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The use of ratios derived from the statement of cash flows and profitability ratios in forecasting financial distress

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Abstract : *This research aims to reach the best set of ratios derived from the list of cash flows and profitability ratios that can be used to predict the distress of industrial companies listed on the Iraq Stock Exchange at an early date in order for the management to intervene to take appropriate corrective measures, and to achieve this, (22) were used. Ratio, for a sample consisting of 8 companies, half of which are distressed and the other half are non - distressed, for the period (2017-2018). (5) ratios were reached, through which the research objectives could be achieved, and the following model was formulated:*

Z = 28.431 x 1 + 11.514 x 2 + 2.233 x 6-9.587 x 10-29.365 x 17

The accuracy of the model was also tested in predicting the distress of industrial companies listed on the Iraq Stock Exchange a year before the distress, and the degree of accuracy was 87.5%.

INTRODUCTION: Financial distress is considered a dangerous indicator facing economic units and other associated parties, which will affect the imposition of the continuity of these economic units, so the management, at its various levels, should find an appropriate way for the purpose of early forecasting of the distress of the economic unit, and it is worth noting that the departments have tools for the forecasting process It is known as the financial ratios that are derived from the content of the financial statements and which act as a warning device that alerts the decision-makers in those units to take an appropriate series of decisions to reduce the phenomenon of financial distress that the economic unit may be exposed to. Financial ratios express a mathematical relationship between two values or two items of the content of the financial statements, By analyzing the financial ratios of these lists, you can assess the financial position of the economic unit and its performance during a specific period of time, and the aim of this research was to assist the departments of companies operating in the Iraqi industrial sector in early prediction of their financial stumbling, especially that the companies of this sector suffer from continuous defaults. Due to the lack of the Iraqi industrial environment for the legislation that regulates its work, as well as the weakness of government support, especially with regard to the settlement The government provided to these companies, due to the inability of their departments to advance their reality on the financial and financing side, so it was free to search for ways to foresee that phenomenon, and the trend was to adopt ratios derived from the list of cash flows and profitability ratios because of the importance that these ratios bear in the process of forecasting financial distress For economic units depending on the monetary and merit basis together, and in order to achieve the objectives of this research it was divided into four sections, the first topic dealt with the research methodology, while the second topic dealt with the theoretical side of this research by focusing on the list of cash flows and profitability and their indicators and the concept of forecast and the relationship between forecasting financial distress and the rates of flows Criticism and profitability ratios. As for the third topic, it included analyzing the results of the research and testing its hypotheses, and the fourth topic addressed the most important findings and recommendations of the research.

1- Topic One: Research Methodology: -

1-1- Research problem:-

The research problem is represented in the insufficiency of financial ratios derived from the financial position and income lists, which are adopted in the process of predicting financial distress in a large number of researches, as they interpret the results on the basis of merit only, and thus predicting financial distress in a manner that is not objective, and the research problem is summarized by the following questions:

1-What are the cash flow and profit rates appropriate to the requirements of the industrial environment in Iraq؟

2-Do cash flow and profitability ratios help in predicting the financial distress of the Iraqi industrial companies?

1-2- Research objective :

The research aims at the following :

1- A statement of the concept of cash flows, their importance and most important indicators.

2-Knowing the concept of profitability, its importance and indicators.

3-Knowing the prediction of financial distress in terms of the concept and the factors affecting it.

4-Using the cash flow and profitability ratios to help predict the financial distress of the industrial companies listed on the Iraq Stock Exchange by formulating a model that predicts the financial distress of the companies a year before the distress.

1-3- Importance of research:

The importance of research can be demonstrated through the following- :
1-The importance of cash flow and profitability ratios by combining the cash basis and the accrual basis, and using those ratios in forecasting the financial distress of economic units.
2- Predicting financial distress, helping the departments of Industrial economic units to adopt appropriate preventive or corrective decisions in a timely manner.
3- Predicting financial distress helps in perpetuating the continuity of the economic unit and sends confidence to current and prospective investors and creditors.

1-4- Research hypothesis:

The research is based on a basic hypothesis that:
The ratios derived from the list of cash flows and profitability ratios can be used in forecasting the financial distress of industrial companies listed on the Iraq Stock Exchange by formulating a predictive model that can predict the financial distress a year before its occurrence.

