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Cash flow analysis: Red flag indicators of financial distress in Malaysian companies

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Abstract: The unprecedented coronavirus disease (COVID-19) pandemic devastated the world from early 2020 caused an economic decline impacting numerous companies worldwide, including Malaysia. Thus, companies should foresee financial distress to better prepare and establish mitigating measures for future challenges. One method to examine the financial situation of a company is by investigating the cash flow information. The study aims to investigate the relationship between cash flow patterns and financial distress. Data were gathered from 24 public listed companies in Bursa Malaysia from 2009 to 2019 and the study applied the binary logistic regression and chi-square analysis test for independence. The results indicated that companies with a negative cash flow from operating activities would more likely experience financial distress due to the inability to generate sufficient cash to cover operations, future investment, and long-term debt. Additionally, distressed companies tend to discard fixed assets/investments, or drawdown borrowings to relieve the cash deficit.

Keywords: *Cash flow pattern, Cash flow; Financial distress.*

1. Introduction

"Cash is king" is a popular notion worldwide, denoting the significance of cash to individuals and corporations for survival. Companies aim to generate profit, be sustainable, and ensure continuity. Although profit indicates company financial stability, cash is the lifeline of the company. The ability of companies to generate cash from activities is crucial for company survival and development. Companies that constantly consume cash without adequate replenishment would face disaster as the situation causes financial distress and business failure. Financially distressed companies are defined as companies facing poor performance, inefficient operations, high financial leverage, and cash flow issues, causing declined market value (Chan and Chen, 1991).

The pandemic had disrupted the global economic growth and severely impacted Malaysian businesses (Reuters, 2020). Despite a good effort at managing the outbreak, Malaysia's implementation of various Movement Control Orders (MCO) from 18 March 2020 had negative repercussions. Deteriorating global economics and financial conditions significantly affected the Malaysian economy, resulting in many company closures. Assessing the financial health of companies is essential for interested users to measure company performance, financial planning and employ early mitigating measures to prevent bankruptcy.

The financial health of companies is measured based on financial performance by evaluating financial statements comprising the statement of financial position (balance sheet), statement of profit or loss and other comprehensive income (income statement), statement of cash flows (cash flow statement), statement of changes in equity, and notes to the financial statements. The financial statements are mandatory to be disclosed in the annual report of public listed companies. A common method to

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measure company health is traditional ratios according to the balance sheet and income statement items. Cash flow ratios are also usually utilised, as observed in numerous Malaysian studies emphasising cash flow ratios to predict financial distress (see Jaafar et al., 2018; Abdullah et al., 2019; Kamaluddin et al., 2019).

The current study focused on analysing the cash flow information from a different perspective by examining the components. The study identified whether companies could predict financial distress using a simplified method that observes the signs of cash flow from operating, investing, and financing activities forming the cash flow pattern.

The study examined eight cash flow patterns combining signs of cash flows from operating activities, investing activities, and financing activities, namely CFP1, CFP2, CFP3, CFP4, CFP5, CFP6, CFP7, and CFP8. The findings could aid financial statement users to understand better the relationship between the cash flow components and the effects of each cash flow pattern to enable better analysis of company performance in decision making. The study also contributes to studies on financial distress by examining the impact of the varying cash flow combinations from operating, investing, and financing activities in measuring company health.

2. Literature Review

2.1. Financial Distress

Financial distress arises when companies experience financial difficulties. Cash flow problems in operations impede the ability of companies to generate enough cash to fulfil current obligations (Outecheva, 2007), create defaults in debt payments, or debt restructuring to avoid the default. Generally, the obligations are fulfilled with difficulties (Andrade and Kaplan, 1998; Wu et al., 2008). Bursa Malaysia supervises financially distressed companies, classified under Practice Note 17 (PN17) for companies listed under the Main Market or Guidance Note 3 (GN3) for companies under the Access, Certainty, Efficiency (ACE) Market. The listed companies are granted a temporary recovery period to restructure financial affairs to relieve any declared status. The restructuring actions include strengthening financial position, including the cash flow position. Nevertheless, listings under PN17 or GN3 damage the company image and reputation. Stakeholders such as creditors, suppliers, investors, customers, and employees are usually reluctant to engage with financially distressed companies (Cornell and Shapiro, 1987).

2.2. Financial Distress and Bankruptcy

Numerous studies on the relationship between financially distressed companies and cash flow defined financial distress. For example, financial distress is described as when the company incoming cash flow is lower than the outgoing cash flow (Gentry et al., 1989) when companies cannot satisfy obligations (Brigham et al., 1999; Bahnson and Bartley, 1992), or decreasing profitability (Jaafar et al., 2018).

The substance of the definitions is the same- a company is financially distressed when experiencing cash flow issues. Financial distress usually creates severe consequences if the problem is not handled timely and properly. Geng et al. (2015) stated that companies failing to recover from financial distress tend to face bankruptcy, as confirmed by Arlov et al. (2011). Hence, predicting financial distress is crucial to prevent the repercussions of bankruptcy (Banks, 2005).

2.3. Cash Flow Patterns to Predict Financial Distress

Cash flow statements evaluate cash source and usage for the three components: operations, investing, and financing. Cash flow from operations is an essential variable that presents information on company operating activities and internal operational capabilities. The cash flow from operations represents cash before any dividend pay-out and positively indicates company health (Dickinson, 2011). Cash flow from investing is the company inflows and outflows during an accounting period emphasising the company investment strategy, either in fixed assets or shares in other companies. Meanwhile, cash

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flow from financing indicates receipts from issuing shares and debts, dividend payments, drawdowns of loans, and payments to lower loan obligations.

The cash flow combinations grant users crucial information to evaluate how the company manages cash to fulfil ongoing cash needs through operating, investing, and financing activities, whether the company generates sufficient cash flows from the operations, how and why the company changes asset mix and financing mix, and detect signs of financial distress. Each component sign could be positive or negative, with eight (8) possible combinations of cash flow components.

