# CLASSIFICATION OF BANKRUPTCY WITH CASH FLOW INFORMATION: EVIDENCE FROM SMALL SIZE FIRMS

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## Abstract

Corporate financial ratios have been debated in the past as the most importance measures in predicting corporate failure, yet gaps remain in the literature about cash flow information in classifying between bankrupted and non-bankrupted firms. This study test whether cash flow components is more useful in classifying bankrupted and non-bankrupted of small and unlisted firms in Spain. The results of this study suggest that cash flows components are superior to financial ratios for classifying small failed and non-failed companies with the logit model. Particularly, most failing firms, reduce or avoid paying dividend to their owner. This reduction or the absence of dividend payments as a proportion of total outflow is often related to either a significant decrease in the net operating inflow and/or an increase in the relative outflow to fixed charges resulting from increased external debt financing.

**Keywords:** Cash Flow Information, Bankruptcy, Financial Ratios, Classification

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## 1. INTRODUCTION

Academic research have long advocated the use of financial ratio in multiple discriminant analysis (Beaver 1966, Altman 1968, & 1983, Blum 1974, Altman et al 1977, Ohlson 1980, Martin, 1979). These authors claims that financial ratios reflects key relationship among financial variables and provide basic guidelines for financial planning and analysis.

Others authors such as Beaver (1966), Aziz and Lawson (1985), Gilbert et al. (1990), Casey and Bartczak (1985), Gombolat et al (1987), Dambolena & Shulmen (1988), Giblbert et al (1990) & Fernandez et al. (2014), Lious et al. (2016) claim that cash flow information provide useful information source for predicting bankruptcy. To them, accounting information that best distinguishes between distressed and non-distressed companies is considered most useful to creditors. Research findings on the predictive potential of cash flow have been disappointing for advocates of the cash flow information. Authors have found little evidence supporting the belief that cash flow information has incremental predictor usefulness over accrual information in predicting bankruptcy. This is because prior study focus only cash flow from operating activities.

Although the cash flow theory suggests that operating cash flow may be the most important predictor of financial distress, other components of cash flow such as net cash flow, net cash from financial and investment should also have incremental predictive usefulness.

The objectives of this study are to review the financial failure literature and identify the ratios that were useful in discriminating between failed and non-bankrupted firms; to develop a model of cash flow components and illustrate it use; to compare empirical the discriminating ability of those financial ratios to the cash flow components in classifying bankrupted and non-bankrupted firms; and to provide recommendation for future study.

## 2. LITERATURE REVIEW

According to Heath (1978, p. 20), financial flexibility is the capacity of a firm to control cash receipts and payments to survive a period of financial adversity. He believes that the usefulness of cash flow is to achieve a state of equilibrium in total cash flow so that the available purchasing power will be equal to the needs to set by establishing limits and management decisions. The concept of financial flexibility indicates that the occurrence of certain events triggers an unexpected drop in total cash flow, thus forcing a company to take corrective action to regain cash flow equilibrium. The activities by management in restoring cash flow equilibrium dictates the futures cash flows. Some events occur suddenly, while others can be cyclical in nature.

Furthermore, financial researchers such as Brealey and Myers (1981), Van Horne (1980), Weston and Brisgham (1981) reveal that net cash flows are

the basis for determining the value of a firm. According to these authors, the need to use operating cash flows in predicting bankruptcy prevalence. Unlike the financial ratios which serve as proxies for measuring cash flow, cash flow components unambiguously measure accrual accounting cash flow inflow and outflows. In Lious et al. the value relevance of operating cash flow was superior to accrual earning after the mandatory IFRS adoption. This study develops a common set of eight net cash flow components. The cash flow components were developed originally by Helfert (1982). By measure the relative proportion each component contributes to either total net inflow or total net outflow, a pattern of uniform cash flow information is created. Like the sample bias in the ratio based studies, the relatives contribution of each component is dependent on the companies in the sample. However, using a uniform set of eight systematically related components to measure total financial performance avoids a measurement bias that may be encountered when using ratios.

Unlike the funds flow components, financial ratios selected by the MDA approach are not necessarily interrelated in a total system context. The degree that the selected set of ratios do not encompass all dimensions of a total interrelated system, a measurement bias will exist vis-a-vis the funds flow model. Another criticism of earlier bankruptcy studies focused on the shortcomings of multivariate discriminant analysis (MDA). The statistical problems of MDA were identified earlier. An alternative to MDA is the use of a conditional probability model. The use of conditional logit or probit analysis avoids the problems related to the use of MDA. With a conditional probability model no assumptions have to be made regarding prior probabilities of bankruptcy and/or the distribution of the predictor variables. The empirical analysis in this study utilizes the logit program. Table 1 below provides a summary of studies which authors employed cash flow components in classifying bankrupted and non-bankrupted firms.

Casey and Bartczak (1985) reached this conclusion on the basis of the number of firms correctly classified into their respective groups. While their conclusion is valid, there are grounds to argue that cash flow information has significant information content over accrual information in assessing the predicted *probability* of failure. Predicting the probability of failure extends the mere classification into either the failed or non-failed group and is practically more useful. For instance, the classification of a company into a non-failed group does not provide information on the likelihood of this group membership. Perhaps the likelihood of the membership into this group is 51%. Knowing the probability of failure enables the assessment of the degree of distress and the risk associated with a particular company. Bankers may lend at premium interest rates to companies that are classified in the failed group that have a marginal probability of failure. Conclusions supporting Casey and Bartczak (1985) were reached by Gombola *et al* (1987). Gombola *et al* (1987) conducted a factor analysis of 21 accrual ratios and three cash flow ratios and found that cash flows loaded on a separate factor in the later years being 1973-1981 but did not load separately during the earlier years, 1967-1972. Based on this finding, they argued that if cash flow has information content then it should be more salient based on data from the later years.

