Ultimate controllers and the probability of filing for bankruptcy in Great Britain

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Abstract

This paper aims to examine whether the probability of filing for bankruptcy is influenced by the company's ownership structure. To explore this relationship, a Logit model with a sample of 1272 public listed companies from Great Britain, from which 99 companies filed for bankruptcy between 1997 and mid 2005, is analysed. Specifically, two aspects of ownership structure are studied. First, it is argued that a shareholder with the largest voting rights at an established threshold might exert significant influence in the decisions of a company. In this respect the identity of the ultimate controller is defined based on three categories: Family, Group and Widely Held Financial Institutions. Second, it is argued that any influence from the ultimate controllers with respect to the use of a bankruptcy procedure would also depend on their cash flow rights. An ultimate controller with high cash flow ownership would align its interests to those of the firm with the aim of maximising its value. Therefore, the company would be less likely of falling into financial distress. However, in cases where the company is already in financial distress, ultimate controllers with high cash flow ownership might prefer (if they have the choice) out of court negotiations, as the formal bankruptcy procedure is more costly. The results showed no evidence that the identity of the ultimate controller influences the probability of filing for bankruptcy per se. However, once an interaction term of cash flow ownership and the identity of each controller is considered in the model, the probability for using the bankruptcy procedure increases significantly as the cash flow ownership of each shareholder with the ultimate control decreases.

Keywords: Bankruptcy, ultimate controller, cash flow ownership.

1. Introduction

In 2005, companies in Great Britain increased the use of bankruptcy procedures in comparison with 2004. According to National Statistics, during the second quarter of 2005, company winding up petitions in GB increased by 45% in contrast to the same quarter in 2004.[1]

A petition to file for bankruptcy can be made by the company itself (by directors and/or members) or by its creditors. Creditors might follow this type of proceedings in cases where they are at risk of not being paid. It has been shown in previous research that creditors are more likely to use the legal procedure in countries with strong creditor's legal protection as the recovery rate of the costs involved is more efficient (Claessens and Klapper, 2002; Claessens et al., 2003). In this respect, GB is among those countries which have strong protective laws for creditors (La Porta et al., 1998).

Companies' directors of a financially distressed company might use the bankruptcy procedure (if they have the option) or attempt to rescue the company by other means. The choice of using a formal bankruptcy procedure might depend on the identity of the ultimate controller. Claessens et al. (2003), for instance, found that the likelihood of filing for bankruptcy is lower for bank-owned and group affiliated firms in a study of East Asian financially distressed companies during the times of financial crisis (1997-1998). They argued that ownership links to creditors (as a bank) increases the out-of-court settlements and consequently decreases the probability of entry into a bankruptcy procedure. Similarly, Becchetti and Sierra (2003) found that the probability of bankruptcy is lower for firms' with a group membership. However, the reason of this effect was not discussed in their paper.

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[1] News release from the department of constitutional affairs

http://www.dca.gov.uk/statistics/cwubps/2005/cwubps-q2.pdf

To date, most of the literature in bankruptcy has concentrated on identifying early warnings of companies' failure depending on several financial ratios. Altman (1968) was one of the first attempts to study corporate failure using financial ratios that represented profitability, liquidity, activity, solvency and gearing. Generally, the empirical literature reports on a variety of such ratios following different techniques such as multiple discriminant analysis (MDA), neural networks and Logit models. Ohlson (1980), for example, presented empirical results by applying a Logit model to forecast corporate failure based on several financial ratios. The factors that were found to be significant were size, financial structure, performance and liquidity. Some more empirical findings can also be found in Beaver (1967), Peel et al. (1986), Altman and Narayanan (1997), Altman (2000), Barniv et al. (2002), Charitou et al. (2004), among others.

This paper expands on the bankruptcy literature by using a Logit model in a sample of 1272 public listed GB companies. The aim is to examine whether the identity of ultimate controllers (shareholders with the largest level of voting rights in a control chain) is an influence in the likelihood of filing for bankruptcy. In this respect, ultimate controller does not strictly refer to the shareholder with total control over the company, but it could also refer to the shareholder that at a given threshold has the largest number of voting rights via a control chain and might exercise significant influence over firms' decisions.

Some types of shareholders might have more incentives to take on bankruptcy procedures; others might prefer out-of-court negotiations; yet others might not even need to reach that decision as the performance of the company is satisfactory.

Ultimate controllers with a large stake of cash flow rights are more likely to align their interests to those of the firm (value-maximisation). In these circumstances, they

might prefer, if they have the option, out-of-court negotiations in cases of financial distress as a formal petition for bankruptcy might be more costly. Also, financial distress may be avoided as they would probably carry out closer monitoring of the company's activities and more efficient decision making with respect to the company's operations. Empirical research has found significant evidence of a positive correlation between cash flow ownership and firms' performance (Poletti-Hughes, 2005; Lemmon and Lins, 2003; Denis and McConnell, 2003; Lins, 2003; Claessens et al., 2002; Claessens and Djankov, 1999). To represent this relationship, an interaction term between the ultimate controller and its cash flow ownership is created. The probability of using bankruptcy procedures is expected to be lower when ultimate controllers have higher stakes of corporate ownership. This probability might also differ depending on the identity of the ultimate controller.

