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Methods of Forecasting Credit Losses in A Sample of Iraqi Banks - A Comparative Analysis

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Abstract:

The general trend in Iraqi banks is focused towards the application of international financial reporting standards, especially the international financial reporting standard IFRS 9 "Financial Instruments", in addition to the directives issued on the Central Bank of Iraq's instructions for the year 2018 regarding the development of expected credit losses models, and not to adhere to a specific method for calculating these losses and authorizing the banks' departments to adopt the method of calculating losses that suits the nature of the bank's activity and to be consistent in its use from time to time. The research problem revolves around the different methodologies for calculating expected credit losses according to the instructions of the Central Bank of Iraq compared to the requirements for calculating those losses according to IFRS 9, as well as the difference between the banks listed in the Iraq Stock Exchange among themselves. The research aims to present methods of forecasting expected credit losses in a sample of Iraqi banks and compare them with the requirements of IFRS 9 and the instructions of the Central Bank of Iraq in this regard. The research reaches a set of conclusions, the most important of which is that the International Financial Reporting Standard IFRS 9 has not been fully applied in Iraqi banks so far. There is also a difference between banks in the methods of calculating expected credit losses according to the mentioned criterion. And based on the conclusions that come, the research presents a set of recommendations, the most important of which is the necessity of preparing the infrastructure in the Iraqi environment first so that the standard can be applied correctly by subjecting the employees to training courses to familiarize them with the IFRS 9 standard, its application methods and requirements.

Keyword: **Expected credit losses, IFRS 9**

1. Introduction:

The global financial crisis that occurred between (2007-2010) prompted the leaders of the Group of Twenty (G20) countries and the Basel Committee on Banking Supervision to demand from the setters of international accounting standards need to reconsider the approved standards for provisions on financial assets, and modify the mechanisms used in this field, where the new standards were based on a fundamental basis represented in the use of models based on expected credit loss instead of the old models based on the achieved credit loss.As a result, the International Accounting Standards Board (IASB) issued the International Financial Reporting Standard IFRS 9 in July of 2014. Also, the US Financial Accounting Standards Board (FASB) finally issued IFRS 9 on the present value of expected credit loss (CECL) in June of 2016. Noting that the two versions share the goal of early recognition of credit loss and not waiting for the loss to occur in a material and actual manner as a condition for forming provisions.

As for the local environment, and based on the keenness of the Central Bank of Iraq to oblige banks to apply international best practices and apply international financial reporting standards IFRSs in order to deepen the concepts of transparency in disclosure and what is required by IFRS 9 standard, The Central Bank of Iraq directed its letter in the number (9/12) dated (1/4/2016), in which it called on all banks to move from the unified accounting system for banks and insurance companies to the application of international standards, including standards for financial instruments. And authorizing the banks' managements to adopt a certain method for calculating the expected credit losses and stabilizing them from one period to another, in line with the nature of the bank's work.The research problem can be summarized in the following questions:

1. Is there a difference between the requirements for calculating expected credit losses in the instructions of the Central Bank of Iraq and the requirements for calculating those losses in accordance with IFRS 9?

2. Is there a difference between Iraqi banks regarding the method of calculating the expected credit losses contained in the instructions of the Central Bank of Iraq?

This research aims to present and analyze the requirements of the International Financial Reporting Standard IFRS 9 regarding expected credit losses and to indicate the conditions for their recognition and the basis for their measurement and disclosure in the financial statements.

<u>The research is based on the following hypothesis:</u>

There is no difference between Iraqi banks regarding the method of calculating the expected credit losses contained in the instructions of the Central Bank of Iraq.

The importance of the research lies in providing scientific and practical support and assistance through clarifying the requirements of the International Financial Reporting Standard IFRS 9 in the field of calculating expected credit losses and comparing those requirements with what is provided by the concerned bank departments.

2- Credit concept.