Dambolena and Shulman (1988) developed a variant of CFFO called net liquid balance. Net Liquid Balance (NLB) was derived by subtracting increases in cash investments and adding increases in long term financial flows to CFFO disclosed in the statement of cash flows. Dambolena and Shulman (1988) found that when NLB was added to Altman's (1968) Z score model and consistently improved the predictive performance of both these models. Meanwhile, flow identity as the framework for their study investigating the ability of cash flow to predict financial distress. They used this identity since they perceived corporate bankruptcy to be closely related to firm valuation which in turn is closely related to Lawson's identity of cash flows. Using both MDA and logistic regression they found that cash flow variables correctly classified bankrupt and non-bankrupt firms with a high degree of accuracy up to five years prior.

In examining whether distressed firms filing bankruptcy could be distinguished from those that avoid filing, Gilbert *et al* (1990) observed that contrary to the findings of Casey and Bartczak (1985), cash flow ratios (cash flow from operations to total liabilities and cash flow from operations to current liabilities as defined by Casey and Bartczak (1985)) were significant predictors of distress. In both their logit models, the cash flow ratios had intuitively appealing signs with the coefficients being significant at p=0.001. The two cash flow ratios however did not simultaneously occur in any one model. This suggests that the stepwise logit methodology adopted by Gilbert *et al* (1990) recognised and appropriately treated the correlation between the two cash flow ratios.

## 3. DATA AND METHODOLOGY

The data set, variables used, and the logistic scheme are described as follows:

### 3.1. Data and variables

The data sample for this bankruptcy prediction study consist of Spanish corporation that field for bankruptcy in 2008 or 2009 financial crisis as identified in the bankruptcy database in SABI. We found that there were 534 unlisted firms that were declare bankrupt from the SABI due to failure related circumstances during the sixteen periods. The stop of reporting financial statement to the SABI two or more years before experiencing bankruptcy. The second phase of the screening process involved a search of leading to information. Most studies on bankruptcy have focused on the predictive ability of financial information released approximately one year before the date of failure to serve as a predictor of failure within the next twelve months. Acquiring accurate dates when failure occurred and comparing it to the date of the latest annual financial statements are two important parts of the research methodology in the study. If it was found that a company declared bankruptcy, or was declared bankrupt or was liquidated, we acquired from the previous published sources the best available date of record of the failure. The classification of the 534

companies deleted from SABI file due to failure related circumstances.

During the third phrase of the screening process, the recorded date of failure is compared to the date of the last reported annual report of the failed company. If the date of failure is known precisely and it occurred four months or more after the date of the last recorded annual report (ie, the date of the latest fiscal year end), the date of failure and the financial statement are assumed to be one time period apart. If the precise date of failure was less than four months after the date of the last annual report, the annual report of the preceding year becomes the closest to the date of failure. In standardising the comparison dates, experience indicates at least three months are required to complete the bankruptcy filing process. In SABI, we found that a company with a date of failure one month after the date of its latest annual report would more than likely have been involved in bankruptcy proceedings. That is, it was very close to financial failure before the last annual report was released.

**Table 1.** Summary of studies with cash flow component in classifying bankrupt and non-bankrupted firms

| *Study* | *Method* | *Cash flow variables* | *Findings* |
|---|---|---|---|
| Gilbert et al (1990) USA | Examined the predictive abilities of models based on two types of samples 52 bankrupt and 208 n0n-bankrupt firms. They employed 14 ratios of which three were cash flow ratios in a stepwise logit model | Cash flow from operations/current liabilities (CFFO/CL) Cash flow from operations/total liabilities (CFFO/TL) Cash flow from operation/total assets | CFFO/TL is significant in classifying bankrupt and non-bankrupt firms CFFO/CL is significant in classifying bankrupt and non-bankrupt firms. Concluded that cash flow ratios add significantly to prediction accuracy of accrual models. |
| Aziz & Lawson (1989) (USA) | 49 bankrupt firms matched with 49 non-bankrupt firms up to five years prior to failure. Compared cash models with Altman's Z and Zeta models, and a mixed model comprising cash and accrual variables. | Various cash flow variables extracted from the Lawson cash flow identity model. | The cash flow model was more accurate in predicting bankruptcies. Operating cash flow and lender cash flow were the two most significant cash variables. |
| Dambolena & Shulmen (1988) (USA) | Recomputed logit model equivalents for Altman's 1968 model and Gentry et al 1985b. Used 25 bankrupts matched with 25 non-bankrupts. A similar sample size was used for validation. Tested the marginal predictive ability of a funds flow ratio. | Net liquid balance which equals operating cash flows minus increases in cash investments, plus increases in long term financial flows. | Net liquid balance improved the predictive accuracy of both models especially for non-bankrupt firms. Improvement in predictive accuracy was greater for the Gentry et al model than for Altman's model. |
| Gombola et al (1987) (USA) | Computed 21 accrual ratios and three cash flow ratios for 77 failed and matched non-failed firms. Data collected for at least one year for each firm up to four years prior to failure. Employed linear MDA. | Nash flow from operations/sales cash flow from operations/assets cash flow from operations/debt. | None of the cash flow ratios were significant predictors of failure. |
| Casey & Bartczak (1985) (USA) | For 60 bankrupt and 230 non-bankrupt firms up to five years prior to failure, cash flow and accrual ratios were used to classify the firms using MDA and logit. | Operating cash flow (OCF) defined as working capital from operations adjusted by non-cash working capital accounts, OCF/current liabilities and OCF/total liabilities. | Cash flow ratios did not significantly increase the predictive ability of the accrual MDA and logit models. On re-interpretation of their results, the cash flow variables significantly increased explanatory power and predicted probabilities of failure/non-failure of the accrual model. |

For comparative statistical analysis, annual report of the preceding year provide the type of standardized information needed. Failure is assumed to have occurred on January 1of that year if only the year of the failure is known. The date the last annual report is compared to the January 1 failure date when establishing the number of periods that expired before one company failed. The cash flow statement and balance sheet information for failed industrial companies are used to determine the cash flows and the financial ratios. Complete financial statement information was available for 490 of the 534 companies for one and two years before failure. Using a criterion of total sales between 700.000 euros and 8.000.000 euros; total assets between 350.000 to 4.000.000 euros and finally, total number of employees ranging from 10 to 49, we found that 179 of the 534 companies could be classified as small and not listed.

