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USING DECISION TREE TECHNIQUE TO PREDICT THE FINANCIAL FAILURE AND EARNINGS SUSTAINABILITY: A PANEL DATA ANALYSIS

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Abstract
The paper aims to predict financial failure in Iraqi private banks using artificial intelligence techniques, the decision tree technique. It also seeks to explore the impact of this technology on the ability of private banks to provide information that helps decision-makers. It avoids financial failure that leads to bankruptcy and unemployment for many of its workforces and limits the power of these banks to finance investment plans for the development process on the one hand. On the other hand, work has been done on the gross domestic product by relying on the profitability index found in the standard panel model to sustain the profits of these banks, which leads to continuing their banking business after depending on (Green GDP) (Green Gross domestic product) as a variable Independent in raising rates of profitability. After amending the (GDP) index (Gross domestic product), it now includes the depletion of natural resources, the high rates of environmental pollution, and the consumption of fixed capital. Thus, all these variables work to give an accurate picture of the decision-maker and enhance banks' profitability. Artificial intelligence technology is one of the advanced technologies that help Iraqi private banks provide the appropriate information that helps them predict financial failure due to several considerations, the most important of which are (their ability to predict, accuracy, speed, ease of interpretation, and understanding, and their uncomplicated calculations. Valuable even in the presence of little data), which is reflected in the ability of the research sample banks to support and finance sustainable development plans in the Iraqi environment in all its aspects, especially (labor and financial support). Results also show that all the standard models used in Panel Data (pooled model, fixed effect, and random effect) of the monetary credit granted by private banks directed towards green output in achieving sustainable profitability for banks

Keywords: Decision Tree, Financial Failure, Earnings Sustainability, Panel Data Analysis

Introduction
Due to the paramount importance of private banks, they are critical economic sectors that work to attract many investments and contribute to supporting and diversifying financial resources in various fields. Because of the circumstances and events that have afflicted these banks, whether these events are political, economic, or other, represented by the Corona pandemic,

which affected these banks and exposed some of them to financial failure that may lead them to non-survival and continuation [1]. Therefore, it is necessary to use modern methods and techniques that help us predict the economic collapse of these banks and determine their ability to continue during a specific period to take appropriate corrective measures. Consequently, this research came to make its scientific contributions to help private banks in the process of predicting financial failure. This is by sustaining the profits of these banks through the development of a new indicator, which is the (Green GDP) index. This indicator considers the impact of environmental pollution, constant capital consumption, costs of depletion of natural resources, and the use of modern and advanced techniques for forecasting (decision trees technology).

Literature review

In this aspect, we will deal with decision trees, financial failure, and sustainable development. Panel scale

1- The concept of decision trees

High technology is one of the most critical issues affecting the work environment of economic units [2, 3]. This technology allows the entry of new possibilities and possibilities to support the activities of the decision-making process and the nature of its dependence at all levels. Especially in banking units because of its apparent impact on the immediate work environment. Consequently, this technology has become an essential factor in changing the culture of economic units, especially banking units, into a culture dependent on technology and development, whether in their administrations or uses or in the methods of investing their tools. Among these technological tools used is one of the artificial intelligence techniques, which is the Decision Trees (DT) technique [4]. There are several and diverse decision tree ideas. It is a technique of learning and supervision based on the inputs used to construct a decision tree to generate outputs based on the nature of the decisions in the tree that reflect a conclusion [5].

Moreover, decision trees are a decision theory used on a large scale by decision-makers to support the decision made by them, usually in graphs [6]. Decision trees have characteristics that are 1- hierarchical nature, 2- flexibility, 3- tree size 14) [7]. Through what was mentioned above, Decision Trees are modern technologies that work efficiently and understandably for users [8]. In addition, it is characterized by its remarkable ability to solve complex problems scientifically and quickly by relying on groups of decisions that are in a hierarchical form starting from the root until reaching the final determination that will be taken from among a set of available choices (alternatives). Given the ability of this technology (DT) to solve complex problems, especially problems related to the decision-making process (prediction), it will be used in the method of predicting the financial failure of banks, the research sample, and the extent of the impact of this technology on sustainable development.