Table (1) Sample of distressed companies and non-distressed companies

Distressed companies	Non-distressed companies
1- Modern Chemical Industries Company	1- Iraqi Carpet and Furniture Company
2- The Iraqi Company for Engineering Works	2- The Modern Sewing Company
3- Metal Industries and Bicycles Company	3- Ready-Made Clothes Company
4- The Iraqi Company for Manufacturing and Marketing Dates	4- Al-Kindi Company for the Production of Veterinary Vaccines

Source: Prepared by the researchers, depending on the Iraq Stock Exchange website.

1-5-Research limits:

1-Spatial boundaries: The spatial limits of research are the industrial companies listed on the Iraq Stock Exchange.
2-Temporal limits: The research is applied for the financial period (2017-2018).

1-6- Research style and method

In order to cover all aspects related to the research, the descriptive method was used in order to develop a conceptual framework for the research variables through the available Arab and foreign sources. On the practical side, a number of ratios derived from cash flows and profitability ratios were adopted to predict the financial distress of the companies. The method of multiple discriminatory analysis on the statistical program (SPSS) to find out which ratios have greater predictive power than other ratios.

2- Previous studies.

2-1-Otom, 2014, (Predicting Financial Distress using financial Ratios In Companieslistedin Nairobi Stock Exange (2003-2011))

The aim of this study is to confirm the possibility of using financial ratios to predict financial distress in the non-financial sector of Kenyan companies listed on the Nairobi Stock Exchange. Several questions were raised, the most important of which is how good are the financial ratios in predicting financial distress? What are the most accurate ratios in predicting financial distress? The research period was from 2003-2011, and the research sample companies were classified into sound and distressed, and the method of statistical significance backward-graded to analyze financial ratios and the method of discriminatory analysis to predict distress. The study concluded that the ratios related to profitability, financial leverage and operational efficiency can predict Financial distress.

2-2- Kamaluddin, et al., 2019, (Financial Distress Prediction Through Cash Flow Ratios Analysis)

This study aims to examine the relationship of cash flow ratios in forecasting financially distressed companies in industrial and consumer products companies on the Bourse Malaysia as a sample. The study of financial distress is critical because it can lead to bankruptcy, most previous studies in Malaysia focus on traditional financial ratios, while this study exploits the strength of cash flow ratios, the liquidity ratio, solvency ratio, efficiency ratio and profitability ratio used in this study are derived from a statement Cash flow. The Altman Z score is used to measure the level of financial distress, the results show that cash flow ratios are reliable tools for predicting financial distress in Malaysia, as the study is useful in giving insights to stakeholders in decision-making.

2- The second topic.

2-1- The concept, significance and ratios of cash flows.

2-1-1- Concept of the statement of cash flows.

The cash flow statement can be viewed as a list that provides information about the cash receipts and payments of the economic unit during a certain period, where the difference between cash receipts and payments represents the amount of change in cash for this period in order to help investors and creditors to know the best sources of cash and its uses during the period (Spiceland, et. (2020: 168), and this list can also be expressed as a statement showing the real cash inflows and outflows of the economic unit during the fiscal year (Schmidlin, 2014: 25).

2-1-2-The significance of the cash flow statement.

The adoption of the statement of cash flows is due to a number of points which are as follows: (Qusis, Baradei , 2014: 54)

1- Provides information of different content and significance than what is provided by other lists.

2-The cash flow statement can exceed the effects produced by the accrual basis.

3- It avoids the impact of changes in price levels as a result of inflation.

4- It is considered an important source for a number of percentages related to the extent of efficiency in the administration's policies for its various activities.

2-1-3-Cash flow ratios.

There are a number of ratios derived from the statement of cash flows, which are used in data analysis of economic units, the most important of which are the following:

1-Ratios for assessing the quality of profits: - These ratios show the importance of the increase in cash generated from the operating activities of the economic unit, and that the high level of net income does not necessarily mean that the unit achieved a high cash flow and vice versa (Muhammad, 2013: 349).

2- Indicators for evaluating financing policies: - In the list of cash flows a lot of information appears through the analysis of financial ratios that are used in measuring the degree of efficiency of management in the field of financing policies (Al-Noubani, 2011: 48).

3-Ratios for assessing the quality of financial liquidity: - Using these ratios on a cash basis is considered the best representation of liquidity in general, because the cash that is available from operating activities includes the whole year, instead of the balance at one point in time (Kieso, et .al, 2011: 642)

4- Financial flexibility: - Refers to the ability of the economic unit to pay its obligations from its net cash flows available from its operating activities without the need to liquidate its assets used in its operations (Kieso, et .al, 2018, 373).