The meaning of credit in economics refers to the ability to lend, and idiomatically, the obligation of one party to another party to lend or debt, which means that the creditor gives the debtor an amount of money (loan) for a specified period of time and the debtor is obligated to perform the debt when it expires.

Credit was also defined as "an activity carried out by the bank in its various specializations by providing financing ceilings and granting various credit facilities, as is the case in (loans, overdrafts and discount bills) for the various economic and commercial sectors" (Al -Amin and Rabeh, 11: 2017).

Bank loans are one of the types of credit (financial assets) and they are the most common in banks and are resorted to meet the various needs of borrowers, such as financing, investment or expansion of investment. The process of granting loans is the trust that the bank attaches to its customers (Zain & Wan, 2020: 423).

2-1 Credit according to the borrower

1. Private bank credit: It is granted to natural or legal persons (companies), and this credit is granted depending on the financial capacity (current and future) of individuals and institutions.

2. Public bank credit: It is granted to public bodies and institutions, government departments and the state. This credit is granted on the basis of trust in dealing with the state.

2-2- Credit according to its nature (Dada and Amara, 137: 2018):

1. Direct bank credit: It is represented in loans, such as the debit current account, Bill of Exchange, cash advances, lease financing. This type is represented by granting cash amounts directly to the loan applicant (credit) for use in agreed operations in the credit contract.

2. Indirect bank credit: It is represented in letters of guarantee, bank acceptances and credit cards.

2-3 Regarding the purpose of the credit (Eyal, 15:2020):

1. Investment credit: It is granted for the purpose of investment, such as establishing a productive project or financing long-term investment operations, such as investing in fixed assets such as land, machinery, and others.

2. Commercial credit: It is a short-term credit granted to business companies to finance the working capital in them with the aim of activating the circulation of goods and facilitating production and current operations, and it is used in import and distribution, so it clears itself.

3. Consumer credit: It is credit granted to purchase consumer goods and used to meet an individual's need, such as buying a car. It is usually personal credit and is granted to state employees and other companies.

2-4 In terms of duration (Al-Baldawi, 2019: 114):

4. Short-term credit: Its duration is less than one year, starting from the date of granting it until the date of payment or renewal. It is often a commercial credit for the purpose of financing the purchase of certain goods. Payment is made by the customer after selling the goods.

5. Medium-term credit: Its duration ranges between (5-1) years, and this type of credit is usually allocated to finance industrial projects such as purchasing equipment and machinery and for the purposes of industrial expansion.
6. Long-term credit (Abbas, 210: 2014): Its duration exceeds five years, and may reach twenty-five years. It is used to purchase fixed assets, establish a new project, or expand the current project.

2-5 In terms of credit-related guarantees (Karim, 240: 2019):

1. Personal credit: It is granted to the borrower without providing any guarantee for the repayment of the credit, and it is sufficient to make a promise to the credit grantor to repay the debt.
2. Credit in kind: It is granted to the borrower after presenting assets to repay the credit.

3-Measurement of credit impairment according to IFRS 9

The expected credit losses model depends on the accuracy of information and indicators that reflect the possibility of a loss in the future and the importance of the timing associated with this information. The concept of expected credit losses is defined as "The weighted average of credit losses with counting the different risks of default as weights" (Al-Moghamis, 330:2018). Under IFRS 9, delinquency is a lagging indicator and the increase in credit risk occurs before assets are delinquency. Therefore, the economic unit must have sufficient information when determining expected credit losses. Accordingly, information from past events, current conditions, as well as future expectations must be available to support the process of measuring credit losses, where the date of recognition of the financial asset is determined, and then the periodic update of the provision for credit losses for the asset and changes in credit losses is made. It is also not possible to rely on the maturity date only. This leads to the early and timely recognition of Expected Credit Loss (KPMG,2014:74). According to the expected loss model, the expected cash flows are discounted at the same effective interest rate used when purchasing the asset for the first time, thus maintaining a cost-based measurement. The economic unit records the decline of the financial asset held at amortized cost until the fair value of that asset is less than the book value (Beerbaum & Ahmad, 2015: 3). Expected credit losses are measured on the basis of two models and as follows (Barnoussi etal, 2020:181):
1. Expected credit losses 12-month period: It is defined as "the portion of lifetime expected credit losses that represents the expected credit losses resulting from default events on the potential instrument within 12-months after the reporting date."
2. Expected credit losses over the life of the asset: It is defined as "the expected credit losses that result from everything that is possible to cause default over the expected life of the financial instrument."
The ECL credit loss calculation model is applied through three stages according to the general approach, and the impairment of financial assets is recognized according to this approach as follows (EY, 2018:20):