2- The concept of financial failure

Financial failure is one of the topics that researchers are most interested in due to its dangerous and adverse effects on its national economy and many groups working in it, especially the banking sector [9]. Therefore, researchers have dealt with many names related to financial failure, which revolved around stumbling, hardship, bankruptcy, and loss. Others believe that these terms are different from each other, and each has its definition and cannot be combined with one phenomenon [10]. Financial faltering: It is the situation in which the economic unit

faces a set of disturbances that lead it to stop its activity due to the inability to pay its obligations [11]. As for financial hardship: the liabilities of the economic unit are more significant than its assets [12], and financial bankruptcy: is the case related to the monetary unit's declaration of default and the cessation of its activity through a court ruling due to its inability to pay its obligations [13]. Therefore, financial failure is the inability of the economic unit to pay its debts on time or in the future and its lack of capabilities and capabilities through which it can obtain returns to pay its obligations, which leads to financial failure [14]. Financial failure goes through several stages, the most important of which are:

1- the scene of exhibiting the exhibitor (the emergence stage),
2- the set of financial weakness (liquidity deficit),
3- the phase of financial insolvency,
4- the stage of total ruin,
5- the stage of declaring bankruptcy (liquidation)

3- The concept of sustainable development

During the seventies and eighties of the twentieth century, the world lived through more than one crisis that resulted in new problems that imposed themselves on the ground [15]. Its emergence has led to a reconsideration of all the theories underlying the "development" process. For example, there was talk about non-renewable resources wasted due to overexploitation and their role in creating deep imbalances in the ecosystem. Also, the nuclear armament movement and its dangers entail threatening human life, depleting natural resources, and polluting the oceans [16]. These matters had a prominent role in changing the traditional thinking pattern in building theories of (growth and development). Attention began to turn towards a new theoretical construction based on searching for the causes of the sustainability of life. From here, the concept of (sustainability) crystallized [17]. Sustainable development can be defined as "a conscious and enduring societal process directed according to an independent national will to create structural transformations and to bring about political, social and economic changes that allow the achievement of a steady growth of the capabilities of the concerned community and a continuous improvement of the quality of life in it" [18]. It can be defined as "representing the development that meets the needs of present generations without compromising the ability to meet the requirements of future generations" [19]. Moreover, sustainable development consists of three basic dimensions (the economic dimension, the social dimension, and the environmental dimension) [20].

4- Panel Data Concept

The Panel scale is a model of the standard models that are usually used in economic studies. This measure consists of internal and external indicators, as the inner hands are represented by the Camels traditional indicators, which are (capital adequacy, asset quality, profitability, and liquidity), and the external indicators are represented by (gross domestic product), Inflation). Thus, the relationship between profitability and internal and external indicators in the banks of the research sample will be clarified to reach the profit sustainability process, which affects sustainable development [21].

Therefore, the relationship between capital adequacy and profitability is that capital adequacy measures the bank's financial strength. As more capital adequacy increases, the confidence of

depositors increases, and thus the financing capacity of the bank increases, which increases the bank's profitability [22].

Also, the relationship between the asset quality ratio and profitability is positive as the assets' quality reflects credit risk [23]. Thus, the higher the percentage, the number of depositors increases, which leads to increased profitability. On the contrary, if the quality of the assets decreases, the depositors will decrease, which leads to a decrease in profitability.

Also, the relationship between profitability and management is positive as the direction reflects the ability of the bank's managers to use the available resources. Thus, the more efficient the managers, the greater the bank's profitability.

Also, the relationship between liquidity and profitability is an inverse relationship, as the more liquidity, the lower the profitability, and the higher the profitability, the lower the liquidity. Consequently, the bank must balance liquidity and profitability to maintain its stability [22].

The gross domestic product is related to profitability, as we note through the model to be assessed the existence of a direct relationship between economic growth and profitability rates through the high demand for credit, which was associated with periods of high rates of GDP. Such a relationship was confirmed over the length of the study, as the long-term relationship was established by the Cranker causation test when credit is a variable dependent on the output, which will indicate that high rates of GDP are a cause of raising credit rates and the values of each p-value confirm this. stat)) [24]. The credit-to-output ratio can be determined through the (Markov Switching) matrix.

$$s(t)=11\alpha \quad \{= GDP) psc/ ($$
$$s(t) =22\alpha$$

Where;

Psc: Local Granted Credit.

GDP: gross domestic product.

1α: the first period constant.

2α: the second period constant.

(This equation is used to determine the periods in which there is a continuous relationship. The credit ratio is also compared between the first and second periods to determine the percentage that leads to stability).

We believe that the Gross Domestic Product (GDP) was and still includes the undisclosed costs of many environmental pollutants associated with production processes, especially in those countries whose output depends on the oil sectors or the percentage of fossil fuel use high. G. Marland notes that carbon concentrations began to develop starting in the 1860s when his restrictions provoked that the group of these accumulations resulted from burning fossil fuels, which is mainly the accumulation of those pollutants [25]. It is expected that these emissions will increase during the years (2012-2035) by 35%, which leads to more fears of the consequences of these emissions. On the other hand, these emissions were the cause of high rates of global warming, whose effects could remain within the atmosphere for decades, causing high temperatures and unexpected changes in the climate. Some studies expect that the impact of global warming may accumulate to the limits that are sufficient for the world to witness the rise in temperature seen during the end of the Ice Age, which leads to the melting of all snow. This is expected to happen in the year 2100, which will have dire effects on some countries, leading to decreased drinking water levels, desertification, a rise in sea levels, and

