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DETERMINANTS OF FINANCIAL DISTRESS COSTS

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Abstract. This paper provides international evidence on financial distress costs. To achieve this aim, we have developed a model where financial distress costs are determined, on the one hand, by making use of a more accurate indicator of the probability of financial distress and, on the other, by a set of variables that, according to financial theory, explain the magnitude of the costs borne by a firm in the case of financial distress. Our results reveal the relevance of our improved indicator of the probability of financial distress, since it positively affects financial distress costs in all the countries analyzed. Furthermore, since our model controls for the probability of financial distress, we can test the trade-off between the benefits and costs of debt. This allows us to verify that the benefits debt outweigh the costs. Our results also indicate that distress costs are negatively related to liquid assets; hence, their benefits more than offset their opportunity costs.

1. Introduction

This study integrates two lines of research that have so far been developed separately without exploring the potential of cross-fertilization. The first, mainly theoretical one deals with financial distress costs. The second one finds its roots in the empirical studies on financial distress prediction. This integration relies on the idea that financial distress costs are determined, on the one hand, by the probability of financial distress and, on the other, by the costs that the firm will incur in case of financial distress (ex-post financial distress costs).

The literature on financial distress costs has focused foremost on *direct* financial distress costs, which are the administrative and legal costs associated with the bankruptcy process. This strand of literature [see, for instance, WARNER (1977), WEISS (1990), GILSON et al. (1990), GILSON (1997), BETKER (1997)] seems to have reached a consensus that the direct costs are relatively small in proportion to the total loss suffered by a large quoted firm filing for bankruptcy. The interest in *indirect* financial distress costs only came later. These are the costs borne by all firms that can no longer meet their financial obligations when they become due (BEAVER, 1966) and that can bring the firm closer to bankruptcy.

Previous research on the determinants of financial distress costs is quite scarce and does not account for appropriate indicators of the probability of financial distress. OPLER and TITMAN (1994) and ANDRADE and KAPLAN (1998) both use debt-based indicators assuming that the higher the firm's leverage, the higher its probability of financial distress. However, as JENSEN (1989a) states, the relationship between debt and financial distress is perhaps one of the least understood aspects of organizational evolution, and leverage can also be beneficial for financially distressed firms (see JENSEN, 1989b; WRUCK, 1990; OFEK, 1993). Consequently, our study distinguishes between the effect of the probability of financial distress and that of leverage. We use an alternative, more accurate indicator of the probability of financial distress, that allows us to examine the real effect of leverage on financial distress costs.

In summary, our main objective is to provide evidence on the determinants of financial distress costs by integrating the studies on financial distress prediction and the studies on financial distress costs. To achieve this aim, we have developed a model in which financial distress costs are determined, on the one hand, by the probability of financial distress and, on the other, by a set of variables that, according to financial theory, explain the magnitude of the costs borne by a firm in case of financial distress. We thus assume that the probability of financial distress influences, directly and/or indirectly, a firm's performance. ALTMAN (1984) suggests that indirect financial distress costs in the form of the opportunity loss of sales can be measured by relating forgone sales with industry performance. In this way, we accept that financial distress costs correspond to a negative performance, as measured by the variation in the firm's sales in relation to the average variation in its sector.

The resulting model is estimated on large data panels of three well-developed countries (the US, the UK, and Germany) by the generalized method of moments (GMM), which allows us to solve endogeneity problems by using instruments. We also control for the unobservable heterogeneity, which arises when the individuals analyzed are firms, by using the panel data methodology.

Our results indicate that financial distress costs are positively related to the probability of financial distress and negatively to leverage and the holding of liquid assets. The negative coefficient of the investment policy variable supports the idea that the potential benefits to firms facing financial distress of first eliminating any non-profitable projects are exceeded by the underinvestment costs that arise when the firm is forced to abandon and/or forgo profitable investments. Our evidence also indicates that there is a general tendency to reduce employment following the deterioration of the financial condition of the firm; however, the effect of this policy on financial distress costs depends on the particular institutional system.

The remainder of the paper is organized as follows. In Section 2, we describe the theoretical framework, highlighting the advantages of considering an indicator of the probability of financial distress other than leverage, and formulate our hypotheses. Section 3 specifies an explanatory model of financial distress costs that allows us to test our hypotheses. Section 4 describes the data set and the methodology. In Section 5, we present and comment on the main results of the estimation of our model of financial distress costs. Finally, Section 6 presents our conclusions.

2. Theory

In the previous literature on financial distress costs there has only been a weak development of a specific theory in disconnection from the empirical research on financial distress and bankruptcy. It was not until the 90's that scholars began to develop explanatory models that were no longer limited to the study of bankrupt firms. In fact, WHITE (1996) points to ex-ante financial distress costs as the most important source of bankruptcy costs. Moreover, WARD and FOSTER (1997) point out that studying only bankruptcy leads to an important bias because firms usually get into a financial distress cycle and a lack of financial flexibility several years before filing for bankruptcy. PINDADO and RODRIGUES (2004) furthermore indicate that bankruptcy is only one of the possible outcomes of financial distress, which is mainly of a legal nature, without any specific economic and univocal significance.

Accordingly, OPLER and TITMAN (1994) define financial distress more broadly as the non-sporadic situation where companies can no longer meet their liabilities when they become due, and either break their commitments with creditors or face them with severe difficulties. WRUCK (1990), ASQUITH et al. (1994), ANDRADE and KAPLAN (1998), and WHITAKER (1999) use a similar definition to characterize the critical point when a firm reaches a financial distress situation: namely, when its earnings before interests, taxes,

and amortizations (EBITDA) are smaller than its financial expenses.