3-1 The general approach: In light of this approach and on the date of preparing the financial reports, the unit must recognize a provision for impairment losses of financial assets based on expected losses for 12-months or over the life of the asset. When measuring the expected credit losses of financial assets, the unit must take into account the measurement principles stipulated in IFRS 9, which are (EY, 2018:20):

- **An unbiased, probability-weighted amount determined by the possible outcomes.**
- **The time value of money.**
- **Information about past events, current conditions and forecasts of future economic conditions available without effort at the date of the report**

This approach is based on three stages to measure the expected credit losses (ECL) of financial assets. The following is an explanation of these stages:

3-1-1 The first stage: This stage includes financial assets that have not shown a significant increase in credit risk since their initial recognition, and the expected credit losses reserve are recognized for them for a period of 12-months (Vasilyeva & Frolova, 2019: 76), and they are on the basis of the following assumptions (Beerbaum & Ahmad, 2015:4):

- **Low credit risk**
- **The borrower is financially sound and able to meet his obligations.**
- **There is no impact of adverse economic changes on the borrower's ability to meet his financial obligations.**

3-1-2 The second stage: This stage includes the financial assets that have shown signs of an increase in credit risk since the initial recognition and there is no objective evidence of a decrease (Schutte etal, 2020:2).The indicators of asset impairment are as follows (Beerbaum & Ahmad, 2015: 2):

- **The emergence of a noticeable financial distress for the borrower.**
- **The borrower's failure to pay or delay the due date of interest or basic payments.**
- **The possibility of the asset being subject to restructuring or the borrower's exposure to bankruptcy.**

3-1-3 The third stage: It includes the low-value financial assets in which the value has decreased, where the expected credit losses are calculated over the useful life of the asset, as well as calculating the interest return on the basis of the amortized cost (Cohen & Edwards, 2017:43). The indications that the financial asset has impaired its credit value are the following (BDO, 2014: 15):

- **Significant/material financial difficulties of the borrower.**
- **Violation of the terms of the contract, such as default or the presence of unpaid dues.**
- **The possibility of the borrower's exposure to bankruptcy or financial restructuring.**

4- Methods for predicting expected credit losses in banks

Proceeding from the keenness of the Central Bank of Iraq on the commitment of banks to apply the best international practices in the field of banking industry, the application of international financial reporting standards (IFRSs) and the deepening of their concepts of transparency and disclosure, and what is included in the International Financial Reporting Standard, IFRS 9, The Central Bank of Iraq, through its book No. (12/9) dated (4/1/2016), called on all banks to move from the unified accounting system for banks and insurance companies to international standards, and two committees were formed to study the transition to international accounting standards and held several meetings and made recommendations in this regard.