the spread of extreme climate phenomena [26]. The International Energy Outlook report for the year 2019 to 2050 indicates that economic growth is responsible for the high rates of carbon dioxide emissions, which will see a decrease in 2020. Then it will rise in 2050 to higher levels than it was in 2019, and in the paragraphs of low economic growth rates, it indicated that carbon dioxide would witness a decrease. It is expected to be on a slow rise in 2045 (US Energy in formation, 2020)). Therefore, we needed to enter the costs of environmental pollution resulting from the high levels of Co2 () from the limits agreed upon within the Kyoto Climate Agreement, which Iraq signed and considered effective since March 23, 2009. Primarily since the GDP indicator works on results in the depletion of natural resources and constant capital consumption, as countries attempt to achieve high levels of economic growth, with all these policies calling for achieving high rates of GDP, accumulations of pollutants increased, which led to high rates of environmental pollution. In addition to what has been mentioned, the GDP does not include the costs of these pollutions, so we built a model for the green product (GDP) (the law of the Republic of Iraq joining the United Nations Convention: 2009). This model that we will build, which is (Green GDP), includes all the variables mentioned previously and an attempt by researchers to make an index of sustainable profitability.

Banking operations in Iraq also witnessed rapid developments and changes due to the improvement of the banking system in Iraq and the world alike due to the growth of the banking business and the expansion of its tools. However, this was not sufficient to meet the challenges occurring due to the spread of the Corona epidemic, Covit19, which significantly affected the overall economic operations. To meet these challenges, a group of banks, including the Bank of England, lowered interest rates and reduced the bank's capital in exchange for support for small and medium enterprises. In addition, these procedures were implemented by the Central Bank of Australia and Canada to varying degrees [27].

Gopinath [28] shows that this epidemic could lead to banks raising interest on borrowing as a result of banks' fear of the possibility of repayment by individuals and companies, and as a result. Such concerns may lead to a reduction in credit, raise recession rates, and reflect these effects globally through the international trade system. Countries, especially those that depend on foreign borrowing for their financing, may find that they cannot meet the loan requirements [29].

The research will work on the various development dimensions represented in the social, economic, and environmental dimensions by studying the most critical sectors that affect sustainable development to sustain profit. These sectors are the private banks that represent the case study for research. These techniques will predict their financial failure by relying on advanced technologies that avoid financial loss. This mechanism helps them in maintaining the workforce and avoiding unemployment. On the other hand, these (private) banks play a significant role in financing small and medium enterprises to employ the largest segment of the population. As well as studying the economic growth aspect of these banks by studying the effect of the gross domestic product on banks. All this will be done by building a green product model as the model is (Green GDP) that includes all the variables mentioned previously. This is an attempt by researchers to construct an indicator of sustainable profitability. We would also like to show that the Camels variables have been relied upon, which includes (capital adequacy index, asset quality, management, profitability, and liquidity) as a basis for predicting financial failure using the decision tree technique. The sustainability of the profits of private

banks, which is the basis for the economic success of the banks, was also verified by using the Panel Data method, which was also based on the Camels Index variables. But in this case, profitability was considered an independent variable, and the dependent variable was introduced in addition to the Camels Index variables referred to above. This variable is fixed capital depreciation costs, natural resource depletion costs, and environmental degradation costs. They result from the two gas accumulations of the years covered by the study. Carbon dioxide constitutes about 75% of the accumulations experienced in Iraq in 1990, based on the recommendations of the Kyoto Agreement. Therefore, we preferred to calculate them separately from the research and adopt their results, as shown in Appendix (1), which shows how to build a green product model, in addition to the costs of carbon dioxide, which violates the Kyoto agreement.

Methodology

The research aims to Predict the financial failure of Iraqi private banks by relying on one of the artificial intelligence techniques, which is the decision tree technology. It is one of the advanced technologies that help us detect and liquidate these banks 'failure and ensure the possibility of their continuation through the sustainable development of their profits based on the panel data model. To achieve these goals, the following was followed:

1- Using Camels criterion equations as a preliminary process to access the appropriate data for the prediction process.

2- Predicting the financial failure of the banks, the research sample using the decision trees technique.

3- To sustain profits, a green product model is built (Green GDP) as an independent variable among the other independent variables within the data panel model in the profitability function.

The banking sector is one of the critical economic sectors that work to attract many investments and contribute to diversifying financial resources, contributing to achieving sustainable development. Therefore, the adoption of artificial intelligence techniques represented by the decision trees technology is a requirement because it can provide appropriate data and information that leads these banks to avoid financial failure. Furthermore, the importance of the research also stems from studying the extent of the success and failure of banks and the sustainability of their profits, which are considered an indicator of the success of banking work, through adopting an updated indicator, which is (green GDP) as an independent variable within the profitability function of these banks.

