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## Prediction of Financial Failure and Economic Continuity Using the CAMELS Standard and Time Series: An Analytical Approach

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### Abstract

*The study aimed to investigate the prediction of financial failure (FF) and evaluate the performance and classification of banks to provide an early warning system for future financial failure. The study relied on time series (TS) and the Camel criterion to predict financial failure, which relies on a set of traditional indicators. The sample includes eight Iraqi banks listed on the Iraq Stock Exchange for 2010-2020. The results indicated that financial indicators help auditors assess the continuity of banks, and the results of indicators (financial and operational) indicate uncertainty about banks by determining their ability to continue. The study provides evidence of the importance of auditors adopting early warning methods for bank failure. The significance of the study comes from the importance of the Iraqi banking sector and its central role in Iraq. The study highlights many obstacles and problems that lead to failure and the inability of banks to continue.*

### 1. Introduction

Due to the environment surrounding the organisation, which can cause a high risk, FF is a condition facing most economic units; this is reflected negatively and is more likely to make the organisation fail. The inability of the economic unit to pay its obligations on time and the expansion of borrowing lead to significant losses borne by the economic unit, which is called failure. Thus, it exposes them to bankruptcy and liquidation [7]. Therefore, FF is defined as the state of imbalance facing the economic unit because of its inability to pay its short-term obligations on time. According to [24], it can also be regarded as a weakness of resources of the resources available, whether internal or external. This imbalance may vary or permanent the casual balance, as the more difficult it is to overcome economic instability, the more structural imbalance it is [23]. Explained to the FF that the cash flow cannot pay the obligations incurred by exaggeration in using lift and tide ratios as the economic unit intends to obtain a high profit. In managing the unit's economic activities, the manifestations indicate that the economic unit is destined to FF due to the lack of weak administrative and financial competencies. Some units follow traditional methods without relying on advanced and modern technology, making them unable to compete in the market [17]. This occurs in the financial situation of the economic unit, such as increased financial leverage or dependence on short-term debt

of manifestation [14]. The FF consists of three types: the failure of business the failure that occurs through a range of problems; a failure which occurs when the economic unit is unable to cover the costs incurred by the passengers [26]; administrative failure: this type of failure has weak capacity and efficiency of the administrative system of economic unit [8]. The stages of FF are five according to [22]: the stage of feeling the emergence of the problem (the appearance of the exhibitor), the phase of the liquidity deficit, the insolvency phase, the total insolvency phase, and the classifying phase (Bankruptcy). Private Banks have been of the utmost importance to the economic sector, striving to attract many investments and contribute to supporting and diversifying economic resources in various fields [21]. This is experienced due to the events and circumstances that affect those banks, whether those events are political, economic or other social impacts which lead to FF. So, it is necessary to determine their ability to continue during a specific period and use scientific methods to help us predict the FF of these banks to take corrective actions appropriately. Therefore, this study needs to provide help for the private banks in the process of predicting FF. This can be achieved by relying on scientific methods in performance evaluation and forecasting FF. This study examined the classification of the equations of the Camels standard (CS) and the evaluation of the performance of banks, which consists of five financial indicators. FF will be predicted using traditional methods in FF forecasting. Thus, it is imperative to investigate the result of the weakness of the scientific methods of predicting their financial position for future purposes. The problem of this study lies in the weakness and absence of scientific methods that predict the risks of FF and its impact on the continuity of its activity in the future. Studies show that some Iraqi banks use traditional methods while these conventional methods are used to predict FF through financial analysis. On the continuity of economic units, the financial ratios give misleading results that cannot be relied upon in governance.

## 2. Literature review

Study [6] The study uses the Sherrord model to predict the FF of the private banks in the province of Nineveh. It aims to determine the success and failure of these banks and to continue and stay to the extent that their loans falter. This has adverse effects on the national economy. The Sherrord model is adopted by one of the traditional models. [6]. The study concluded that banks need to adopt the Sherrord model to predict FF and see how well the companies that lend them are performing. In other word, the study of [2] aimed to reach a model that can predict the financial bankruptcy of banks in Pakistan. Using a series of financial ratios, the study was based on a traditional method of gradual analysis. The study showed that the model can reveal and predict the financial bankruptcy of banks at 80%, just two years before the bankruptcy and led to three important financial ratios. The study of [4] aimed to predict the future financial position of Al-Mutasim Company and its ability to continue its future work. The study showed the correlation between the prediction of FF and the continuity of economic units. The traditional methods of the Kida model and a set of financial ratios were adopted for the study. The study concluded that to enable the company to take the necessary measures to address the serious indicators that affect the continuity and survival of the company, the company did not use any predictive models of financial analysis tools. Additionally, [11] This study aims to evaluate the performance and forecast financial distress of banks listed on the Tehran Stock Exchange based on CAMELS indicators and the Data Envelopment Analysis model. First, using the data of 17 banks in the fiscal year 2018, 5 levels of determining the health of banks, in the form of differences between the performance of these banks in terms of capital adequacy, quality of asset quality of management, Earning and liquidity and sensitivity to market risk, It was found. The studied banks were divided into two groups, healthy and helpless, based on CAMELS indices; also, the results of this study showed that CAMELS financial ratios can be a good assessor for banks' financial distress.

