

The Size of Indirect Financial Distress Costs: Which Variable is Reliably Important?

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Abstract

In this paper, we analyze a panel data of 190 financially distressed firms to determine which firm-specific variable is reliably important in explaining the level of indirect financial distress costs. A better understanding of factors affecting indirect financial distress costs is essential not only for the purpose of enriching empirical studies in this field but also for the purpose of cross-country comparison. Optimal model selection procedure, together with panel data analysis technique is used to determine the most optimal model to explain the level of indirect financial distress costs. The findings of this paper indicate that the average size of the indirect financial distress costs for the period of study is 21.6%. In addition to that, this paper finds evidence suggesting the relevance of size of the firm, the level of intangible assets and the existence of alternative investment opportunities, which implies the importance of these factors in determining the level of indirect financial distress costs. This paper argues that the level of liquid assets and expected earnings growth are statistically unimportant in determining the level of indirect financial distress costs for Malaysia's financially distressed firms.

Keywords: panel data, vselect, firm value, capital discount

Introduction

The main objective of this paper is to provide further evidence on the size and determinants of indirect financial distress costs. The understanding of this topic is very important as financial distress costs were found to be one of the critical factor in determining the optimal capital structure (Ahmed & Hisham, 2009), demand for conventional and Islamic insurance (Hamid, 2008, 2010; Hamid, Osman, Ariffin, & Nordin, 2009), corporate hedging practices (Ertugrul, Sezer, & Sirmans, 2008; Judge, 2004), and trade receivables policy (Molina & Preve, 2009). However, despite the importance of this topic, there are relatively few studies measuring the size and analyzing the determinants of indirect costs (Tshitangano, 2010). Previous studies such as Sautner and Vladimirov (2015), Bulot, Salamudin, and Abdoh (2014), Bisogno and De Luca (2012), and Andrade and Kaplan (1998), have examined the variation in firms' financial distress costs to determine which of the variables are significant in influencing the size of financial distress costs. The results of the empirical research show that the level of

indirect financial distress cost is the effect of many factors. The variables in the models are selected based on their importance in specific theory, policy or both. But as researchers disagree on what is most important, there is usually only partial overlap among the variables considered in different empirical papers. Therefore, it is necessary to investigate which of the explanatory variables suggested in the literature emerge as the most relevant determinants of indirect financial distress cost. In this paper, we argue that the determinants of financial distress cost for our sample of firms would be different due to its unique firm and country-specific characteristics, hence empirical findings from other research cannot be generalized to this paper's sample. Furthermore, the robustness of the findings of the previous studies needs to be examined against evidence from other research and countries such as Malaysia. To achieve the objective of this study, Stata command *vselect*, together with panel data analysis technique is employed. This article is organized into several subsections. First, we presented related works on determinants of indirect financial distress costs. Then, we discussed the study's data and methodology. Next,

the analysis and results are presented along with discussions. Finally, conclusions and suggestions for future research are provided.

Literature Review

To remain consistent with previous studies, measures pertaining to the dependent variable and the firm-specific determinants of indirect financial distress costs were taken from reviewing previous studies. The following sub-sections will explain the dependent and independent variables examined in this paper.

Dependent variable: indirect financial distress costs

Indirect financial distress costs, which is considered as opportunity costs (Warner, 1977), refer to the costs suffered by a company as a result of its deteriorating financial conditions (Elali & Trainor, 2008) or a disruption of “business as usual” (Opler & Titman, 1993). These costs may be viewed in two ways: (a) decrease in operational performance (Altman, 1984; Altman & Hotchkiss, 2006; Elali & Trainor, 2008), and (b) decrease in the value of the firms (Branch, 2002; Sautner & Vladimirov, 2015; Wijantini, 2007). The work of Andrade and Kaplan (1998) and Whitaker (1999) testifies that both operational performance and equity values angle would get consistent conclusions. In this paper, indirect financial distress costs will be measured using the operational performance, represented by opportunity loss. Following Pindado and Rodrigues (2005), opportunity loss will be calculated as the difference between the growth rate of the sales of the sector and the growth rate of the sales of the firm. Specifically, opportunity loss is calculated as the difference between firms’ sales growth and the sector’s sales growth. A positive answer will demonstrate that firm bear opportunity loss and underperform as compared to its industry performance in term of sales growth. The following formula illustrates the calculation of opportunity loss:

$$OL = [(Sales_{Sit} - Sales_{it-1}) / Sales_{Sit}]_{sector} - [(Sales_{Sit} - Sales_{it-1}) / Sales_{it}]_{firm} \quad (1)$$

