Cash Flow Patterns and Financial Distress Prediction

Adeyemi Aderin[1], Otivbo Amede[2]

Abstract: The study investigates the ability of cash flow patterns to accurately predict the incidence of financial distress. A total of four hundred and ninety (490) firm-year observations were sampled consisting of non-financial firms quoted on the Nigerian Stock Exchange between 2011 and 2017. Several models were developed to capture different variants of the cash flow patterns along with the possibility of the life-cycle effect. The developed models were analysed using a combination of the Generalised Least Squares (GLS) and the Generalised Method of Moments (GMM). The results indicate that cash flow patterns have predictive ability in determining the incidence of financial distress both in the current period and in the immediately prior period. This predictive ability, however, does not extend to subsequent prior periods. Also, the life cycle effect significantly affects the pattern of relationship between the cash flow patterns and financial distress prediction. The study was able to correct the problem of assignment of weights to individual cash flow patterns, but recommended the inculcation of the complete life cycle effects capturing individual stages of organisational development in the models.

Keywords: Altman Z-score; Cash Flow Patterns; Financial Distress; Life-cycle Effect.

JEL Classification: M21; M41

1. Introduction

The Financial Accounting Standard Board (FASB) in 1987 issued Statement No. 95: "Statement of Cash Flow", in which the cash flow statement became an integral part of financial statements. The main objective of the statement of cash flow was to provide relevant stakeholders with the requisite information relating to a firms cash receipts and disbursements for a given period. The cash flow statement was segmented into three parts; operating, investing and financing activities. Depending on the receipts and spending pattern of the organisation, the firm would exhibit overtime different signs for each of its cash flow activities. The variation of the collective signs in one accounting period is what is referred to as cash flow pattern.

Cash flow is adjudged to be a better measure of the health status of an organisation because it is a real and objective concept, as opposed to profit which is an artificial concept (Etemadi & Tariverdi, 2006). It is argued that companies with positive cash flow patterns are able to raise capital and obtain funds from the capital market, while companies that have negative cash flow patterns are unable to source for funds and therefore face the risk of failure (Zeitun, Tian, & Keen, 2007). Based on this assumption,

[1] University of Benin, Nigeria, Corresponding author: adeyemi.aderin@uniben.edu.
[2] University of Benin, Nigeria, E-mail: otivbo.amede@uniben.edu.

a company is perceived to be financially distressed when the sum of its expected equity value and current year profit is negative, or when its net cash flows is lower than its debt obligations, or when its net cash flows is negative (Scott, 1981). Financial distress is to a large extent based on the inflow and outflow of liquid resources, and an organisation that cannot meet its debt obligations as they fall due would generally be adjudged to be distressed. Financial distress in itself is not bankruptcy, but the existence of financial distress is a major signal of impending bankruptcy. The likelihood of bankruptcy increases when firms show symptoms of financial distress. Financial distress can be defined as that stage wherein a company's profitability decreases to the point that it is unable to adequately or comfortably meet its debt obligations as they fall due.

Prior studies such as Nanayakkara and Azeez (2015), and Schellenger and Cross (1994) used only cash flow from operations in predicting financial distress. They saw cash flows from operations as the basic ingredient that an organisation utilises in financing the business in terms of continued expansion and the timely settlement of its obligations. This study however sought to show that all the cash flow components are important in the determination of financial distress, but the degree of their relevance could also be a factor of the developmental phase of the organisation under consideration. The study therefore, analyses the varied degree to which the patterns of the cash flows can determine the probability of financial distress, while also providing additional evidence for ascertaining the life cycle phase of an organisation (basically its decline stage) through the use of the cash flow patterns it exhibits.