Furthermore, prior studies have compared the sample failed firms with a sample of non-failed companies that were in the same respective industries and of approximately the same asset size. This study apply the same matching concept adopted in previous studies by matching the 179 failed small companies with a non-failed small companies in the same industry, selecting matching companies that were similar in assets size, sales and number of employees for the fiscal year three years before bankruptcy.

## 3.2. Model

The objective of this study is to test whether cash flow components are more useful than the financial ratios in predicting bankruptcy during the 2009 or 2008 financial crisis. The logit technique is used to examine the predictive ability of the cash flow from components relatively to the financial ratios. We used the cash flow from components and financial ratios for two year before financial distress.

Empirical evidence from previous studies have accounted that cash flow data provide the best information to use in empirical tests designed to discriminate between bankrupted and non-bankrupted companies. To start the theoretical framework that illustrate the trend of the cash flow components relatively to the financial ration to the probability of bankruptcy, we acknowledge that net cash flow is composed of cash inflows and outflows. However, the level and speed of each cash inflow and outflow component reflects the operating, investment and financing decision of the management. The resource allocation decisions of management are reflexed in the mix of the component generating cash inflow or outflows given any state of economic condition. Thus, measuring the change in the level and speed of each cash inflow and outflow component provides a theoretical rationale to differentiate between financially bankrupted firms or non-bankrupted firms.

To achieve the objective of this study, six proposition were proposed:

First, a firm's financial success or failure depends upon the proportion of Net Operating Fund Flows (NOFF), which consist of cash inflows (sales as primary source) menus cash outflows (such as expenditures related to cost of goods sold, selling and advertising, research and development, rental, extraordinary, and minority interest claims. Therefore, the lower the net operating fund flows, the high the probability that the firms is facing a financial distress. All thing being equal, a firm can obtain fund inflow normally from its net operating fund flows. However, seasonal event such as economics turbulence can cause the NOFFs to be negative, representing low cash inflows and high cash outflows. Particularly, during the financial crisis, most small firms experience a decline in sales, resulting to a negative NOFFs.

Second, most small business owner believes that the net working capital fund flows (NWCFF) provide the best way to maintain an equilibrium condition between sources and uses. Net outflow of funds for working capital are negative when the level accounts receivable (AR) or inventories (INV) are increasing and are positive when the level accounting payable (AP) are decreasing or a combination of both. Thus, the higher the proportion of net cash outflow going to net working capital, the higher the probability of failure.

Third, the smaller the proportion of net cash outflows going to capital investment, the higher the probability of failure. Firms faced with financial distress situation are mostly characterised with small size of cash outflow going to capital investment. This reflect the firm's market share and expected growth in demand for its products.

Fourth, fixed coverage expenditure outflow (FCEF) reveals the proportion of net cash outflow going to interest and leasing expenditures. When debt and/or leasing are used when a firm's internal operation funds are insufficient to meet the investment outflows, interest, debt amortization and leasing expenditure must be paid. Fixed coverage payment is always an outflow of funds, thus, the higher the proportion of the net cash outflows going to the interest and leasing expenditures, the higher the probability of failure.

Fifth, since most small business do not declare their dividend. We assume that dividend can be earned either through net profit for the period or pay themselves salary or personal allowance. Considering these three possibilities, most small firms will be preferred to use salary or personal allowances to avoid taxes charge after profit. Thus, the larger the relative proportion of net cash outflow going to dividend, the smaller the probability of failure. Since almost all small firms examined in this study are sole proprietors, when business is favourable, their salary or personal allowance will be higher. This is a signalling that the company is in a financial healthy state. However, when business is not favourable, owner can receive dividend through salary or personal allowance.

Sixth, Helfert cash fund flows model considered short-term borrowing (NFFF) as financial fund flows, even though, other authors argued that this variable should be placed under working capital. According to Helfert, firms experiencing decreased in the operating cash flow can used short-term debts to meet their financial necessities. Therefore, the larger the net cash outflow to capital investment, the smaller the probability of failure.

One of the limitation of prior cash flow studies is that not all studies have provide the validated of the models used. Gombola et al (1987) suggest that the reason why many previous studies would not detect significance in cash flow components in a multivariate model is because of the multicollinearity between cash flow and accrual components. He adds that most of the multivariate studies that did not find cash flow components to significant in predicting failure, combined early and late years data. However, other group of research account the significant of cash flow components used in predicting bankruptcy when applied the late year data. Among those were, Aziz and Lawson, 1989 and Gilbert et al. (1990). To resolve the problem of multicollinearity the presence study the widespread recognition that cash flow components is distinct from that provided by the income statement and balance sheet, and the consequence introduction of the cash flow accounting standards of companies in the Spanish market. This suggests that cash flow components may provide added predictive ability to that provide by accrual components.

With respect to the diversity, Kuhn (1970) suggests that repeated confirmation is essential for reaching on a phenomenon in a given research paradigm. Most previous studies in cash flow have used different measurement. This diversity issue is compounded by the diversity of research approaches and statistical techniques employed in the paradigm. The different approaches and statistical techniques may produces different results, as functional relationship between the independent (predictor) variables and the dependent variables may be suited more to a particular technique than to other. This result may due to some statistical artefact rather than manipulation of the dependent variables. To resolve this problem of validity we use to the logit models to check if similar results can be achieved.

Lastly, this make use of cash flows components instead of just meanly operating cash flows in predicting financial failure in order to avoid the

narrow, premature and unjust view of cash flow information as illustrated by prior studies when reference is given only to operating cash flow. This narrow view of using only operating cash flow would be the reason why there are solution of cash flow not capable of predicting bankruptcy failure.