The research sample includes the private commercial banks listed on the Iraq Stock Exchange. The sample included (10) banks (Iraqi Commercial, Al-Ittihad, Al-Ahly, Al-Khaleej, Iraqi Credit, Mosul, Babylon, Baghdad, Sumer, Kurdistan). This study relies on the published financial data of the private Iraqi commercial banks listed on the Iraq Stock Exchange for the years (2006-2015) and amounting to (10 years).

Results

In the beginning, the researchers conducted collecting data for the banks, the research sample, by relying on the financial reports listed on the Iraq Stock Exchange. Then the data initialization process, which consisted of three phases, was (data cleaning, data integration, processing lost

data). Through these processes, a sample of banks was identified consisting of (10) banks and (10) years out of (17) years of Every bank. At this stage, the five-pointer Camels criterion equations are used. These indicators include capital adequacy C, asset quality A, management M, profitability E, liquidity L. Table 1 shows the equations for the Camels criterion.

TABLE 1. EQUATIONS OF CAMELS RATING SYSTEM

#	The name of the indicator/abbreviation	The legal formula
1	Capital adequacy (C)	= Total nominal or paid-up capital + reserves + retained earnings / total assets X 100%
2	Asset Quality A))	Rating ratio = Provision for doubtful debts / Total loans X 100%
3	Management Index (M)	Ratio of total rating = bad debts / equity + doubtful debts provision X 100%
4	Profitability Index (E)	Ratio of Bad Debts to Total Assets = Bad Debts / Total Assets X 100%
5	Liquidity Index (L)	Profit Growth Ratio = Current Net Profit - Previous Net Profit / Previous Net Profit X 100%
6	Market Risk Sensitivity Index (S)	Return (profit) on total assets = net profit / total assets X 100%

TABLE 2. RESULTS OF CAMELS EQUATIONS FOR TEN YEARS (AL-ETIHAD BANK)

#	**Nominal capital index**	**Rating ratio**	**The percentage of the total rating**	**The ratio of bad debts to total assets**	**Profit growth rate**	**Rate of return on total assets**	**Rate of return on equity**	**Legal liquidity ratio**	**Cash balance ratio**
1	96	28	0	0	871	0	4	1936	37
2	79	0	0	0	101	0	8	498	7
3	70	0	0	0	20	0	6	261	8
4	47	0	0	0	122	0	7	124	13
5	64	0	0	0	147	0	14	213	13
6	46	0	15	7	-48	0	7	184	6
7	22	0	0	0	385	0	18	99	2

8	52	0	4	2	141	0	25	116	4
9	40	9	4	2	-65	0	7	95	2
10	41	10	6	3	-99	0	0	36	0
Average	56	5	3	1	158	0	10	356	9

Since artificial intelligence techniques, especially decision tree technology, require low and high-quality data, the averages of the results of Camels' equations will be extracted for ten years, as shown in table 3.

TABLE 3. RESULTS OF CAMELS AVERAGES

#	The bank name	Nominal capital index	Rating ratio	The percentage of the total rating	The ratio of bad debts to total assets	Profit growth rate	Rate of return on total assets	Rate of return on equity	Legal liquidity ratio	Cash balance ratio
-1	Iraqi Commercial Bank	**50**	**475**	**9**	**5**	**33**	**0**	**6**	**147**	**12**
-2	Al-Etihad Bank	**56**	**5**	**3**	**1**	**158**	**0**	**10**	**356**	**9**
-3	Al-Ahly Bank	**51**	**0**	**7**	**3**	**22**	**0**	**5**	**166**	**9**
-4	Iraqi Credit Bank	**33**	**28**	**10**	**2**	**20**	**0**	**15**	**81**	**5**
-5	Gulf Bank	**44**	**10**	**9**	**4**	**56**	**0**	**33**	**68**	**10**
-6	Mosul Bank	**45**	**6**	**2**	**1**	**-1**	**0**	**12**	**115**	**22**
-7	Babylon Bank	**46**	**9**	**1**	**0**	**12**	**0**	**7**	**112**	**9**
-8	Bank of Baghdad	**18**	**15**	**21**	**4**	**44**	**0**	**16**	**77**	**9**

-9	Sumer Bank	**64**	**53**	**2**	**1**	**80**	**0**	**3**	**223**	**8**
10 -	Kurdistan Bank	**38**	**0**	**1**	**0**	**122**	**0**	**11**	**219**	**25**

After the necessary high-quality and accurate database has been prepared, which represents the inputs of artificial intelligence technology, namely the decision trees technology, as shown in Table (3). Therefore, in the next step, these entries will be stored in a separate file. Each bank of the research sample contains nine values for each indicator of one value, as shown in the following interface.