The model controls for financial ratios in light of Claessens et al. (2003) and Altman (2000). It also controls for the effects of changes in accounting regulations and macroeconomic effects over time, industrial sectors and size. Robustness of the results are discussed with respect to the selection of financial ratios, ultimate ownership thresholds, multicollinearity and sample bias.

This paper is structured as follows. Section two presents the theoretical framework that leads to the construction of the model under analysis. Section three presents the data and descriptive statistics. Section four presents the empirical results using a Logit model. Section five reports robustness checks to validate the results. Section six concludes.

2. Ultimate controllers and the probability of bankruptcy

In Great Britain, the insolvency procedure introduced by the Insolvency Act 1986 states that a petition to court can be made by a creditor or by a company's member or director. In these circumstances, firms go into administration, and creditors' rights freeze, in the sense that there is an automatic stay of assets at the beginning of such procedure. The administrator (Insolvency Practitioner) would attempt to sort out the financially distressed company by selling the firm as a unit to a third party or following corporate rescue. Only in extreme cases, and as a last resort, do companies go into liquidation, requiring assets to be sold separately to rescue some of the capital in order to pay back financial debts (Armour and Cheffins, 2002).

There are different factors that have been associated with filing for bankruptcy. A firm with low profitability, cash flow problems and high levels of leverage is more likely to file for bankruptcy (Altman, 1968). It has also been argued that financial ratios do not reflect the causes of filing for bankruptcy but its symptoms (Morris, 1997).

Qualitative characteristics of the firm, such as managerial ability, have also been shown to be associated with the probability of filing for bankruptcy. For instance, De Angelo et al. (2002) analysed in a case-study the characteristics and operational flow of L.A. Gear, from its successful period through to its collapse. They suggested that part of the company's failure was the result of an excess of inventory which became obsolete (given the change of fashion). In this respect, managerial input was partly responsible for assuming that stock did not need to be updated to respond to market demand. Managerial ability in both financial and qualitative factors would appear to be a key factor for a successful company.

Bankruptcy has also been found associated with a combination of both the level of rights given to creditors by the country's law and the enforcement of such rights. In countries where creditor rights are higher, the number of firms that go into this proceeding is also high. The speed and success of collecting efficiently in court encourages creditors to use formal and costly bankruptcy proceedings in the case of default (Claessens and Klapper, 2005). Great Britain is one of the countries in which creditors might be encouraged to use formal bankruptcy procedures as it has been shown in previous research that countries from an English legal origin have the highest law enforcement and protection to creditors (La Porta et al., 1998). It has also been suggested that bankruptcy law is a means of controlling the agency costs that arise from the relationship between managers and owners. In this setting, managers are forced to disclose information about the firm that could otherwise only prevail inside the firm (Li and Li, 1999).

Filing for bankruptcy might also be related to the ownership structure of a company. Peel et al. (1986) was one of the initial studies where shareholdings were regarded as enhancing the predictive power of model of corporate failure. They suggested that the change of directors' shareholdings from one period to the next may have significance for predicting company viability. Buchanan and Yang (2005) studied the effect of controlling shareholders in the bankruptcy of an Italian firm (Parmalat). In their study, it was questioned whether the collapse of Parmalat was the result of both weak country legislation and poor corporate governance practices. Specifically, this was a consequence of mismanagement, accounting irregularities and regulatory failure on the part of the controlling family.

Claessens et al. (2003) found that for financially distressed East Asian corporations the likelihood of going into bankruptcy was lower for those companies controlled by

banks and group-affiliated firms as ultimate controllers. In these cases, distressed firms might have opted for renegotiations for debt payments to creditors rather than using the bankruptcy procedures.

Ultimate controllers can be categorised in two main groups: i) where shareholders have equal cash flow rights and voting rights, and; ii) where shareholders have a lower number of cash flow rights but still have the ultimate control given by the voting rights at a certain threshold. This difference between voting rights and cash flow rights might be a result of either pyramidal structures or multiple control chains (Faccio and Lang, 2002).

The identity of the ultimate controller and the extent of its cash flow ownership might determine the decisions taken by the shareholders in a company. Ultimate controllers, such as banks or corporate groups, might have different priorities in the decision making process than a family. For example, some companies may file for bankruptcy as a strategic decision, to terminate debts and restart their activities with a clean sheet, Balcaen and Ooghe (2006). Banks or group controllers, for instance, might have better financing opportunities than other types of controllers and consequently prefer out-of-court negotiations in cases of financial distress (Claessens et al. 2003). By contrast, family owners might use bankruptcy procedures more frequently, probably because of organisational limitations, such as more capital constraints, risk avoidance and restricted managerial talents (Buchanan and Yang, 2005).