2-2- Concept, significance and profitability ratios

2-2-1-the concept of profitability.

Profitability is the increase in the revenues of the economic unit over its costs, or in other words, it is the amount of the excess of its assets over its liabilities (Saif al-Islam, 2018: 20).

Profitability is seen as a measure of the competitive position of the economic unit in the market and a measure of the quality of its management, the value of its issued securities, its ability to reap profits from its invested capital, and the focus of the efforts of financial analysts (Robinson, 2015: 329).

2-2-2-The significance of profitability.

The importance of profitability can be shown through the following: (Toshniwal, 2016: 177)

1-From the profitability analysis, the current and future earning capabilities of the economic unit can be explained.

2-The importance of profitability appears when it becomes a goal guiding the behavior of managers and employees.

3-Profitability assists users of outside accounting information in relation to their concerns about the statement of financial position and the degree of ability to maintain the health of the economic unit through net profits.

2-2-3 Profitability ratios.

Profitability ratios are used to assess the ability of economic units to generate profits from the operating cycle compared to the expenditures and other costs incurred by those units during a specific period of time, and they are two types as follows :

1-Percentages related to sales profitability: - The study of sales profitability, or as it is sometimes called (the revenue power of the economic unit), aims to identify the ability of the economic unit to generate profits through its sales (Muhammad, Others, 2000: 66).

2-Ratios related to the profitability of investment: - These ratios aim to judge the investment policies of economic units through their ability to achieve profitability using the funds available to them during the financial period (Al-Hubaity, Yahya, 2002: 111).

2-3- The concept of forecasting and the factors affecting it.

2-3-1- The concept of forecasting.

Forecasting is an essential input into the decision-making processes of operations management because it provides information on the future activity of the economic unit (Stevenson, 2012, 74).

Financial forecasting is the process of anticipating and estimating future financial events, results and operations that can be predicted based on the past performance of the economic unit and assessing its current conditions using historical financial information (Alwan, 2015: 67).

2-3-2-Factors affecting the forecasting process.

There are a number of factors that clearly affect the prediction process, and they can be explained as follows: (Fatih, 2014: 32)

1-- **Time**: the prediction of time is affected, as it is easy in the short term and difficult in the long term.

2-**Income**: It is necessary to know the movement of income during the next period of time and know its direction, as income affects purchasing power.

3-**Social and cultural developments**: These types of developments affect the consumption patterns within societies, and as a result they affect the nature and types of goods that are used within those societies.

4-**Geographical factor**: The one who makes the prediction should be aware of the nature of the climatic and geographical region in it, because the way of life varies according to geography.

5-**Technological development**: Evolution is the creation of products that meet the needs of modern societies, so it is necessary to know the course of this development and its effects.

6-**The degree of political and economic stability**: the more stable things are, the easier the prediction process will be.

7- **Competition**: You must know the strength, size and number of competitors.

2-4-The relationship between cash flow ratios and the prediction of financial distress.

Cash flow ratios indicate that the economic unit will be financially strong if it generates sufficient cash flows from its operations, and will distress financially and fail when it is unable to generate sufficient cash flows from those operations (Waqas, Rus, 2018: 3), The difficulty of generating cash flows occurs when the revenues of the results of its operations are not sufficient to cover the expenses of those operations, and it may also be due to the management as a result of its mismanagement of the cash flows, which can lead to the aggravation of the financial situation of the economic unit and its distress (Rinti, Yadiati, 2018: 150), so the relationship between the prediction of distress and the cash flow ratios can be known as an inverse relationship.

2-5- The relationship between profitability ratios and the prediction of financial distress.

One of the causes of financial distress is the decline in the profitability of the economic unit for successive years, and this can happen, because operating expenses are greater than the income obtained by the economic unit (Rinti, Yadiati, 2018: 150), as the decline in profitability ratios can lead to losses to the economic unit, This forces the unit to resort to additional borrowing to increase its need for liquidity, which leads to an increase in debt and thus accelerates the default of the economic unit (Kumer, 2017: 4), and thus the relationship between profitability ratios and the prediction of financial distress is an inverse relationship.

3-The third topic.

3-1- An introduction to the research sample companies.