### 3.3. Variable measurement

Six cash flow components were selected to be used in the logit model for classifying bankrupted and non-bankrupt companies. The selection of the ratio was based on two primary criteria: (1) the most frequently used ratios, and (2) asset size. The most widely used cash flow ratios in predicting bankruptcy derived from nineteen bankruptcy studies. Table 3 provide details of studies that employ cash flow component in predicting financial distress situation. We selected six most important components that we used in almost all the studies. The selected cash flow component:

1) Net Operating fund Flows (NOFFs) = inflows (IF) minus outflows (OF) from operating activities
2) Net Investment fund Flows (NIFFs) = inflows (IF) minus outflows (OF) from investing activities
3) Net Financial Fund Flows (NFFFs) = inflows (IF) minus outflows (OF) from financing activities.
4) Net Working Capital Fund Flows (NWCFFs) = inflows (WCIF) minus outflows (WCOF) from working capital
5) Dividend outflow (DIV)
6) Fixed Coverage Expenditure Outflows (FCEF)
7) Change in Cash (CC)
8) Total Net Flow/Total Assets

All the cash flow variables were scaled by total net flow. This is because we want to determine the percentage of the total net inflows that are contributed by each net inflow component and the percentage of total net outflows contributed by each net outflow component. Following Helfert model and the accounting convention underlying the funds flow statement results in total net inflow of fund (TNIF) are equal to the absolute value of total net outflows (TNOF), therefore, TNF=TNIF=TNOF.

For the financial ratios, nine financial ratios were selected to be used in the logit model for classifying bankrupt and non-bankrupt firms. The selection of the ratio was based on three primary criteria: (1) the most frequently used ratios, (2) asset size and the (3) financial market effect. Among the nine financial ratios, six ration were selected based on the three specified criteria. These ratios are: net income/total assets (NI/TA), EBIT/total assets (EBIT/TA), total debt/total assets (TD/TA), net working capital/total assets (NWC/TA), cash flow/Total debts (CF/TD), current assets/current liabilities (CA/CL) and cash plus marketable securities/current liabilities (C/CL), and Log TA. The exclusion of retained earnings/total assets is because it is similar to total debt/total assets. To control for the size and financial markets, we use log of total assets as a proxy for size and total market value of common stock/book value of total capital as the financial market proxy (Altman et al. 1975).

The financial distress prediction models were constructed using binary logistic regression (LR) as illustrated in Hosmer and Lemeshow (1989). We employ the Proc Logistic command in SPSS to generate the logistic statistical models. Suppose the response variable can take on the ordered values 0 and 1, with *i* predictor variables, and defining $P_0$ as the probability that a firm is in state 0 given the vector $X = (X_1, X_2, \ldots, X_i)$ of independent variables, the logit can be estimated as follows:

$$l = \ln [P_0/(1-P_0)] = \beta_0 + \beta_1 X_1 + \beta_1 X_2 + \beta_i X_i \quad (1)$$

Where $\beta_0$ is the intercept parameter and the $\beta_i$ coefficients represent the effect of the *j*th explanatory variable on a company's probability of ending up in state 1 or 0 is given by:

$$P(FD = 0/X_j) = P_0 = \frac{\exp^l}{1+exp\, l} \quad (2)$$

$$P(FD = 1/X_j) = P_1 = 1-P_0 \quad (3)$$

Where FD represent financial distress with levels 0 and 1 and $\mathbf{X}_j$ is the know vector of the predictor variables corresponding to the *j*th observation. The predictive accuracy of each model was validated using the variance inflation factor technique used by SPSS 23 software. The bias resulting from the predicting observation was reduces since as we run a model with/without the technique and compare the results.

## 4. DATA ANALYSIS

### 4.1. Descriptive statistics

Table 2 shows the mean and standard deviation of failed and non-failed firms in term of their operations, investment, financing, net working capital and dividends. The theoretical framework with respect to the relationship between the probability of bankruptcy and the cash flow components are supported by the descriptive statistic information.

For the cash flow components, the result shows that there is remarkable difference between the means of the failed and non-failed small unlisted companies, one and two years before bankruptcy. One year before the failure, the results show that NOFF/TNF, NIFF/TNF, NFFF/TNF, and CC/TNF were negative for the all failed firms. However, for the non-failed firms, all the cash flows components were positive. Comparing these figures with the results obtained from the financial ratios demonstrates the superiority of the cash flow measure in predicting bankruptcy. One year before the bankruptcy, the financial ratios of most small firms shows that these companies are healthy. Unlike the bankrupted firms, the mean of the cash flow components and financial ratios for the non-bankruptcy are positive. Similar results were found for two years before the bankruptcy.

### 4.2. Logistic regression analysis

The parameter estimates for the cash flow components and financial ratios are reported in Table 3. These parameters indicate that, for both years, bankrupted firms are significantly more likely to have lower (negative) or higher (positive) cash flow component before financial distress then healthy firms. The classification results in Table 3

even better illustrate the disparities in the importance of cash flow components for the samples and the year.

With respect to proposition fifth, the results show that the strongest cash flow component for sample is dividend component. The dividend component (DIV) is significant at the 0.001 level for the test using only cash flow components to classify bankrupted and non-bankrupted firms. This findings indicate that the higher relative dividend component, the lower the probability of failure. In other word, the lower the dividend components, the higher the probability of failure. The finding is consistent with the proposition 5 of the theoretical framework present in section 3. This shows that higher dividends satisfy the preference of owners of the firms and thereby sustaining the long run economics viability of their business.