3. Data and Descriptive Statistics

3.1. Data

The dataset used in the present study contains information from different sources. The initial sample of companies was obtained based on a public available database which contains ownership data developed by Faccio and Lang (2002). This dataset contains information related to ultimate ownership for GB firms in 1997. Only non-financial companies were selected from the total of companies available (1568 out of 1953).

Current activity status of each company was obtained from the Companies House webpage. Each company was traced from 1997 up to July 2005 to determine whether they were still active or had filed for bankruptcy by being in any of the following stages: administration, receivership, liquidation, voluntary administration or entirely dissolved. This match of companies was carefully carried out considering that some of the companies might have changed their names since 1997.

For those companies that were identified as dissolved in the Companies House database, the filing information was checked to find whether the dissolution was the result of a formal bankruptcy procedure. In three of the dissolved companies, there was no trace of such procedures, but only a voluntary dissolution was registered. Therefore such observations were not considered for the final sample.

Financial data for each company was obtained from "Fame". For firms that had filed for bankruptcy, the corresponding match of financial information corresponded to the previous year of the last financial statement available before the bankruptcy filing procedure started. This was performed in accordance to Altman (1968), who suggested that financial data has a higher forecasting power when it is closer to the time when a company is in financial distress. So for instance, if the filed company's

last financial statement was available for 1998, the information used for the analysis corresponded to 1997, and so on. The earliest date of information for such companies is therefore for the year 1996. Note that bankruptcy filing procedures for companies in the sample may have occurred any time from 1997 to 2005. Therefore, the financial data could correspond to any year from 1996 to 2004.

For companies that were still active in the period of analysis, the year of available financial data was chosen at random from 1996 to 2004 in order to reduce selection bias. Note that this period is consistent with the information used for firms that filed for bankruptcy. Therefore, if the last available financial statement for the company was 2004, then the financial information to be used could be from any year between 1996 and 2003 (if available).

Some observations were omitted if: i) data was unavailable for required variables, such as sales; ii) companies could not be perfectly identified as their names were common to more than one option; iii) companies were duplicated in the initial sample.

In summary, the data in the present study contains 1272 observations, where 99 firms (7.8%) have been classified as the "failed" sample and the remainder 1173 of the observations as the active companies.

Table 1 presents the incidence by year of financial information used for bankrupt and non-bankrupt companies. Each year present a percentage of failures of between 5% and 14.4% with respect to the total number of observations per year. Note that the exception is for 2004. There was no bankrupt company in 2004 in the present sample; however, 28 firms are included in the non-bankrupt classification for this year. The reason is that the latest financial statements available were for 2005 and based on that, the random process to assign a year for the accounting information was performed.

The sample selection procedure conducted in the present study differs from other techniques, such as matched pairs. As discussed by Balcaen and Ooghe (2006), non-random samples (as in matched pairs) may result in over-sampling the failing companies with respect to the population in an extreme proportion (50:50). Instead of using matching pairs, the present study specifies the model controlling for the variables that are normally used for pairing, such as industrial sector, year and size.

3.2. Financial Ratios

To pursue this analysis, the bankruptcy model was specified by using international adaptations of the Altman Z-score model. Specifically, it follows Claessens et al. (2003), where firm size, return on assets (ROA), and leverage were used as the financial ratios. This model is then augmented with ownership information to test the importance of identity of the ultimate controller and its cash flow ownership in the likelihood of filing for bankruptcy.

In this specification of the model, *size* is represented by the logarithm of sales as it has being suggested that it predicts the probability of firms' failure. As mentioned by Claessens and Klapper (2005), the size of a firm may affect the use of bankruptcy. However, as bankruptcy is costly, creditors or the company itself might be discouraged to use this proceeding for small firms.

Leverage is constructed with the ratio of sales to debt. This ratio represents the ability of companies to fulfil their financial obligations as a measure of sales. A high ratio would imply that the company can pay its liabilities and therefore the probability of bankruptcy would be lower. It is then expected that the lower the ratio, the higher the probability of filing for bankruptcy.

ROA represents the return of the firm with respect to its investment. This ratio is calculated with profits before taxes divided by total assets. In this case it is also expected that a negative relationship exists between ROA and bankruptcy.

To check the robustness of the financial ratios and their full effect on bankruptcy, a second model was applied. The corresponding results are discussed but not presented in tables. This approach calculates financial ratios, which measure profitability, liquidity, solvency, gearing and activity, as suggested by Altman (2000).

Profitability is defined as the ratio of retained earnings to total assets. This ratio not only accounts for the earnings of the company but also represents the firms' age. A relatively young firm normally has lower retained earnings, which would decrease the ratio for profitability and consequently its future growth. Generally, a young firm has a higher probability of bankruptcy as it is not fully established in the market place.

Liquidity is represented by the ratio of current assets minus current liabilities to total assets. This ratio is the working capital of the firm and contributes to the general measure of a company's performance. A firm with available cash flow is expected to have lower probability of filing for bankruptcy, especially by having higher current assets with respect to the total assets.