3-1-1- An overview of distressed companies: A profile of the distressed companies can be clarified through the following table:

Table (2)

Co. / Details	Chemical for squeezing	Iraqi Engineering Works	National Metal Industries	Dates manufacturing
Co. Address	**Baghdad / Babel District / Behind Bata Factory / Mahalla 925 / Alley 8 / Building 28**	**Baghdad / Al-Wehda neighborhood / Mahala 904 / Alley 68**	**Baghdad / Mahmoudiya**	**Baghdad / Shaljia / behind the Baratha Mosque**
Date of Establishment	**19 / 6 / 1946**	**1/10/85**	**28 / 9 / 1964**	**29/ 1/ 1989**
Seed capital	**149,500**	**8,000,000**	**250,000,000**	**50,000,000**

Listing date	**25/ 7/ 2004**	**8/ 7/ 2004**	**25/ 7/ 2004**	**4/ 9/ 2004**
Capital upon listing	**60,000,000**	**240,000,000**	**4 billion**	**1,267,500,000**
The current capital	**180,000,000**	**1.5 billion**	**5 billion**	**17,250,000,000**
The nominal value of the share	**1 Iraqi dinar**	**1 Iraqi dinar**	**1 Iraqi dinar**	**1 Iraqi dinar**
Short symbol	**IMCI**	**IIEW**	**IMIB**	**IIDP**
The main activity	**Production of ethyl alcohol**	**Production of constructional and electrical materials**	**Producing metal materials and bicycles**	**Dates production and marketing**

Source: Prepared by the two researchers, depending on the data of the Iraq Stock Exchange.

3-1-2- An overview of non-distressed companies: A profile of non-distressed companies can be clarified through the following table:

Table (3)

Co. / Details	**Carpets and upholstery**	**Modern sewing**	**Ready-to-wear**	**Al-Kindi Vaccine Company**
Co. Address	**Baghdad / Industrial Zone / Al-Dawoodi / Al-Hamra District / M 622 / St. 28 / Building 52**	**Baghdad / Al-Waziriya / District 303 / Alley 10 / Building 2**	**Baghdad / Mahmoudiya / Main Street**	**Baghdad / Abu Ghraib / Akarkouf intersection**
Date of Establishment	**10/ 5/ 1989**	**14/ 2/ 1989**	**31/ 5/ 1976**	**10/ 1/ 1990**
Seed capital	**5,000,000**	**6,000,000**	**1,500,000**	**15,000,000**
Listing date	**25/ 7/ 2004**	**8/ 7/ 2004**	**25/ 7/ 2004**	**25/ 7/ 2004**
Capital upon listing	**500,000,000**	**900,000,000**	**360,000,000**	**360,000,000**
The current capital	**500,000,000**	**1 billion**	**1,593,000,000**	**5,940,000,000**
The nominal value of the share	**1 Iraqi dinar**	**1 Iraqi dinar**	**1 Iraqi dinar**	**1 Iraqi dinar**
Short symbol	**IITC**	**IMOS**	**IRMC**	**IKLV**
The main activity	**Production of carpets and upholstery**	**Production of clothes and blankets**	**Garment production and general trade**	**Production of veterinary vaccines**

Source: Prepared by the two researchers, depending on the data of the Iraq Stock Exchange.

3-2-Collecting data of troubled economic units and analyzing them in order to arrive at the ratios derived from the list of cash flows and profitability ratios and through the following table: -

Table (4)

No.	**Ratios**	**Engineering Works**	**Metal and bicycles**	**Chemical for squeezing**	**Produce dates**