A study of [10] aimed to examine the association between the predictions made by the administrations and the auditors' views on the continuity of the economically unsuccessful economic units. The Zmijewski model was adopted to predict the continuity or bankruptcy of the economic unit. Giving an unrealistic picture of the activity of the entity and the list of its financial position, the

study showed that the managers of the financially failed units are more prone to manipulating forecasts. Therefore, to predict the FF using the scientific methods of Iraqi private banks is the overall objective of this study, as well as to provide an early warning system for future failures. The following steps will be taken to illustrate this general objective for the classification and valuation of banks by adopting the CS and traditional methods of forecasting TS to predict the FF of the selected banks. The importance of using scientific methods and their ability to raise the efficiency of Iraqi private banks in predicting FF reveals the significance of the study. Particularly with the challenges private banks face that cannot meet their obligations, such as some going bankrupt and liquidated. A necessary urgent requirement now is to support in predicting the FF and demonstrate the ability of banks to continue their activity. Thus, the study is based on the following hypothesis:

There is a relationship between the scientific methods represented by the complete standard and TS and the ability of banks to select the correct prediction for the FF and the ruling on the continuity of economic unit”.

### **3. Theoretical framework**

#### **3.1 The Concept of Continuity**

It is generally assumed that economic units will have a long life despite the significant failure of the companies. Most of them have a high rate of continuity. Therefore, organisations are expected to last long enough to meet their commitments and achieve their goals on time. The author explained further that the continuity of an economic unit in its activity for an extended period is meant to achieve its objectives and economic plans and the implementation of its current obligations and activities. [3]. [9] Stated that since there is a period sufficient to achieve objectives, the economic duration will be what it is not for an indefinite time. This hypothesis raised an excuse to ignore the current filter values when viewing assets and liabilities in the statement of financial position. Three cases characterise the imposition of continuity: the normal and natural situation, the situation in which the age of the economic unit is predetermined if there are indicators at present that allow the presumption of discontinuity. [18]. In the ability to determine economic units to continue, the economic unit and the external auditors also have several indications of uncertainty [18]. Some indicators indicate the uncertainty of the continuity of the economic unit [26], they are financial indicators, internal indicators, and operational indicators. According to Standard 570, the events and indicators that assist the auditor in determining uncertainties about the sustainability of the economic unit are financial events and operational events (International Standard Auditing 570, 2016). This study concludes that it is possible to reduce the importance of these events and their impact on economic units through the indicators. This is carried out by the team leader working in the unit by making the entity (monetary unit) stay away from any risky events and circumstances that affect the continuation and usually make it unable to work. They can look for alternative means of financing, such as disposing of assets, rescheduling loans and providing additional capital through the ability to pay off their debt, make their business system balanced with management plans, and provide adequate cash flows.

#### **3.2 The Concept of CAMELS Standard**

The process of assessing the performance and efficiency of the banking system has become an urgent necessity for banks and their administrations after the economic changes and important events of the last three decades of the last century, as well as the rapid technological changes [19]. To enable them to identify the strengths and weaknesses of these banks and to base their plans, there were strategies on the emergence of the great role played by the banking industry in various fields and in many countries, especially in the field of economic growth, globalisation, and fierce competition in the market by the parties [25]. As banks do not conduct comprehensive assessments but only quantify them, the traditional methods used to assess banks' performance of financial ratios cannot detect the risks they face early. The organisation is an essential tool to protect banks from failure as it conducts a comprehensive assessment of banks (quantitative and qualitative). Through six financial indicators, it represents an early warning system for risk-facing banks. Those banks assess the performance

through the outcome and indicators such as capital adequacy, asset quality, management, profitability, liquidity, and market risk sensitivity [19]. Thus, the CS is defined as "a quick indicator of the financial position of a bank and its degree of classification" [15]. The CS is a direct and field-based monitoring tool that US regulatory authorities have relied on to make decisions. [15] reported that the CS is a unified regulatory system that recognises banks' financial viability and strength by evaluating and identifying their weaknesses and strengths using six financial indicators to enable the management to take corrective action. [12] added that this standard also has many advantages, which include the Standardization of the reporting system, Classification of banks according to one standard, Focus on six key indicators, which leads to shortening of the evaluation time and Building a standard system for predicting reliance on banks' financial statements [20]. About the level of regulatory action, this standard also classifies banks according to a specific system. These banks are classified using the Likert scale: "strong, satisfactory, good, sharp and unsatisfactory" [16]. The following table presents this standard, which consists of six indicators, as mentioned above, and the index contains several equations.