Solvency is represented by the ratio of earnings before interest and taxes (EBIT) to total assets. This ratio aims to measure the net earnings of the company. It is considered that a firm that does not produce earnings, i.e. higher liabilities than assets, has a larger probability of filing for bankruptcy. Therefore, it is expected that the larger the ratio, the lower the probability of bankruptcy.

Gearing, which is measured as the ratio of total debt to total equity, represents the total capital that is borrowed. The higher the gearing ratio, the larger the proportion of

a company's borrowings and therefore, the closer a company is to becoming insolvent.

Activity is the ratio of sales to total assets, and it represents the turnover of the company. This reflects the acceptance on the firm in the market and the popularity of the product. A firm with a high activity ratio might decrease its probability of filing for bankruptcy.

3.3. Ultimate Controller

Ultimate controller refers to the shareholders with the largest direct or indirect stake of voting rights of a company. In this respect, the largest ultimate controller is defined at the 10% threshold. Therefore, if the ultimate controller is classified as a family, for instance, this would mean that the family has at least, but is not limited to 10% of the controlling stake. A second threshold is established at the 20% cut-off point to explore further the results. These thresholds have been chosen in light of Claessens et al. (2002) and La Porta et al. (2002), who suggested that significant influence over the company can be exerted with as low as 10% of voting rights.

The classification of the identities of the ultimate controllers is as follows. *Family* as the ultimate largest controller refers to an individual or a firm which is not listed on any stock exchange. Unlisted firms are considered as a family controller, a proposition justified with statistical support by Faccio and Lang (2002).[2] *Widely Held Financial* refers to those companies controlled by a widely held financial company, such as a bank. *Group* refers to those companies controlled by a non-financial

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[2] Faccio and Lang (2002) were unable to find ownership data for all unlisted firms. Any failed attempt to identify owners for unlisted firms was classified as family. They also offer statistical support for it.

company which is also widely held. This category also includes other types of organizations such as charities, voting trusts, employees, cooperatives, or minority foreign investors and State (national government, local authority or government agency). The identity of the controllers is represented with a dummy variable which equals one if the company's largest controller is a Family, Widely Held Financial or Group, respectively; otherwise zero when the company is widely held at a certain threshold.

The second variable that is of interest for this research is corporate ownership. *Corporate ownership* refers to the proportion of cash flow rights of the ultimate controllers. For example, if a family is the largest controller with 10% of the controlling stake, the corporate ownership may also be 10% when the voting rights equal the cash flow rights. However, in some instances, cash flow rights could be lower. This difference is created as a result of different factors, such as multiple control chains and pyramids. It is important to note that detailed data available on corporate ownership is restricted to those companies which have a controller with at least 10% of the control stake. Firms that do not fulfil this characteristic present an empty cell for both control stake and cash flow stake. The only information that is then available for those firms (304 observations) is that cash flow ownership might be any proportion between 0% and <10%.

To deal with this data restriction, the analysis was carried out by constructing indices that represent different levels of cash flow ownership. The indices were created in ranges of ten percentual points each. Therefore, they represent cash flow ownership from >0% to <10%, 10% to <20%, and so on. There are 9 indices in total representing each of the ranges, where 1 represents the lower range of cash flow

ownership available (>0% to <10%). Note that all the observations that have empty cells in this category are then classified in the index as 1.

Finally, an *interaction term* is constructed with the identity of the ultimate controller and its level of cash flow ownership (represented by the indices). This interaction term aims to measure whether the probability of bankruptcy is influenced when both variables are considered simultaneously.

3.4. Descriptive Statistics

The descriptive statistics of the different variables including financial ratios and non-financial variables are presented in this section.

All the statistics are presented for two groups of firms: bankrupt and non-bankrupt. Table 2 presents the mean values for the financial ratios. The highest differences between bankrupt and non-bankrupt firms are observed for ROA, solvency and profitability. Leverage and Activity do not show a significant difference in the average ratios between bankrupt and non-bankrupt firms. In the case of profitability, it can be observed that although the difference on the average ratios is significant, the average ratio for non-bankrupt firms is negative, which is contrary to expectation. This is mainly the result of several active companies which did not present a positive account in retained earnings.

The remainder of the average ratios behaved as expected, where bankrupt firms have averaged lower ratios for all variables except for gearing, which was expected to be higher. The only ratios that were shown to behave in an opposite manner were Leverage and Activity; however, it was shown that there is no significant difference between bankrupt and non-bankrupt firms in these ratios.

Table 3 presents the proportions of ultimate controllers in the sample. The statistics are presented at two different thresholds of the controlling stake, 10% and 20%. Ultimate controller is a dummy variable which equals one if there is a shareholder with at least 10% or 20% of the controlling stake, respectively; otherwise zero. There is a significant difference between the proportions of ultimate controller between bankrupt and non-bankrupt firms. This means that companies that have filed for bankruptcy have a higher proportion of shareholders with at least 10% or 20% of the control. This is an important statistic as it shows that the controlling structure of a company might be relevant to influence the likelihood of filing for bankruptcy.