Accordingly, we adopt a definition of financial distress that emphasizes the initial period of development of the process, when it is still possible for the firm to react and recover despite bearing most of the indirect financial distress costs. This definition focuses on a financial concept of financial distress which, as opposed to bankruptcy, does not depend on the legal consequences and is consequently not country specific. Following this definition, we obtain an indicator of the probability of financial distress that integrates recent developments of financial theory and, at the same time, can be applied to different country/economic and legal contexts. By adopting this indicator, we can get deeper insight about the role played by other variables for a firm's financial distress costs. Specifically, the model we propose to explain financial distress costs takes into account, on the one hand, the probability of financial distress occurring and, on the other, the costs originating from such a situation.

2.1 Indirect Financial Distress Costs

The financial literature has traditionally differentiated two types of financial distress costs, namely direct and indirect costs [see, for instance, KIM (1978)]. As previously mentioned, the literature largely agrees about the relative size of direct financial distress costs. Since the first attempt of WARNER (1977) to measure these costs, subsequent empirical evidence has been quite unanimous about their low relative value in proportion to the firm's pre-bankruptcy market value.[1] Indirect financial distress costs, on the other hand, are in essence the consequence of running a firm that cannot meet its financial obligations. In contrast to the former, these costs are unobservable in nature, and WARNER (1977) properly considered them as opportunity costs.

Despite the difficulty in measuring them, our study focuses on indirect financial distress costs. We do so, not by quantifying the losses in terms of market value, but by identifying the determinants of these losses. In this context, we measure financial distress costs by an indicator of performance. GIROUX and WIGGINS (1984) already relate sales decline to subsequent bankruptcy, and ALTMAN (1984) measures indirect financial distress costs by comparing firm and industry sales performance. Our study also uses sales variables to evaluate the financial distress costs because this variable is less influenced by specific institutional characteristics than market values or earnings. Specifically, according to the proposal of OPLER and TITMAN (1994), we evaluate the extent of the financial crisis by comparing the growth rate of the firm's sales with the growth rate of the sales of its sector. In fact, insolvent firms have a strong tendency to lose their position within their sector, even if they do not get involved in bankruptcy processes. Hence, our view of financial distress costs relies on the fact that the sectoral behaviour may not be proportionally participated in by all firms, and that insolvent firms always lag behind the other firms in the sector.

Apart from financial distress, there are other factors that influence the sales growth. Most of these factors are firm specific, as for instance, bad management. Consequently, we let these factors enter our model as an individual effect. Additionally, to control for other remaining effects, we include in our model some sector adjusted variables, time dummy variables, and some control variables. As a result, our model is able to capture the partial effect of financial distress on sales growth, which is an appropriate measure of the indirect costs of financial distress.

2.2 A More Accurate Proxy for the Probability of Financial Distress

Previous research on financial distress costs has traditionally used leverage to capture the effect of the probability of financial distress. Like OPLER and TITMAN (1994), many scholars have as-

sumed that these two variables are closely connected, without taking into account that, according to JENSEN (1989a), there is a trade-off between the costs and benefits of leverage. Unlike prior studies, we propose a measure of the probability of financial distress that stems from the estimation of logistic models and captures most of the impact of financial distress on performance. However, this relationship between economic fundamentals and firm value is not clear. Following PINDADO et al. (2004), we apply a new methodology to obtain the probability of financial distress. This approach consists first of the estimation of fixed and random effect logistic models for panel data, which allows to control for the unobservable heterogeneity in the specification of the model for the probability of financial distress. Second, once the model is specified, a more consistent estimation of the probability of financial distress for each year and country is obtained.

This probability is then entered into our model. Thereby we consider not only the consequences of the financial distress in case it occurs, but also the consequences of the probability of its occurrence. Our measure of the probability of financial distress is expected to maintain a positive relationship with our financial distress costs variable, since this relation would validate the usefulness of both indicators as proxies for the probability and costs of financial distress, respectively.

2.3 The Role of Leverage in the Financial Distress Process

The issue of the causes and consequences of financial distress costs has often been overshadowed by the capital structure puzzle. This has led to only a weak development of any specific theory in disconnection from the empirical research on financial distress and bankruptcy prediction. Leverage continues to be considered a basic explanatory variable in modelling financial distress costs, and the positive relationship between leverage and the probability of financial distress, and consequently between leverage and financial distress costs, has been generally assumed (OPLER and TITMAN, 1994). However, these relations have turned out to be too simplistic and are challenged by the agency arguments in JENSEN (1989a,b) and WRUCK (1990). These authors offer a new perspective of the problem, in which not only the costs, but also the potential benefits of debt for financial distress processes are considered. It is worth mentioning that the two hypotheses of the positive and negative effect of leverage on financial distress costs are not mutually exclusive. Rather, these opposing effects may offset each other, leaving leverage insignificant in explaining financial distress costs. Therefore, we shall consider these opposing effects of leverage when incorporating this variable in our model.