Lagged cash flows are further utilised in predicting the probability of financial distress. The justification for this is based on the perception that when firms encounter problems with their cash flow position, such as a drastic drop in net cash flow from operations or average cash holdings, drastic measures would be taken in subsequent periods in an attempt to even out such deficiencies. Some firms have high financial flexibility and would be able to report much improved cash flow patterns in the subsequent periods. If financial distress was to occur in these subsequent periods, the cash flow pattern of the year in which the distress occurred would not be a true reflection of the financial health of the organisation in that period, hence, to ascertain the determinants of such distress, the current financial health has to be compared vis-à-vis prior cash flow patterns. Scott (1981) opined that if current cash flows can be used to ascertain the current financial position of an entity, then prior year cash flows should be able to predict financial distress.

One of the basic problem encountered by prior studies exist in the use of econometric methods in analysing their data. The subsequent section highlights some methodologies used in prior studies along with the perceived flaws in their usage. Our study builds on these flaws and attempts to provide more appropriate analysis in order to arrive at more robust results from which generalisations can be made. Other issues that motivated the study are addressed in the critique of prior studies in the literature review.

2. Literature Review

Sayari and Mugan (2013) analysed the role of cash flow patterns in predicting financial distress of firms quoted on the Istanbul Stock Exchange. They utilised four separate models to capture different variants of the cash flow components in terms of current year cash flow pattern, prior period (lagged) cash flow pattern, use of qualitative variables to capture the magnitude of each cash flow component, and normalising each cash flow component by aggregating them with total assets. Their study was

however perceived to be flawed on three premises. First, the ranking scale of the cash flow patterns [(+++) allocated the highest rank in relation to healthy firms] may not portray an adequate reflection of cash flow combinations that can be used to effectively analyse and predict the health status of a firm. Second, the use of analysis of variance (ANOVA) for analysing a mix of qualitative and quantitative variables is deemed to be inappropriate. The analysis of covariance (ANCOVA) would have been a better analysis method in this stead. Third, the panel data regression analysis or the generalised least square method may have been more appropriate for the study, given the high degree of variability that is bound to occur among the variables, otherwise, exhaustive diagnostic tests would have to be analysed for the study. Their results indicate that cash flow patterns have significant impact on the financial distress scores while lagged cash flow patterns did not exhibit significant relationship with the financial distress scores. For their third and fourth models, cash flow from operations and cash flow from financing were found to be statistically significant with the financial distress scores, while cash flow from investing was not statistically significant with the financial distress score.

Samsudin and Kamaluddin (2015) made the same perceived flaws as Suyari and Mugan (2013) in terms of the assignment of weights to the different cash flow patterns in relation to financial distress. Also, the use of the binary logistic econometric tool might have been appropriate if the classification of firms into distressed and non-distressed was an ideal one, thereby giving occasion for the allocation of dummy variables. However, the authors' classification was based on subjective usage by prior studies that classify firms into distressed and non-distressed companies based on the Bursa Malaysia PN17 classification. This classification is deemed not to be based on any factual backing as the PN17 does not exactly capture distressed firms, but firms with certain indications of financial distress such as firms that do not meet up to the minimum capital base requirements. Their results indicate that only four patterns can significantly predict financial distress and the patterns include (+--), (++-), (+-+) and (---).

Kordestani, Biglari and Bakhtiari (2011) focused on the ability of the combination of cash flow components to predict the incidence of financial distress. They posited that the statement of cash flow is an effective tool for predicting bankruptcy situations because it is less susceptible to manipulations. The effects of cash flow patterns on financial distress prediction in firms was analysed up to 3 years before the incidence of the distress. Unlike other studies, they utilised the chi-square analysis to ascertain the existence of significant difference among the cash flow components in predicting bankruptcy. Their pattern ranking is also perceived to be flawed, even much more than other studies, but due to the method of analysis utilised, the problem of pattern ranking was avoided.