The significance of the difference between proportions of bankrupt and non-bankrupt companies decreases when tested by specific ultimate controllers. Specifically, only the proportion of those companies controlled by families and widely held financial institutions were shown to differ between bankrupt and non-bankrupt companies, but only at the 10% significance level.

4. Empirical Evidence

In the present study the validity of two hypotheses is examined. First, it is argued that the probability of filing for bankruptcy might be influenced in different levels depending on the identity of the ultimate controller. The intuition behind this hypothesis is that a shareholder with the largest voting rights at the established threshold might exert significant influence in the decisions of a company. Family, banks or other companies might have different preferences or abilities to make decisions about a company.

Such decisions might be of two main types: i) to carry out closer monitoring of the activities of the company which would promote the well being of it; ii) in cases of

financial distress and if they have the option, they might prefer out-of-court negotiations instead of a formal bankruptcy procedure as the latter is more costly.

Second, it is argued that any influence from the ultimate controllers with respect to use a bankruptcy procedure would also depend on their cash flow rights. The intuition in this hypothesis is related to the alignment of interests' hypothesis. For instance, if the cash flow ownership of a family controller is high, the family controller might get encouraged to carry out closer supervision of the activities of the firm with the aim of maximising its value. But also, in this hypothesis it is considered that different ultimate controllers have different means of successfully avoiding to enter into a bankruptcy procedure. For example, some ultimate controllers might have easier access to external finance, such as bank controllers, and might be more able to follow out-of-court negotiations.

Therefore, the combination of both the identity of the ultimate controller and high cash flow ownership might be a determinant of the probability of filing for bankruptcy. Heiss and Köke (2004) argued that the quality of monitoring might vary between different ultimate controllers, depending on their cash flow stake. In such circumstances the probability of filing for bankruptcy might be more powerful when ultimate controllers and their ownership level are considered in the model. In their findings, the impact of ownership concentration on the probability of bankruptcy was shown to be negative but insignificant, probably because they did not consider the interaction of both identity of the controller and its ownership.

The present study adopts a Logit model for the empirical analysis of the likelihood of filing for bankruptcy. According to Ohlson (1980), bankruptcy models are better specified with a logistic regression than the Multiple Discriminant Analysis (MDA) technique which has been applied in previous literature such as in Altman (1968),

Altman et al. (1977), Taffler (1983), Baldwin and Glezen (1992), among others. In a recent review, Balcaen and Ooghe (2006) examined the advantages and disadvantages of different statistical techniques applied to corporate failure models. These included MDA, conditional probability models, risk index models and univariate analysis. In their analysis the application of the Logit model was considered to be associated with fewer assumptions about the characteristics of the variables than for instance MDA. Moreover, Logit models make no assumptions about the statistical distribution of independent variables and the dependent variable score can be interpreted as giving the probability of an event occurring (Morris, 1997).

The coefficients calculated by the Logit model are interpreted as signs of the partial effects of each explanatory variable (x_j) on the response probability. In addition, for a unit increase in x_j, the weighted log of the odds in favour of the dependent variable (bankruptcy) changes by the calculated parameter β_j.

Table 4 presents the results for four different models. All the regressions include dummy variables to control for the different industrial sectors. This accounts for the variations among industries with respect to accounting measurement conventions relating to depreciation, inventory valuation and capitalising/expensing intangibles. Time dummies are also included in all the regressions to control for changes in law and regulations and differences in the economic environment such as booms/recessions, higher/lower interest rates, etc. The first hypothesis examines whether the identity of the ultimate owner would increase/decrease the probability of filing for bankruptcy. Column (1) and Column (3) present these results at the 10% and 20% thresholds, respectively.

The coefficient estimates for the identity of the ultimate controllers who own at least 10% and 20% of the voting rights, respectively, is not significant in determining

the likelihood of filing for bankruptcy. This suggests that the identity of the ultimate controller per se might not influence the probability of filing for bankruptcy. The insignificance of the results differs from Claessens et al. (2003)'s study, in which firms with a group and /or a bank controller were shown to be 50% and 75% less likely to go into bankruptcy than firms that do not have such ownership structure. They argued that ownership structure matters for the risk of filing for bankruptcy, probably because banks and group-affiliated firms may choose out-of-court solutions to manage financial distress (as they probably have more access to financing in internal markets).