Independent variables

Leverage: Leverage continues to be one of the most important explanatory variables in explaining financial distress costs. There are, however, opposing arguments for either positive or negative relation between leverage

and financial distress costs. In an argument which began with the seminal work of Modigliani and Miller (1958), it has been suggested that there is a positive relationship between leverage and financial distress costs. Opler and Titman (1994) gives evidence that there is a positive relationship between financial structure and firm performance in industry downturns. They reveal that more highly leveraged firms tend to lose market share and experience lower operating profits than do their competitors in industry downturns. This indirectly suggests a positive relationship between leverage and loss of market shares since one measurement of financial distress costs is by calculating the changes in corporate performance. Jensen (1989) offers a different perspective of the problem, in which not only the costs but also the potential benefits of debt for financial distress processes are considered, implying that the benefits of leverage will reduce financial distress costs. Thus, this paper argues that there is an ambiguous relationship between leverage and indirect financial distress costs.

Firm’s size: In theory, small firms have a bigger problem in assessing capital because of the asymmetric information between insiders and outsiders. The difficulties become severe when the possibility of liquidation arises. However, managing large firms during the period of financial distress may be costly since its more complicated internal organizations requires implicit contracts which may be difficult to enforce during difficult times (Novaes & Zingales, 1995). Bigger size may represent higher level and more complex conflicts of interest, making it more difficult for the claimants to agree over resolving the distress. Moreover, bigger firms may positively relate to the larger number of creditors and bigger bank loans received by distressed firms.

Intangible Assets: Firms with high asset intangibility usually have values in trademark, expertise, patents, rights, brand names, good reputations and services after sales. In addition to that, the products of these firms will usually be priced relatively higher. That is, customers have to pay higher prices for products or services provided by high asset intangible firms. However, when high intangible asset firms experience severe financial distress, their customers will have higher losses since they lose not only the promised after-sale-service but also the products’ name, reputation, and status, for which the customers have already paid when they bought the products. As a result of financial distress, customers of high asset intangibility will become more hesitant to buy its

products. Therefore, it is common belief that, when a firm is in financial distress, the more intangible the firm's assets, the higher the sales loss.

Tangible Assets: Financial contracts are strongly influenced by the degree to which a company's assets support the transactions, with some form of collateral normally being essential to gaining access to credit. Thus, the proportion of tangible fixed assets in total company assets is a measure of the capacity to provide collateral and consequently, obtain (re)financing. Nevertheless, these assets suffer a big loss of value when small firms go into distress because they will often negotiate in adverse market conditions. Shleifer and Vishny (1992) points out that in recessions many potential buyers of a company's assets only buy when there is a big discount. Thus, sellers of a distressed company try to postpone transactions until markets become more liquid. Therefore, the higher the percentage of tangibles fixed assets over the total assets, the smaller will be the incentive for the different stakeholders to push the firm into bankruptcy.

Holding of Liquid Assets: The cash component of the assets is utilized by the firm to assist them in mitigating the effect of financial distress. Pindado and Rodrigues (2005) finds that the holding of liquid assets are negatively related to the costs of financial distress, which implies that insolvent firms can take advantage of holding larger stocks of this kind of assets.

Change in Investment policy: Tshitangano (2010) shows that there is a negative relationship between change in investment policy and the size of indirect financial distress costs. This means that the divestiture increases the costs of financial distress and it can be concluded that underinvestment has a stronger effect than overinvestment in financial policy.

Investment opportunity: In this study, an investment opportunity is proxy by Tobin's Q. Significance of the Tobin's Q Coefficient would support the need to control for investment opportunities when explaining financial distress costs. The idea is that if a firm has good investment opportunities in comparison to its sector, this could mitigate the financial distress costs borne by the firm.

Expected earnings growth: Firms with high expected earnings growth are considered susceptible to greater losses in distress (Titman & Wessels, 1988). This is because a significant of their operating value depends on as yet unrealized high future earnings (Yuval Dan

Bar-Or, 2000). In times of distress, these relatively large components of value are lost. In addition to that, consistent with debt overhang problem, industries with large growth opportunities tend to have high potential costs of financial distress.

Methodology

Data

The target population for this paper was all firms listed as financially distressed by Bursa Malaysia under the requirement of Practice Notes 4 (PN4), Practice Notes 17 (PN17) and Amended PN17 (APN17) respectively, from 15 February 2001 when PN4 was introduced, until 31 December 2011. The list of all affected issuers was obtained from the Media Releases and Companies Announcement from the Bursa Malaysia website from January 2001 to December 2011. The final sample of firms consists of 190 firms that met the criteria of non-missing data of financial distress costs and other variables, and, therefore, sufficient firm-year observations over the period of five years before financial distress. The five-year period choice is somewhat similar to the study by Bisogno and De Luca (2012). The annual reports of the selected firms were obtained from the Annual companies Handbook (various editions) and the DataStream.