Ward (1994) noticed that prior literature mostly found cash flow from operations to have strong predictive usefulness in predicting financial distress as opposed to cash flow from investing and financing. He posited that such anomaly might be as a result of industry specificity and sought out to investigate the consistency of his position with the cash flow theory. Some of the measures he utilised to categorise firms as distressed includes up to 40% (this was an arbitrary figure) reduction in cash dividends and renegotiated loan terms. These measures are however perceived to be inadequate to wholly determine the distress status of an organisation as some form of reduction in cash dividends and loan renegotiations might be intentional strategies to meet certain objectives. His results indicate that cash flow from operations and investing activities were the major cash flow component determinants of financial distress.

Dickinson (2011) used cash flow patterns to trace the life cycle of an organisation. She segmented the life cycle stages of an organisation into introduction, growth, maturity, shake-out and decline. Her

study was predicated on the extent to which cash flows can be used to predict healthy and distressed firms, which would be a function of the stage of that company in the life cycle. She posited that distinct patterns were peculiar to different stages of growth, hence, the cash flow patterns are not direct signals of the financial health of an organisation. Even though prior studies mostly attributed the pattern (--+) to be an indication of distress, she argued that such pattern would ordinarily be possessed by a company that was at its early introductory stage. This position motivated the use of growth related variables in our study to moderate the relationship between cash flow patterns and bankruptcy prediction. Dickinson (2011) analysis of the cash flow patterns based on the stage of organisation development was similar to that utilised by Vorst and Yohn (2017) and is given as follows: Introduction (--+), Growth (+-+), Maturity (+--), Shake-out (+++) (++-) (---), and Decline (-+-) (-++).

Akbar, Akbar, Tang, and Qureshi (2019) utilised the life-cycle dimension of Dickinson (2011) in analysing the relationship between corporate life cycle and bankruptcy risk. Their results indicate that bankruptcy risk was higher during the introduction, growth and decline stages than at the mature and shake-out stages. The growth stage however showed lower bankruptcy risk potential than the introduction and decline stages. The segmentation of the bankruptcy potential of each life cycle phase provides additional information to managers about the degree of fragility of the firm at each stage of its development, and hence, assists management in averting the possibility of turbulent scenarios.

3. Methodology

The research adopted a mixed method research design by utilising a combination of the cross-sectional research design and the longitudinal research design. We made use of a sample of four hundred and ninety (490) non-financial firm-year data selected from the consumer goods, healthcare, industrial goods and natural resources sectors of the Nigerian Stock Exchange. The study made reference to the life cycle effect by testing the assertion of Dickinson (2011) which stipulated that the ability of cash flow patterns to predict financial distress is predicated on the life cycle stage of the firm. The selected sample covered a period of seven years (2011-2017) and was selected using a combination of the stratified and random sampling techniques. The possible dimensions of the cash flow patterns of firms are depicted in table 1.

Table 1. Analysis of Cash Flow Patterns

	Cash Flow from Operations	**Cash Flow from Investing**	**Cash Flow from Financing**
P1	–	–	–
P2	–	+	–
P3	–	–	+
P4	–	+	+
P5	+	+	+
P6	+	+	–
P7	+	–	+
P8	+	–	–

Note. P1 = Pattern one; P2 = Pattern two; P3 = Pattern three; P4 = Pattern four; P5 = Pattern five; P6 = Pattern six; P7 = Pattern seven; P8 = Pattern eight.

The cash flow patterns that firms could exhibit are ranked from one to eight. The ranking scale is assigned such that cash flow patterns perceived to be more related to distressed firms are ranked higher (see table 1). The ranking scale utilised was largely inspired by the work of Jantadej (2006). Cash flow pattern (+--) is perceived to be the best predictor of an healthy firms as it depicts the pattern