The Central Bank of Iraq also asked the banks to do the following (CBI, 2: 2018):

- **The obligation to disclose in accordance with the requirements of international financial reporting standards issued after 1/1/2019.**
- **Each bank submits the plan approved by its board of directors or the regional manager of a foreign bank branch prepared by the formed committee to the Central Bank of Iraq.**
- **Banks must put in place the necessary systems that enable them to fully comply with the requirements of IFRS 9, especially with regard to calculating expected credit losses.**
- **The bank compares the quantitative impact (Qis) from the application of the above criterion, especially the provision for expected credit losses, compared to the financial provisions approved by the bank, and provides the Central Bank with them along with the quarterly financial statements.**

4-1 Calculation range expected credit losses

According to the International Financial Reporting Standard IFRS 9, the expected credit loss measurement model is applied within the following framework (except for what was measured at fair value through the income statement) and as stated in the guiding regulations for the application of IFRS 9 (Central Bank of Iraq Instructions, 3:2018) :

1- Loans and credit facilities (direct and indirect).
2-Debt instruments recorded at amortized cost.
3-Debt instruments recorded at fair value through the statement of other comprehensive income.
4-Commitments to grant loans or ceilings when there is an existing obligation to extend or increase the credit.
5-Assets resulting from contracts that fall within the scope of IFRS 15.
6-Letters of guarantee stipulated in accordance with the requirements of IFRS 9.
7-Financial receivables related to lease contracts within the requirements of IFRS 16 International Financial Reporting Standard.
8-Trade receivables.
9-Islamic finance products that bear the characteristics of debt (asset and return).
10-Credit claims on banks and financial institutions (except for current balances that will be used to cover bank operations such as transfers, letters of guarantee and credits within a very short period of time).

4-2 Credit rating of the Central Bank of Iraq.

Based on the provisions of Paragraph (1) of Article (104) of the Banking Law (94) for the year (2004), the instructions of the Law to Facilitate the Implementation of the Banking Law (4) for the year (2010), the Central Bank of Iraq has classified credit into interest-producing loans and non-producing loans. For returns, and these loans are subdivided according to what is shown in the following table (Instructions of the Law to Facilitate Implementation of the Banking Law (4), 2010:16):

Table (1)
Credit rating according to the instructions of the Central Bank of Iraq

credit classification			
Loan type	**Credit classification**	**%**	**Descriptive criteria**
Yield Producing Loans	**Credit the good**	**2%**	**The data is up-to-date, cash flows are continuous, repayments are on time and the borrower's reputation is financially sound.**
	Credit average	**%10**	**The loan is collectible with interest, and its indicators:** **1- More than 30 days have passed and less than 90 days have passed.** **2- The slowdown in updated information and the decline in profitability and cash flows.** **3- Economic stagnation in the borrower's activity sector.** **4- The possibility of non-payment as a result of the emergence of a defect and weakness in the management of the company.** **5- Request to extend the eligibility period.** **6- Inadequate guarantees.** **7- The bank's failure to evaluate the guarantees provided periodically.**
Loans unproductive for Yields	**Credit without Average**	**%25**	**More than 90 days and less than 180 days, and its indicators:** **1- Late payment of installments.** **2- Low cash flow.** **3- The bank's inability to obtain sufficient information about the borrower.**
	Doubtful credit	**%50**	**More than 180 days and less than a year, and its indicators:** **1- Failure to pay the due payments with interest.** **2- Decrease in the market value of the**

			offered guarantees. 3- File a lawsuit by the bank against the borrower.
	Losing credit	%100	It is the one that cannot be collected with the possibility of collecting part of it and it includes all credits granted that have been due for a year or more and have not been paid.
Source: Prepared by the two researchers based on instructions (4) for the year 2010, instructions to facilitate the implementation of the Banking Law.			

The bank has set the indicated ratios and they have been circulated to all banks and are approved in the credit loss provision account. These ratios are fixed and apply to all banks.