**Table 1.** Standard equations (CAMELS)

| No. | Indicator               | Equation                                                                                                                                                                                                                   |
|-----|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Capital adequacy ratio  | Total nominal or paid-up capital + Reserves + Retained earnings / Total assets X 100%                                                                                                                                      |
| 2   | Asset Quality Index     | Classification ratio = Provision for doubtful debts / Total loans X 100%<br>PTC = non-performing loans / shareholders' equity + Provision for doubtful debts X 100%<br>RNPLTA = non-performing loans / Total assets × 100% |
| 3   | MI                      | Profit Growth Ratio = Current Net Profit - Previous Net Profit / Previous Net Profit × 100%                                                                                                                                |
| 4   | Profitability           | Return (profit) on total assets = Net profit / total assets × 100%<br>ROQ = Net Profit / Total Equity × 100%                                                                                                               |
| 5   | Liquidity Index         | LLR = Liquid Assets / Total Deposits × 100%<br>The ratio of Cash Balance = Cash / Total Deposits X 100%                                                                                                                    |
| 6   | Market Risk Sensitivity | The CBI does not apply this indicator                                                                                                                                                                                      |

**Table 2.** Summary of comparison criteria adopted in the classification of banks according to CS.

| No. | Indicator                    | Approved Evaluation Standard |                        |                   |                                          |
|-----|------------------------------|------------------------------|------------------------|-------------------|------------------------------------------|
| 1   | Capital adequacy index (CAI) | 12%                          |                        |                   |                                          |
| 2   | Rating ratio PTC             | Classification index         | Type of classification | Rating ratio (RR) | Percentage of total classification (PTC) |
|     |                              | 1                            | Strong                 | Less than 5%      | Less than 20%                            |
|     |                              | 2                            | Satisfactory           | Between 5 - % 15% | Between 20 % -50%                        |
|     |                              | 3                            | Good                   | 15 - %35%         | 50 - %80%                                |
|     |                              | 4                            | Borderline             | 35 - %60%         | 80 - %100%                               |
|     |                              | 5                            | Unsatisfactory         | More than 60%     | More than 100%                           |
| 3   | The ratio of non-            | 10%                          |                        |                   |                                          |

|   |                                                         |                      |                        |                   |
|---|---------------------------------------------------------|----------------------|------------------------|-------------------|
|   | performing loans to total assets (RNPLTA)               |                      |                        |                   |
| 4 | Management Index (MI)                                   | Classification index | Type of classification | Evaluation        |
|   |                                                         | 1                    | Strong                 | More than 30%     |
|   |                                                         | 2                    | Satisfactory           | Between 25 - %30% |
|   |                                                         | 3                    | Good                   | 20 - %25%         |
|   |                                                         | 4                    | Borderline             | 15 - %20%         |
|   |                                                         | 5                    | Unsatisfactory         | 10 - %15%         |
| 5 | ROA<br>ROQ                                              | 2.5%<br>38%          |                        |                   |
| 6 | Legal Liquidity Ratio (LLR)<br>Cash balance ratio (CBR) | 15%<br>15%           |                        |                   |

### 3.4 The Concept of Time Series

One of the main and important topics that have a major and active role in contributing to creating a predictive model for predicting the future in all areas is the implementation of TS. According to [5], TS is defined as a set of observations obtained at equal intervals that are sometimes regular. In other word, [13] TS is a set of observations generated respectively over a period. In this case, time series are characterised by being usually independent; they depend on each other and exploit this lack of independence to reach reliable predictions. Also, TS enjoys a set of essential objectives, which are following the behaviour of the TS and using the results obtained for future prediction. To study the phenomenon in the past and use it to predict the future to make appropriate decisions in order not to make mistakes by making sure that the case depends on the TS [19], [1]. The TS also has several methods, including the method used by this study in the practical aspect called the exponential multiplication method for predicting time-series data containing a trend; this method is applied. Because this method paves the general trend with different parameters, the latter value is less or greater than the previous values. According to this method, this differs from the real series depending on A and Y from the three equations used. The first equation is used to refine the TS data, and the second is used to calculate the linearity of the data. The polished value is used in the first linear trend equation to calculate the predictive value in the third equation.

$$oneeeS_t = \alpha X_t + (1 - \alpha)(S_{t-1} + b_{t-1}) \quad (1)$$

$$oneeneb_t = \gamma(S_t - S_{t-1}) + (1 - \gamma)b_{t-1} \quad (2)$$

$$F_{t+m} = S_t + b_t(m) \quad (3)$$

Where:  $S_t$  is the boot value at the string level.  $X_t$  is the values for the period. It is the linear amount of TS data.  $F(t + m)$  is the predictive value of the phenomenon in time  $\alpha$ , and  $\gamma$  is a Constant value of 1.0.

## 4. Methodology

The deductive approach will be adopted, while the applied (experimental) approach will be adopted to accomplish the practical aspect. The following steps are followed for the methodology of the study: Data collection, Removal of the data that represent the variables of the financial indicators and Pre-processing: to evaluate banks' performance and their application, the five-point CAMELS will be applied to: "strong, satisfactory, good, marginal, unsatisfactory". The scale will be used to

measure the financial imbalance (if any) in the performance of banks for the following reasons adopted: the CS is a global standard adopted in the classification and assessment of banks, the Central Bank of Iraq performs the implementation, Ease of access to the components of the indicators. In contrast, the indicators are meaningful and easy to interpret, and the traditional method of TS is used to predict the FF of the selected banks.