of a company that makes enough cash flows from its operations to cover its investments and its financing obligations. Pattern five (+++) has been classified by some authors (Kordestani et al., 2011; Sayari & Mugan, 2013) as the best predictor of an healthy firm status despite its relative rareness, but this appears not to be justifiable as this pattern depicts a situation whereby the firm has to sell its assets and raise money either through loans or the issue of shares, while at the same time amercing cash inflows from operations. This scenario could occur as a result of the company's inability to make sufficient cash flows from its operations and hence, the need to augment with inflows from investing and financing activities. Pattern one (---) is an extreme case of distress where the company cannot generate cash flows from any of its activities whether operating, investing or financing. Generally, the cash flow patterns that display positive net cash flow from operations are seen to be better predictors of a healthy firm while those that portray negative cash flows from operations are seen as good predictors of financial distress. This is because a firm that cannot produce sufficient cash flows from its operations is perceived to be a distressed firm.

Also, Ward (1994) noted that a comparatively stable and consistent cash flow pattern existed among the cash flow components of healthy companies, while financially distressed companies exhibited declining cash flows (mostly in all the individual components) up to two years before the advent of the bankruptcy. We therefore also test the veracity of this assertion by investigating the predictive capabilities of the cash flow patterns up to two years before the eventuality of the distress.

Based on the issues discussed above, three models were propounded for the study as follows:

$$ZSCR_t = \beta_0 + \beta_1 AGE_t + \beta_2 SIZE_t + \beta_3 CFP_t + U_t \quad (1)$$

$$ZSCR_t = \beta_0 + \beta_1 AGE_t + \beta_2 SIZE_t + \beta_3 CFP_{t-1} + U_t \quad (2)$$

$$ZSCR_t = \beta_0 + \beta_1 AGE_t + \beta_2 SIZE_t + \beta_3 CFP_{t-2} + U_t \quad (3)$$

ZSCR = Z-Score (Distress Prediction Score)

AGE = Firm age

SIZE = Firm size

CFP = Cash flow pattern

CFP_{t-1} = One year lagged cash flow pattern

CFP_{t-2} = Two years lagged cash flow pattern

The models were primarily adapted from the work of Sayari and Mugan (2013). Model one is used to analyse the ability of the cash flow patterns to predict the incidence of financial distress. Firm age and firm size are introduced into the model as control variables in order to capture some probable effect of the life-cycle stage of the organisation. Model two and three sought to address the assertion of Ward (1994) that declining cash flows in organisations occur up to two years before the eventuality of the distress.

Also, in line with the position of Dickinson (2011) that cash flow patterns are not direct indicators of the financial health status of an organisation, but rather represent the developmental phase of an organisation, we moderate the cash flow patterns with elements that represent in certain ways the changes that occur as an organisation develops (represented by firm age and firm size in this case). This leads to a fourth model given as:

$$ZSCR_t = \beta_0 + \beta_1 AGE_t + \beta_2 SIZE_t + \beta_3 CFP_t + \beta_4 CFP*AGE_t + \beta_5 CFP*SIZE_t + U_t \quad (4)$$

ZSCR = Z-Score (Distress Prediction Score)

AGE = Firm age

SIZE = Firm size

CFP = Cash flow pattern

CFP*AGE = Moderation of cash flow pattern by firm age

CFP*SIZE = Moderation of cash flow pattern by firm size

Model four addresses the dynamism of the cash flow patterns as the organisation transits between phases. Financial distress is captured using the revised Altman Z-score model for public companies. The revised Z-score is given as:

$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5$

Z = Overall Index (Z-score)

X_1 = Working capital/Total assets

X_2 = Retained earnings/Total assets

X_3 = Earnings before interest and taxes/Total assets

X_4 = Market value of equity/Book value of total liabilities

X_5 = Sales/Total assets

A Z-score of above 2.99 indicates that the company is healthy, while a Z-score of below 1.81 indicates that the company is distressed. Altman, Iwanicz-Drozdowska, Laitinen and Suvas (2014) showed that distressed firms exhibit peculiar financial profiles prior to the year of eventual bankruptcy, and these profiles informed the intuition behind the Z-score model. Scores between 1.81 and 2.99 indicates that the company is in a grey area and there might be the existence of distress elements for such companies. Altman (1968) described the grey area as the "zone of ignorance". Firms that fall within this area possess both distressed and non-distressed financial characteristics, hence firms that fall into this category are expected to be closely watched in order to expedite any necessary remedial or recovery action.