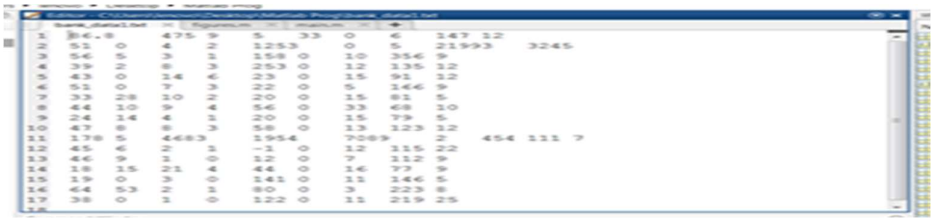

FIGURE 1. THE SEPARATE FILE FOR STORING THE DECISION TREE INPUTS IN THE PROGRAM

After the inputs have been stored in a separate file in the program, artificial intelligence technology will be applied during this stage. The decision tree technique on this stored database represents the inputs by relying on conditional IF-Then instructions, as shown in the following interface.

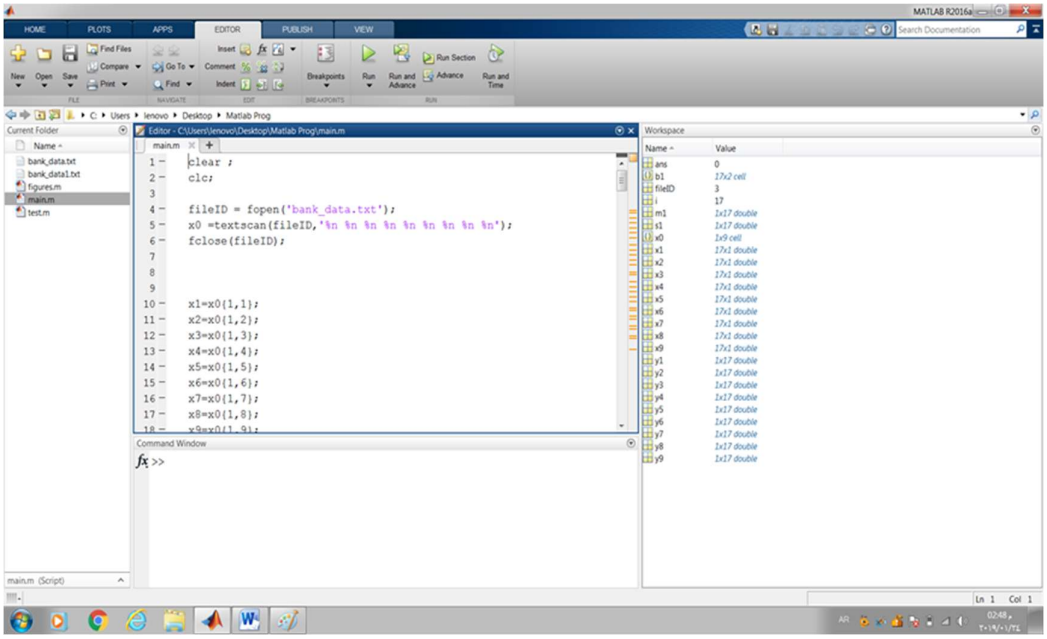

FIGURE 2. APPLICATION OF DECISION TREES TECHNIQUE TO INPUT

After the program has been implemented, during this stage, the results obtained by applying technology will be stored and retrieved in new matrices in order to facilitate the process of their evaluation. This aims to define the decisions and potential outcomes of the banks and the research sample accurately and as indicated in the above interface of the program.

After the results obtained from applying the technique have been stored, the products will be evaluated and interpreted during this stage. This is done by analyzing the results from using the decision tree technique to reach the appropriate decision.

Table 4 shows the banks 'evaluation of the research sample according to the decision trees technique.

TABLE 4. RESULTS OF ASSESSING BANKS USING A DECISION TREE

#	The bank name	Evaluation
1	Iraqi Commercial Bank	good
2	Al-Etihad Bank	Satisfactory
3	Al-Ahly Bank	good
4	Iraqi Credit Bank	good
5	Gulf Bank	Satisfactory
6	Mosul Bank	Satisfactory
7	Babylon Bank	good
8	Bank of Baghdad	good
9	Sumer Bank	good
10	Kurdistan Bank	Satisfactory

Through the results that have been reached, researchers see that the artificial intelligence technology represented by the technology (decision trees) is one of the advanced technologies that help Iraqi private banks provide the appropriate information that helps them predict financial failure. The reason for this is due to many considerations, the most important of which are (their predictability, accuracy, speed, ease of interpretation and understanding, and their uncomplicated calculations, and they have value even with little data), which is reflected in the ability of the research sample banks to support and finance sustainable development plans in the Iraqi environment from All aspects, especially those of (labor and financial support). To determine the impact of banks in the research sample on sustainable development from the economic dimension, the data panel and GDP variables will be relied on to build a green output model.