Model and measurement

The main objective of this paper is to examine the determinants of indirect financial distress costs. This paper specifies and estimates the following baseline regression model for all firms:

$$CFD_{it} = \beta_0 + \beta_1 LEV_{it} + \beta_2 SIZE_{it} + \beta_3 INTANG_{it} + \beta_4 EEG_{it} + \beta_5 TANG_{it} + \beta_6 LA_{it} + \beta_7 CINV_{it} + \beta_8 IO_{it} + \varepsilon_{it} \quad (2)$$

CFD is indirect financial distress costs, proxy by opportunity loss, and calculated as the difference between the growth rate of the sales of the sector and the growth rate of the sales of the firm. LEV is a ratio of total debt to total assets, SIZE is firm's size, calculated with log of total sales, INTANG is ratio of total market value to book value of total assets, EEG is the ratio of earnings before interest, taxes, depreciation and amortization (EBITDA) to market value of assets, TANG is the ratio of net fixed assets to total assets, LA is the ratio of total cash flow to current assets, CINV is the ratio of net retained cash to total assets and IO is measured by the Tobin's Q ratio.

Data analysis steps

The model of indirect financial distress costs, as presented in equation (2), is estimated by using the panel data analysis steps as illustrated in Figure 1.

The first step is to determine the most optimal combination of predictors. In this study, Stata command, *vselect*, developed by Lindsey and Sheather (2010) is used to determine whether a certain variable should be included in the model. Following Lindsey and Sheather (2010), the optimal model defined as the one that optimizes one or more information criteria. Those criteria are Mallow's C_p (C), Adjusted R^2 (R2ADJ), Akaike's information criterion (AIC), Akaike's corrected information criterion (AICC), and Bayesian information criterion (BIC). This research uses the definitions of these criteria given in Sheather (2009). Generally, higher variance explained by the model R2ADJ and lower C, AIC, AICC and BIC values indicate the best fitting model (Lindsey & Sheather, 2010; Rees et al., 2013). Similar Stata command, *vselect*, was also used by previous researchers from various fields of studies such as by Anwar and Sun (2012), Butler, Keefe, and Kieschnick (2014) and Makumi (2013).

The second step is to choose the most appropriate panel data estimator. The two available alternatives for

analyzing micro panel data are static and dynamic techniques. The main criterion for choosing between the two alternatives is by looking at the coefficient of the lagged dependent variable. The significance of the lagged dependent variable (p -value < 0.05) would indicate the need to go for dynamic model, as it (dynamic model) is more appropriate and useful when the dependent variable depends on its own past realizations (Brañas-Garza, Bucheli, & García-Muñoz, 2011), otherwise static model is to be preferred (p -value > 0.05). The third step is to choose the most appropriate static or dynamic panel data analysis technique. The choice of the most appropriate static technique depends upon three types of tests as suggested and outlined by Park (2011). The tests are F-test, Breusch-Pagan Lagrange Multiplier (LM) test, and Hausman test. For dynamic model, System Generalized Method of Moment (SGMM) is preferred against Difference Generalized Method of Moment (DGMM). This is consistent with the previous literature that SGMM is better (Blundell & Bond, 1998) and more efficient (Ahn & Schmidt, 1995) than DGMM. The fourth and final step is to perform the diagnostic tests (multicollinearity, heteroscedasticity, and serial correlation) and finding the correct strategy to rectify the problem(s) identified (if any). The strategy to rectify the problem(s) will be based on the suggestion by Hoechle (2007).