		2017	2018	2017	2018	2017	2018	2017	2018
1-	Current debt coverage ratio	-0.580	0.662	-0.018	-0.072	0.048	0.065	-0.010	0.218
2-	Operating cash flow adequacy ratio	5.714	1.244	0.742	0.361	1.275	2.468	0.986	1.206
3-	The ratio of operating cash flows to capital expenditures	0	0	-295.087	-1.416	0.979	0.996	0	1.001
4-	Depreciation Impact Ratio	-1.321	0.642	-1.526	-0.284	3.210	0.031	-12.004	0.554
5-	The ratio of operating cash flows to net cash flows	3.307	0.989	1.006	1.001	-48.726	-294.876	0.184	-306.607
6-	Operating cash indicator	0.260	-1.510	0.091	-0.331	-0.062	-1.468	0.027	-0.356
7-	The percentage of operating flows	0.651	12.453	1.472	1.985	0	0	2.385	4.989
8-	Manual operational activity indicator	0.261	-2.450	0.095	0.408	-0.060	-1.468	0.038	-0.361
9-	Return on operating cash flow on assets	-0.029	0.059	-0.213	-0.153	0.0007	0.074	-0.002	0.043
10-	The ratio of return on operating cash flow to equity	-0.030	0.065	0.047	0.138	0.0007	0.075	-0.003	0.054
11-	Ordinary share of operating cash flow	-0.025	0.051	-0.014	-0.070	0.020	1.899	-0.002	0.066
12-	The interest rate and dividends received	0.484	0	0.002	-0.002	0.138	0.001	0	-0.0004
13-	Dividend ratio	0	0	0	0	0	0	0	0
14-	Fixed asset turnover rate	-0.035	0.075	-0.213	-1.439	0.034	0.781	-0.007	0.161
15-	The rate of working capital turnover	-0.235	0.502	0.047	0.161	0.0007	0.077	-0.005	0.102
16-	Debt Coverage Ratio	-0.028	0.060	-0.028	-0.150	0.0007	0.072	-0.011	0.049
17-	Percentage of gross profit from operations	-0.900	1.720	-3.431	-5.181	0	0	-0.134	-1.354
18-	Net Profit Ratio	-1.876	-1.619	-5.601	-10.568	0	0	-1.186	-2.400
19-	Return on total assets	-0.113	-0.039	-0.336	-0.461	-0.011	-0.050	-0.091	-0.122
20-	The rate of return on total assets	-1.137	-0.039	-0.336	-0.461	-0.011	-0.050	-0.091	-0.122
21-	Return on equity	-0.117	-0.043	0.524	0.418	-0.012	-0.057	-0.118	-0.153
22-	Distributions ratio	0	0	0	0	0	0	0	0

Source: Prepared by the two researchers, depending on the Iraq Stock Exchange website.

3-3-Collecting data of non-distressed economic units and analyzing them to arrive at the ratios derived from the list of cash flows and profitability ratios and through the following table: -

Table (5)

No.	Ratios	Carpets and upholstery		Modern sewing		Ready clothes		Canadian vaccines	
		2017	2018	2017	2018	2017	2018	2017	2018
1-	Current debt coverage ratio	0.418	0.013	1.620	1.092	0.841	0.248	6.370	-0.448
2-	Operating cash flow adequacy	3.340	1.022	3.041	1.963	1.056	1.041	1.971	0.852

	ratio								
3-	**The ratio of operating cash flows to capital expenditure**	**166.877**	**35.216**	**35.750**	**96.453**	**350.325**	**18.965**	**6.626**	**-0.148**
4-	**Depreciation Impact Ratio**	**0.049**	**0.724**	**0.071**	**0.045**	**0.022**	**0.027**	**0.192**	**-0.498**
5-	**The ratio of operating cash flows to net cash flows**	**1.006**	**1.029**	**1.028**	**1.010**	**0.980**	**1.029**	**0.948**	**2.651**
6-	**Operating cash indicator**	**1.899**	**0.043**	**1.527**	**1.687**	**2.901**	**2.649**	**4.309**	**-6.269**
7-	**The percentage of operating flows**	**6.075**	**652.056**	**3.616**	**15.992**	**473.550**	**91.065**	**1.727**	**1.880**
8-	**Manual operational activity indicator**	**1.132**	**-0.621**	**1.274**	**1.324**	**2.386**	**1.439**	**4.025**	**1.480**
9-	**Return on operating cash flow on assets**	**0.138**	**-0.004**	**0.281**	**0.288**	**0.164**	**0.101**	**0.129**	**-0.042**
10-	**The ratio of return on operating cash flow to equity**	**0.207**	**-0.006**	**0.340**	**0.391**	**0.020**	**0.171**	**0.132**	**-0.047**
11-	**Ordinary share of operating cash flow**	**0.869**	**0.026**	**0.528**	**0.805**	**0.024**	**0.220**	**0.144**	**-0.097**
12-	**The interest rate and dividends received**	**0**	**0**	**0.021**	**0.036**	**-0.001**	**-0.0009**	**0.100**	**0.072**
13-	**Dividend ratio**	**1.899**	**0.043**	**1.527**	**1.687**	**0.290**	**2.649**	**4.309**	**-6.269**
14-	**Fixed asset turnover rate**	**5.350**	**0.170**	**1.522**	**2.508**	**0.025**	**0.230**	**0.536**	**-0.170**
15-	**The rate of working capital turnover**	**0.227**	**-0.006**	**0.519**	**0.547**	**0.125**	**0.775**	**0.183**	**-0.063**
16-	**Debt Coverage Ratio**	**0.147**	**-0.004**	**0.300**	**0.344**	**0.017**	**0.120**	**0.132**	**-0.439**
17-	**Percentage of gross profit from operations**	**31.511**	**250.017**	**3.450**	**9.148**	**27.684**	**4.040**	**0.584**	**0.275**
18-	**Net Profit Ratio**	**2.240**	**329.888**	**1.589**	**4.649**	**8.783**	**1.362**	**0.197**	**0.051**
19-	**Return on total assets**	**0.073**	**0.095**	**0.193**	**0.179**	**0.593**	**0.040**	**0.043**	**-0.009**
20-	**The rate of return on total assets**	**0.086**	**0.112**	**0.228**	**0.021**	**0.068**	**0.046**	**0.047**	**-0.009**
21-	**Return on equity**	**0.109**	**0.139**	**0.222**	**0.231**	**0.070**	**0.064**	**0.030**	**-0.007**
22-	**Distributions ratio**	**1**	**1**	**0.950**	**0.949**	**0.955**	**0.948**	**0.697**	**0.729**