**Table 2.** Mean and standard deviations of cash flow variables and financial ratios for failed and non-failed companies one and two years before the failure during the financial crisis

| *Variables* | *Failed Firms* | | *Non-Failed Firms* | |
|---|---|---|---|---|
| | *Mean* | *Standard Deviation* | *Mean* | *Standard Deviation* |
| ***Cash flow variables (year 1)*** | | | | |
| NOFF/TNF | -0,171 | 0,305 | -0,182 | 2,875 |
| NIFF/TNF | -0,383 | 2,859 | 1,562 | 17,042 |
| NFFF/TNF | -0,060 | 0,149 | 0,028 | 0,391 |
| NWCFF/TNF | 1,074 | 4,462 | 0,818 | 3,212 |
| DIV/TNF | 0,292 | 0,294 | 0,511 | 1,440 |
| FCEF/TNF | 0,064 | 0,143 | 0,093 | 0,223 |
| CC/TNF | -0,065 | 0,280 | 0,122 | 0,404 |
| TNF/TA | 1,940 | 2,874 | 57,247 | 589,002 |
| ***Financial Ratios (year 1)*** | | | | |
| NI/TA | -0,409 | 1,107 | 0,082 | 1,732 |
| EBIT/TA | -0,317 | 0,786 | 0,189 | 3,165 |
| TD/TA | 1,859 | 5,974 | 29,837 | 266,661 |
| CF/TD | -0,765 | 2,480 | 14,042 | 130,001 |
| NWC/TA | 0,342 | 0,441 | 0,244 | 0,324 |
| CA/CL | 2,291 | 4,973 | 7,723 | 59,240 |
| C/CL | 0,128 | 0,447 | 0,722 | 2,682 |
| Log TA | 3,129 | 0,488 | 4,301 | 0,853 |
| ***Cash flow variables (year 2)*** | | | | |
| NOFF/TNF | -0,113 | 0,289 | 0,210 | 0,793 |
| NIFF/TNF | -0,221 | 1,551 | 0,985 | 13,332 |
| NFFF/TNF | -0,067 | 0,140 | -0,049 | 0,342 |
| NWCFF/TNF | 0,748 | 1,410 | 1,235 | 5,727 |
| DIV/TNF | 0,366 | 1,055 | 0,595 | 2,060 |
| FCEF/TNF | 0,056 | 0,092 | 0,916 | 8,836 |
| CC/TNF | -0,032 | 0,057 | 0,190 | 0,645 |
| TNF/TA | 1,893 | 2,355 | 7,915 | 55,619 |
| ***Financial Ratios (year 2)*** | | | | |
| NI/TA | -0,265 | 0,645 | 0,076 | 1,506 |
| EBIT/TA | -0,214 | 0,626 | 0,018 | 0,281 |
| TD/TA | 1,317 | 2,798 | 89,448 | 929,922 |
| CF/TD | -0,571 | 1,538 | 4,125 | 20,415 |
| NWC/TA | 0,386 | 0,413 | 13,097 | 131,675 |
| CA/CL | 2,661 | 7,921 | 3,916 | 15,767 |
| C/CL | 0,203 | 0,978 | 2,740 | 17,616 |
| Log TA | 3,556 | 0,466 | 4,275 | 0,870 |

Most failing firms, reduce or avoid paying dividend to their owner. This reduction or the absence of dividend payments as a proportion of total outflow is often related to either a significant decrease in the net operating inflow and/or an increase in the relative outflow to fixed charges resulting from increased external debt financing. Analysing Table 3 one and two of before the collapse, the result shows that the value for dividend drop drastically for failed firms. One year before bankruptcy, dividend component (DIV) is 0.017. Two year before bankruptcy, the dividend component was 1,043. Lower coefficient of dividend components indicates that such companies do not pay income taxes due to the poor financial performance, accrual income taxes liabilities are reduced and appear as a use of funds. The effect of the dividend component also affect the level of wages, as they are reduced and use as funds. Thus, the higher the sources of funds from the assets and liabilities components, the lower the probability of failure.

The NIFF has also has significant incremental predictive power in both variables. With respect to proportion 3 which state that the smaller the proportion of net cash outflows going to capital investment, the higher the probability of failure. In other word, the larger the proportion of net cash outflows going to capital investment, the lower the probability of failure. The findings closely resembles proportion 3 which indicates the smaller the size of the net cash outflow going to capital investment, the higher the anticipated bankruptcy. Firms faced with bankruptcy lack the capacity of increasing the market demand for their product, thus anticipated growth becomes very lower due to insufficient cash for capital investment.

With respect to proportion 4 which state that the higher the proportion of the net cash outflow going to interest and leasing expenditure, the higher the probability of the failure, or alternatively, meet the investment outflows, interest, debt amortization and leasing expenditure must be paid. Fixed coverage payment is always an outflow of funds, thus, the smaller the proportion of the net cash outflows going to the interest and leasing expenditures, the lower the probability of failure. The finding from this study reflect proportion 4, since for the one year lapped, the coefficient of fixed coverage component was 0.501, positive and statistically significant at the 0.05 level. For the two lapped, the variable was not significant.

To ascertain the incremental explanatory power of cash flow components, this study adds each financial ratios separately to a base cash flows model incorporating the eight cash flow components. Then all combinations of the ratios are added to the cash flow model. In Table 4, we run eight separate logit analyses in order to measure the contribution of the cash flows components against the financial ratios for both bankrupted and non-bankrupted companies. For measuring the significance of the contribution of cash flow components and financial ratios, we use a significant change in the -2log Likelihood function statistic.

We began the process by incorporating only the intercept to classify the 152 small firms which serve as the platform for establishing a standard use in comparing the significant change in -2Log Likelihood. With this in mind, we run another regressions adding separately the financial ratios and the cash flows components. From Table 4, test contain the -2log Likelihood for the intercept only, which is -140.493. Based on some prior studies, the

incremental explanatory power of the traditional financial ratios drops when C/CL and EBIT/TA ratios are excluded from the model. In test 2, after excluding the C/CL ratios from the model, we realise a Chi-square test of the change in the -2log Likelihood from 140.493 to 129.335, at the 0.05 level of significant.

In Test 3, the -2log Likelihood statistic when EBIT/TA was 108.375 and the change in the -2log Likelihood statistics from Test 1 to Test 3, 140.493 to 108.375 was significant at the 0.1 level. When all the eight ratios were included in the logit analysis, the resulting -2log Likelihood statistic was 102.360. A chi Square test of the change in the likelihood statistics from Test 1 to Test 4, 140.493 to 108.375 was significant at the 0.05 level. All these three regressions show that the financial ratios make a contribution in classifying the 175 small companies when compared with the intercept.