#### 4.1 Research Analysis Technique

To analyse the data, we are using Microsoft Excel to remove the data that will be analysed using the CAMELS evaluation process. And the initial processing of the standard (CAMELS) consists of (five) indicators by the SPSS. Also, the Mantib program based on the Double Exponential Smoothing model will predict FF in TS.

#### 4.2 Sample

The Sample is eight banks Listed on the Iraq Stock Exchange for 2010-2020. Table 3 below shows the selected banks as follows:

**Table 3.** Sample of the study

| No. | Bank name                      |
|-----|--------------------------------|
| 1   | Middle East Bank of Iraq (MEB) |
| 2   | Northern Bank (NB)             |
| 3   | United Investment Bank (UIB)   |
| 4   | Bank of Mosul (BM)             |
| 5   | Bank of Babylon (BB).          |
| 6   | Bank of Baghdad (BOB)          |
| 7   | Dar Salaam Bank (DSB)          |
| 8   | Sumer Bank (SB)                |

### 5. Result:

#### 5.1 Camels Standard Procedure

We collected the data on the selected banks by relying on the financial reports available in the Iraqi market for securities. In the process of prediction, data configuration is a key to accessing accurate and high-quality data. This includes configuring several procedures to obtain the appropriate data, such as data cleaning, lost data processing and integration. After the preparation of data from different sources, this study applied the reliable data obtained from the following accounts: accumulated surplus; total loans and advances; liquid assets, total deposits; nominal or paid-up capital, reserves, total assets, provision for doubtful debts, Current net profit and previous net profit, total equity and cash in hand. The study completed the preparation of data that the standard (Camels) applied by relying on five financial indicators. Each indicator contains several equations. A database was obtained after the standard (Camels) equations were applied in the five indicators containing the standard (Camels) results for ten years for each indicator. These results will be used as inputs to predict using TS. Table 4 shows a sample of the results of the CS indicators for the Commercial Bank of Iraq within 10 years.

**Table 4.** Sample of 10-year Camel's benchmark results (Commercial Bank of Iraq).

| Year | CAI | RR   | PTC | RNPLTA | MI  | ROA | ROQ | LLR | CBR |
|------|-----|------|-----|--------|-----|-----|-----|-----|-----|
| 1    | 39  | 42   | 8   | 4      | 27  | 0   | 3   | 514 | 64  |
| 2    | 31  | 100  | 9   | 4      | 15  | 0   | 4   | 49  | 3   |
| 3    | 33  | 153  | 10  | 4      | 77  | 0   | 6   | 6   | 1   |
| 4    | 42  | 205  | 12  | 6      | -1  | 0   | 5   | 30  | 5   |
| 5    | 52  | 2333 | 13  | 7      | 225 | 0   | 15  | 84  | 12  |
| 6    | 57  | 1029 | 8   | 5      | -43 | 0   | 6   | 143 | 9   |
| 7    | 52  | 397  | 10  | 5      | 79  | 0   | 10  | 134 | 8   |
| 8    | 61  | 231  | 8   | 5      | -25 | 0   | 5   | 219 | 6   |

|    |    |     |   |   |     |   |   |     |   |
|----|----|-----|---|---|-----|---|---|-----|---|
| 9  | 65 | 139 | 6 | 4 | -2  | 0 | 4 | 117 | 7 |
| 10 | 68 | 116 | 7 | 5 | -22 | 0 | 3 | 172 | 4 |

We extracted the average results of the standard indicators after obtaining the results of this standard for ten years to obtain a database through which the banks' performance and classification can be evaluated with the results of the CS averages.

**Table 5.** Results of the average CS.

| Year | Bank name | CAI | RR  | PTC | RNPLTA | MI   | ROA | ROQ | LLR   | CBR  |
|------|-----------|-----|-----|-----|--------|------|-----|-----|-------|------|
| 1    | MEB       | 50  | 475 | 9   | 5      | 33   | 0   | 6   | 147   | 12   |
| 2    | NB        | 51  | 0   | 4   | 2      | 1253 | 0   | 5   | 21993 | 3245 |
| 3    | UIB.      | 56  | 5   | 3   | 1      | 158  | 0   | 10  | 356   | 9    |
| 4    | BM.       | 39  | 2   | 8   | 3      | 253  | 0   | 12  | 135   | 12   |
| 5    | BB.       | 43  | 0   | 14  | 6      | 23   | 0   | 15  | 91    | 12   |
| 6    | BOB       | 51  | 0   | 7   | 3      | 22   | 0   | 5   | 166   | 9    |
| 7    | DSB       | 33  | 28  | 10  | 2      | 20   | 0   | 15  | 81    | 5    |
| 8    | SB        | 44  | 10  | 9   | 4      | 56   | 0   | 33  | 68    | 10   |

During this stage, we will evaluate the performance of banks and their classification using the results from Table 5. The classification of banks will be based on a five-point Likert scale: strong—satisfactory—good—alone—unsatisfactory. The banks are classified according to Table 6 using specific benchmarks approved by the Central Bank of Iraq.