Table 1.
Cash flow statement components.

Cash flow pattern	Cash flow from operating activities (CFO)	Cash flow from investing activities (CFI)	Cash flow from financing activities (CFF)
Pattern 1	Positive (+)	Positive (+)	Negative (-)
Pattern 2	Positive (+)	Negative (-)	Negative (-)
Pattern 3	Positive (+)	Negative (-)	Positive (+)
Pattern 4	Negative (-)	Positive (+)	Positive (+)
Pattern 5	Negative (-)	Negative (-)	Positive (+)
Pattern 6	Negative (-)	Positive (+)	Negative (-)
Pattern 7	Negative (-)	Negative (-)	Negative (-)
Pattern 8	Positive (+)	Positive (+)	Positive (+)

Pattern 1 (CFP1) demonstrates a positive sign for cash flow from operating and investing activities but a negative cash flow movement from financing activities. The situation arises when a company utilises cash from operations and from fixed assets sale to pay debts or owners (Gup and Samson, 1998; Steyn Bruwer and Hamman, 2008), a temporary state (Gup and Samson, 1998).

Pattern 2 (CFP2) suggests a positive sign for cash flow from operating activities but negative for cash flows from investing and financing activities. The scenario occurs when companies use cash from operations to purchase fixed assets and pay debts or owners (Jantadej, 2006), which is a common pattern. The company could be utilising cash flow from its operations to finance expansion or replace depreciating assets (Gup and Samson, 1998).

Pattern 3 (CFP3) denotes a positive sign for cash flows from operating and financing activities but a negative cash flow from investing activities. The situation emerges when companies use cash from operations and borrowings (or owner investment) to expand or due to potentially good investment opportunities (Bruwer and Hamman, 2005; Jantadej, 2006).

Pattern 4 (CFP4) depicts a negative sign for cash flow from operating activities but a positive cash flow movement from investing and financing activities. The situation signifies that the operating cash flow problem in companies is covered by fixed assets sale and borrowing from debt holders or cash injection by shareholders as the company generates insufficient cash from its operations (Kepçe, 2017). Jantadej (2006) stated that a company with the mentioned pattern is experiencing severe financial issues.

Pattern 5 (CFP5) signifies a negative cash flow movement from operating and investing activities but a positive cash flow movement from financing activities. The scenario depicts a shortfall in cash flows from operations, and the purchase of the fixed assets are financed through borrowings or issuing shares (Gup and Samson, 1998). Jantadej (2006) proposed that companies demonstrating the pattern are under temporary financial distress.

Pattern 6 (CFP6) denote a negative sign for cash flows from operating and financing activities but a positive cash flow movement from investing activities. The situation indicates the company is financing operating cash flow shortages and paying debt or shareholders via the sale of fixed assets or other

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investments (Gup and Samson, 1993). Jantadej (2006) stated that companies with the pattern face financial difficulties.

Pattern 7 (CFP7) signifies a negative sign for all the cash flows from operating, investing, and financing activities. The scenario is rare and only possible if previously accumulated cash is utilised to cover the negative cash flows (Bruwer and Hamman, 2005). Gup and Samson (1993) highlighted that a company with the pattern faces severe financial trouble due to no profits and low asset growth.

Pattern 8 (CFP8) demonstrates positive movements in all three components of cash from operating, investing, and financing activities. The situation is very unusual, indicating a liquid company using the cash generated from operations, sale of assets, and financing to accumulate piles of cash for strategic reasons (Jantadej, 2006).

The Life Cycle Theory describes the company life cycle, which connects specific characteristics to a company during various phases of its life cycle from the start-up to growth, maturity, and decline. Several characteristics of the company net income and cash flow emerge (Mueller, 1972; Myers, 1977) at each stage. The combination of operating, investing, and financing cash flows in a company presents the company life cycle mapping at every financial statement date and function as a benchmark to evaluate company performance.

Gup and Samson (1993) investigated the positive or negative signs of the three cash flow statement components and connected several characteristics to companies with specific cash flow patterns. Figure 1 presents the cash flow pattern combinations and life cycle theory. A similar cash flow pattern method was also proposed by Dickinson (2011) to separate the stages in a company life cycle, as illustrated in Table 0 below.