Firm age is measured as the number of years the company has been in operation from its inception, while firm size is captured using the value of total assets. The cash flow patterns are ranked based on their perceived ability to predict financial distress (table 1). Models 1, 2 and 3 are analysed using the generalised least square regression technique. This techniques is adopted because of its ability to assign weights to the observations in a given population based their degree of variability. This automatically corrects for the problem of autocorrelation and heteroskedasticity in the model.

Given the intention to analyse the impact of the life cycle effect on the relationship between the cash flow patterns and distress prediction, model 4 is analysed using the Generalised Method of Momemts (GMM). This is primarily due to the existence of a large, though finite possibility of life cycle phases which automatically makes the moment conditions larger than the parameters under consideration. The ability of the GMM to cater for unobservable exogenous variables as well as its characteristics of being consistent, efficient and being asymptotically normal makes it a suitable choice of analysis for model 4.

4. Results and Discussions

Table 2. Descriptive Statistics

	ZSCR	AGE	SIZE	CFP	CFP_{t-1}	CFP_{t-2}
Mean	1.9094	25.516	57010	6.3278	6.4630	6.5902
Median	1.9400	26.000	9440.5	7.0000	8.0000	8.0000
Maximum	18.110	53.000	16110	8.0000	8.0000	8.0000
Minimum	-58.580	1.0000	224.50	1.0000	1.0000	1.0000
Std. Dev.	3.2942	13.097	16114	2.2344	2.2189	2.1618
Skewness	-12.582	-0.2539	5.8679	-1.2279	-1.3759	-1.4946
Kurtosis	238.52	1.7641	44.293	3.1736	3.5257	3.8573
Jarque-Bera	11290	36.449	37241	123.25	137.03	140.63
Probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Sum	922.26	12503	27650	3088.0	2708.0	2300.0
Sum Sq. Dev.	5230.8	83884	1.2E+13	2431.5	2058.1	1626.4
Observations	483	490	485	488	419	349

Note. ZSCR = Z-score; AGE = Firm Age; SIZE = Firm Size; CFP = Cash flow Pattern; CFP_{t-1} = Cash flow pattern (one year lag); CFP_{t-2} = Cash flow pattern (two years lag).

The result of the descriptive statistics is shown in table 2. The analysis of the financial distress scores show that the healthiest firm possessed a Z-score of 18.11, while the most distressed firm exhibited a Z-score of -58.58. The mean value of 1.9 indicates a fairly healthy/distress spread of the firms utilised. The analysis of firm age indicates that some firms were utilised for the study from the point of their inception. The firm size (measured by total asset) values are given in millions of naira (N'm) with average reported net worth of all firms utilised amounting to about N57billion. The analysis of the cash flow patterns indicate that most of the firms exhibited healthy cash flow patterns, however, some of them exhibited distressed patterns. All the variables were normally distributed and mostly negatively skewed, with the exception of firm size which was positively skewed.

Table 3. Pearson Correlation Matrix

Correlation t-Statistic Probability	ZSCR	AGE	SIZE	CFP	CFP1	CFP2
ZSCR	1.0000 ----- -----					
AGE	0.1251 2.3393 0.0199	1.0000 ----- -----				
SIZE	-0.0231 -0.4297 0.6676	-0.0868 -1.6174 0.1067	1.0000 ----- -----			
CFP	0.0896 1.6694 0.0959	-0.0583 -1.0842 0.2790	0.0402 0.7468 0.4557	1.0000 ----- -----		
CFP1	0.1318 2.4676 0.0141	-0.0274 -0.5095 0.6107	0.0392 0.7280 0.4671	0.2641 5.0800 0.0000	1.0000 ----- -----	
CFP2	-0.0345 -0.6413 0.5217	-0.0255 -0.4740 0.6358	0.0231 0.4288 0.6683	0.1365 2.5574 0.0110	0.2245 4.2736 0.0000	1.0000 ----- -----

Note. ZSCR = Z-score; AGE = Firm Age; SIZE = Firm Size; CFP = Cash flow Pattern; CFP_{t-1} = Cash flow pattern (one year lag); CFP_{t-2} = Cash flow pattern (two years lag).