1. Panel Data Analysis

Three types of models prevail in the tablet data, which can be explained as follows

1- Pooled Regression Model

Within the framework of this model, bank units and time (N * T) are taken, meaning the number of banks (companies) and time (the period required to be studied for each bank). Then, model regression is performed, ignoring the cross-section of the time series data. But the main problem with such models is that they do not distinguish between the different banks under study. In other words, such a model loses the characteristic of heterogeneity or individual status that may characterize the banks under investigation. In contrast, this form allows for the difference of the fixed limit for each bank, which may indicate the personal characteristics of each bank separately. This is done by adding a random variable to each bank.

2- Fixed effect model

This model allows for the different individual status of each bank through the difference inhomogeneity between banks by showing the value of the fixed limit for each bank. Its name

as the fixed effect is because the fixed limit may differ from one bank to another. However, this does not mean that the interrupted part of the y-axis (i.e., the segment) changes with time (time constancy).

3- Random Effect Model

Within the framework of this model, the units, which are expressed here as (banks), have a moving average value of the fixed term. The selected time for each segment in this model is constant, and it is a random parameter, as we assume in the regression analysis.

Many explanatory variables that affect the dependent variable are not added correctly as they are reduced to the error limit.

Based on the preceding, the fixed effect model assumes that each bank has its fixed limit. Furthermore, it is also believed that each bank differs from the other in its error limit.

After estimating the previous three models, we apply the Housman test to see which of the two models (fixed effect or random effect) is suitable for acceptance.

4- Housman test

This test is based on two assumptions

Nothingness Hypothesis (Ho): The random-effects model is adequate

Alternative Hypothesis (H1): The fixed effects model is appropriate

Decision: If the value of P.V is statistically significant, we accept the fixed effects model. Otherwise, we take the random-effects model.

2. Assessment and analysis

It is noted from the results of the (pooled) regression that the variable credit granted to green product (x2) is the only significant variable among the research variables. Its value is p. value (0.0002) which is less than (0.05). As for the other variables (liquidity (x3), management (x4), quality of assets (x5), capital adequacy (x6)), they were not statistically significant.

However, in this model, we assume that the ten banks are the same, but this usually does not happen in reality. Therefore, these results cannot be accepted because this model treats them as one treatment, meaning there is no difference between them. The capital adequacy index and management were associated with a positive positive relationship with profitability in commercial banks in Iraq, but it was not statistically significant. The liquidity and asset quality index are related to profitability in an inverse relationship related to internal indicators. The external hands represented in the credit granted about the costs of consumption of fixed capital and the depletion of natural resources. It means consuming natural resources, forests, timber, pastures, crude oil, minerals, and other natural resources. It also includes the costs of environmental damage resulting from burning fossil fuels, pollution resulting from production processes, and climatic and ecological degradation. All these external variables have been included in what is known as a sustainable green product, which has significant effects and has statistical indications on the profitability of commercial banks. The increase in the rates of cash credits granted by commercial banks in the form of loans granted directed towards green output will increase the profitability of commercial banks by (0.15%). It has been expressed through the direct relationship between the ratio of credit granted to green output and profitability.

If we move to the second model (the fixed effect model), we find that the variable of the ratio of credit granted to green product (x2) is statistically significant. The value of p. value (0.0002) is less than (0.05). This means that increasing the ratio of credit granted to green output by

(1%). Consequently, this will lead to an increase in profitability by (0.173) assuming the stability of other factors. However, some variables show their insignificance in effect and contradict the theoretical logic, as they appeared with different signs such as liquidity and quality of assets.

As for the results of (the random effect model), it also showed that the variable of the credit granted to the green product (x2 is statistically significant). The p. Value is (0.0004), which is less than the level of (0.05), while the rest of the independent variables were not significant. Statistically speaking, increasing the percentage of (x2) by (1%) will lead to an increase in the profitability ratio (y) by ((0.15%) assuming the stability of other factors. This model shows some features with negative signs that contradict the theory (liquidity, quality of assets). It appears through an assessment of the model's parameters that there is a direct relationship between capital adequacy and profitability in commercial banks, as capital adequacy expresses the financial position of banks and their financing capacity. Management directly affects bank managers' ability to use the available resources, which leads to raising the rates of profitability. In contrast, the assessment results indicate an inverse relationship between liquidity and the quality of assets. It can be understood from this that the decrease in the ratio of bad debts to total assets does not affect depositors' decisions In those banks. Likewise, the percentage of liquid assets to total deposits negatively affects banks' profitability in this rise. In addition to that, all these internal factors are considered ineffective and statistically insignificant on the profitability of commercial banks in Iraq. It is noticed that profitability was determined by the external factors represented by the green product and the variables it contained (environmental, economic, and social).