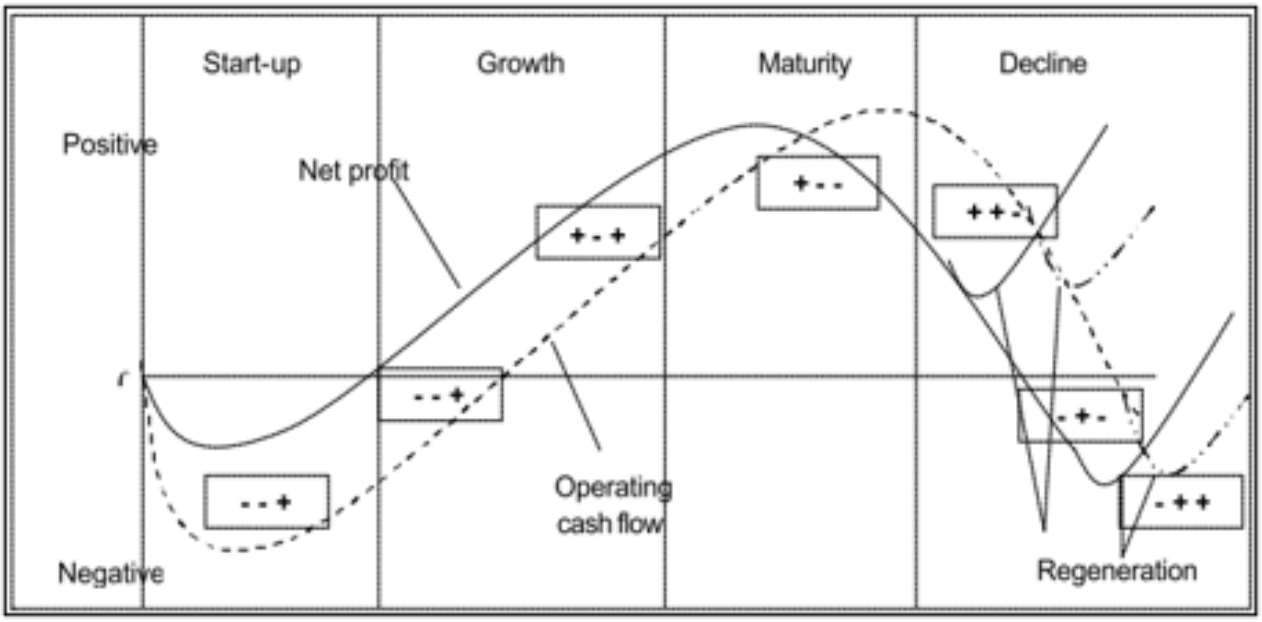

Figure 1.
Cash flow pattern combinations and the life cycle theory.
Source: Bruwer and Hamman (2005) and Mulford and Comiskey (1996).

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Table 0.
Cash flow life cycle stages according to Dickinson (2011).

Models	Cash Flows		
	CFO	CFI	CFF
Introduction	-	-	+
Growth	+	-	+
Mature	+	-	-
Shake-Out	-	-	-
Shake-Out	+	+	+
Shake-Out	+	+	-
Decline	-	+	+
Decline	-	+	-

Note:
CFO: Cash flow from operating activities, CFI: Cash flow from investing activities, and CFF: Cash flow from financing activities.

Companies at the start-up phase usually face the cash flow pattern 5 (CFP5) (-,-,+). The negative cash flow from operating activities occurs from expanding the current assets (Bruwer and Hamman, 2005). Furthermore, companies at the start-up phase generally own investments in non-current assets, and the company expansion is funded by debt from loans or equity through issuing new shares. The company undergoes cash flow pattern 3 (CFP3) (+,-,+) upon progressing, expanding with potential growth opportunities.

Although cash is generated from the operating activities, the amount is insufficient to fund the investing activities. The phase involves the company sourcing for funding from the financing activities. Investors will be interested as the company demonstrates potential growth opportunities and begins investing in new shares or granting new loans as they believe the company can repay (Gup and Samson, 1993). The company experiences cash flow pattern 2 (CFP2) (+,-,-) upon entering the mature stage, involving generating sufficient cash to finance operations. The company could experience potential expansion and repay loans.

The company enters the shake-out stage when it displays cash flow pattern 7 (CFP7) (-,-,-), cash flow pattern 8 (CFP8) (+,+,+), or cash flow pattern 1 (CFP1) (+,+,-). A shake-out stage involves company shrinkage denoting a positive cash flow from operations, but the cash may be utilised to redeem company debts. The positive cash flow may be insufficient, causing the companies to sell fixed assets or investments to cover debt repayment. The company may also experience negative cash flow from operating, investing, and financing activities, signifying a major financial problem due to low asset growth and low profitability.

The company in the shake-out stage may generate cash from operating activities, sales from fixed assets, or the drawdown of loans. The scenario is temporary and exceptional (Bruwer and Hamman, 2005) based on the ratios. Gup and Samson (1993) stated that companies with the traits own low total assets, with negative growth rates, and are not profitable. Cash flow patterns 4 (CFP4) (-,+,+) and 6 (CFP6) (-,+,-) demonstrates the decline stage of companies. Selling fixed assets and investments indicates the company is not in the growth phase, particularly with the negative cash from operations signifying slow operations with a possible net loss, failing to generate sufficient cash. Debt repayment adds burden, leading to liquidation (Bruwer and Hamman, 2005).

3. Hypothesis Development

Beaver (1966) suggested that company exhibit signs of financial distress upon failure to generate enough cash to meet its needs. A financially distressed company experiencing a cash deficit from operations tend to obtain and use cash from investing or financing activities to compensate the deficit. Past studies suggested that a financially distressed company would possess insufficient cash from operations (Largay and Stickney, 1980), sell assets and other investments (Ward and Foster, 1996),

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acquire external financing to solve financial problems (Ward, 1994), seek short-term financing and experience difficulties in obtaining long-term financing or repay long-term debt obligations in following years (Ward, 1992).

The study investigates the relationship between cash flow pattern and financial distress in public listed companies in Malaysia and the effectiveness in predicting financial distress. The cash flow patterns are independent variables divided into eight possible combinations: CFP1, CFP2, CFP3, CFP4, CFP5, CFP6, CFP7, and CFP8 measured based on Jantadej (2006), Kordestani et al. (2011), and Shamsudin and Kamaluddin (2015). The dependent variable is financial distress, specifically categorised into distressed and healthy companies.

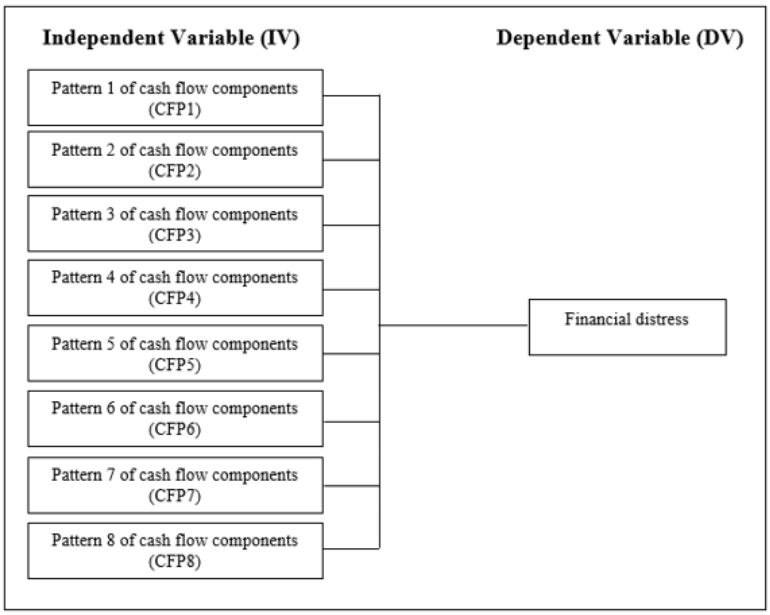

Figure 2.
The conceptual framework of the study.