Source: Prepared by the researchers, depending on the Iraq Stock Exchange website.

3-4- Inputs discriminant analysis.

As noted through the previous presentation of the results of the economic activity of industrial companies, the research sample during the period between 2017-2018, when eight industrial companies were obtained, which were divided into two groups, each group consisting of four industrial companies. The two groups (distressed industrial companies)

and (non-distressed industrial companies), which are shown in Table No. (1), faltering and non-performing economic units, and thus the inputs of the discriminatory analysis consist of two types:

1-**The dependent variable:** It is represented by distressed economic units, which will be given (0), while non-distressed companies will be given (1).

2-**The independent variable:** It is represented by the financial ratios represented in Table No. (6).

Table (6)

No.	Variable symbol	Financial ratio	The equation
1	x1	Current debt coverage ratio	Net operating cash flows / current liabilities
2	x2	Operating cash flow adequacy ratio	Cash inflows from operating activities / basic cash requirements
3	x3	The ratio of operating cash flows to capital expenditure	Net operating cash flow / cash outflow for investment expenditures
4	x4	Depreciation Impact Ratio	Depreciation expense / net operating cash flow
5	x5	The ratio of operating cash flows to net cash flows	Net operating cash flow / gross net cash flow
6	x6	Operating cash indicator	Net operating cash flow / net income
7	x7	The percentage of operating flows	Total cash flow from operating activities / net sales
8	x8	Manual operational activity indicator	Net operating cash flow / operating profit before interest and tax
9	x9	Return on operating cash flow on assets	Net operating cash flow / total assets
10	x10	The ratio of return on operating cash flow to equity	Net cash flow from operating activities / equity
11	x11	Ordinary share of operating cash flow	Net Operating Cash Flow - dividend of preferred stock / number of common stock
12	x12	The interest rate and dividends received	Cash receipts realized from interest income and dividends / cash inflows from operating activities
13	x13	Dividend ratio	Net cash flow from operating activities / dividends to shareholders
14	x14	Fixed asset turnover rate	Net operating cash flow / total fixed assets
15	x15	The rate of working capital turnover	Net operating cash flow / average working capital
16	x16	Debt Coverage Ratio	Net cash available from operating activities / average total liabilities
17	x17	Percentage of gross profit from operations	Gross profit / net sales
18	x18	Net Profit Ratio	Earnings after interest and taxes / net sales
19	x19	Return on total assets	Net profit after tax / total assets
20	x20	The rate of return on total assets	Earnings Before Interest and Taxes / Total Assets
21	x21	Return on equity	Net profit / equity
22	x22	Distributions ratio	Stock dividend / net profit after tax

Source: Prepared by the researchers.

3-5-The normal distribution test for the study sample should be clarified whether the study sample follows the normal distribution, that is, the data representing the variables follow the normal distribution. So this assumption is considered one of the basic assumptions affecting the validity and accuracy of the discriminatory function as shown in Table No. (7).