To decide whether to accept either static or random models, we resort to the Husman test, and the test reflects that the probability value reaches (2 = 80%), which is greater than the level (5%). This means we cannot reject the null hypothesis, that is, accept the alternative view (acceptance of the random effects model), indicating independent explained variables that were not included within the primary model. Their effect was reduced to a random variable. These variables may be represented (by the political factor). The above model also included the following variables defined by (capital adequacy, the ratio of bad debts to total assets, profit growth rate, legal liquidity ratio, in addition to fixed capital costs, costs of depleting natural resources, and environmental damage costs resulting from granting credit to green output. It was associated with a positive relationship with profitability in commercial banks. Whenever green output increases by (1%), profitability increases by (0.15%). This means commercial banks can benefit and profit if the government relies on the green product index as an alternative to the traditional product index. This indicator will create new job opportunities, mainly if the Iraqi government adopts economic policies to diversify production and dependence on environmentally friendly products. For example, the agricultural sector can absorb large unemployment numbers and reduce natural resources and environmental pollution. It has a severe impact on many economic and social variables. Also, adopting green output works to raise accurate economic growth rates and create a stable economic environment. The work of banks will be in an unpredictable environment within economies that depend on an extractive sector whose prices are determined externally and subject to global demand. The following tables indicate the results of panel data analysis.

TABLE 5. RESULTS OF POOLED REGRESSION

Dependent Variable: D(Y)
Method: Panel Least Squares
Date: 05/29/20 Time: 14:49
Sample (adjusted): 2007 2015
Periods included: 9
Cross-sections included: 10
Total panel (balanced) observations: 90

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.979375	8.340437	0.357220	0.7218
X2	0.150839	0.039201	3.847887	0.0002
X3	-0.006421	0.035433	-0.181202	0.8566
X4	0.026658	0.017477	1.525377	0.1309
X5	-0.636352	1.313086	-0.484623	0.6292
X6	0.046520	0.186375	0.249604	0.8035

R-squared	0.184727	Mean dependent var	-0.777778
Adjusted R-squared	0.136199	S.D. dependent var	25.86559
S.E. of regression	24.03971	Akaike info criterion	9.261631
Sum squared resid	48544.23	Schwarz criterion	9.428285
Log likelihood	-410.7734	Hannan-Quinn criter.	9.328836
F-statistic	3.806602	Durbin-Watson stat	3.075276
Prob(F-statistic)	0.003714		

TABLE 6. RESULTS OF FIXED EFFECTS

Dependent Variable: D(Y)
Method: Panel Least Squares
Date: 05/29/20 Time: 14:45
Sample (adjusted): 2007 2015
Periods included: 9
Cross-sections included: 10
Total panel (balanced) observations: 90

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.792827	11.86497	-0.319666	0.7501
X2	0.173000	0.043959	3.935480	0.0002
X3	-0.009467	0.045093	-0.209938	0.8343
X4	0.026969	0.019004	1.419137	0.1600
X5	-1.274189	2.010097	-0.633894	0.5281
X6	0.259704	0.280767	0.924982	0.3579

Effects Specification			
Cross-section fixed (dummy variables)			
R-squared	0.210343	Mean dependent var	-0.777778
Adjusted R-squared	0.062940	S.D. dependent var	25.86559
S.E. of regression	25.03837	Akaike info criterion	9.429708
Sum squared resid	47018.99	Schwarz criterion	9.846343
Log likelihood	-409.3368	Hannan-Quinn criter.	9.597719
F-statistic	1.426996	Durbin-Watson stat	3.138260
Prob(F-statistic)	0.162011		

TABLE 7. RESULTS OF RANDOM EFFECTS

Dependent Variable: D(Y)
Method: Panel EGLS (Cross-section random effects)
Date: 05/29/20 Time: 14:58
Sample (adjusted): 2007 2015
Periods included: 9
Cross-sections included: 10
Total panel (balanced) observations: 90
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.979375	8.686917	0.342973	0.7325
X2	0.150839	0.040829	3.694413	0.0004
X3	-0.006421	0.036905	-0.173975	0.8623
X4	0.026658	0.018203	1.464537	0.1468
X5	-0.636352	1.367635	-0.465294	0.6429
X6	0.046520	0.194117	0.239648	0.8112

Effects Specification		
	S.D.	Rho
Cross-section random	0.000000	0.0000
Idiosyncratic random	25.03837	1.0000

Weighted Statistics			
R-squared	0.184727	Mean dependent var	-0.777778
Adjusted R-squared	0.136199	S.D. dependent var	25.86559
S.E. of regression	24.03971	Sum squared resid	48544.23
F-statistic	3.806602	Durbin-Watson stat	3.075276
Prob(F-statistic)	0.003714		

Unweighted Statistics

R-squared	0.184727	Mean dependent var	-0.777778
Sum squared resid	48544.23	Durbin-Watson stat	3.075276