**Table 3.** Logit coefficients and Wald t statistics for separate runs of Funds Flow Components and Financial Ratios

| *Variables* | *β* | *Exp(β)* | *Wald* | *P-Value* |
|---|---|---|---|---|
| ***Cash flow components (year 1)*** | | | | |
| Intercept | 0,011 | 1,011 | 0,026 | 0,872 |
| NOFF/TNF | -0,017 | 0,983 | 1,060 | 0,003 |
| NIFF/TNF | -0,235 | 0,791 | 0,205 | 0,051 |
| NFFF/TNF | 0,067 | 1,069 | 1,585 | 0,208 |
| NWCFF/TNF | -0,557 | 0,573 | 1,506 | 0,320 |
| DIV/TNF | 0,017 | 0,400 | 0,709 | 0,000 |
| FCEF/TNF | 0,501 | 0,606 | 0,903 | 0,042 |
| CC/TNF | -0,001 | 0,999 | 0,043 | 0,836 |
| TNF/TA | 0,232 | 1,261 | 1,454 | 0,228 |
| ***Financial Ratios (year 1)*** | | | | |
| Intercept | 1,940 | 26,683 | 42,894 | 0,000 |
| NI/TA | -0,064 | 0,938 | 0,345 | 0,557 |
| EBIT/TA | 0,190 | 1,210 | 4,854 | 0,028 |
| TD/TA | -0,075 | 0,928 | 4,622 | 0,032 |
| CF/TD | -0,602 | 0,548 | 9,765 | 0,002 |
| NWC/TA | 1,820 | 6,169 | 10,376 | 0,001 |
| CA/CL | 0,075 | 1,078 | 9,579 | 0,002 |
| C/CL | -1,939 | 0,144 | 12,798 | 0,000 |
| Log TA | -4,649 | 0,010 | 42,818 | 0,000 |
| ***Cash flow components (year 2)*** | | | | |
| Intercept | 0,582 | 1,789 | 6,204 | 0,013 |
| NOFF/TNF | -3,833 | 0,022 | 15,144 | 0,000 |
| NIFF/TNF | 0,014 | 1,015 | 0,544 | 0,461 |
| NFFF/TNF | -1,164 | 0,312 | 2,112 | 0,146 |
| NWCFF/TNF | 0,056 | 1,058 | 1,665 | 0,197 |
| DIV/TNF | 1,043 | 9,044 | 0,152 | 0,097 |
| FCEF/TNF | -2,424 | 0,089 | 3,835 | 0,250 |
| CC/TNF | -5,803 | 0,003 | 8,102 | 0,004 |
| TNF/TA | -0,094 | 0,911 | 2,771 | 0,296 |
| ***Financial Ratios (year 2)*** | | | | |
| Intercept | 1,734 | 18,930 | 42,899 | 0,000 |
| NI/TA | -0,168 | 0,846 | 0,088 | 0,766 |
| EBIT/TA | -1,629 | 0,196 | 2,825 | 0,093 |
| TD/TA | -0,185 | 0,831 | 7,622 | 0,006 |
| CF/TD | -0,021 | 0,979 | 0,611 | 0,434 |
| NWC/TA | -0,274 | 0,760 | 1,761 | 0,185 |
| CA/CL | 0,112 | 1,119 | 7,528 | 0,006 |
| C/CL | -1,146 | 0,318 | 10,854 | 0,001 |
| Log TA | -2,650 | 0,071 | 42,705 | 0,000 |

Furthermore, for the fifth test we excluded C/TA due to the problem of statistical over identification. Thus, we included seven cash flow components and a scale measure, total net flows/total assets (TNF/TA), to the intercept in classifying the sample companies. This techniques help us to prevent the over identification of the residual component in the cash fund analysis. The -2log of the likelihood statistic in the fifth test was 199,778 compared to 129,335 with the intercept only. The Chi-square statistic shows the addition of the either cash flow components make a significant contribution in classifying the sample companies at the 0.01 level.

The final logit model consist of three tests combine eight cash flow components with either seven or either financial ratios in the logit analysis. We dropped the EBIT/TA because of high correlation with net cash flow from operation (NOFF) and cash flow/total debt (CF/TD). This omission was necessary because it did not affect the test since similar effect were present in the other two variables. With respect to the financial ratios, we excluded C/CL and included the remaining seven ratios combine with the eight cash flows measure in the logit analysis.

In measuring the marginal contribution of adding seven ratios to the eight cash flow components in test 6, the Chi Square results show there is a significant change in the -2log Likelihood statistic from 199,778 to 57,785 at the 0.001 level. Similar results were obtained using the eight cash flow components and the seven financial, excluding C/CL and EBITA/TA. The result shows that the marginal contribution to the -2log Likelihood change from 129.335 to 57.785 at the 0.001 level of significant when either cash flow components are combined with seven financial ratios excluding C/CL. This indicates that the addition of a financial ratio to the cash flow components does not make any significant contribution to the categorizing between bankrupted or non-bankrupted firms. However, the reverse is true for the cash flow component due to its significant contribution to the categorizing of bankrupted or non-bankrupted small firms.

Test 7 shows a replicate of Test 3 with the EBITA/TA excluded and the combination of the eight cash flow components. The -2log Likelihood statistic changes from 108.375 to 63.923 and is significant at the 0.05 level. Meanwhile, a combination of the 8 financial ratios and the eight cash flow components result in a -2log likelihood statistic of 228.540. The Chi square results show that adding either the above set of seven ratios or the set of either ratios to the either cash flow components result to as decreased in the significant change in the -2log likelihood statistic from 199.778 to either 57.785 or 63.923. Notwithstanding, a combination of the eight cash flow components with the above set of seven or eight financial ratios does produce a significant increase and change in the -2log likelihood statistics at the 0.05 level form 108.375 to 63.923 or from 102.360 to 228.54. This result shows that improved classification performance archived in the probit model is due to the superiority of the cash flow components with regard to the financial ratios used in bankruptcy prediction.