2.4 The Trade-off Between the Benefits and Costs of Holding Liquid Assets

The holding of liquid assets is another factor that has historically been linked to the analysis of financial distress, particularly from a short term perspective. Liquid assets are usually considered a safeguard against crises since they may allow firms to save funds in such a situation. For example, they may prevent the firm from having to sell assets in unfavorable conditions to face their payment obligations (SHLEIFER and VISHNY, 1992) or enable the firm to avoid the higher cost of other sources of funds to finance their activities and investments (MIKKELSON and PARTCH, 2003). Alternatively, it has also been shown that insolvent firms usually waste their liquid assets to covering losses, instead of allocating them to profitable projects (OPLER et al. 1999). Moreover, as JOHN (1993) and OPLER et al. (1999) argue, the holding of liquid assets causes firms to bear an opportunity cost because of the lower return on these kinds of assets. Therefore, the discussion whether liquid assets are a good and

necessary first line of defense against financial distress or whether they contribute to the inefficient conditions by slowing the reaction to the crisis remains open.

2.5 The Reaction to the Crisis: Investment and Employment Policies

As financial distress turns more serious and the probability of bankruptcy rises, the way in which firms react to the crisis must also be taken into account. The eventual recovery or bankruptcy of the firm will be the result of the firm's reaction and the financial distress costs it bears. However, beyond a certain point, the costs may be high enough to offset the capacity of management to react.

To introduce the reaction to the crisis in our model, we have selected a set of managerial decisions that are simultaneously determined with financial distress costs and thus have a dynamic impact on them. JOHN et al. (1992), OFEK (1993), and OPLER and TITMAN (1994) also relate certain managerial decisions to the way in which firms react to a situation of financial distress. Previous literature emphasizes the investment and employment policies as the most important mechanisms to deal with a crisis. According to KHURANA and LIPPINCOTT (2000), firm restructurings can be classified in two basic categories: one consists of dismissing employees, the other of abandoning business lines. In this context, we have selected these changes in employment and investment policies as responses to financial distress, which will have a dynamic impact on the current performance of the firm. The inclusion of these reaction variables implicates the existence of simultaneity in our financial distress costs model because of the dynamic way in which investment and employment policies relate to financial distress costs.

ASQUITH et al. (1994) and OPLER and TITMAN (1994) also recognize that firms' investment and employment behavior is affected during a financial crisis and offer an evaluation of this connection by analyzing common determinants of both policies and bankruptcy costs. We go one step further. By incorporating in our model both investment and employment policies as explanatory variables of financial distress costs, we can explicitly take into account the potential simultaneity between them. Whereas this simultaneity would cause problems in a traditional ordinary least squares framework, the generalized method of moments methodology we propose, which will be discussed in Section 4, is suitable for dealing with the simultaneity between the dependent and the explanatory variables in the model. Note that the problem consists of a possible influence of the financial distress costs on the investment and employment policies. Therefore, several lags of the the investment and employment variables could qualify as good instruments.

3. A Model of Financial Distress Costs

In this section, we propose a model in which financial distress costs are explained by the probability of financial distress occurring and by the determinants of the costs that this situation would give rise to, controlling for investment opportunities, sector, and size effects. Given this premise, our financial distress costs model is as follows:

$$\begin{aligned} \boldsymbol{IC_{it}} = {} & \beta_0 + \beta_1 \boldsymbol{IPROB_{it}} + \beta_2 \boldsymbol{LEV_{it}} \\ & + \beta_3 \boldsymbol{LA_{it}} + \beta_4 \Delta \boldsymbol{INV_{it}} \\ & + (\beta_5 + \gamma_1 \boldsymbol{DEMP_{it}}) \Delta \boldsymbol{EMP_{it}} + \beta_6 \boldsymbol{Q_{it}} \\ & + \beta_7 \boldsymbol{SECTOR_{it}} + \beta_8 \boldsymbol{SIZE_{it}} + \boldsymbol{\varepsilon_{it}}, \end{aligned}$$

where $\boldsymbol{IC_{it}}$ denotes financial distress costs as measured by the difference between the growth rate of the sales of the sector and the growth rate of firm sales, $\boldsymbol{IPROB_{it}}$ is the probability of financial distress, $\boldsymbol{LEV_{it}}$ is the firm's leverage adjusted to its sector, $\boldsymbol{LA_{it}}$ denotes the firm's holding of liquid assets, $\Delta \boldsymbol{INV_{it}}$ and $\Delta \boldsymbol{EMP_{it}}$ stand

for changes in the firm's investment and employment policies, respectively, $DEMP_{it}$ is a dummy variable which takes value one if the firm's probability of financial distress is higher than the average probability in its country, and zero otherwise, Q_{it} is the firm's Tobin's q adjusted to its sector, $SECTOR_{it}$ is the average profitability of the firm's sector, $SIZE_{it}$ is the logarithm of the firm's sales, and ε is the random disturbance.[2]

The econometric specification of the model reflects our idea that financial distress costs are determined by both the probability of financial distress and the ex-post financial distress costs, proxied by leverage, holding of liquid assets, and changes in investment and employment policies. Additionally, we also control for the effect of another three variables on a firm's sales performance. CHEN et al. (1997) suggest that the financial distress status of the firm must be considered jointly with its investment opportunities when analyzing sales performance. LANG et al. (1996) also found a strong positive relationship between Tobin's q and all proxies for a firm's growth, and PINDADO and DE LA TORRE (2003) show that Tobin's q is better suited than the book-to-market ratio to proxy for investment opportunities.

These findings lead us to anticipate that a firm's investment opportunities (Q_{it}) will influence its expected sales growth. Differences in sectoral performance ($SECTOR_{it}$) are also included in our model. This is necessary since a firm's performance can only be evaluated by taking into account the profitability trend followed by its sector as measured by the average earnings before interest and taxes (EBIT) (OPLER and TITMAN, 1994). Finally, according to RAJAN and ZINGALES (1995), size can be used as a proxy for the inverse of the probability of financial distress, a traditional assumption that relies on the negative correlation between size and cash flow volatility.