**Table 6.** Results of classification of banks according to the CS.

| Final indicator      | Good |                | Satisfactory |        | Satisfactory |              | Satisfactory |
|----------------------|------|----------------|--------------|--------|--------------|--------------|--------------|
|                      | 1    | Strong         | 1            | Strong | 1            | Strong       |              |
| CBR                  | 12   | Strong         | 3245         | Strong | 5            | Strong       | 12           |
| LLR                  | 147  | Strong         | 21993        | Strong | 356          | Strong       | 135          |
| ROQ                  | 6    | Strong         | 5            | Strong | 10           | Strong       | 12           |
| ROA                  | 0    | Unsatisfactory | 0            | Strong | 0            | Satisfactory | 0            |
| PGR                  | 33   | Strong         | 1253         | Strong | 158          | Strong       | 253          |
| RNPLTA               | 5    | Strong         | 2            | Strong | 1            | Strong       | 3            |
| PTC                  | 9    | Strong         | 4            | Strong | 3            | Strong       | 8            |
| RR                   | 475  | Strong         | 0            | Strong | 5            | Satisfactory | 2            |
| Nominal capital fund | 50   | Unsatisfactory | 51           | Strong | 56           | Strong       | 39           |
| Bank name            | MEB  |                | UIB.         |        | BB           |              | DSB          |
| No.                  | 1    | 1              | 2            | 2      | 3            | 3            | 4            |

|        | Good |        | Good |        | Good |        | Satisfactory |              |
|--------|------|--------|------|--------|------|--------|--------------|--------------|
| Strong | 12   | Good   | 9    | Good   | 5    | Good   | 1            | Strong       |
| 1      |      | 1      |      | 1      |      | 1      | 0            | 1            |
| Strong | 91   | Strong | 166  | Strong | 8    | Strong | 6            | Strong       |
| 1      |      | 1      |      | 1      |      | 1      | 8            | 1            |
| Strong | 15   | Strong | 5    | Strong | 1    | Strong | 3            | Strong       |
| 1      |      | 1      |      | 1      |      | 3      | 3            | 2            |
| Strong | 0    | Strong | 0    | Strong | 0    | Good   | 0            | Satisfactory |
| 1      |      | 1      |      | 1      |      | 1      |              | 1            |
| Strong | 23   | Strong | 22   | Strong | 2    | Strong | 5            | 1            |
| Strong |      | Good   |      | Good   |      | Good   | 6            | Strong       |
| 1      | 6    | 1      | 3    | 1      | 2    | 1      | 4            | 1            |
| Strong |      | Strong |      | Strong |      | Strong |              | Strong       |
| 1      | 14   | 1      | 7    | 1      | 1    | 1      | 9            | 1            |
| Strong |      | Strong |      | Strong |      | Strong |              | Strong       |
| 1      | 0    | 1      | 0    | 1      | 2    | 3      | 1            | 2            |
| Strong |      | Strong |      | Strong |      | Good   |              | Satisfactory |
| 1      | 43   | 1      | 51   | 1      | 3    | 1      | 4            | 1            |
| Strong |      | Strong |      | Strong |      | Strong |              | Strong       |
|        | ME   |        | UIB. |        | BB   |        | DSB          |              |
|        | 5    |        | 6    |        | 7    |        | 8            |              |

A bank does not take any supervisory action with a strong rating. It is a sound financial unit in all respects and at any point. While this level is not a concern, its weakness can be addressed. At this level, the satisfactory classification is that the bank can withstand fluctuations in the market by relying on the normal control process. This shows a sound financial organisation with minor challenges that can be addressed and overcome. Also, classification is good at this level but has some weaknesses that require the bank to work hard. These risks and weaknesses are overcome to support the existing control system. The bank is required to maintain close and continuous control at the critical classification of this level because it suffers from obvious imbalances in the financial and administrative aspects that make it unable to continue competition in the market. In the case of unsatisfactory classification, the bank's condition at this level is severe and needs rapid financial support and permanent and continuous control to avert failure. The indication of zeros in the ROA index shows the bank has made a profit, but the figure after the vase is very little with no value, which is significant enough to be neglected by Us. The final process of governance of the banks was as follows: taking the Commercial Bank of Iraq as example, the bank obtained classification (1) for the index of capital adequacy, classification (5) of the classification ratio, and classification (1) for the RNPLTA, (1) for PGR (MI), (5) for ROA, (5) for ROQ and (1) for liquidity ratio ( $5 + 1 + 1 + 5 + 5 + 1 + 5 = 25$ ). Then, the arithmetic average of these numbers is obtained as  $(25/9)$  while the indicator is equal to 2.777. Thus, the result is rounded to (3) and the bank gets an assessment (good). According to the CS, this was achieved by the first objective of the research on the evaluation of the bank. The banks were classified as "strong, satisfactory, good, marginal, unsatisfactory" by comparing the results of each indicator with the evaluation criteria adopted in Table 3.