And as stated in the Central Bank's letter no. (9/6/466) dated (12/26/2018) in accordance with IFRS 9, a credit policy approved by the bank's board of directors must be available to be applied to dealers in the credit process, and it includes the basis for determining the degree of creditworthiness of customers and standardization concepts and assessment bases for all departments concerned with the bank. The bank can adopt a general accounting methodology or a methodology for each type or specific group of accounts, depending on the common characteristics of those accounts. The reasons and justifications for choosing the methodology and the common characteristics on which it was built, as well as the consistency on the approved methodology, must be documented, and according to the letter of the Central Bank of Iraq no. (9/3/5670) dated (24/3/2021). The degree of creditworthiness is determined when increasing, granting or renewing on a quarterly basis, when classifying debts and creating provision in ten categories, taking into consideration the indicators for each category according to the following (Central Bank of Iraq, 8:2021):

Table (2)
Classification creditworthiness

Status	Category	Credit risk level
Productive for returns	1	Very Low Risk
	2	Low Risk
	3	Moderate risk
	4	Acceptable Risk
	5	Marginally Acceptable Risk
	6	Risk Subject to Increase
	7	Risks Needing Special Attention (Watch List) (Medium credit)
Unproductive for returns	8	Substandard credit
	9	Doubtful credit
	10	Loss credit
Source: Prepared by the two researchers based on the book (Central Bank of Iraq, 2021) "Creditworthiness Instructions"		

5- Approved methodologies for forecasting expected credit losses in banks, the research sample.

The research sample banks adopt relatively different methods when forecasting the expected credit losses for each bank, as these banks are divided into categories according to the level of their application to the requirements of the International Financial Reporting Standard IFRS 9 in general and the requirements for calculating the allowance for expected credit losses in particular. (Note: Due to the specifics of banking work and the confidentiality of the relevant information, the banks of the research sample were coded).

5-1 Bank (A) and Bank (B)

Banks (A) and (B) calculate expected credit losses in accordance with the requirements of IFRS 9 as follows:

- 12-month expected credit losses: It is calculated from the first 12 months from the date of preparing the financial statements.
- Expected credit losses over the life of the instrument, computed from the date of preparing the financial statements until the maturity date of the financial asset.

Bank (A) relies on the classification of individuals on six characteristics: (age, work, geographic location, maturity period, type of guarantee, extension). It also depends on the classification of companies on six features as well (the age of the company, cash flow, type of activity, the company's capital, the company's profits and losses, the degree of disclosure), and these main features are subdivided into several sub-features and according to the bank's divisions. Table (3) below presents the details of one of the features that have been divided into sub-classifications to clarify the method of calculation:

Table (3)
Classification grades for the age trait

Degree of risk	Classification details	Stage	Age
1	High quality - lower credit risk	The first stage	18-35
2	High quality - very low risk		36-45
3	High to medium quality - low risk		46-50
4	Medium quality - moderate risk		51-55
5	It has risk characteristics - a significant degree of risk	The second stage	56-69
6	high credit risk		70-71
7	Persistently weak risk -Very high credit risk		72-73
8	High risk - probability of default with the possibility of recovery of principal and interest		74-75
9	Less rated - irregular with the possibility of recovering principal and interest	The Third stage	76-80
10	Non-performing - with less possibility of full recovery of principal or interest		more -80

Source: The field interview with bank officials (A) on (25/5/2021) and (26/5/2021), and the data obtained from the bank.

Through Table (3) above, if the bank obtained information about the age of one of the borrowers, let it be 40 years, this means that he belongs to the second category within the first stage in which the age of the borrowers ranges between (36-45) years, and therefore the degree of risk of the borrower will be (2/10), which is equivalent to (0.2). And then move to the second feature, and so on for the rest of the features, noting that some features are divided into a classification less than (10) and according to the policy of the bank, and in this case the degree obtained by the borrower is divided by the number of attribute classifications.