We now turn to the expected signs of the coefficients of the explanatory variables of our model, according to the arguments discussed in the previous section. The probability of financial distress variable is expected to maintain a positive relationship with our indicator of financial distress costs, validating our proxy variables. Consistent with JENSEN (1989a,b) and WRUCK (1990), a negative coefficient of adjusted leverage would support the hypothesis that the benefits of leverage improve performance and reduce financial distress costs. A negative relationship between financial distress costs and the holding of liquid assets would imply that insolvent firms can take advantage of maintaining larger stocks of liquid assets, instead of them leading to extended situations of financial distress.

The explanatory variable that accounts for the investment reaction policy in our model is the change in a firm's investment rate. This variable allows us to address which investment distortion (underinvestment or overinvestment) has a stronger effect on the financial policy. Thus, a negative coefficient of this variable would indicate that divestitures increase the financial distress cost, and, consequently, that the negative effect of foregoing negative net present value (NPV) projects outweigths the positive effects of abandoning negative NPV projects. In this case, we could conclude that the underinvestment problem has a stronger effect on the financial policy than the overinvestment problem.

The employment policy is also treated as a reaction variable, but its use as a way of dealing with financial crises will be more dependent on the institutional context because the country-specific employment laws impose serious restrictions to employment reductions even in cases of financial distress. Hence, we can take advantage of a joint analysis of this variable and the financial distress probability. In this way, a negative relation between the employment variable and financial distress costs would suggest that labor legislation prevents employment reductions from being an economically feasible policy for facing financial distress. Furthermore, the interaction of this variable with the ***DEMP*** dummy allows us to investigate whether there are differences in the

intensity with which financial distress costs react to variations in employment between firms with low and high probability of financial distress (β_5 versus $\beta_5 + \gamma_1$). The comparison of the coefficient of this variable between these two categories of firms requires testing the statistical significance of the coefficient when the dummy variable takes value one; we thus perform a linear restriction test of the null hypothesis H_0: $\beta_5 + \gamma_1 = 0$.

Regarding the control variables, significance of the coefficient of Tobin's q would support the need to control for investment opportunities when explaining financial distress costs. The idea is that if a firm has good investment opportunities in comparison to its sector, this could mitigate the financial distress costs borne by the firm. The sector variable is intended to capture the effect of the economic performance of the industry on a firm's individual performance. Therefore, a positive coefficient of this variable would imply that financial distress costs are lower in growing sectors, whereas the opposite sign would indicate that those firms in declining and mature sectors are the ones bearing lower financial distress costs. Finally, a negative sign of the coefficient of the size variable would confirm that larger firms deal more easily with financial distress. However, the effect of this variable on financial distress costs is not so straightforward since larger firms may face greater difficulties in expanding than other firms in their sector.

4. Data and Methodology

The scope of our analysis requires both enough sectoral and enough institutional diversity to develop a general model for financial distress costs. We have thus used an international database—the Compustat Global Vantage (CG)—as our datasource. Unlike other approaches followed in previous research, the econometric methodology applied in this paper requires data for at least six consecutive years. A minimum of five periods is necessary to test for second-order serial correlation (ARELLANO and BOND, 1991), and since we lose one year of data in the construction of some variables (see Appendix), a minimum of six consecutive periods is needed. Although we are only able to select samples with the described structure for the US, the UK, and Germany, they are highly representative for the world economy and allow us to account for a variety of institutional environments. Actually, these three countries cover a broad spectrum of financial distress procedures regarding their pro-debtor and pro-creditor biases (see FRANKS et al. 1996). This fact allows us to examine how the different legal systems influence financial distress costs.

For each country, we construct an unbalanced panel comprising companies with six to ten year-data between 1990 and 1999. This procedure permits the number of observations to vary across companies, thus representing added information for our model. As a result, we have an unbalanced panel, which enables us to mitigate the survivorship bias by letting us include in our study companies suffering a non-random exit (for instance, liquidation) whenever we have information before this non-random exit. Consequently, to mitigate the survivorship bias, we combine in our unbalanced panel all the available observations of publicly listed companies included in the CG Industrial Active files (containing information on active listed companies) and CG Industrial Research files.[3] The structure of the panel by number of companies and number of annual observations per country is provided in Table 1.

All the companies in our samples are organized in nine broad economic industry groups in accordance with SIC—*Economic Sector Codes*—to exclude financial companies (code 5000), since they have their own distinctive features in financial distress. Table 2 shows the sectoral diversity of these panels, which enables us to make the necessary sectoral adjustments of the variables. The summary statistics of the variables used in the estimation are shown in Table 3.

Table 1: Structure of the Panels by Number of Companies and Annual Observations Per Country

Country	Number of companies	Number of annual observations					Total number of observations
		6	7	8	9	10	
Germany	186	102	168	80	117	1220	1687
US	1704	1014	1246	1416	1584	10040	15300
UK	491	246	406	544	639	2530	4365
Total	2381	1362	1820	2040	2340	13790	21352

Note:
For each country, data of companies for which the information is available for at least six consecutive years between 1990 and 1999 have been extracted. The resultant unbalanced panel comprises 186 German (1687 observations), 1704 US (15300 observations), and 491 UK (4365 observations) non-financial quoted companies.