3.1. Pattern 1 (CFP1) Analysis

Pattern 1 (CFP1) demonstrates that a combination of *positive* (+) cash flows from operating and investing activities with *negative* (−) cash flows from financing activities are possible indicators of a financially distressed company. Although the company could generate a positive operating cash flow, the excess cash is inadequate to fulfil financing needs, such as repaying debt holders. Positive cash flows from investing activities suggest that the company may use proceeds from selling fixed assets or other investments to fulfil financing needs. Maintaining the cash flow equilibrium is critical to ensure financial health and stability (Foster and Ward, 1997).

Shamsudin and Kamaluddin (2015) emphasised that a company might need to use all cash from operating activities and generate cash from investment sales to fulfil financing needs and reach a cash flow equilibrium point. Nonetheless, the company may exhaust its assets to support financing needs if the situation continues. Dickinson's (2011) research on the company life cycle suggests that companies with the mentioned cash flow pattern undergo the shake-out stage, which signifies the company is shrinking. Companies with the stated cash flow pattern experience financial distress, as confirmed by numerous studies (Gup and Samson, 1993; Bruwer and Hamman, 2005; Jantadej, 2006; Kordestani et al., 2011; Shamsudin and Kamaluddin, 2015). Thus, the study proposed the following:

H_1: Companies with CFP1 components experience financial distress.

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3.2. Pattern 2 (CFP2) Analysis

Pattern 2 (CFP2) includes a combination of *positive* (+) cash flow from operating activities and *negative* (−) cash flows from investing and financing activities. Companies with the cash flow pattern could perform well, producing a positive cash flow from operations. Furthermore, the negative cash flows from investing and financing activities indicate that the company utilises excess cash from operations to invest in fixed assets or other investments, service debts, and pay dividends to shareholders. The pattern aligns with Dickinson (2011) whereby the company is at the mature stage as the assets are used more efficiently and generate positive cash flows from earnings and operations.

Jantadej (2006) proposed that companies with the specified cash flow pattern perform well, as verified in Gup and Samson (1993), Bruwer and Hamman (2005), and Kordestani et al. (2011). Conversely, Shamsudin and Kamaluddin (2015) mentioned that the cash flow pattern is experienced by distressed Malaysian companies that faced losses but could achieve positive cash flows from operating activities because of the changes in working capital. Hence, the cash flow pattern could predict financial distress. Therefore, the study proposed as follows:

H_2: Companies with CFP2 experience financial distress.

3.3. Pattern 3 (CFP3) Analysis

Pattern 3 (CFP3) includes a combination of a *positive* (+) cash flow from operating activities, a *negative* (−) cash flow from investing activities, and a *positive* (+) cash flow from financing activities. The combination suggests a growing and well-performing company with many good investment opportunities. Dickinson (2011) proposed that a company with the pattern signifies the growth stage whereby the profit margin is maximised from increased investment and efficiency (Wernerfelt, 1985).

As the company may not be producing sufficient cash flow from operating activities, funds are needed from borrowings or raising capital from share issuance to support the investing activities. Shamsudin and Kamaluddin (2015) demonstrated that Malaysian public listed companies with the specified cash flow pattern face financial distress as the companies are more likely to source for external financing via bank borrowings due to insufficient excess cash from operations. Thus, the study presents the following:

H_3: Companies with CFP3 experience financial distress.

3.4. Pattern 4 (CFP4) Analysis

Pattern 4 (CFP4) comprises a combination of *negative* (−) cash flow from operating activities and *positive* (+) cash flows from investing and financing activities. The pattern denotes that the company experiences severe financial difficulties from the inability to produce adequate cash to fulfil operating needs. Apart from utilising funds from selling fixed assets or other investments to compensate the cash deficit, the company resorts to borrowings from debt lenders to cover the deficit.

The company may experience loan default with consistent negative cash flows from operating activities and failure to produce enough cash flows from investing and financing activities to fulfil all cash needs. Kordestani et al. (2011) stated that the pattern denotes that a company faces financial exigency due to the gradual failure to service debts. Dickinson (2011) added that companies with the specified cash flow pattern face the decline stage involving asset liquidation to service the debts or enter debt renegotiation. Bruwer and Hamman (2005) proposed that distressed companies frequently experience the cash flow pattern. Hence, the following is presented:

H_4: Companies with CFP4 experience financial distress.

3.5. Analysis of Pattern 5 (CFP5)

Pattern 5 (CFP5) comprised a combination of *negative* (−) cash flows from operating and investing activities with a *positive* (+) cash flow from financing activities. Dickinson (2011) mentioned that companies with the pattern enter the introduction stage, creating investments for expansion and

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owning access to financing from banks. Nonetheless, a company in the situation may face temporary financial difficulty (Jantadej, 2006). Although facing a negative position for cash flow from operations, the company continues investing in fixed assets or other investments, expecting the investments will produce significant future cash flows.

The company also raises funds from borrowings or capital injection by shareholders to compensate the deficits in operating activities and finance investing activities (Gup and Samson, 1993). The risk involved is if the investment in fixed assets or other investments fails to produce adequate positive cash flows in the future, the company could experience financial difficulties as the cash would be insufficient to fulfil debt obligations. Correspondingly, Kordestani et al. (2011) presented a significant relationship between the specified cash flow pattern and future financial distress. Therefore, the study proposed as follows:

H_5: Companies with CFP5 experience financial distress.

