0285**	0.0152		0.0014	-0.0355
		(2.0003)	(2.0907)		(3.0103)	(0.2667)		(0.2064)	(-1.2138)
AGE		-1.05E-05	1.14E-05		-5.40E-06	5.41E-05		0.0001**	9.67E-05*
		-1.266727	(0.6144)		(-0.1830)	0.710701		(7.0148)	(2.0721)
Cross Effects									
LEV*OLM			-0.0128**			-0.0354**			-0.0299**
			(-12.6689)			(-4.9867)			(-3.0969)
LTOTASS*OLM			0.0043**			0.0166**			0.0102**
			(12.0440)			(7.12563)			(5.8320)
INTANG*OLM			-0.0266^			0.0162			0.0568
			(-1.8401)			(0.2160)			(1.2061)
AGE*OLM			-3.03E-05			-0.0002			4.83E-05
			(-0.8758)			(-0.9633)			(0.5705)
Control Variables									
INTCOV	-3.26E-07**	-3.24E-07**	-3.03E-07**	-0.0002**	-0.0002**	-0.0002**	-8.36E-	-7.64E-06**	-7.47E-06**
	(-3.8960)	(-3.8717)	(-3.6261)	(-6.5153)	(-5.9546)	(-5.3957)	(5.0938)	(-4.6971)	(-4.6033)
LIQUID	0.0004**	0.0004**	0.0005**	0.0026**	-9.40E-05**	6.61E-05	0.0031**	0.0046**	0.0049**
	-10.1356	(8.0082)	(9.8517)	(3.2395)	(-0.0986)	(0.0388)	(4.3689)	(5.9212)	(6.2314)
CASH	-8.86E-05**	-9.76E-05**	-0.0001**	-0.0003*	-0.0002	-0.0002	0.0001	6.79E-05	5.42E-05
	(-6.2573)	(-6.4979)	(-6.7436)	(-2.2009)	(-1.3457)	(-1.4402)	(1.0701)	(0.4707)	(0.3778)
R^2 adjusted	0.2065	0.2102	0.2466	0.2344	0.2903	0.3312	0.2849	0.3009	0.3521
Wald (δ_1= ... =δ_6=0)	28,641.33**	31,546.69**	30,264.48**	11,564.55**	15,687.54**	16,764.22**	896.31**	1,012.54**	1,066.88**
$E(\varepsilon)=0$	649.784**	596.3147**	555.3672**	108.6314**	99.6415**	113.1547**	235.6533**	315.6314**	208.6541**
Estimation error	1.6651	1.5367	1.5057	9.6451	9.2974	7.1103	1.3387	1.3315	1.3174
m2 Test	0.90	0.82	0.79	0.96	0.95	0.90	0.98	0.95	0.94
Sargan Test	73.54(68)	79.72(72)	81.02(72)	59.62(49)	60.74(49)	61.88(50)	58.19(47)	66.74(58)	70.41(67)
p–Hausman	0.4867	0.4154	0.5007	0.6674	0.5977	0.6661	0.5874	0.5687	0.5964