Our model of financial distress costs is estimated by using the panel data methodology. We control for heterogeneity by modeling it as an individual effect, η_i, which is then eliminated by taking the first differences of the variables. In this way, the error term of our model, ε_{it}, has the following components:

$$\varepsilon_{it} = \eta_i + d_t + v_{it},$$

where η_i is the firm specific effect that captures the unobservable heterogeneity, d_t is the time effect that captures the influence of macroeconomic variables, and v_{it} is the random disturbance. Besides heterogeneity, we also need to take into account that the endogeneity of the explanatory variables may bias our results. Apart from the simultaneity problem between the investment and employment variables, and the financial distress cost described in Section 2, the endogeneity could arise because there is a delay between the time when a financial decision is made and when it is executed. To address the endogeneity problem, we estimate our model by using a generalized method of moments (GMM) estimator, proposed by ARELLANO and BOND (1991), which allows us to control for the endogeneity of all the explanatory variables by using instruments. Since it is quite difficult to choose good contemporaneous instruments, we follow the suggestion by ARELLANO and BOND (1991) to use all the right-hand side variables in the model lagged twice or more as instruments. This strategy of obtaining additional instruments by using the orthogonally conditions that exist between lagged values of the right-hand side variables improves efficiency in our estimations with respect to other GMM estimators.

The estimation is carried out using DPD for Ox written by DOORNIK et al. (1999). To check for the potential misspecification of the model, we used the Sargan statistic of over-identifying restrictions, which tests for the absence of correlation between the instruments and the error term. Additionally, we perform the m_2 statistic, developed by ARELLANO and BOND (1991), to test for lack of second-order serial correlation in the first-difference residuals. Finally, Table 4 provides two Wald tests. z_1 is a test of the joint significance of the reported coefficients, and z_2 is a test of the joint significance of the time dummies.

5. Results

In this section, estimation results of the proposed model of financial distress costs are presented. First, we discuss the determinants of financial distress costs in US, UK, and German firms. Next, a global model is estimated to perform a sensitivity analysis to address the institutional influence on financial distress costs across countries.

Table 2: Sample Distribution by Economic Sector Classification

		US			UK			Germany		
Economic Sector	*SIC Code*	*Number of companies*	*Number of observations*	*% of obs.*	*Number of companies*	*Number of observations*	*% of obs.*	*Number of companies*	*Number of observations*	*% of obs.*
Basic Materials	1000	109	978	6.39	54	478	10.95	10	95	5.63
Consumer—Cyclical	2000	418	3779	24.70	130	1151	26.37	57	518	30.71
Consumer—Non Cyclical	3000	192	1725	11.27	60	549	12.58	34	310	18.38
Health Care	3500	478	4389	28.69	96	854	19.56	51	454	26.91
Energy	4000	267	2395	15.65	51	453	10.38	20	187	11.08
Capital Goods	6000	165	1405	9.18	76	665	15.23	11	96	5.69
Technology	8000	44	365	2.39	5	45	1.03	1	7	0.41
Communication	8600	24	205	1.34	19	170	3.89	–	–	–
Transportation	9500	7	59	0.39	–	–	–	–	–	–
Total		1704	15300	100.00	491	4365	100.00	186	1687	100.00

Note:
All companies in our panels have been allocated to one of nine broad economic industry groups in accordance with the Economic Sector Code (SIC) reported in Compustat Global Vantage, excluding Financial Services (code 5000).

5.1 The Determinants of Financial Distress Costs

The first three columns of Table 4 present the GMM estimation results of our financial distress costs model for the US, the UK, and Germany. The positive coefficient of *IPROB* for all the analyzed countries confirms that the proposed indicator correctly captures the expected effect of the probability of financial distress. Furthermore, the significance and the correct sign of this coefficient across countries suggest that the indicator constitutes a better proxy for the probability of financial distress than those used in previous research, such as leverage. This notion is confirmed by the results concerning the leverage variable in our model: Its coefficient is significant and negative for all countries. Consistent with JENSEN (1989a,b) and WRUCK (1990), the results thus provide evidence of the benefits of leverage. Also as expected, the holding of liquid assets is negatively related to financial distress costs in all cases. This result confirms the results of OPLER et al. (1999) that the benefits of maintaining relatively large stocks of liquid assets more than offset their implicit costs. That is, in the analyzed countries, a more liquid asset structure can serve as a low-cost and flexible mechanism to prevent financial distress.

Concerning the reaction variables, the results are, in general, as expected. The investment policy variable always has a significant and negative coefficient, which supports that the underinvestment problem is more relevant than the overinvestment one. Our interpretation of this finding is that firms react to the financial distress by divesting, and that such divestitures mainly consist of abandoning profitable projects. This result indicates that the ex-post financial distress costs could be a source of underinvestment, and supports the inverse relationship between investment and ex-post financial distress costs found by ASQUITH et al. (1994) and ANDRADE and KAPLAN (1998).