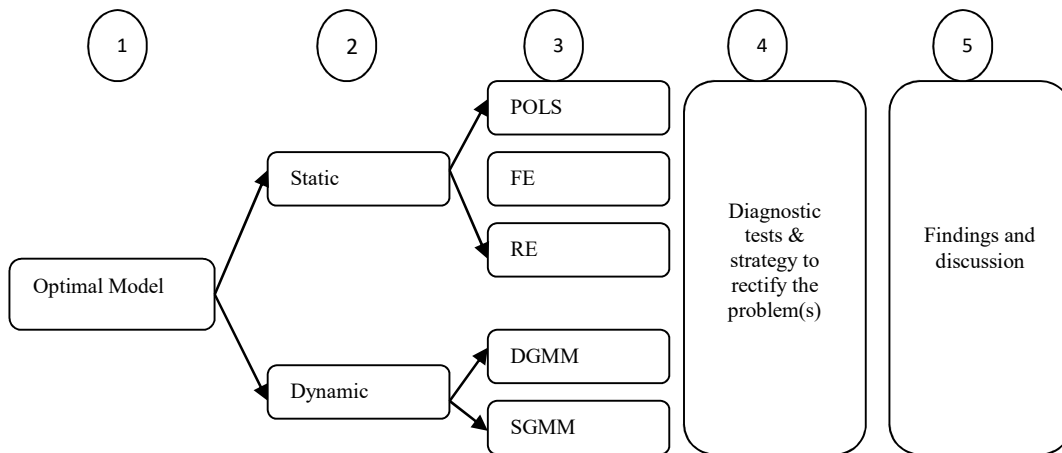


Figure 1: Data analysis steps

Empirical results and discussions

The summary statistics of the dependent and explanatory variables over the sample period are

presented in Table 1, reflecting the indirect financial distress costs of the analyzed firms. The indirect financial distress costs, represented by opportunity loss indicate that the firm's suffers opportunity loss of 21.61% for the period of study and ranges from a minimum value of -170.84 to a maximum value of 113.52. This signifies the existence of both costs and benefits of financial distress. This means that the performances of financially distressed firms are 26.61% worst compared to industry sector performance. This paper findings supported earlier research such as Giroux and Wiggins (1984) and

Kwansa and Cho (1995) that indirect financial distress costs is suffered not only by bankrupt firms but also suffered by financially distressed firms prior to their classification as financially distressed. The level of indirect financial distress costs found in this paper is comparable to the study by the previous researcher such as Altman (1984) (20.8%), Andrade and Kaplan (1998) (10% to 20%). The minimum value of -170.84% and the maximum value of 113.52% signifies the existence of both costs and benefits of financial distress.

Table 1: Descriptive Statistics

Variables	Obs.	Mean	Std. Dev.	Min	Max
Opportunity costs	990	21.61	40.30	-170.84	113.52
Leverage	990	91.49	161.89	-458.72	980.3
Change in investment	990	287.25	216.46	3.24	996.36
Investment opportunities	990	.61	.79	-9.93	.97
Intangible assets	990	-1.36	125.48	-905.95	172.86
Tangible assets	990	44.19	25.77	.04	307.95
Liquid assets	990	-2.59	34.17	-595.81	128.86
Expected earnings growth	990	-8.83	24.78	-278.07	67.62
Firm's size	990	4.33	1.38	-3.24	8.76

This paper begins the analysis by determining the most optimal combination and number of variables to be included in the final model. As shown in Table 2 (Panel A and Panel B), the choices of the most optimal model predictor size is five. The variables chosen are firm's size, intangible assets, liquid assets, investment opportunities, and expected earnings growth. The remaining three variables (change in investment, tangible assets, and leverage) were

dropped and excluded from the subsequent analysis. The chosen variables imply the importance of those variables in determining the level of indirect financial distress cost for this sample of firms. As expected, the optimal model for this paper is different from previous literature. The difference in the model can be attributed to the choice of different proxy for independent and dependent variable, firms and country-specific characteristics, and variable selection technique employed.

Table 2: Optimal Models

Panel A: Optimal models highlighted					
No of predictors	R2ADJ	C	AIC	AICC	BIC
1	.0744011	40.7213	10695.16	13518.87	10704.96
2	.1002462	12.903	10667.98	13491.7	10682.68
3	.1042704	9.416431	10664.51	13488.26	10684.12
4	.1073249	7.01655	10662.11	13485.88	10686.62
5	.1094439	5.662084	10660.74	13484.54	10690.15
6	.1094598	6.644754	10661.71	13485.55	10696.03
7	.1098129	7.253894	10662.31	13486.18	10701.53
8	.1091395	9	10664.06	13487.97	10708.18

Panel B: Selected Predictors Highlighted	
No of predictors	
1	SIZE

2	SIZE INTANG
3	SIZE INTANG LA
4	SIZE INTANG LA IO
5	SIZE INTANG LA IO EEG
6	SIZE INTANG LA IO EEG CINV
7	SIZE INTANG LA IO EEG CINV TANG
8	SIZE INTANG LA IO EEG CINV TANG LEV

Notes: SIZE = Firm’s size, INTANG = Intangible assets, LA = Liquid assets, IO = Investment opportunities, EEG = Expected earnings growth, CINV = Change in investment, TANG = Tangible assets and LEV = Leverage.

The next step is to select the most appropriate panel data analysis technique to be employed. The results

of the panel specification test as presented in Table 3 suggests that fixed effects model is the most appropriate data analysis technique.