**Table 7.** Forecast for the year 2019 with the final judgment of the selected banks.

| Final judgment       | Good  |                     | Satisfactory |                     | Good  |                     | Satisfactory |                     | Good  |
|----------------------|-------|---------------------|--------------|---------------------|-------|---------------------|--------------|---------------------|-------|
| CBR                  | 5.5   | 5<br>Unsatisfactory | 12.6         | 5<br>Unsatisfactory | 1.5   | 5<br>Unsatisfactory | 30.8         | 1<br>Strong         | 3.9   |
| LIR                  | 184.1 | 1<br>Strong         | 151.5        | 1<br>Strong         | 21.1  | 1<br>Strong         | 175.0        | 1<br>Strong         | 25.8  |
| Rate of ROQ          | 7.9   | 5<br>Unsatisfactory | 3.0          | 5<br>Unsatisfactory | 8.6   | 5<br>Unsatisfactory | 9.7          | 5<br>Unsatisfactory | 2.1   |
| Rate of ROA          | 0     | 5<br>Unsatisfactory | 0            | 5<br>Unsatisfactory | 0     | 5<br>Unsatisfactory | 0            | 5<br>Unsatisfactory | 0     |
| PGR                  | -82.7 | 5<br>Unsatisfactory | 72.7         | 1<br>Strong         | -94.1 | 5<br>Unsatisfactory | 9.6          | 3<br>Good           | -42.6 |
| RNPLTA               | 6.9   | 1<br>Strong         | 0.7          | 1<br>Strong         | 4.6   | 1<br>Strong         | 1.0          | 1<br>Strong         | 28.8  |
| PTC                  | 4.8   | 1<br>Strong         | 1.9          | 1<br>Strong         | 5.1   | 1<br>Strong         | 1.1          | 1<br>Strong         | 40.1  |
| RR                   | 554   | 5<br>Unsatisfactory | 0            | 1<br>Strong         | 5.4   | 2<br>Satisfactory   | 0            | 1<br>Strong         | 0     |
| Nominal capital fund | 83    | 1<br>Strong         | 75.8         | 1<br>Strong         | 40.8  | 1<br>Strong         | 75.2         | 1<br>Strong         | 34.4  |
| Bank name            | MEB   |                     | UIB          |                     | BOB   |                     | DSB          |                     | MEB   |
| No.                  | 1     |                     | 2            |                     | 3     |                     | 4            |                     | 5     |

|                | Good |                | Good  |                | Unsatisfactory |                |
|----------------|------|----------------|-------|----------------|----------------|----------------|
| 5              | 11.6 | 5              | 2.3   | 5              | 12.5           | 5              |
| Unsatisfactory |      | Unsatisfactory |       | Unsatisfactory |                | Unsatisfactory |
| 1              | 209  | 1              | 125.7 | 1              | 59             | 1              |
| Strong         |      | Strong         |       | Strong         |                | Strong         |
| 5              | 4.8  | 5              | 5.3   | 5              | 37             | 5              |
| Unsatisfactory |      | Unsatisfactory |       | Unsatisfactory |                | Unsatisfactory |
| 5              | 0    | 5              | 0     | 5              | 0              | 5              |
| Unsatisfactory |      | Unsatisfactory |       | Unsatisfactory |                | Unsatisfactory |
| 5              | -9.3 | 5              | -14.1 | 5              | 53.5           | 1              |
| Unsatisfactory |      | Unsatisfactory |       | Unsatisfactory |                | Strong         |
| 5              | 4.3  | 1              | 6.1   | 1              | 3.1            | 1              |
| Unsatisfactory |      | Strong         |       | Strong         |                | Strong         |
| 2              | 9.3  | 1              | 9.6   | 1              | 11.4           | 1              |
| Satisfactory   |      | Strong         |       | Strong         |                | Strong         |
| 1              | 0    | 1              | 89.4  | 5              | 0              | 1              |
| Strong         |      | Strong         |       | Unsatisfactory |                | Strong         |
| 1              | 38.2 | 1              | 61    | 1              | 44.6           | 1              |
| Strong         |      | Strong         |       | Strong         |                | Strong         |
|                | UIB. |                | BB.   |                | DSB            |                |
|                | 6    |                | 7     |                | 8              |                |