Table 3: Summary Statistics by Country

	Country	*Mean*	*Standard Deviation*	*Minimum*	*Maximum*
IC_{it}	US	0.0933	3.2051	−1.4288	343.2
	UK	0.0982	0.8818	−1.2159	37.8852
	Germany	0.0461	0.6997	−1.0669	24.5426
$IPROB_{it}$	US	0.1081	0.2304	0	1
	UK	0.0658	0.1819	0	0.9987
	Germany	0.0657	0.1857	0	1
LEV_{it}	US	0	0.2171	−0.427	0.5512
	UK	−0.0005	0.1776	−0.3945	0.5476
	Germany	−0.0001	0.1947	−0.524	0.4454
LA_{it}	US	0.4625	0.2693	0.0466	1.6435
	UK	0.5545	0.2633	0.0501	1.8589
	Germany	0.519	0.2301	0.0674	1.6822
ΔINV_{it}	US	0.1016	0.1541	−0.2397	0.9589
	UK	0.0907	0.1562	−0.3363	0.9176
	Germany	0.0937	0.1374	−0.2551	0.8811
ΔEMP_{it}	US	−0.0005	0.0019	−0.0113	0.0067
	UK	−0.0003	0.003	−0.0172	0.0147
	Germany	−0.0003	0.0015	−0.0083	0.0057
Q_{it}	US	−0.1376	1.4084	−2.9676	10.5076
	UK	−0.0472	0.9806	−1.8671	8.1319
	Germany	−0.0113	0.7167	−2.1913	7.0299
$SECTOR_{it}$	US	0.2294	1.8801	−6.3076	13.5155
	UK	0.1398	1.3131	−7.596	5.8729
	Germany	0.0551	1.5043	−9.1504	5.9789
$SIZE_{it}$	US	5.9598	1.8392	0.8924	10.2884
	UK	5.7018	1.6936	1.2653	9.8426
	Germany	6.4125	1.7714	2.1558	11.2321

Note:
IC_{it} denotes financial distress costs; $IPROB_{it}$ is the probability of financial distress; LEV_{it} is the firm's leverage adjusted to its sector; LA_{it} denotes the firm's holding of liquid assets; ΔINV_{it} and ΔEMP_{it} stand for changes in the firm's investment and employment policies, respectively; Q_{it} is the firm's Tobin's q adjusted to its sector; $SECTOR_{it}$ is the average profitability of the firm's sector; and $SIZE_{it}$ is the logarithm of the firm's sales. For each variable and country, we report the values of the following statistics: Mean, Standard Deviation, Minimum and Maximum. The last rows are obtained from the panel that results from merging the data of the five countries.

As shown in Table 4, the coefficient of the employment policy variable is significant, except for the US. The negative coefficient found for UK and German firms indicates that in these countries the labor legislation makes employment reductions an unfeasible option for facing the financial distress situation. However, the costs of this policy vary depending on the probability of financial distress, and the degree of this dependence is influenced by the institutional context. This evidence emphasizes the need to analyze the employment policy and the probability of financial distress jointly. In fact, the coefficient of the interaction term, γ_1, is significant for all countries, which confirms that there are differences in the intensity with which financial distress costs react to variations in employment between firms with low and high probability of financial distress. Moreover, the consequences of employment policy in high-probability firms differ across countries, the US being the only country where firms with a high probability of financial distress can use changes to employment to mitigate their financial distress costs. Note that the effect of employment reductions in high-probability UK and German firms is negative and significant (see the linear restriction tests in Table 4). The coefficients of Tobin's q, and the sector and size variables are generally significant, which

Table 4: Estimation Results of the Financial Distress Costs Model by Country and for the Full Sample

Country	*US*	*UK*	*Germany*	*TOTAL*
Explanatory variables	1704 firms.	491 firms.	186 firms.	2381 firms.
$IPROB_{it}$	0.80417*(0.1434)	0.20661*(0.04119)	0.14593*(0.02558)	0.51531*(0.1416)
LEV_{it}	−0.832149*(0.1761)	−0.330297*(0.05523)	−0.439209*(0.05347)	−0.983263*(0.183)
LA_{it}	−1.06477*(0.1294)	−1.62107*(0.03583)	−1.56152*(0.05297)	−1.02550*(0.1478)
ΔINV_{it}	−1.72876*(0.3123)	−1.71194*(0.07951)	−2.44524*(0.07831)	−2.05796*(0.3379)
ΔEMP_{it}	−19.6724(17.36)	−69.0092*(3.328)	−150.008*(5.658)	−44.0876*(12.75)
$DEMP_{it}$* ΔEMP_{it}	57.2335**(26.92)	−115.514*(6.880)	141.965*(6.805)	39.9293*(26.34)
Q_{it}	−0.020958(0.01865)	−0.071216*(0.009134)	−0.073227*(0.006894)	−0.04511**(0.02052)
$SECTOR_{it}$	−0.007426*(0.002722)	0.00692*(0.002359)	0.00037(0.001529)	−0.006927**(0.003348)
$SIZE_{it}$	0.14878**(0.05781)	−0.29941*(0.01735)	0.451465*(0.01616)	−0.14337**(0.05782)
χ^2 (1)	–	281.919*	435.164*	2.29861**
z_1	202.8 (9)	4846 (8)	3703 (9)	181.1 (9)
z_2	48.99 (8)	332.4 (8)	6859 (8)	50.92 (8)
z_3	–	–	–	57.81 (10)
m_1	−1.116	−2.972*	−1.253	−1.130
m_2	1.125	−1.032	1.260	0.7505
Sargan	230.6 (315) 1.0	339.4 (315)0.165	169.6 (315) 1.0	237.4 (315) 1.0