Lastly, analysing Table 5a, two cash flow components (NFFF/TNF and NWCFF/TNF) were statistically significant for test 6, 7 and 8 at the 0.05 and 0.01 level. This provide further support of the

contribution of cash flow component in categorizing small bankrupted and non-bankrupted firms. Similar results were obtained for two years before bankruptcy as shown in Table 5b.

**Table 4.** Logit coefficients, Wald test statistic for separate run of cash flow variables and financial ratios

| *Variables* | | *Change in -2Log L* | *Degrees of Freedom* | *P-Value* |
|---|---|---|---|---|
| Test Number | ***Testing Ratios and Cash flow variables Separately (year 1)*** | | | |
| 1 | 7 Financial Ratios, Excluding C/CL | 129,335 | 9 | 0,086 |
| 2 | 7 Financial Ratios, Excluding EBIT/TA | 108,375 | 8 | 0,060 |
| 3 | 8 Financial Ratios | 102,360 | 10 | 0,042 |
| 4 | 8 Cash Flow Components | 199,778 | 6 | 0,077 |
| | ***Testing Combinations of Ratios and Cash flows (year 1)*** | | | |
| 5 | 7 Ratios and 8 Cash Flow (C/CL omitted) | 57,785 | 14 | 0,000 |
| 6 | 7 Ratios and 8 Cash Flow(EBIT/TA omitted) | 63,923 | 13 | 0,005 |
| 7 | 8 Ratios and 8 Cash Flow components | 228,54 | 10 | 0,002 |
| Test Number | ***Testing Ratios and Cash flow variables Separately (year 2)*** | | | |
| 1 | 7 Financial Ratios, Excluding C/CL | 205,708 | 11 | 0,823 |
| 2 | 7 Financial Ratios, Excluding EBIT/TA | 189,518 | 10 | 0,018 |
| 3 | 8 Financial Ratios | 186,282 | 11 | 0,001 |
| 4 | 8 Cash Flow Components | 248,508 | 9 | 0,001 |
| | ***Testing Combinations of Ratios and Cash flows (year 2)*** | | | |
| 5 | 7 Ratios and 8 Cash Flow (C/CL omitted) | 150,175 | 10 | 0,001 |
| 6 | 7 Ratios and 8 Cash Flow(EBIT/TA omitted) | 146,949 | 10 | 0,001 |
| 7 | 8 Ratios and 8 Cash Flow components | 145,011 | 10 | 0,001 |

**Table 5a.** Logit coefficients and Wald t statistics for combined runs of Cash Flow Components and Financial Ratios (year 1)

| *Variables* | *Test 6* | *Test 7* | *Test 8* |
|---|---|---|---|
| Intercept | 2,740*** | 7,818*** | 1,054*** |
| | (5,118) | (29,116) | (4,249) |
| NOFF/TNF | 0,214 | 0,599 | 1,995** |
| | (0,655) | (1,340) | (4,366) |
| NIFF/TNF | 0,013 | 0,015 | 0,005 |
| | (0,179) | (0,242) | (0,024) |
| NFFF/TNF | -4,747*** | -5,049** | -6,001** |
| | (10,645) | (9,376) | (9,700) |
| NWCFF/TNF | 0,463*** | 0,459** | 0,596*** |
| | (16,390) | (8,548) | (11,000) |
| DIV/TNF | -1,146 | -2,802** | -2,433* |
| | (1,275) | (4,992) | (3,556) |
| FCEF/TNF | -2,281 | -1,623 | -0,739 |
| | (0,432) | (0,149) | (0,023) |
| CC/TNF | -1,714** | 3,606 | 3,271 |
| | (5,370) | (2,334) | (2,147) |
| TNF/TA | -0,092 | -0,304 | -0,342 |
| | (0,414) | (1,741) | (2,406) |
| NI/TA | -0,110 | -0,102 | -0,017 |
| | (0,621) | (0,512) | 0,008 |
| BIT/TA | -0,269 | | -1,560* |
| | (0,140) | | (3,334) |
| TD/TA | -0,093** | -0,082 | -0,107* |
| | (5,560) | (1,971) | (3,824) |
| CF/TD | -0,227 | -0,551 | -0,582** |
| | (2,193) | (5,484) | (5,883) |
| NWC/TA | 0,989 | 1,475** | 2,196** |
| | (1,985) | (2,763) | (5,497) |
| CA/CL | 0,047 | 0,101* | 0,109*** |
| | (2,103) | (10,377) | (10,754) |
| C/CL | | -3,537*** | -3,435** |
| | | (6,094) | (7,242) |
| LogTA | -6,279*** | -7,371** | -8,402*** |
| | (34,758) | (28,637) | (23,410) |

*Note: *p<.1 (two-tailed), *p<.05 (two-tailed), ***p<.01 level (two-tailed)*

**Table 5b.** Logit coefficients and Wald t statistics for combined runs of Cash Flow Components and Financial Ratios (year 2)