Table 3: Panel Specification Tests

	Lagged dependent variable	F-Test	BP-LM test	Appropriate model
p-value	.083	.000	.460	Fixed effect

The fourth and final step in the data analysis process is to perform diagnostic tests to check for the presence of severe multicollinearity, heteroscedasticity, and serial correlation problems. As presented in Table 4, the diagnostic checks on the baseline model (FE) indicate the presence of

heteroscedasticity (p-value < 0.05) and serial correlation (p-value < 0.05) problems. To rectify the problems, following the suggestion by Hoechle (2007), the remedial procedure has been carried out by using the fixed effect model with the cluster option.

Table 4: Diagnostic Tests

Multicollinearity	Serial Correlation	Heteroscedasticity	Strategy to rectify
Mean VIF = 1.07	p-value = .0000	p-value = .0000	Fixed effect (Cluster)

Considering together various diagnostic tests that have been conducted and remedial procedure undertaken, this paper may say that there is enough evidence to conclude that the examined statistical test satisfy the key assumptions of linear regression.

financial distress costs, which is explained by the highest coefficient value of -21.69 and t statistics of -7.33.

As shown in Table 5, the regression result suggests that the model fits the data well at the 1% level. The Adjusted R² is 25.9%. The results of the regression also suggest that firm’s size, intangible assets, and investment opportunities have a statistically significant relationship with opportunity costs. From these results, it is apparent that any the increase in investment opportunities, a decrease in firms’ size and a decrease in the size of intangible assets will increase the level of indirect financial distress costs. In addition to that, ceteris paribus, firm’s size seems to have the greatest influence on the level of indirect

Firm’s size: In this paper, firm size has a significant and negative impact on the level of indirect financial distress costs. This confirms that larger firms deal more easily with financial distress. One of the arguments supporting a negative relationship between firm’s size and the level of indirect financial distress costs is provided by Chen (1995). Their paper argues that the effect of financial distress has a higher negative effect on small firms than on large firms given their increased likelihood of failing and greater difficulty in assessing capital because of the asymmetric information between insiders and outsiders. On the other hand, small firms might better be able to avoid problems of financial distress

because of their less complicated internal contractual agreements (Opler, 1993).

Intangible assets: Firms with high intangible assets refer to the firms with high values in trademark, expertise, patents, rights, brand names, good reputations and services after sales. In addition to that, the products of these firms will usually price relatively higher. That is, customers have to pay higher prices for products or services provided by high asset intangible firms. The negative relationship between intangible assets and indirect financial distress costs suggests that the more intangible the firm's assets, the higher and the sales loss. It is argued that, when high intangible asset firms experience severe financial distress, their customers will have higher losses since they lose not only the promised after-sale-service but also the products' name, reputation, and status, for which the customers have already paid when they buy the products. As a

result of financial distress, a customer of high asset intangibility will become more hesitant to buy its products. This evidence is consistent with Sheilfer and Vishny (1992) and shows that firms with high intangible assets lose value when distressed while industry performance is poor, and consequently have high financial distress costs.

Investment opportunities: Theoretically, there should be a significant and positive relationship between the availability of investment opportunities and indirect financial distress costs. The idea is that the availability of good investment opportunities in comparison to its sector could help the firms to mitigate the financial distress costs borne by the firm. This paper provides further evidence that there is a significant positive relationship between the existence of alternative investment opportunities and the level of indirect financial distress costs.

Table 5: Regression Results

	Fixed effect with cluster option
Size	-21.69*** (-7.33)
Intangible assets	-0.0338* (-2.21)
Liquid Assets	.0645 (1.95)
Investment opportunities	9.194** (2.80)
Expected earnings growth	.0723 (1.58)
Constant	110.8*** (9.46)
Observations	950
F (5, 198)	21.42***
R ²	.417
Adj. R ²	.259
Notes: (1) <i>t</i> statistics in parentheses (2) * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$	

Conclusions

This paper has examined the determinants of the indirect financial distress costs for financially distressed firms in Malaysia. The results suggest that, on average, the firms are suffering opportunity costs of 21.6%, showing that financial distress surely brings losses to listed firms. The results also suggest that three explanatory variables, firm's size, assets intangibility and investment opportunities are statistically significant. Although this paper provides empirical evidence, a number of areas need to be refined with future empirical research. First, this paper did not provide any sectoral analysis on the size of indirect financial distress costs. Future research should explore whether industry or sectoral

classification would have any effect on the size of indirect financial distress costs and its relationship with selected determinants. Second, this paper utilizes Stata command *vselect* in determining the most optimal model. Future researchers might want to use different technique and method of analysis in determining the size and types of variables to be included in the model.

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