**Table 8.** Forecast for the year 2020 with the final judgment of sample banks.

| Final judgment       | Good   |
|----------------------|--------|
| CBR                  | 5.4    |
| LLR                  | 184.1  |
| Rate of ROQ          | 8.7    |
| Rate of ROA          | 0      |
| PGR                  | -101.1 |
| RNP/LTA              | 6.9    |
| PTC                  | 4.4    |
| RR                   | 465    |
| Nominal capital fund | 86.8   |
| Bank name            | MEB    |
| No.                  | 1      |

|                | Satisfactory   |                | Good           |                | Satisfactory |                | Good           |                | Good  |
|----------------|----------------|----------------|----------------|----------------|--------------|----------------|----------------|----------------|-------|
| 5              | 12.1           | 5              | 1.4            | 5              | 32.8         | 1              | 3.1            | 5              | 11.6  |
| Unsatisfactory | Unsatisfactory | 1              | Unsatisfactory | 1              | Strong       | 25.1           | Unsatisfactory | 1              | 217   |
| 1              |                |                |                |                |              |                |                |                |       |
| Strong         | 152.7          | 5              | 19.7           | 5              | 177.8        | 5              | 2.0            | 5              | 4.6   |
| Unsatisfactory | 2.7            | Unsatisfactory | 10.5           | Unsatisfactory | 18.5         | Unsatisfactory | Unsatisfactory | Unsatisfactory | 0     |
| 5              | 0              | 5              | 0              | 5              | 0            | 5              | 0              | 5              | 0     |
| Unsatisfactory | Unsatisfactory | 1              | -95.9          | 5              | 18.2         | 4              | -43.1          | Unsatisfactory | -40.1 |
| 5              |                |                |                |                |              |                |                |                |       |
| Unsatisfactory | 62.3           | Strong         | 4.9            | 1              | 0.9          | 1              | 30.8           | Unsatisfactory | 4.5   |
| 1              | 0.6            | 1              | 5.2            | 1              | 1.0          | 1              | 43.3           | 2              | 9.7   |
| Strong         | 1.9            | Strong         | 5.3            | 2              | 0            | 1              | 0              | 1              | 0     |
| 5              | 0              | 1              | Satisfactory   | Strong         | Strong       | Strong         | Strong         | Strong         | 0     |
| Unsatisfactory | Unsatisfactory | 1              | 38.4           | 1              | 82.2         | 1              | 33.3           | 1              | 37.0  |
| 1              |                |                |                |                |              |                |                |                |       |
| Strong         | 78.8           | Strong         | 3              | Strong         | 4            | 5              | 6              |                |       |
|                | UIB.           |                | BB             |                | DSB          |                | MEB            |                | UIB.  |
|                | 2              |                | 3              |                | 4            |                | 5              |                | 6     |

|                | Good  |                | Satisfactory |                |
|----------------|-------|----------------|--------------|----------------|
| 5              |       | 5              | 5            |                |
| Unsatisfactory | 2.2   | Unsatisfactory | 11           | Unsatisfactory |
| 1              | 120.4 | 1              | 59           | 1              |
| جوي            |       | Strong         |              | Strong         |
| 5              | 5.0   | 5              | 34           | 5              |
| Unsatisfactory |       | Unsatisfactory |              | Unsatisfactory |
| 5              | 0     | 5              | 0            | 5              |
| Unsatisfactory |       | Unsatisfactory |              | Unsatisfactory |
| 5              | -14.3 | 5              | 56.4         | 1              |
| Unsatisfactory |       | Unsatisfactory |              | Strong         |
| 1              | 7.2   | 1              | 3            | 1              |
| Strong         |       | Strong         |              | Strong         |
| 1              | 11.1  | 1              | 11.8         | 1              |
| Strong         |       | Strong         |              | Strong         |
| 1              | 93    | 5              | 0            | 1              |
| Strong         |       | Unsatisfactory |              | Strong         |
| 1              | 65    | 1              | 45.1         | 1              |
| Strong         |       | Strong         |              | Strong         |
|                | BB.   |                | DSB          |                |
|                | 7     |                | 8            |                |

## 5.2 Analysis of the Result of the Predicted Year

This study analysed a sample of the predicted years, 2020, for the extraction results' abundance and the lengthy analysis process. During the year 2020, the Commercial Bank of Iraq achieved a good assessment a result of the significant increase in the capital adequacy ratio of 86.8%, the total rating of 4.4%, the RNPLTA of 6.9% (184.1%) and a significant decrease in the RR of (465%), profit growth rate (PGR) of (101.1%), ROA of (0%), and ROQ of 8.7% (5.4%). The Islamic Bank of Iraq obtained a satisfactory evaluation during the year 2020 due to the significant increase in the capital adequacy ratio of (78.8%), the rating rate of (0%), the total classification of 1.9% (0.6%), profit growth of (62.3%), LLR of (152.7%), and a significant decrease in return on assets (0%) and ROE (2.7%). The Union Bank achieved a good evaluation during the year 2020 due to the significant increase in the capital adequacy ratio of (38.4%), the rating rate of (5.3%), the total rating of (5.2%) and the RNPLTA of (4.9%), the LLR of (19.7%), the significant decrease in the PGR of (-95.9%), the ROA of (0%), and the ROE of (10.5%). The Iraqi Investment Bank obtained a satisfactory assessment during the year 2020 to the significant increase in the capital adequacy ratio of (82.8%), the RR of (0%), the total rating of 1.0% (0.9%), the LLR of (177.8%), the CBR of (32.8%), the significant impact of the PGR of (18.2%), and the ROA of 0% (18.5%). Al-Iqtisad Investment Bank received a good evaluation during the year 2020 due to the significant increase in the capital adequacy ratio (33.3%), the RR of 0%, the total rating of 43.3% (30.1%), the PGR (-43.1%), the rate of ROA of 0%, the ROE of 2.0% and the CBR (3.1%). During the year 2020, the National Bank achieved a good assessment as a result of the significant increase in the capital adequacy ratio of (37.0%), the RR of (0%), the total RR of (9.7%), the RNPLTA of (-4.1%), the ROQ of (0%), the ROQ of (4.6%) and the CBR of (11.6%). The Credit Bank of Iraq received a good evaluation during the year 2020 due to the significant increase in the capital adequacy ratio of (65%), the total classification of (11.1%), the RNPLTA of 7.2% (120.4%), a significant decrease in the rating by (93%), PGR of (-14.3%), ROA of (0%), and ROQ of 5.0% (2.2%). Gulf Bank received a satisfactory assessment during the year 2020 to the significant increase in the capital adequacy index of (45.1%), the RR of (0%), the total rating of (11.8%), the