| *Variables* | *Test 6* | *Test 7* | *Test 8* |
|---|---|---|---|
| Intercept | 1,274*** | 1,374*** | 1,076*** |
| | (4,123) | (4,634) | (7,601) |
| NOFF/TNF | -1,749* | -2,278** | -1,934* |
| | (2,808) | (4,345) | (3,283) |
| NIFF/TNF | -0,015 | -0,017 | -0,021 |
| | (0,372) | (0,505) | (0,768) |
| NFFF/TNF | -1,841 | -1,942 | -1,914 |
| | (2,405) | (2,436) | (2,403) |
| NWCFF/TNF | 0,149** | 0,166*** | 0,164** |
| | (8,988) | (10,268) | (9,946) |
| DIV/TNF | -0,335 | -0,329 | -0,375* |
| | (2,461) | (2,321) | (2,962) |
| FCEF/TNF | -0,827 | -0,975 | -0,624 |
| | (0,333) | (0,405) | (0,171) |
| CC/TNF | -8,713** | -3,635 | -3,502 |
| | (7,927) | (1,109) | (1,066) |
| TNF/TA | -0,619*** | -0,500*** | -0,556*** |
| | (17,673) | (13,231) | (14,281) |
| NI/TA | -0,333 | -0,777 | -0,116 |
| | (0,324) | (2,563) | (0,033) |
| BIT/TA | -1,050 | | -1,039 |
| | (2,102) | | (1,891) |
| TD/TA | -0,088 | -0,089 | -0,092 |
| | (1,532) | (1,539) | (1,708) |
| CF/TD | 0,006 | 0,014 | 0,011 |
| | (0,060) | (0,401) | (0,233) |
| NWC/TA | -0,206 | -0,276 | -0,285 |
| | (0,797) | (1,397) | (1,481) |
| CA/CL | -0,011 | 0,077 | 0,072 |
| | (0,429) | (2,546) | (2,449) |
| C/CL | | -0,839** | -0,784** |
| | | (4,113) | (4,064) |
| LogTA | -3,743*** | -3,873*** | -4,025*** |
| | (44,490) | (44,771) | (44,137) |

*Note: *p<.1 (two-tailed), *p<.05 (two-tailed), ***p<.01 level (two-tailed)*

### 4.3. Robustness

Gombola et al (1987) argue that the construct validity of cash flow components is a significant factor explaining the variability in the results of prior studies. According to the SABI database, sampled firms cash flow components were prepared according to *Plan de General de Contabilidad de año 2007*. To avoid a narrow focus of cash flow financial distress prediction as shown in prior studies (most prior studies have ignored the used of the other cash flows variables predicting financial distress), this study employ the potential of other cash flow variables such as cash flow from investing activities, and cash flow from financing activities. The premature and unjust dismissal of the cash flow information in predicting financial distress have been due to the narrow view of prior research on cash flows from operation.

With respect to model validity, biased probit and logistic parameter estimates can be associated with the model when the sample sizes of 10(S+1) or lower, where S is the number of predictor variable. Small sample sizes in a single group does not appear to cause parameter estimate bias Freeman, 1987; and Stone and Rasp, 1991). This is because the sample size is less than 10(S+1) for the models in this study, bias is likely present in the parameter estimates generated by the sample models. In situations where parameter estimates are biased (either from collinearity or small sample sizes), the Wald $\chi^2$ statistic for each parameter estimate is not the best measure of an added variable. Instead, we adopted the change in the overall model's log likelihood statistic when adding a variable. This study use the Change in -2Log Likelihood for the added cash flow variable as the test statistic for each cash flow variables. Following the discussion of Stone and Rasp (1991), the use of the Change in -2Log Chi-square and classification accuracy should result in reliable conclusion concerning the usefulness of cash flow information. However, any bias in this study resulting from the small sample size should be biased against finding significance of cash flow components. Thus, results showing that are useful are still valid.

### 4.4. Choice-base sampling bias

Even though previous studies such as Zmijewski (1984) have argued that binary probit and logistic bankruptcy models generate biased parameter estimates, Maddals (1991) opposed that the logit model, one does not need to use a weighing procedure due to the fact that logit coefficients of the independent variables are not affected by the unequal sampling rates, however, only the constant term are affected. The constant term decreased by the fraction sampled from each population to control for the bias. As such, the test are not affected by this bias, nor are comparisons across models. Adjustment from the constant term implies a correct classification of more healthy firms and the correct classification of fewer distressed firms for each model, with a resulting increase in total classification rates. Therefore the results from comparisons between the two samples categorization rates should be equal.

## 5. CONCLUSION

Nowadays, many companies spend time and money in preparing the statement of cash flow. Although most dichotomous bankruptcy research studies have portrayed the superiority of the financial ratios over the cash flows, this judgement have been based on only one components of cash flow (cash flow from operating activities). However, these studies failed to determine whether cash flow information provided in the statement of cash flow may be more useful to a particular industry. Thus, the present study employed the cash flow component vis-à-vis the financial ratios in classification of small bankrupted and non-bankrupted firms before the failure. That is it compared the cash flow component versus the financial ratios to determine whether or not cash flow information as presented in the statement of cash flow is more useful for prediction of bankruptcy of small firms one year or two year before the failure.

Several proposition were used to develop the theoretical rationale for using cash flow components to explaining the probability of failure. The ability for cash flow information to be classified as bankrupted or non-bankrupted was compare to the classification performance of a set of eight prior discriminating financial ratios. The analysis use the logit model to classify 179 small companies. The findings were as follows:

First, when using just the intercept of the logit model, the cash flow components and the financial ratios make significant contribution in classifying the 179 small companies. Several tests indicated that cash flows components are superior to financial ratios for classifying small failed and non-failed companies with the logit model.

Second, we found all the cash flows variables significant when only the cash flow components were used in the regression model. Unlike the cash flow model, an opposed result proof evidence when only the financial ratios were used in classifying the small companies in Spain. The dividend fund flow component (DIV/TNF), dividends as a percent of total net outflow of funds, was markedly smaller for bankrupted companies one and two year before bankruptcy than the non-bankrupted companies. The net investment fund flow component (NIFF/TNF) was markedly smaller for failed companies one and two lapped before bankrupted than the non-bankrupted companies. Finally, when the ratios and cash flow components are combined, the significant variables were the dividend fund flow component and set other assets and liabilities.

Since the main objective of this study is to evaluate cash flow components potential in predicting bankruptcy for small firms, it is not surprising that unambiguous measure of the fund flows components are significant in classifying bankrupted and non-bankrupted companies. The dynamic nature of business and economic conditions suggest the need to re-evaluate frequently the contribution of the fund flow components in predicting corporate bankruptcy.

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