3.6. Pattern 6 (CFP6) Analysis

Pattern 6 (CFP6) involves a combination of a *negative* (−) cash flow from operating activities, a *positive* (+) cash flow from investing activities, and a *negative* (−) cash flow from financing activities. The combination suggests a company facing financial difficulties, denoting a decline stage in the company life cycle (Dickinson, 2011). Companies under the situation possess insufficient cash to fulfil operational needs and debt obligations. Hence, the company must resort to selling fixed assets or other investments to meet operating and financing needs (Jantadej, 2006; Kordestani et al., 2011). The financial issue worsens if the company constantly fails to produce enough cash to fulfil operation and financing needs and exhaust the company assets to compensate for the cash deficits. Bruwer and Hamman (2005) and Jantadej (2006) stated that companies with the cash flow pattern signify financial distress. Hence, the study proposed the following:

H_6: Companies with CFP6 experience financial distress.

3.7. Pattern 7 (CFP7) Analysis

Pattern 7 (CFP7) involves a combination of *negative* (−) cash flows from all operating, investing, and financing activities. The unusual situation indicates the company faces serious financial problems (Steyn Bruwer and Hamman, 2008). The company must use the cash reserves to finance all cash needs due to insufficient cash from company operations.

The company will exhaust cash reserves in the future if the scenario continues. Dickinson (2011) stated that the cash flow pattern indicates the company undergoes the shake-out stage. Past studies reported that companies with the specified cash flow pattern suggest financial distress (Gup and Samson, 1993; Bruwer and Hamman, 2005; Jantadej, 2006; Kordestani et al., 2011; Shamsudin and Kamaluddin, 2015). Hence, the following is suggested:

H_7: Companies with CFP7 experience financial distress.

3.8. Pattern 8 (CFP8) Analysis

Pattern 8 (CFP8) includes a combination of *positive* (+) cash flows from operating, investing, and financing activities. The unusual scenario denotes a highly liquid company that produces cash from all three types of activities for future development (Jantadej, 2006). Non-utilisation of the cash balances leads to capital inefficiency. Dickinson (2011) mentioned that companies with the cash flow pattern face shrinking and enter the shake-out stage. Therefore, the study suggested as follows:

H8: Companies with CFP8 experience financial distress.

4. Research Design

4.1. Sample

The study referred to the PN17 and GN3 lists in Bursa Malaysia as of 31 May 2020 to select distressed companies, consisting of 28 companies, following Shamsudin and Kamaluddin (2015) and

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Jaafar et al. (2018). Finance and insurance companies were excluded because of the high dependence on economic circumstances and supervision by other regulatory bodies such as Bank Negara Malaysia (BNM) with different regulatory requirements from the non-financial companies (Dalnial et al., 2014; Arshad et al., 2015).

The sample also included a similar number of healthy companies according to similar revenues or total assets. The healthy companies were chosen based on a one-to-one matching with the financially distressed companies in similar industries (see Foster and Ward, 1997; Shamsudin and Kamaluddin, 2015). The study sample comprised 12 distressed companies and 12 healthy companies with five (5) observation years, amounting to 120 observations.

4.2. Data Collection Method

The study employed secondary data, data gathered from existing resources (Sekaran and Bougie, 2016) and extracted manually from the annual reports on the Bursa Malaysia website. The data collection involves a five-year (5) period with the base year as the trigger date for PN17 or GN3 based on the Bursa Malaysia website (First Announcement) (Md Zeni and Ameer, 2010; Arshad et al., 2015). The five years were worked backwards from the latest financial statements before the trigger date. As the companies possessed different trigger dates, the financial data extracted from the cash flow statements covered from 2009 until 2019.

Data from each company were extracted manually from the cash flow statements according to the outcome of the operating, investing, and financing activities for each year. For instance, if Company A faced cash inflow from operating activities (+), cash inflow from investing activities (+), and cash outflow from financing activities (−) in the first year before the trigger date (Year −1), Company A has type 1 of the cash flow pattern (+, +, −) for that particular year. A similar extraction process was performed for Company B and others. The samples were divided based on the cash flow patterns within the years under review. Data collection and gathering were performed with Microsoft Excel and according to the collected data, with 120 observations.

The study applied the IBM Statistical Package for Social Sciences (SPSS) version 26 to examine data. Descriptive statistics were employed to elaborate the sample characteristics. As the variables were categorical, the descriptive statistics analysis was in the form of frequency. Moreover, the study used Pearson's chi-square test for independence to identify any significant relationship between the cash flow patterns and financial distress. The statistical tool compared the observed frequency of occurrence in each category against the expected frequency to observe any connection between the two variables measured, following a cross-tabulation table (Pallant, 2016).

Logistic regression was employed to assess whether the cash flow patterns could significantly predict financial distress. Numerous studies in Malaysia employed logistic regression to predict financial distress (see Ong et al., 2011; Shamsudin and Kamaluddin, 2015; Abdullah et al., 2019). Nonetheless, binary logistic regression is used in a prediction with two categories. A binary logistic regression model examines the link between a set of predictors (independent variables) and a binary response variable (dependent variable). A binary response has only two possible values, specifically distressed and not distressed.

The binary regression model aids the understanding of how changes in the predictor values are linked to the changes in the probability of an event. Jantadej (2006) and Shamsudin and Kamaluddin (2015) applied the same model to predict financial distress. Pallant (2016) suggested that a dichotomous dependent variable (two categories or two values) should have responses or observations with the value of 0 for those lacking or absence of the characteristic of interest and 1 for those representing the current interest.