The Pearson correlation matrix (table 3) reveals the association that exists between the major variables utilised in the study. The correlation results of the individual variables indicates that the highest association exists between the current cash flow pattern and the one-year lag (r = 0.264). The mediating variables (firm age and firm size) introduced to capture the life cycle effect of the firms did not exhibit any form of high correlations with all other variables. However, contrary to expectation, the association between firm size and firm age is found to be negative (-0.086). Casual empiricism portrays both a start-up firm and a firm with low asset base as growing firms, and firms with increased age and asset base as maturing firms before the eventuality of their decline. The existence of low correlation values among the association of all the individual variables is an indication of the absence of multicollinearity among the variables.

Table 4. Generalized Least Square (Dependent Variable: ZSCR)

	Model 1		**Model 2**		**Model 3**	
	Z-Stat.	**Prob.**	**Z-Stat.**	**Prob.**	**Z-Stat.**	**Prob.**
AGE	2.4722	0.0134**	2.5542	0.0106**	2.2906	0.0220**
SIZE	-0.4762	0.6339	-0.3775	0.7058	-0.2179	0.8275
CFP	1.7745	0.0760*				
CFP_{t-1}			2.7262	0.0064**		
CFP_{t-2}					-0.5803	0.5616
Prob (LR Statistics)	0.0264**		0.0029**		0.1198	

*Note. ** represents significance at the 5% level; * represents significance at the 10% level. ZSCR = Z-score; AGE = Firm Age; SIZE = Firm Size; CFP = Cash flow Pattern; CFP_{t-1} = Cash flow pattern (one year lag); CFP_{t-2} = Cash flow pattern (two years lag).*

The results of model 1 (table 4) indicates that cash flow patterns are positively and significantly related to financial distress. The relationship was however only significant at the 10% level of significance, and not at the 5% level of significance. This nevertheless is an indication of the ability of the cash flow patterns to predict the possibility of financial distress as improved patterns are indications of better health status for the firm. Firm age exhibits positive and significant relationship with Z-score. The implication of this is that as a firm grows, its financial health increases significantly. Firm size on the other hand did not possess significant relations with the Z-score. The relationship between firm age, firm size and the Z-score are consistent in the three models.

The results of model 2 reveal that the one-year lagged cash flow patterns have the capacity to adequately predict the occurrence of financial distress in firms; as they also exhibit positive and significant relationships with the Z-score. The results of models 3 however differs significantly from those of model 1 and 2, in relation to the outcome of the cash flow patterns, as the lagged cash flow patterns (two-years lag) exhibit negative and non-significant relationships with the Z-score. This suggests that distress probabilities cannot adequately be predicted by cash flow patterns that exist two years before the culmination of the distress, hence, the most effective prediction using cash flow patterns should be a one-year forecast based on the presently reported net cash flow.