The insignificance of the estimators in the present study, in contrast to those in Claessens et al. (2003), might be the result of different factors. First, the dependent variable in the present paper separates bankrupt from non-bankrupt companies, whereas Claessens et al. (2003) used bankrupt and financially distressed firms. One could argue that a model which does not include healthy firms would limit the predictive power with respect to the financial ratios. For example, ROA is expected to be low for both financially distressed and bankrupt firms. By contrast, ROA is expected to be high for healthy firms. For this reason, it was decided to use bankrupt and non-bankrupt firms in the dichotomous classification of the dependent variable. Second, the data used in the present study corresponds to Great Britain, whereas Claessens et al. (2003) concentrated on East Asia. There is an implicit difference in the ownership patterns of these two different regions of the globe. For instance, La Porta et al. (1998) reported that in a sample of the 10 largest non-financial domestic UK firms, the average company's ownership by the three largest controllers is 19%, while the median is 15%. Goergen and Renneboog (2001) reported that the median for the largest voting block is 9.9% in a sample of 207 companies in 1992, while the

median by the three largest voting blocks is 21.7%. In other words, companies may be characterized by having widely held structures, where the largest ultimate controlling stake might be lower than 20%. In these circumstances, the largest shareholder is frequently able to influence the firm's decisions with a relatively small direct stake in its cash flow rights (Claessens et al., 2002). By contrast, in East Asian companies, two thirds of firms are controlled by a single shareholder, where more than half of the corporations are controlled by a family (Claessens et al., 2000).

To explore this issue further, a second hypothesis with respect to the cash flow ownership of each of the ultimate controllers is examined. It is argued that a specific ultimate controller of a financially distressed company who has high cash flow ownership might be discouraged from choosing to file for bankruptcy (if the option were available) and might prefer an out-of-court negotiation as it is less costly. But also, a specific controller of a financially healthy company who has a high cash flow ownership might carry out monitoring activities that would promote the good performance of the firm. In this case, it is likely that as the company performs well, the use of the formal bankruptcy procedures would not be required.

Column (2) and (4) in Table 4 show this relationship at the 10% and 20% thresholds, respectively. The impact of the interaction of cash flow ownership (CO) and the identity of the controller is negatively and significantly associated with the likelihood of filing for bankruptcy. At the 10% threshold, this implies that when the ultimate controller is a family, the odds of filing for bankruptcy are 7 for every unit increase in cash flow ownership (exponential of 1.95). This means that a family controlled company is 87% less likely to file for bankruptcy as it increases its cash flow ownership by one unit compared to a firm which is not family controlled. For a group, the corresponding odds of filing for bankruptcy are 6; and for a widely held

financial company, 8. This is equivalent to 85% and 88% less likelihood of filing for bankruptcy, respectively. This suggests that only the simultaneous effect of the identity of the controller (family, group, financial institution) with the level of cash flow ownership was shown to be significant in determining the probability of filing for bankruptcy.

It can be observed that at the 20% threshold, the interaction terms for group is not significant, whereas for family and widely held financial is significant at the 10% level. This might be the result of the reduced number of companies which have an individual controller with at least 20% of the stake. While at the 10% threshold, 76% of the companies have a controller, at the 20% threshold, only 35% of companies have a controller (See Table 3). This might decrease the power of the regressions and as a result decrease the significance levels of the variables[3].

With respect to the financial ratios, it was found that only ROA and Size were significant in predicting the probability of bankruptcy. Leverage was not significant, but its sign, as well as that for ROA and Size were negative as had been predicted. These results remain consistent for the four models, as shown in Table 4. This implies that firms that filed for bankruptcy tended to be smaller and were worse performers during the period of analysis.

5. Robustness of the results

5.1. Financial ratios

To test for the consistency of the results, a different set of financial ratios was considered. This follows Altman (2000), who used ratios to represent profitability, solvency, activity, liquidity and gearing in the bankruptcy model. Only the ratios for gearing, profitability and solvency were significant and with the expected sign.

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[3] A robustness check with this respect is carried out below.

However, the results with respect to the ultimate control variables remained consistent in significance with those presented in Table 4. At the 10% cut-off point, the probability of filing for bankruptcy decreases in 83% when a family is the ultimate controller with every one unit increase in cash flow ownership in comparison with non-family controllers. A group and a widely held financial company controllers are 83% and 86% less likely to file for bankruptcy in comparison with non-group and non-widely held financial company controllers, respectively.

5.2. Controlling stake

Although both available controlling stakes were analysed (at the 10% and at the 20% thresholds), it was considered that the results for the 10% threshold represent a better picture of the impact of the variables. This may be implied as a shareholder with the majority of voting rights (even with at least 10% of the voting rights) could significantly influence company's decisions (Claessens et al., 2002). Goergen and Renneboog (2001) stated that the UK differs from other European countries in ownership concentration and in its active and hostile market for corporate control. It was mentioned in their study that to challenge the decisions of the largest shareholder, a voting agreement between the second and third largest shareholders would be needed. In other words, the decisions over the company made by the ultimate controller with a stake of less than 20% might be difficult to challenge. This is the main reason to consider that the analysis in the present study is best interpreted when the controlling threshold is considered from the 10% of the stake, where the ultimate controlling structure can be observed for more companies.