TABLE 8. RESULTS OF HAUSMAN TEST

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	2.337655	5	0.8007

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
X2	0.173000	0.150839	0.000265	0.1737
X3	-0.009467	-0.006421	0.000671	0.9064
X4	0.026969	0.026658	0.000030	0.9547
X5	-1.274189	-0.636352	2.170066	0.6650
X6	0.259704	0.046520	0.041148	0.2933

Cross-section random effects test equation:
Dependent Variable: D(Y)
Method: Panel Least Squares
Date: 05/29/20 Time: 14:59
Sample (adjusted): 2007 2015
Periods included: 9
Cross-sections included: 10
Total panel (balanced) observations: 90

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.792827	11.86497	-0.319666	0.7501
X2	0.173000	0.043959	3.935480	0.0002
X3	-0.009467	0.045093	-0.209938	0.8343
X4	0.026969	0.019004	1.419137	0.1600
X5	-1.274189	2.010097	-0.633894	0.5281
X6	0.259704	0.280767	0.924982	0.3579

Effects Specification			
Cross-section fixed (dummy variables)			
R-squared	0.210343	Mean dependent var	-0.777778
Adjusted R-squared	0.062940	S.D. dependent var	25.86559
S.E. of regression	25.03837	Akaike info criterion	9.429708
Sum squared resid	47018.99	Schwarz criterion	9.846343
Log likelihood	-409.3368	Hannan-Quinn criter.	9.597719
F-statistic	1.426996	Durbin-Watson stat	3.138260
Prob(F-statistic)	0.162011		

Conclusions

Artificial intelligence represented by technology (decision trees) is one of the advanced technologies that help Iraqi private banks provide the appropriate information that helps them predict financial failure. This is due to several considerations, the most important of which are (its predictability, accuracy, speed, ease of interpretation and understanding, its uncomplicated calculations, and its value even with little data). All this is reflected in the banks' ability, the research sample, to support and finance sustainable development plans in the Iraqi environment in all its aspects, especially (labor and financial support). The results of all standard models used in Panel Data (Pooled Model, Fixed Effect, and Random Effects) show the significance of the cash credit granted by private banks directed towards green output in achieving sustainable profitability for banks. I have implicitly reduced many variables measuring profitability and continuity of banking business after introducing the concept of green output as an independent variable in the profitability function within the panel data model as a proxy variable for standard output (green product). The results of applying decision trees indicate the possibility of predicting the survival of the research sample banks (mostly) in practicing their banking business. The Panel Data model shows that the green output is associated with a positive correlation with profitability, which is a function of the survival and success of the banking business. Using the decision tree algorithm to provide more accurate information to help private Iraqi banks predict financial failure. This is what contributes to the sustainable development process in the country. Other techniques such as (id3 and c4 algorithm) can also be used to forecast the financial failure of banks. Therefore, the Central Bank of Iraq should issue instructions or instructions to apply modern technologies. In addition, the central bank should direct the bank privately to hold seminars and awareness courses using modern technologies to predict the financial failure of banks with the help of experts specializing in this field to develop the skills of bank employees in using advanced and contemporary programs. It is essential to raise the rates of cash credit granted by private banks towards the green product sectors. It is necessary to amend the existing banking profitability and performance models after including the green output. It consists of environmental pollutants, constant capital consumption, and the acceleration of depletion of natural resources to raise economic growth rates.

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Appendix(1): How to Calculate the Green output

Green Output	Damage Cost	Depletion of Natural Resources	Consumption of Fixed Capital	Gross Domestic Product	**Year**
34364979374	2609910979	4730000000	8250000000	49954890353	2005
46919551529	2275841556	6300000000	9310000000	64805393085	2006
67067567313	1412081368	7980400499	12380000000	88840049181	2007
90477653426	2146420941	12820045778	18090000000	123534120145	2008
104729632573	2412636037	7580009113	13960000000	128682277723	2009
106390001192	2816719235	11560002223	17750000000	138516722650	2010
140575994333	3377982348	16655687763	25140000000	185749664444	2011
167072445265	1488214035	21080333154	28360000000	218000992454	2012
168548548091	15688905008	21700222030	28700000000	234637675129	2013
173682775805	5052879292	24150001078	25530000000	228415656175	2014
128858146992	3435957919	16620000000	17860000000	166774104911	2015

Source: Prepared by Researchers

- Gross Domestic Product At Current Prices($)

  National Accounts- Analysis of Mian Aggregates(AMA)
- Depletion of Resources=Depletion of Metals(Gold Tin, Lead Zinc, iron, Copper, Tin Nickel, Silver,…et)+ Energy Sources(Oil, Coal, Natural Gas).

  Source: World Bank Data
-

  . The cost of damage is represented by the data of the Central Bank with a fixed rate of (75%) for the year 1990