Note:
The dependent variable is the financial distress costs borne by the firm (IC_{it}) as measured by the difference between the growth rate of the sales of the sector and the growth rate of the sales of the firm; $IPROB_{it}$ is the probability of financial distress; LEV_{it} is the firm's leverage adjusted to its sector; LA_{it} denotes the firm's holding of liquid assets; ΔINV_{it} and ΔEMP_{it} stand for changes in the firm's investment and employment policies, respectively; $DEMP_{it}$ is a dummy variable that takes value one if the firm's probability of financial distress is higher than the average probability in its country, and zero otherwise. The regressions are performed by using the panels described in Table 1 for each country. Other information needed to read this table is: i) Heteroskedasticity robust asymptotic standard errors are shown in parentheses; ii) *, ** indicate significance at the 1% and 5% level, respectively. iii) χ^2 (1) is the linear restriction test under the following null hypothesis: $H_0 = \beta_5 + \gamma_1$; iv) z_1 is a Wald test of the joint significance of the reported coefficients, asymptotically distributed as χ^2 under the null of no relationship, degrees of freedom in parentheses; v) z_2 is a Wald test of the joint significance of the time dummy variables, asymptotically distributed as χ^2 under the null of no relationship, degrees of freedom in parentheses; vi) z_3 is a Wald test of the joint significance of the country dummy variables, asymptotically distributed as χ^2 under the null of no relationship, degrees of freedom in parentheses; vii) m_i is a serial correlation test of order i using residuals in first differences, asymptotically distributed N(0,1) under the null of no serial correlation; viii) Sargan is a test of the over-identifying restrictions, asymptotically distributed as χ^2 under the null of no relation between the instruments and the error term, degrees of freedom in parentheses.

confirms that these effects should be controlled for when analyzing financial distress costs. The negative sign of the coefficient of Tobin's q in the UK and Germany indicates that the existence of good investment opportunities mitigates the financial distress costs borne by UK and German firms, whereas they do not seem to be so relevant in the US. The significance of the sector effect confirms that the magnitude of the financial distress costs borne by the firm is dependent on the growth rate of the sectoral profitability. Finally, the size variable is significant for all the analyzed countries, which confirms its relevance as a control variable in our model.

5.2 Financial Distress Costs in Different Institutional Contexts

One of the major contributions of our study is that it offers the possibility to analyze how the differences in institutional contexts across countries influence financial distress costs. The studies of LA PORTA et al. (1997), LA PORTA et al. (1998), and DEMIRGÜÇ-KUNT and MAKSIMOVIC (1999) examine the impact of the different legal systems on firms' financial structures in general, and on financial distress processes in particular. These studies open a new strand of financial literature that explicitly and more systematically takes into ac-

count the degree of investor protection than has been done previously.

In this context, the countries analyzed in our study allow us to compare different classifications of institutional systems. LA PORTA et al. (1997, 1998) point to the legal tradition (common law *versus* civil law) as the most important institutional feature affecting firms' financing. The US is a common-law country that is expected to protect investors vigorously and, accordingly, would have a *pro* creditor code similar to that of the UK. However, FRANKS et al. (1996) and KAISER (1996) characterize the US code as more debtor friendly in several bankruptcy legislation features than the German code, which is civil in origin. Focusing on the US, the UK, and Germany, our study integrates financial distress costs into the debate about investor protection across these countries' laws. We control for institutional effects in our model by comparing the absolute values of the estimated coefficients of the leverage variable across countries (the coefficient of this variable is always negative). We expect the following relation between the coefficients of the countries analyzed: the more debtor friendly the code, the higher the coefficient of the leverage variable. As shown in the first column of Table 4, financial distress costs in US firms present the highest sensitivity to leverage. This sensitivity is the lowest for UK firms (second column of the table), and German firms lie somewhere in between. These results are in line with the point made by FRANKS et al. (1996) and KAISER (1996): German laws present a smaller pro-debtor bias than US laws, in spite of the latter being of common origin and, consequently, being expected to more strongly protect investors (LA PORTA, et al., 1997, 1998).

Additionally, we perform an analysis of the sensitivity of the coefficients to establish a suitable interpretation of the determinants of financial distress costs. Our financial distress costs model is estimated for the full sample including a country dummy variable, $\mathbf{c_t}$, in the error term (i.e. $\varepsilon_{it} = \eta_i + d_t + \mathbf{c_t} + \boldsymbol{v_{it}}$). The last column of Table 4 presents the GMM estimation results of this global model. The coefficients of all explanatory variables are significant and of the expected sign, thus corroborating the correct specification of the proposed model. In short, we find that financial distress costs are positively related to the probability of financial distress, and negatively to leverage and the holding of liquid assets. The negative coefficient of the investment policy variable confirms that the underinvestment problem is more relevant than the overinvestment one. The results for the employment policy variable support that, in general, this mechanism of facing financial distress is less disadvantageous for high-probability firms (see the linear restriction test in the last column of Table 4). Finally, the results obtained for the z_3 Wald test reject the null hypothesis of joint insignificance of the country dummies, thus supporting the relevance of institutional differences across countries for the analysis of financial distress costs.

6. Conclusions

This study represents an integration between two lines of research on financial distress: the empirical studies on financial distress prediction, and the studies on financial distress costs. Additionally, it provides evidence at an international level on the determinants of financial distress costs, by using samples of several countries, which are representative of different legal systems. Furthermore, the estimation method used represents an important innovation. We have used the panel data methodology to eliminate the unobservable heterogeneity, and control for the endogeneity problem.

To achieve our main objective of developing a model of financial distress costs, we also take new approaches in the choice of the explanatory variables, their measurement and sectoral adjustments, and their interpretation. Instead of leverage itself, we have estimated an alternative indicator of the probability of financial distress. This estimated probability turns out to be better than traditional leverage-based indicators.

Its coefficient is highly significant and has the correct sign for all the countries analyzed. It thus provides more stable information regarding the consequences of the probability of financial distress for financial distress costs. Moreover, the separation between the effect of this probability and that of leverage is one of the major contributions of this work. It allows us to adequately take into consideration the potential benefits of leverage (JENSEN, 1989a; and WRUCK, 1990) in all the analyzed countries.