As shown in Table 3, the number of companies, including bankrupt and non-bankrupt, with a largest ultimate controller at the 10% threshold is 76%. However, at the 20% threshold, the percentage is reduced to 35%. For this reason, it was argued in

the preceding section that at the 20% threshold the significance of the coefficients in the regression model might be decreased. To explore this issue further, a new threshold was established at the 15% cut-off point. The results for this regression were shown to be consistent with the expectation. In general, significance levels and the impact of the coefficients of the interaction terms of the ownership variables decreased in comparison with the results from the model using the 10% threshold, but remained more significant and with a higher impact than those from the model using the 20% threshold.

5.3. Collinearity of explanatory variables

It has been pointed out that Logit models are extremely sensitive to multicollinearity (Balcaen and Ooghe, 2006). Models in corporate finance are very likely to present correlation between independent variables as financial ratios might share equal numerator or denominator (Tucker, 1996). High correlation between the independent variables can cause a large variance in the coefficient estimates; this problem is the same as in cases of small sample size. In addition, multicollinearity may also cause that the estimates present wrong signs and magnitudes. (Wooldridge, 2003; pp. 98).

In an effort to reduce the problem of multicollinearity, a first step was to check which variables had a significant correlation coefficient as presented in the correlation matrix in Table 5. From Table 5, it can be observed that there is a significant correlation coefficient between size and several variables such as, leverage, CO, ROA and family controller.

As size presents significant correlation coefficients against the other explanatory variables, a regression excluding this variable was followed to test the consistency of the estimators. The problem with this procedure is that excluding a variable that belongs to the population model might cause bias in the estimators. However, in this

particular case, after excluding size from the regression model, all the variables remained consistent, which imply that multicollinearity of the independent variables is not affecting the consistency of the estimators. ROA remained significant and negative and leverage insignificant. The estimators for the interaction terms of ultimate controllers and cash flow ownership were also significant with a negative sign as presented in Table 4. Family, group and financial widely held company controllers are approximately 88%, 86% and 88% less likely to file for bankruptcy for every one unit increase in cash flow ownership, respectively.

5.4. Sample Bias

It has been argued that sample bias in empirical studies of bankruptcy could exist when the incidence of bankruptcy filings is overstated (Morris, 1997). This is a typical case that arises in studies that use matched pairs to carry out empirical analysis. In these cases the number of bankrupt firms is represented as the 50% of the population, whereas in reality the proportion of public listed firms in the population that file for bankruptcy in GB is around 1%.

The present study does not follow the technique of matching pairs, but still the number of incidences of companies filing for bankruptcy is larger than 1% (7.8%). However, the selection of the companies under study was not based in specific matching criteria such as year, industrial sector or size. Instead, the present study controlled for those specific factors using time dummies, industry dummies and the log of sales as a measure for size.

Moreover, the 1272 companies used for the present study were selected from an available database which contained the ownership characteristics from which a total of 1568 firms from non-financial industrial sectors were available. The discrimination of firms was followed mainly because of unavailability of data and not because of

bias selection (although to some extent the availability of data could be considered as a source of biasness; however, this is an inevitable fact given the type of data required). In other words, firms were not selected according to their status as in being active or bankrupt, but all the firms that fulfil data requirements for the analysis were considered and thereafter their actual status was traced.

6. Conclusions

The aim of this paper was to introduce a different perspective of analysis of qualitative data into a bankruptcy model. Specifically, the identity of the ultimate controller and its cash flow stake were considered in addition to popular financial ratios. A Logit model was used with a sample of 1272 public listed GB companies, where 99 had filed for bankruptcy between 1997 and mid 2005.

The findings presented no significant evidence that the identity of the controller per se influences the probability of filing for bankruptcy. However, once the cash ownership of the specific ultimate controllers was considered with the construction of an interaction term, evidence of a significant effect was found. This suggests that for a given ultimate controller, the probability of filing for bankruptcy increases as the cash flow ownership decreases. The rationale of this effect might be explained by two different factors. First, as an ultimate controller increases its cash flow ownership over the firm, corporate performance tends to improve given the increment of monitoring and disciplinary activities made by the ultimate controller. This in turn reduces agency costs and increases the firm's value in accordance with the alignment of interests hypothesis (maximise corporate value). In this case, a company would have lower likelihood of going bankrupt.

Second, in cases of financial distress, ultimate controllers who have a higher stake of cash flow rights might opt to use out-of-court negotiations to rescue the firm (if they have the option). This choice might be more beneficial for the shareholders than the use of a formal bankruptcy procedure which might be more costly. In both cases, the significance of the cash flow ownership was shown to depend on the identity of the ultimate controllers, i.e. family, group, widely held financial institution, as their preferences and access to external finance might vary accordingly.

The model was checked with different approaches to confirm the robustness of the results. These included the use of different financial ratios as controls, different ultimate control thresholds and the exclusion of the variable size as it was shown to be collinear with several explanatory variables. Results remained consistent after each of these checks.