The study analysed the connection between eight cash flow pattern components and financial distress. Distressed companies were assigned with the value of 1 and healthy companies with the value of 0, based on the financial distress model in Jantadej (2006):

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$$P(DISTRESS) = 1/\{1+\exp[-(\beta_0 + \beta_1 CFP1 + \beta_2 CFP2 + \beta_3 CFP3 + \beta_4 CFP4 + \beta_5 CFP5 + \beta_6 CFP6 + \beta_7 CFP7 + \beta_8 CFP8)]\}$$

Where:

P(DISTRESS) = The probability that a company experiences financial distress
DISTRESS = a dichotomous variable that equals 1 if a company is financially distressed, 0 otherwise
exp = an exponential function
CFP1 = a dummy variable that equals 1 if a company has positive operating and investing cash flows and a negative financing cash flow, 0 otherwise
CFP2 = a dummy variable that equals 1 if a company has a positive operating cash flow and negative investing and financing cash flows, 0 otherwise
CFP3 = a dummy variable that equals 1 if a company has a positive operating cash flow, a negative investing cash flow, and a positive financing cash flow, 0 otherwise
CFP4 = a dummy variable that equals 1 if a company has a negative operating cash flow and positive investing and financing cash flows, 0 otherwise
CFP5 = a dummy variable that equals 1 if a company has negative operating and investing cash flows but a positive financing cash flow, 0 otherwise
CFP6 = a dummy variable that equals 1 if a company has a negative operating cash flow, a positive investing cash flow, and a negative financing cash flow, 0 otherwise
CFP7 = a dummy variable that equals 1 if a company has negative operating, investing, and financing cash flows, 0 otherwise
CFP8 = a dummy variable that equals 1 if a company has positive operating, investing, and financing cash flows, 0 otherwise

5. Findings and Discussion

5.1. *Descriptive Statistics*

The study discovered that over the five (5) years review period, healthy companies usually experience CFP1, CFP2, and CFP3, whereas distressed companies usually face CFP4, CFP5, CFP6, CFP7, and CFP8. Excluding CFP8, the difference between the CFP1, CFP2, and CFP3 group and the CFP4, CFP5, CFP6, and CFP7 group is that the former group possessed positive cash flows from operating activities. In contrast, the latter group had negative cash flows from operating activities. The findings demonstrated that distressed companies suffered more from negative cash flows from operating activities than healthy companies.

5.2. *Chi-Square Test*

The chi-square test for independence was employed to determine the connection between cash flow patterns and financial distress among public listed companies in Malaysia. Pallant (2016) stated that the chi-square test of statistics is applicable in studies with categorical data for independent and dependent variables. The cash flow patterns and financial distress in the study are categorical. The data must not violate the assumption in applying the chi-square test (Field, 2018; Pallant, 2016), whereby each category must possess no fewer than five counts. Excluding CFP4, CFP6, and CFP8, all other cash flow patterns in the study denoted that the assumption of chi-square was not violated.

The significance value should be 0.05 or less to be significant (Pallant, 2016). The chi-square test results presented that CFP2, CFP3, and CFP5 had a significant connection with financial distress. Although CFP2 (+,-,-) denoted a significant association, $\chi^2_{(1,n=24)} = 7.778$, $p = .005$ healthy companies are more likely to experience CFP2, while distressed companies tend to experience otherwise. The findings aligned with Gup and Samson (1993), Bruwer and Hamman (2005) and Kordestani et al. (2011), denoting that CFP2 could be experienced by healthy companies.

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Similarly, Dickinson (2011) mentioned that CFP2 are companies at the mature phase as the assets are more effectively utilised and positive cash flows are produced from earnings and operations. Jantadej (2006) proposed that companies with a CFP2 pattern perform well and generate positive operating cash flows, and the excess cash is utilised to invest in fixed assets or investments, pay company loans and dividends to shareholders. Conversely, Shamsudin and Kamaluddin (2015) revealed that the pattern is experienced by distressed companies in Malaysia. The link between CFP2 and financial distress in the current study is more in favour of healthy companies compared to distressed companies.

The study also found a significant relationship between CFP3 (+,-,+) and financial distress, indicated by the chi-square test results for independence ($\chi^2_{(1,n=24)} = 4.183$, $p = .041$). Similar to CFP2, CFP3 denotes a higher frequency of the pattern for healthy companies compared to distressed companies. The finding aligns with Bruwer and Hamman (2005), proposing that the pattern denotes a company expanding with major potential growth opportunities. Nonetheless, as the cash generated by operating activities is inadequate to fund the investing activities, the company sources the funds by turning to finance activities. Gup and Samson (1993) described that investors in the company believe the investment will be repaid from the investment opportunities, further investing in new shares or granting advances to the company.

The chi-square test for independence signified a significant link between CFP5 (-,-,+) and financial distress ($\chi^2_{(1,n=24)} = 8.015$, $p = .005$). Companies exhibiting the cash flow pattern may face temporary financial difficulty following insufficient cash generation from operations. Thus, the companies mitigate the situation by borrowing to fund the investments in fixed assets or investments to generate future income. Kordestani et al. (2011) stated that the pattern would cause financial depression within a short period as the companies fail to meet mounting debts.

5.3. Binary Logistic Regression

The binary logistic regression analysis was employed to evaluate the effect of the cash flow patterns on the probability that the companies will experience financial distress. Nevertheless, before the binary logistic regression analysis, the study assessed any multicollinearity issue. Multicollinearity exists when the independent variables are highly correlated. Logistic regression is sensitive to extremely high correlations in the predictor variables. Multicollinearity complicates assessing which predictor is more significant than the other.

Apart from CFP2 (+,-,-), all other predictor variables indicated a tolerance value exceeding .10, denoting multicollinearity is not a problem for CFP1, CFP3, CFP4, CFP5, CFP6, CFP7, and CFP8. The CFP2 revealed a tolerance value of less than .10, suggesting a multicollinearity issue. Tabachnick and Fidell (2014) proposed eliminating one or more redundant variables from the model to avoid multicollinearity. Thus, the binary logistic regression analysis excluded CFP2 in the model, including only seven independent variables: CFP1, CFP3, CFP4, CFP5, CFP6, CFP7, and CFP8. Table 3 illustrates the regression results of the pooled five-year data before the distress year for 12 distressed companies and 12 healthy companies.

Table 3.
Binary logistic regression analysis (prediction model).