Table 5. Generalised Method of Moments (GMM) [Dependent Variable: ZSCR]

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ZSCR(-1)	-0.131556	0.178080	-0.738749	0.4606
AGE	-0.962744	8.155526	-0.118048	0.9061
SIZE	-1.24E-05	2.74E-05	-0.453612	0.6504
CFP	-1.120139	0.507545	-2.206976	0.0280
CFP*AGE	0.037410	0.019701	1.898896	0.0585
CFP*SIZE	8.58E-06	5.49E-06	1.561638	0.1193
@LEV(@ISPERIOD("2013")	0.290396	8.049159	0.036078	0.9712
@LEV(@ISPERIOD("2014")	0.416974	8.100831	0.051473	0.9590
@LEV(@ISPERIOD("2015")	0.219518	8.145589	0.026949	0.9785
@LEV(@ISPERIOD("2016")	0.280911	7.789429	0.036063	0.9713
@LEV(@ISPERIOD("2017")	-0.248288	8.192225	-0.030308	0.9758
Effects Specification				
Cross-section fixed (first differences) Period fixed (dummy variables)				
Mean dependent var	-0.228827	S.D. dependent var	3.636311	
S.E. of regression	4.718647	Sum squared resid	7347.657	
J-statistic	5.047294	Instrument rank	20	

*Note. CFP*AGE = Cash flow pattern moderated by firm age; CFP*SIZE = Cash flow pattern moderated by firm size.*

The results of the moderating effect of the life cycle factors (firm age and firm size) on cash flow patterns are represented in table 5. The moderation of cash flow patterns by firm age and firm size reveals a change in the initial direction of the relationship between cash flow patterns and financial distress prediction. The estimation indicates a significant albeit negative relationship between cash flow patterns and financial distress. This signifies that as the cash flow patterns of a firm improves, the health status of the firm declines, enhancing its distress probabilities. This result contradicts casual empiricism; as firms are expected to become healthier as their cash flow activities and the attendant patterns improve. A justification for this outcome is however prevalent in the moderation with the life cycle indices which highlights the fact that the phases of the organisation's development affects the cash flow pattern it could exhibit at each given stage. The GMM estimation technique takes cognisance of these interaction along each population moment.

The outcome of the GMM estimation indicates a change in signal when cash flow patterns are moderated by both firm age and firm size. The moderation with firm age produced a positive and significant relationship between cash flow patterns and financial distress prediction, while the moderation with firm size produced a positive, but non-significant relationship between cash flow patterns and financial distress prediction. This change in direction is largely occasioned by the life cycle effect on the primary relationship, which entails that cash flow patterns in themselves are not directly appropriate indicators of financial distress, but their ability to adequately indicate distress is dependent on the life cycle stage of the firm. This therefore supports the position of Dickinson (2011) that certain patterns are not necessarily an indication of financial distress, but could be outcomes of the life cycle phase of the firm, such as the inception and growth phases. Nevertheless, as the firms progress through the life cycle continuum, the cash flow patterns are expected to improve.

Subsequently deviations from such improvements that linger for extended periods would therefore be indications of financial distress in the firm of interest.

5. Conclusion

The cash flow patterns of companies are believed to have predictive powers of the existence of symptoms of financial distress and eventual bankruptcy. We tested this assertion by analysing the possibility of these patterns predicting the incidence of financial distress among non-financial firms quoted on the Nigeria Stock Exchange. The results of the study indicate that the cash flow patterns have strong predictive ability in determining the possibility of financial distress. Based on this ability of the cash flow patterns to predict financial distress, it is possible that the study has been able to solve the problem of assigning appropriate weights/ranks to each of the cash flow patterns based on the degree of their perceived ability to predict distress. The study also extends prior studies by focusing only on the patterns of the cash flow components without recourse to the magnitude of the cash flows.

The significant positive relationship that exists between firm age and financial distress (captured by the Altman Z-score) is consistent with the life cycle theory (in relation to the growth stages of the firm), hence, such results could be attributable to the dimension of the sample utilised maintaining the probability that most of the companies in the sample are at their growth/early maturity stage (further buttressed by the cash flow pattern mean value of 6.46). The study also reveals that decreases in the magnitude of firms assets is not a significant indication of the aversion of impending distress. The reported negative relationship between firm size and the health status of the firm (pointing to the fact that increased firm size would lead to increased distress probabilities) can be attributed to reductions in available cash flows as the firm increases investments in assets.