Table 1 Distribution of financial data of bankrupt and non-bankrupt firms by year

Year	Bankrupt	Non-bankrupt	Total	Proportion
Total	99	1173	1272	7.8%
1996	10	178	188	5.3%
1997	16	168	184	8.7%
1998	15	137	152	9.9%
1999	12	137	149	8.1%
2000	23	137	160	14.4%
2001	7	134	141	5.0%
2002	9	137	146	6.2%
2003	7	117	124	5.6%
2004	0	28	28	0.0%

Table 2 Descriptive Statistics for Ultimate Controllers

Variables	Bankrupt	Non-bankrupt	Z-score
Number of firms	99	1173	
ROA (%)	-14.86	1.86	4.85***
Size	4.4	4.9	4.65***
Leverage	2.6	2.5	-0.09
Solvency	-0.12	0.03	4.63***
Liquidity	0.06	0.12	1.44*
Gearing	3.54	1.90	-1.34*
Activity	1.44	1.31	-1.15
Profitability	-0.16	-0.03	4.08***

Average values for the financial ratios of non-bankrupt and bankrupt firms. ROA is the return on assets, measured as the percentage of profits before taxes to total assets. Size is the log of total sales. Leverage is the ratio of total sales to total debt. Solvency is the ratio of EBIT to total assets. Liquidity is the ratio of net current assets to total assets. Gearing is the ratio of total debt to total equity. Activity is the ratio of sales to total assets. Profitability is the ratio of retained earnings to total assets. ***,**,* level of significance at 1%, 5% and 10%, respectively.

Table 3 Descriptive Statistics for Ultimate Controllers

Variables	Total	Bankrupt (1)	Non-bankrupt (2)	Z-score between (1) and (2)
Total	1272	99	1173	
Threshold at 10%				
Ultimate controller	968 (76)	83 (84)	885 (75)	-1.87**
Family	597 (47)	53 (54)	544 (46)	-1.37*
Widely held	250 (20)	21 (21)	229 (20)	
financial				-0.41*
Group	121 (10)	8 (8)	113 (10)	-0.51
Threshold at 20%				
Ultimate controller	445 (35)	41 (41)	404 (34)	-1.39*
Family	320 (25)	31 (31)	289 (25)	-1.47*
Widely held	76 (6)	6 (6)	70 (6)	
financial				-0.04
Group	51 (4)	4 (4)	47 (4)	-0.16

Absolute number of observations, proportions in parenthesis. **,* level of significance at 5% and 10%, respectively.

Table 4 Bankruptcy, ultimate controllers and their cash flow ownership

Independent variables	(1)	(2)	(3)	(4)
	10% threshold		20% threshold	
Intercept	-0.86	-2.82***	-0.69	-1.46
	(0.827)	(1.13)	(0.795)	(0.974)
ROA	-0.01**	-0.01**	-0.01**	-0.01**
	(0.004)	(0.004)	(0.004)	(0.004)
Size	-0.37***	-0.38***	-0.38***	-0.36***
	(0.107)	(0.112)	(0.111)	(0.113)
Leverage	-0.005	-0.004	0.003	-0.007
	(0.062)	(0.060)	(0.063)	(0.061)
Family	0.32	2.39***	0.17	1.18
	(0.308)	(0.839)	(0.261)	(0.744)
Group	-0.15	1.64	-0.32	-0.03
	(0.531)	(1.01)	(0.765)	(.031)
WHF	0.37	2.68***	0.13	1.49
	(0.360)	(0.945)	(0.459)	(1.03)
CO		1.93***		0.44
		(0.683)		(0.294)
Family*CO		-1.95***		-0.52*
		(0.686)		(0.317)
Group*CO		-1.85***		-0.34
		(0.710)		(0.365)
WHF*CO		-2.07***		-0.64*
		(0.721)		(0.384)
No. observations	1272	1272	1272	1272
Pseudo R2	0.1075	0.1139	0.1053	0.1100

The regressions are estimated with LOGIT. The dependent variable Bankruptcy equals one when the firm filed for bankruptcy between 1997 to mid 2005; otherwise zero. ROA=return on assets, size=log of sales, leverage=sales/total debt. Family, Group and Widely Held Financial (WHF) are represented by dummy variables which equal one if the firm's ultimate owner corresponds to each category, respectively; otherwise zero. CO is an index which represents the level of corporate ownership in ranges of 10 percentual points, where 1 represents the lowest corporate ownership level (>0 to <10%). All the regressions include dummies for time and industrial sectors. Robust standard errors. ***,**,* level of significance at 1%, 5% and 10%, respectively.

Table 5. Correlation matrix between pairs of independent variables

	ROA	Size	Leverage
Size	0.26*		
Leverage	0.02	0.09*	
CO	0.02	-0.17*	0.05
Family	0.006	-0.14*	0.04
WHF	0.008	0.004	0.04
Group	-0.03	-0.05	-0.02

* Significant level at the 5%. ROA=return on assets, size=log of sales, leverage=sales/total debt. Family, Group and Widely Held Financial (WHF) are represented by dummy variables which equal one if the firm's ultimate owner corresponds to each category, respectively; otherwise zero. CO is an index which represents the level of corporate ownership in ranges of 10 percentual points, where 1 represents the lowest corporate ownership level (>0 to <10%).

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