		B	**S.E.**	**Wald**	**df**	**Sig**	**Odds ratio**	**95% CI for EXP(B)**	
							Exp (B)	Lower	Upper
CFP1	(+,+,-)	0.687	0.631	1.185	1	0.276	1.989	0.577	6.856
CFP3	(+,-,+)	-0.135	0.639	0.044	1	0.833	0.874	0.250	3.056
CFP4	(-,+,+)	1.514	0.794	3.634	1	0.057*	4.545	0.958	21.562
CFP5	(-,-,+)	2.045	0.624	10.728	1	0.001***	7.727	2.273	26.268
CFP6	(-,+,-)	1.920	0.893	4.620	1	0.032**	6.818	1.184	39.251
CFP7	(-,-,-)	1.226	0.740	2.747	1	0.097*	3.409	0.799	14.538

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		B	S.E.	Wald	df	Sig	Odds ratio	95% CI for EXP(B)	
CFP8	(+,+,+)	22.024	28420.721	0.000	1	0.999	#		
Constant		-0.821	0.362	5.149	1	0.023**	0.440		
Overall tests of model									
Omnibus tests of model coefficients				0.002					
Chi-square				22.544	7				
Hosmer and lemeshow test				1.000					
-2 Log likelihood				143.811					
Cox & Snell R square				0.171					
Nagelkerke R square				0.228					

Note: *** Significant at the 1 per cent level, ** Significant at the 5 per cent level, * Significant at the 10 per cent level
#Above 1.0 million.

The full model comprising all the predictors was statistically significant $\chi^2_{(7,n=24)} = 22.54$, $p = .002$, suggesting that the model could distinguish between the cash flow pattern of distressed companies and healthy companies. The model explained 17.1% (Cox and Snell *R* Square) and 22.8% (Nagelkerke *R* Square) of the variance in financial distress and correctly classified 69.2% of cases.

Table 3 presents four independent variables: CFP4, CFP5, CFP6, and CFP7, suggesting a unique, statistically significant contribution to the model. The strongest predictor for financial distress was CFP5 (-,-,+), with an odds ratio of 7.727, suggesting over seven times more likely to predict financially distressed companies than healthy companies, controlling all other factors in the model. Subsequently, CFP6 (-,+,-) recorded an odds ratio of 6.818 in predicting financial distress, suggesting that CFP6 is over six times more likely to predict financially distressed companies than healthy companies, controlling all other factors in the model.

Although the link between CFP6 and financial distress could not be statistically determined in the earlier chi-square test, the binary logistic regression analysis presented that CFP6 could predict financial distress. Additionally, CFP4 (-,+,+) denoted an odds ratio of 4.545, proposing that CFP4 is four times more likely to predict financially distressed companies than healthy companies, controlling all other factors in the model. Finally, CFP7 (-,-,-) exhibited an odds ratio of 3.409, indicating three times higher probability to predict financially distressed companies than healthy companies when controlling all other factors in the model.

The study then analysed whether the cash flow patterns can predict financial distress.

Table 3 illustrates that CFP1 (+,+,-) signified no significant association with financial distress at the significance level of 5% ($p = .276$). Therefore, CFP1 cannot predict financial distress. The findings contradicted Gup and Samson (1993), Bruwer and Hamman (2005), Jantadej (2006), Kordestani et al. (2011), and Shamsudin and Kamaluddin (2015), whereby the cash flow pattern more likely occurred when a company is financially distressed.

The results from CFP1 might be due to various factors. First, the companies perform well due to the ability to generate positive operating cash flows. The positive investing cash flows might be caused by disposing of fixed assets or investments for capital appreciation or a downsizing exercise. The companies may also be receiving funds from the repayment of advances by related companies. The negative cash flows from financing activities might be due to dividend payment to shareholders from dividend policy, typical for listed companies.

The CFP3 (+,-,+) results suggest no significant relationship with financial distress ($p = .833$) at the significance level of 5%. Thus, CFP3 is not a good predictor of financial distress. The results opposed Shamsudin and Kamaluddin (2015), which denotes a company in financial distress. Nevertheless, the

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results confirmed Bruwer and Hamman (2005), Jantadej (2006), and Kordestani et al. (2011), stating that only healthy companies experience the CFP3 pattern. Generally, companies obtain borrowings to prevent financial distress and expand to generate future income.

The results suggested that CFP4 (-,+,+) is a predictor of financial distress due to the significant relationship with financial distress (p = .057) at the significance level of 10%. The results align with Bruwer and Hamman (2005) and Kordestani et al. (2011), whereby the cash flow pattern usually occurs in distressed companies. Jantadej (2006) debated that companies in the situation possess cash deficits, thus attempting to dispose of fixed assets and generate money through borrowings to compensate the cash deficits from operations. Dickinson (2011) described the pattern at the decline stage as a decline in long-term assets denoting decreased growth potential. Contrarily, Shamsudin and Kamaluddin (2015) discovered no financial distress for the specified cash flow pattern, possibly because of the rare occurrence of the pattern in Malaysian public listed companies.

The findings suggested that CFP5 (-,-,+) indicated a significant relationship with financial distress, with a p-value of .001 at the significance level of 1%. Therefore, CFP5 could predict financial distress. A company with the specified cash flow pattern is not producing enough cash from operations. The negative cash flow from investing activities and positive cash flow from financing activities denote that the company might resort to borrowings to finance the investments in fixed assets and other investments to gain future income. The company might experience a risky situation in any economic downturn, whereby the investments might not produce the expected returns, causing debt accumulation that the company cannot resolve. The findings confirmed Kordestani et al. (2011), arguing that companies with the cash flow pattern would face financial depression within a short period upon failing to service the accumulating debts.

The CFP6 (-,+,-) results also suggested a significant relationship with financial distress with the p-value of .032 at the significance level of 5%. Thus, CFP6 can predict financial distress. The CFP6 denotes a company facing severe financial issues, resorting to selling fixed assets and investments to finance the operations and service debts. The risk includes the company exhausting the assets and investments to sell and worsening financial circumstances upon failure to generate enough cash from operating activities to fund the operations and debts repayment. The findings aligned with Bruwer and Hamman (2005) and Jantadej (2006). Similarly, Dickinson (2011) claimed that companies with CFP6 are at the decline stage, signifying that the company is shrinking.