Table (7)

	Most Extreme Differences			Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)
	Absolute	Positive	Negative		
x1	.500	.500	-.250	.707	.699

x2	.500	.250	-.500	.707	.699
x3	.750	.750	0.000	1.061	.211
x4	.500	0.000	-.500	.707	.699
x5	1.000	1.000	0.000	1.414	.037
x6	.750	.750	-.250	1.061	.211
x7	.750	.750	0.000	1.061	.211
x8	1.000	1.000	0.000	1.414	.037
x9	.750	.750	0.000	1.061	.211
x10	.750	.750	-.250	1.061	.211
x11	.500	.500	-.250	.707	.699
x12	.500	.500	-.250	.707	.699
x13	.750	.750	-.250	1.061	.211
x14	.500	.500	0.000	.707	.699
x15	.750	.750	-.250	1.061	.211
x16	.750	.750	-.250	1.061	.211
x17	.750	.750	0.000	1.061	.211
x18	1.000	1.000	0.000	1.414	.037
x19	1.000	1.000	0.000	1.414	.037
x20	1.000	1.000	0.000	1.414	.037
x21	.750	.750	-.250	1.061	.211
x22	1.000	1.000	0.000	1.414	.037

It is evident from the above table that there are some independent variables, the level of significance was less than 5%. Since the sample size is less than 30, these variables cannot be adopted, so the researchers excluded those variables represented by the following variables (x5, x8, x18, x19.x20, x22).

3-6-Analysis of variance of the independent variables.

For the purpose of demonstrating the availability of statistically significant differences between the averages of the independent variables, and that analysis of variance was performed for the independent variables separately and for both groups. As it is evident through the results of the covariance test that the difference between the averages of the independent variables of the two groups had no significant effect. This was confirmed by (sig> 0.05), in addition to the high values Wilks' Lambda, whose value approached one, and this also confirms the insignificance of the averages of the independent variables for the two groups as in Table (8).

Table (8)

Tests of Equality of Group Means

	Wilks' Lambda	F	df1	df2	Sig.
x1	0.994	0.036	1	6	0.856
x2	0.994	0.036	1	6	0.855
x3	0.712	2.426	1	6	0.170
x4	0.778	1.710	1	6	0.239
x6	0.960	0.251	1	6	0.634
x7	0.630	3.527	1	6	0.109
x9	0.798	1.522	1	6	0.263
x10	0.865	0.938	1	6	0.370
x11	0.975	0.154	1	6	0.708
x12	0.717	2.368	1	6	0.175
x13	0.999	0.007	1	6	0.937
x14	0.846	1.090	1	6	0.337
x15	0.768	1.815	1	6	0.227

x16	0.996	0.026	1	6	0.876
x17	0.513	5.690	1	6	0.054
x21	0.981	0.116	1	6	0.746

3-7-The variables involved in the discriminatory analysis.

As Table (9) shows the variables included in the discriminatory analysis, depending on the values of f, and Wilks' Lambda.

Table (9)

Variables Entered/Removed[a,b,c,d]

Step	Entered	Wilks' Lambda							
		Statistic	df1	df2	df3	Exact F			
						Statistic	df1	df2	Sig.
1	x17	0.513	1	1	6.000	5.690	1	6.000	.054
2	x1	0.153	2	1	6.000	13.805	2	5.000	.009
3	x2	0.030	3	1	6.000	42.863	3	4.000	.002
4	x10	0.003	4	1	6.000	220.833	4	3.000	.000
5	x6	0.001	5	1	6.000	375.348	5	2.000	.003

At each step, the variable that minimizes the overall Wilks' Lambda is entered.

a. Maximum number of steps is 32.

b. Minimum partial F to enter is 3.84.

c. Maximum partial F to remove is 2.71.

d. F level, tolerance, or VIN insufficient for further computation.

It is clear from Table No. (9) that the number of steps the program took for the purpose of extracting the independent variables is (32) steps and that the number of input variables identified by the program amounted to (5) variables only out of (16) variables where the first variable was x17 as its significance Less than (1%) as it got the highest value out of its Wilks' Lambda tally. As for the rest of the independent variables, they were respectively (x1, x2, x10, and x6), as their significance was less than (5%), while the rest of the independent variables were excluded from the discriminatory analysis.

3-8-The eigenvalues and the significance of the discriminative function.

Table No. (10) shows the value of the legal correlation, which was close to one, as this value shows the amount of discriminatory power of the model, as its amount was equal to (0,999).

Table No. (10) also shows the amount of the discriminant function (938.371), as this value indicates the great importance, and thus it can be said that the discriminant function has a good performance.

Table (10)

Eigenvalues

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	938.371[a]	100.0	100.0	.999

a. First 1 canonical discriminant functions were used in the analysis.

3-9-Significant discriminatory function.

Table No. (11) shows the extent of the function's ability to distinguish between the two groups, and is this ability to distinguish due to chance, or is the difference between the two groups a fundamental difference where we notice that Wilks' Lambda's value reached (.001) which is close to the row, as it reached Chi-square value (23.958), with significance less than 5%. This confirms that the discriminatory function has a good ability to distinguish between the two groups and that the difference between them is a fundamental difference and not due to chance.