RNPLTA of (3%), the PGR of (56.4%), the LLR of (59%), the rate of ROA of (0%), ROQ of (34%) and the cash balance of (11%). From the analysis of the results for the year 2020, there is no relationship between the RNPLTA and the rate of ROA and the process of evaluating banks and judging their continuity. The result shows that they are unnecessary and can be dispensed with. Therefore, the primary indicators that the banks can use to evaluate and examine are the Capital adequacy index, asset quality index (i.e. RR and total RR) and liquidity index (i.e. LLR and CBR). Thus, we achieved the second objective of the study: predicting FF using traditional tools called TS.

## 6. Limitation of the Study

The limitation of the study is spatial boundaries: The spatial boundaries of this study are the private commercial banks listed in the Iraqi securities market. Time Limits: This study will only focus on the published financial statements of the Iraqi commercial banks listed on the Iraqi Stock Exchange for 10 years (2006-2015).

## 7. Conclusion

The following are the conclusions derived from the results and findings of the analyses. The indicators that assist the auditor in estimating the continuity of indicators (financial, operational and other) and the indicators and events that indicate uncertainty about the continuity of the economic unit are essential in determining the unit's ability to continue. One of the most recent evaluation criteria that contributes to the assessment and classification of banks is the CS, as it provides an early warning system for bank failures according to a range of financial indicators, which is much better than the traditional methods of financial ratios. The ratio of the non-performing loans to the total assets and the rate of return on the total assets have no significant impact on evaluating banks and determining their sustainability. The liquidity index (LLR and CBR), the asset quality Index (RR, total RR) and the capital adequacy index significantly affect the assessment and determination of the bank's sustainability.

## 8. Recommendation

The following suggestions are recommended after the conclusions were reached to Financial, operational, and other indicators should be considered by the banks to determine the bank's sustainability and help the banks improve their strengths and address their weakness in these indicators. The adoption of the CS is recommended for the banks as it is a modern regulatory standard that leads to a sound and healthy banking system of mistakes and manipulations. Therefore, the banks must adhere to it due to its ability to correct and address errors and deviations. The model gives a comprehensive and realistic view of the banking system. In addition, for assessing banks and ruling on their continuity, this study recommends banks neglect the replat and the rate of ROA as indicators as they are ineffective in achieving this objective. To evaluate the banks and judge their continuity, this study recommends that the banks rely on the capital adequacy index, the asset quality index, and the liquidity index.

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## التنبؤ بالفشل المالي والاستمرارية الاقتصادية باستخدام معيار CAMELS والسلاسل الزمنية: مدخل تحليلي

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### المستخلص

هدفت الدراسة التحري عن التنبؤ بالفشل المالي وتقييم أداء البنوك وتصنيفها بهدف توفير نظام إنذار مبكر للفشل المالي المستقبلي. اعتمدت الدراسة على السلاسل الزمنية ومعيار camel للتنبؤ بالفشل المالي الذي يعتمد على مجموعة من المؤشرات التقليدية. تضمن العينة ثمان مصارف عراقية مدرجة في سوق العراق للأوراق المالية للعام 2010-2020. أشارت النتائج إلى أن المؤشرات المالية تساعد مراقبي الحسابات في تقدير استمرارية المصارف، وتشير نتائج المؤشرات (المالية والتشغيلية) إلى عدم اليقين بشأن المصارف عبر تحديد قدرتها على الاستمرار. تقدم الدراسة أدلة على أهمية اعتماد مراقبي الحسابات أساليب الإنذار المبكر بفشل المصارف. وتأتي أهمية الدراسة من أهمية القطاع المصرفي العراقي وللدور الكبير الذي يلعبه هذا في العراق؛ تسلط الدراسة الضوء على العديد من المعوقات والمشاكل التي تؤدي إلى الفشل وعدم قدرة المصارف على الاستمرار.