The influence of the cash flow patterns on financial distress prediction is also seen to be affected by the life cycle effect. The GMM results indicate that the moderation of cash flow patterns by firm age and firm size changes both the direction as well as the magnitude of the primary relationships. This posits that as firms mature in terms of age and size, their cash flow patterns improve in relation to distress probabilities; but not necessarily in relation to distress prediction abilities.

The results of the study, though robust, could however be extended to encapsulate more sectors, including the financial sector; as the peculiarity of these sectors could produce differing results. Also, the predictive ability of the cash flow patterns could be moderated with the complete life cycle effects in order to ascertain if the stage of a company's life cycle development has the ability to affect the predictive powers of the company's cash flow patterns.

References

Akbar, A., Akbar, M., Tang, W. & Qureshi, M. A. (2019). Is bankruptcy tied to corporate life-cycle? Evidence from Pakistan. *Sustainability*, 11(3), pp. 1-22.

Altman E. I. (1968). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The Journal of Finance*, 23(4), pp. 589-609.

Altman, E. I.; Iwanicz-Drozdowska, M.; Laitinen, E. K. & Suvas, A. (2014). *Distressed firm and bankruptcy prediction in an international context: A review and empirical analysis of Altman's Z-Score model.*: http://www.people.stern.nyu.edu/ealtman/IRMC2014ZMODELpaper1.pdf.

Dickinson, V. (2011). Cash flow patterns as a proxy for firm life cycle. *The Accounting Review, 86*(6), pp. 1969-1994.

Etemadi, H. & Tariverdi, Y. (2006). The effect of cash flow statement on the predictions of professional investors. *Iranian Accounting and Auditing Review, 45*(1), pp. 69-86.

Gup, B. E.; Samson, W. D.; Dugan, M. T.; Kim, M. J. & Jittrapanun, T. (1993). An analysis of patterns from the statement of cash flows. *Financial Practice and Education, 3*(2), pp. 73-79.

Jantadej, P. (2006). *Using the combination of cash flow components to predict financial distress* (Ph.D Thesis). *Interdepartmental Area of Business* (Accountancy), University of Nebraska, Lincoln, Nebraska, USA.

Kordestani, G.; Biglari, V. & Bakhtiari, M. (2011). Ability of combinations of cash flow components to predict financial distress. *Business Theory and Practice,* 12(3), pp. 277-285.

Nanayakkara, K. G. & Azeez, A. A. (2015). Predicting corporate financial distress in Sri Lanka: An extension of the Z-score model. *International Journal of Business and Social Research, 5*(3), pp. 41-56.

Sayari, N. & Mugan, F. N. (2013). Cash flow statement as an evidence for financial distress. *Universal Journal of Accounting and Finance, 1*(3), pp. 95-103.

Schellenger, M. & Cross, J. N. (1994). FASB 95, cash flow and bankruptcy. *Journal of Economics and Finance, 18*(3), pp. 261-274.

Scott, J. H. (1981). The probability of bankruptcy: A comparison of empirical predictions and theoretical models. *Journal of Banking and Finance, 5*(1), pp. 317-344.

Shamsudin, A. & Kamaluddin, A. (2015). Impending bankruptcy: Examining cash flow pattern of distress and healthy firms. *Procedia Economics and Finance, 31*(1), pp. 766-774.

Vorst, P. & Yohn, T. L. (2017). Life cycle models and forecasting growth and profitability. *The Accounting Review, 93*(6), pp. 357-381.

Ward, T. J. (1994). Cash flow information and the prediction of financially distressed mining, oil and gas firms: A comparative study. *Journal of Applied Business Research,* 10(3), pp. 78-86.

Zeitun, R.; Tian, G. & Keen, K. (2007). Default probability for the Jordanian companies: A test of cash flow theory. *International Research Journal of Finance and Economics,* 8(1), pp. 147-162.