Table (11)

Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-square	Df	Sig.
1	.001	23.958	5	.000

3-10-Standard discriminant equations.

Table No. (12) shows the standard differential coefficients for the discriminatory function, as it is possible to know the level of influence of the independent variables on the model, as the value of the coefficients was large and as in Table

No. (12) and the effect of these coefficients differed between the positive effect and the negative effect, and as shown in the following differential function :

Table (12) Standardized Canonical Discriminant Function Coefficients

	Function
	1
x1	28.431
x2	11.514
x6	2.233
x10	-9.587
x17	-29.365

Through Table No. (12), the discriminative function can be formulated as follows:

$$Z = 28.431x_1+11.514x_2+2.233x_6-9.587x_{10}-29.365x_{17}$$

3-11-Determine the cut-off points and verify the classification.

After determining the discriminatory function for the purpose of classifying groups into troubled and healthy companies by compensating for the values of financial ratios in the discriminatory function of one of the economic units, a degree of discrimination will be produced for this economic unit, as this degree will be compared with the cut-off point to find out this economic unit belongs to any group, whether She was healthy or stumbling. Table No. (13) shows the watershed.

Table (13)
Functions at Group Centroids

Y	Function
	1
.00	26.529
1.00	-26.529

Table No. (13) shows that whenever the degree of discrimination for the economic unit is from 26,529, then the economic unit is classified within the distressed economic units, but if the degree of discrimination for the economic unit is close to -26,529, then the economic unit is classified within the sound economic institutions (non-distressed).

3-12-Classification results.

It is clear through the results obtained in Table No. (14), which displays the number of distressed and non-distressed economic units represented by four distressed economic units and four other non-performing economic units. It was found that the classification is 100% accurate.

Table (14) Classification Resultsa,c

		Y	Predicted Group Membership		Total
			.00	1.00	
Original	Count	.00	4	0	4
		1.00	0	4	4
	%	.00	100.0	.0	100.0
		1.00	.0	100.0	100.0

a. 100.0% of original grouped cases correctly classified.

Applying the model to the year 2017, that is, a year before the distress, and the results were as follows:

No.	Co.	Actual classification	Model classification	Prediction correctness
1	**Modern Chemical Industries Company**	**Distressed**	**Distressed**	**True**
2	**The Iraqi Company for Engineering Works**	**Distressed**	**Distressed**	**True**
3	**Metal Industries and Bicycles Company**	**Distressed**	**Distressed**	**True**
4	**The Iraqi Company for**	**Distressed**	**Distressed**	**True**

	Manufacturing and Marketing Dates			
5	**Iraqi Carpet and Furniture Company**	**Non- distressed**	**Non- distressed**	**True**
6	**The Modern Sewing Company**	**Non- distressed**	**Non- distressed**	**True**
7	**Ready-Made Clothes Company**	**Non- distressed**	**Non- distressed**	**True**
8	**Al-Kindi Company for the Production of Veterinary Vaccines**	**Non- distressed**	**Distressed**	**False**

Model prediction score = **87.5%.**

4- Topic Four: - Conclusions and Recommendations:

4-1- Conclusions:

1-The use of multiple methods to form differential functions for predicting financial distress contributes to reaching functions that would achieve the prediction process with the least possible error and thus give a clear picture of the current and future financial conditions that help in making rational decisions.

2- The high phenomenon of financial default of companies, the research sample, is due to the lack of legislation for the industrial sector, a law urging companies to use models for financial default, which help in early prediction.

3-The increase in the accuracy of the forecasting process is affected whenever the annual financial reports issued by the companies, the research sample is complete and prepared according to the approved standards and rules that are applicable globally and locally.

4-Predicting the stumbling of companies before an appropriate period contributes to addressing the defect points and thus contributing to their development and growth.

4-2- Recommendations.

1- The necessity to emphasize the preparation of the list of cash flows by economic units due to the importance of their information.

2- Application of the predictive model reached by the researchers by the companies for the purpose of predicting the financial failure before it occurs so that the appropriate corrective measures can be taken.

3-The necessity of adopting ratios derived from the list of cash flows and urging companies to use them as inputs in the process of predicting companies 'default.

4-The necessity of emphasizing on companies using a mixture of ratios and not relying solely on traditional ratios in the processes of forecasting the financial distress of economic units.

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