The study also revealed that CFP7 (-,-,-) exhibited a significant relationship with financial distress at the significance level of 10% (p = .097). Thus, CFP7 can predict financial distress. The finding confirmed Gup and Samson (1993), Bruwer and Hamman (2005), Jantadej (2006), Kordestani et al. (2011), and Shamsudin and Kamaluddin (2015). The studies proposed that companies with the cash flow pattern faced serious financial difficulties with a higher tendency of bankruptcy. Equally, the shake-out stage in the life cycle was identified by Dickinson (2011) for companies experiencing CFP7.

The findings denoted that CFP8 (+,+,+) did not significantly correlate with financial distress (p = .999) at the significance level of 5%. Therefore, CFP8 cannot predict financial distress, as suggested by Kordestani et al. (2011) and Shamsudin and Kamaluddin (2015). The CFP8 pattern reflected an unusual situation of a cash-rich company accumulating cash from operations, selling fixed assets or investments, and loan drawdowns. Steyn Bruwer and Hamman (2008) mentioned that CFP8 is an extraordinary pattern and only temporary. Jantadej (2006) suggested the pattern might not be a useful predictor of financial distress, indicating a company intends to hold a vast amount of cash for future profitable investment plans, business expansion, or repayment of long-term debts that might be due in the near future.

6. Conclusion

The study aims to formulate an efficient method to predict financial distress by employing the cash flow statement without performing ratio analysis. Based on the bleak economic outlook exacerbated by the pandemic since early 2020, Malaysia experienced the closure of many companies and rising

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unemployment in numerous sectors. Thus, companies should predict financial distress to identify measures to mitigate or resolve the situation. A simplified method involves monitoring the cash flow statement. Therefore, the study examined the connection between cash flow patterns and financial distress in public listed companies in Malaysia and determined whether the cash flow patterns are effective predictors of financial distress in Malaysian public listed companies.

The first objective analysed the link between cash flow patterns and financial distress in Malaysian public listed companies. The results suggested that CFP2, CFP3, and CFP5 significantly associated with financial distress. The CFP2 (+,-,-) indicated a higher frequency in healthy companies than distressed companies. The CFP2 denoted a profitable company that produces positive cash from its operations and utilises the surplus cash for investments, dividend payments, or debt servicing. Similar findings were noted for CFP3 (+,-,+) as companies with the pattern are at the growth stage. Meanwhile, CFP5 (-,-,+) is more likely in financially distressed companies than healthy companies. Companies with the pattern will ultimately become financially distressed within a short period from the inability to serve accumulating debts.

The second objective examined the effectiveness of cash flow patterns in predicting financial distress in Malaysian public listed companies. The results suggested that CFP4, CFP5, CFP6, and CFP7 could predict financial distress. Companies with CFP4 (-,+,+) patterns are at the decline stage. Investors are only interested in investing in the companies if they are confident that the negative cash from operating activities is temporary. Nonetheless, selling non-current assets suggests the companies are not in a growth stage, signalling prolonged negative operating cash flow and ultimately losing investors' confidence.

Companies under CFP5 (-,-,+) experience financial distress, consistently reporting negative cash flows from operations with insufficient cash to rollover working capital. For business continuity, the company turns to bank borrowings to counteract the cash deficit to fund operations or gain financing to fund the investment in fixed assets or other investments that could generate future income. Nonetheless, during an economic downturn, the investments might not produce the expected returns, and the company might possess mounting debts, eventually leading to its collapse from the financial distress.

The results demonstrated that CFP6 (-,+,-) denoted a significant relationship with financial distress and can predict financial distress. When the economy faces a downturn, a company experiencing the cash flow pattern experiences a serious financial problem upon failing to raise sales to produce enough cash from operations. The company also might exhaust fixed assets to sell to produce cash to fulfil financing needs and fail to gain financing during the declining phase, as investors begin realising that the company faces financial difficulty. The declining incoming cash flows worsen the company situation, causing exigency.

Finally, CFP7 (-,-,-) exhibited a significant relationship with financial distress and can predict financial distress. Companies with the pattern are in the shake-out stage. The pattern continues for only a limited period, possible only with internal cash reserves to sustain the company, which eventually depletes upon failure to generate enough operating cash inflows.

The study has several limitations. First, the sample size is small as it involves the PN17 and GN3 companies as of 31 May 2020 only. Furthermore, the number is reduced by factors such as the availability of five-year financial data for the selected companies and each financial year data should comprise one full year accounting cycle. A small sample size could lower the statistical power of a study, causing less accurate parameter estimates and reducing the probability of fulfilling the research objectives.

Second, the study excluded control variables in the model, which could influence the outcome. Apart from cash flows, various other factors might impact company performance, such as total assets and revenue. Third, the data is solely based on the cash flow patterns- different combinations of cash flow from operating activities, investing activities, and financing activities without including the magnitude

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of cash flows across the elements or the changes of the cash flow elements over time, which could indicate signs of financial distress.

Future studies should expand the number of companies in the sample to gain a more accurate result. Data can be gathered according to companies under PN17 and GN3 over a certain period to expand the sample size, and the data collection can be increased to five years instead of the three years as in past studies. Future studies should combine financial ratios with the cash flow patterns in the analysis to gain more predictive results for financial distress as the financial performance of a company depends on the cash flows, income statement, and balance sheet components. Ratios such as the liquidity ratios and the debt ratios are good indicators of financial distress. Combining both methods could produce an interesting avenue for future research.

The magnitude of the cash inflow and outflow across the cash flow elements can also predict financial distress. Positive cash flows from all three elements could signify a healthy company. Nonetheless, the magnitudes of the cash flows might be small, which is detrimental if the company needs to repay debts in subsequent years. The situation may not be apparent by solely observing the cash flow pattern. Thus, future research should analyse the magnitude of the cash inflow and cash outflow to predict financial distress.

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