Financial distress costs are also negatively related to the holding of liquid assets in all countries, thus confirming that the benefits of keeping higher levels of liquid assets more than offset their opportunity cost. The relation between financial distress costs and the investment policy is negative, showing that the underinvestment problem is more relevant than the overinvestment one. Concerning the employment policy, the labor legislation makes employment reductions an unfeasible option when facing a financial distress process. Finally, institutional differences exert a direct influence on financial distress costs, especially regarding their sensitivity to leverage across countries.

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Appendix

Variable Definitions

– *Financial distress costs*: Our dependent variable is measured as the difference between the growth rate of sales of the sector and the growth rate of the sales of the firm:

$$IC_{it} = \left(\frac{Sales_{it} - Sales_{it-1}}{Sales_{it-1}}\right)_{\text{sec}} - \left(\frac{Sales_{it} - Sales_{it-1}}{Sales_{it-1}}\right)$$

where $Sales_{it}$ denotes the firm's turnover, as measured by the gross sales reduced by cash discounts, trade discounts, returned sales excise taxes and value-added taxes, and allowances for which credit is given to customers.

– *Probability of financial distress*: We calculate our probability of financial distress (IPROB), following the methodology developed by PINDADO et al. (2004):

$$Prob(Y > 0) = \beta_0 + \beta_1 EBIT_{it}/K_{i,t-1} + \beta_2 FE_{it}/K_{i,t-1} + \beta_3 CP_{i,t-1}/K_{i,t-1} + d_t + \eta_i + u_{it}$$

The dependent variable is a binary variable that takes value one for financially distressed companies, and zero otherwise. The explanatory variables included in the model are Earnings Before Interests and Taxes ($EBIT_{it}$), Financial Expenses (FE_{it}), and Cumulative Profitability (CP_{it}), all scaled by the replacement value of the total assets ($K_{i,t-1}$) in the beginning of the period.

This approach follows CLEARY (1999), who adapts ALTMAN (1968) by using stock variables at the beginning of the period and flow variables at the end of the period as explanatory variables. However, the key innovation in this model lies in

its estimation by using the panel data methodology. Only in a second stage, the robust model is estimated on a cross-section to incorporate the individual heterogeneity into the probability of financial distress by means of the logit model. This probability is explained, in essence, by the trade-off between a firm's capacity to generate returns and financial charges reflecting the burden of its debt service.

– *Leverage*: $LEV_{it} = D_{it} - D_{itsec}$, where D_{it} denotes the firm's debt ratio, and D_{itsec} the average debt ratio of its sector. Debt ratios are calculated as follows:

$$D_{it} = \frac{MVLTD_{it}}{MVLTD_{it} + VME_{it}},$$

where MVE_{it} is the market value of common equity, $MVLTD_{it}$ is the market value of long term debt, calculated as in MIGUEL and PINDADO (2001).

– *Replacement value of capital:* $K_{it} = RF_{it} + (TA_{it} - BI_{it} - BF_{it} - BI_{it})$, where RF_{it} is the replacement value of tangible fixed assets, TA_{it} is the book value of total assets, BI_{it} is the book value of inventories, BF_{it} is the book value of tangible fixed assets and BI_{it} is the book value of inventories. The last four terms are obtained from the firm's balance sheet, and the first one is calculated according to MIGUEL and PINDADO (2001).

– *Holding of liquid assets:*

$$LA_{it} = \frac{CA_{it}}{K_{it-1}},$$

where CA_{it} denotes the firm's current assets.

– *Tobin's q:* $Q_{it} = q_{it} - q_{itsec}$, where q_{it} is the firm's Tobin's q, and q_{itsec} is the average Tobin's q of its sector. Tobin's q is calculated as follows: $q_{it} = (MVE_{it} + PS_{it} + MVD_{it})/K_{it-1}$, where PS_{it} is the book value of the firm's outstanding preferred stock, and MVD_{it} is the market value of debt, which is obtained as the sum of the book value of short term debt ($BVSTD_{it}$) and the market value of long term debt ($MVLTD_{it}$).

– *Investment policy*: This variable measures the variation in the firm's investment between one period and the previous one: $\Delta INV_{it} = \left(\frac{I}{K}\right)_{it} - \left(\frac{I}{K}\right)_{it-1}$, where a firm's investment (I_{it}) is calculated according to MIGUEL and PINDADO (2001).

– *Employment policy:* This variable measures the variation in the firm's number of employees between one period and the previous one:

$$\Delta EMP_{it} = \left(\frac{No\ EMP}{K}\right)_{it} - \left(\frac{No\ EMP}{K}\right)_{it-1}$$

– *Sector:* The average growth rate of the sectoral profitability is measured as:

$$SECTOR_{it} = \left(\frac{(EBIT_{it}/K_{it})}{(EBIT_{it-1}/K_{it-1})} - 1\right)_{Sec},$$

where $EBIT_{it}$ denotes the earnings before interest and taxes of each firm i in the sector.

– *Size:* $SIZE_{it} = \ln Sales_{it}$

ENDNOTES

[1] More recently, GILSON et al. (1990), GILSON (1997) and BETKER (1997) also quantify the direct financial distress costs, and reach similar values, always around 2 to 5%.

[2] The first subscript of the variables, i, refers to the individual cross-sectional unit, and the second, t, to the time period. A detailed definition of the variables can be found in the Appendix.

[3] These files contain information on companies which were suspended from quotation for some reason (for instance, companies that filed for bankruptcy) after a certain period in the market.

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