Assuming that the Borrower obtains the following scores for each of the six specified characteristics (age = 2, employment = 7, eligibility = 4, geographic location = 5, security = 10, degree of extension = 8), then the scores obtained by the borrower will be summed and from then divide by the number of features (36=2+7+4+5+10+8) and by dividing the number (6=6/36), the borrower will get a score of (6). Then, the degree of risk is determined according to the business model for the bank's classification of the individual and customer sectors, specifically the classification (B) within the second stage and is characterized as having high credit risks and a probability of default of (112%), which represents (PD%) as shown in Table (4) below:

Table (4)

The bank's business model for credit rating for the individual and corporate sectors

Business model for monetary credit rating for the individual and corporate sector				
Internal classification	Degree of risk	Classification details	Stage	Probability %PD
Aaa	1	High quality - lower credit risk	The first stage	99%
Aa	2	High quality - very low risk		102%
A	3	High to medium quality - low risk		103%
Baa	4	Medium quality - moderate risk		104%
Ba	5	It has risk characteristics – significant degree of risk	The second stage	108%
B	6	High credit risk		112%
Caa	7	Persistently weak risk very high credit risk		117%
Ca	8	High risk - possibility of default with the possibility of recovery of principal and interest		120%
C	9	Less rated - irregular with the possibility of recovering the principal and interest	The Third stage	100%
D	10	Irregular - with less possibility of recovering the principal or interest in full		100%

Source: The field interview with bank officials (A) on 14/7/2021 and (17/7/2021) and the data obtained.

Note the probability of default ratios (PD%) mentioned in the above table is hypothetical and differs from one bank to another, as well as from year to year and according to the bank's policy. The bank calculates the average probability of default for each portfolio by calculating the number of non-performing loans for each year on the total loans for that year, through the following equation:

(Number of non-performing loans for the portfolio / Total loans for the portfolio = the percentage of default for the portfolio).

Then the ratios for the past five years are collected and the arithmetic mean is extracted by dividing the sum of the product of five years by (5) and thus the probability of default that is approved for the year in question (PD%), and the bank follows the two banks, (A) (B) in Extracting the loss at default (LGD%) on the following equation:

(Loss upon default = (Exposure upon default - the amount expected to be obtained) / Exposure upon default).

Bank (A) adopts the same previous method for institutions, and as we mentioned that bank (B) uses the same previous method for calculating expected credit losses, except that bank (B) depends on ten characteristics with regard to companies and individuals as well, and it gives each feature a certain percentage, and the total ratios for the ten traits are equal to (100%) and each trait is divided into several branches, and each branch carries a certain value to reach the degree of risk, and then go to the bank's matrix and reach the percentage (PD%), and these percentages are as follows:

(Industry stability (9%) - Financial position (17%) - Management and control (5%) - Company stability (4%) - Competitiveness (6%) - Dealing with legal problems (3%) - Performance indicator and operational performance results (12%) - financing and facilities structure (6%) - cash flows (15%) - balances due (23%), equal to the total (100%), and the table (5) below shows one of the ten features and its branches for companies and individuals for each customer :

(5) Table

Credit classification

Customer Name:						
Feature	Relative weight of the feature	Standards and Indicators	Item Description	Relative weight of the standard%	Degree of danger	PDF% risk value
Industry stability	9%	1- Exchange rates	Stable	1%		0.00%
		2- Laws and regulations	stable with a future outlook	3%		0.00%
		3- Customs tariff	stable	2%		0.00%
		4- Tax system	stable	3%		0.00%
				9%	0.00%	0.00%
Note // If the customer is 90 days or more behind his due dates, a 100% allowance is taken and the above table is neglected.						
Source: Obtained from an interview with officials in Bank (B) on (12/7/2021) and data obtained from the Bank.						

Through the above table, the level of risk for each sub-attribute will be determined and recorded in the (risk degree) field, and then a field product will be obtained (the degree of danger) × (the relative weight of the criterion %) and the result is recorded. The final product represents the value of (PD%) of the customer, after which the percentage obtained from the risk degree field is matched with the corresponding in the field of the level of credit risk through the matrix in Table (6) below:

Table (6)
The degree of credit risk

Category	Credit risk level	Degree of risk
1	0.5%-15% very low risk	Of 1 or less very low risk
2	15%-25% Low Risk	1%-2% Low Risk
3	From 25%-35% moderate risk	2%-4% moderate risk
4	35%-45% acceptable risk	From 4% - 5% acceptable risk
5	45%-55% moderately acceptable risk	5%-10% moderately acceptable risk
6	From 55%-60%, the risk can be increased	From 10%-35%, the risk can be increased
7	60%-70% risk that needs special care (medium credit)	35%-50% risk that needs special attention (medium credit)
8	70%-80% credit below average	From 50%-80% credit below average
9	80%-90% doubtful credit	80%-95% bad credit
10	From 90%-100% credit loss	From 95%-100% Credit Loss

Source: Obtained from an interview with officials in Bank (B) on (12/7/2021) and data obtained from the Bank.

If the customer obtains a score of (4.5%) in Table (5), it falls between (5%-4%) in Table (6), we will find that the corresponding is (from 35%-45% of acceptable risks) listed within degree (4). And here we will go to the bank's (business model for rating cash credit for the individual and corporate sector) as shown in Table (4). We will find that grade (4) falls within the first stage of the Baa rating (medium quality - moderate risk) and we depend on the ratio within the rating, (It should be noted that the ratios within the matrix differ from one bank to another, and according to the policy of the bank).

5-2 Bank (C)

Bank (C) follows one method for calculating expected credit losses for companies and individuals. The bank calculates the probability of default (PD%) in a different way and according to what is stated in the paragraph of the probability of default within the instructions for applying IFRS 9 (Methodology of Bank C, 2 :2021):

3. The economic deviation of the financial instrument = net debt × gross domestic product growth rate × general inflation rate.
4. Square of the economic deviation of the financial instrument.
5. Return the natural logarithm of the principal LN = logarithm (total value of the financial instrument / subsequent period).
6. The period to default (DD:DISTANCE TO DEFAULT) as a measure of the risk of default = return the natural logarithm of the principal + [expected return for the subsequent period – (the instrument's economic deviation square/2)] × Subsequent period.
7. Probability of default PD = normal cumulative redistribution of the two measures of default period (DD:DISTANCE TO DEFAULT).

The researchers would like to point out that bank (C) depends in calculating the equations on the following (methodology of the bank, 5:2021):

- **The GDP growth rate is adopted from (the main page of the economic indicators page - Iraq), where the bank relies on the latest evaluation published by the page.**
- **The total inflation rate is adopted from (the main page of the economic indicators page - Iraq), where the bank relies on the last evaluation published by the page.**
- **The natural logarithm of the principal debt, LN, represents the future value of the debt, that is, the future value of money.**
- **Subsequent period: It represents the remaining period of the loan life.**
- **Period to stumble: The result is extracted through statistical equations through the EXSL MICROSOFT program.**
- **Net Debt: Represents the net remaining amount of the loan after subtracting the repayments.**
- **The expected return for the subsequent period: It is the amount that the bank expects to obtain from the borrower in the future.**
- **After reaching the value of (PD%), it will use the following equation: ECL = PD% x EAD x LGD% .**

5-3 Bank (D)

Bank (D) calculates the expected credit losses for individual and corporate customers, as it calculates the probability of default (PD%) for individuals based on historical economic indicators and linking them to future expectations and based on historical data obtained by the bank from external institutions (International Monetary Fund, World Bank, Central Bank of Iraq), where the bank links future expectations for several historical years, for example from the years (2015-2018) to economic indicators such as (Unemployment), (Inflation), (Real GDP growth) and as Shown in Table (7) the following hypothesis:

Table (7)
Historical ratios of economic indicators

Year	GDR.	Inf.	Unem.
2015	10%	7%	14%
2016	8%	6.8%	12%
2017	7%	6.5%	11.5%
2018	8%	5.0%	10%

Assuming that through historical data and using statistical methods, the bank obtained the value of (beta) for each of the following variables, as well as the fixed percentage, and it was as follows:
a=0.5 , B1: GDP.=2 , B2: Inf.=6 , B3: Unem.=1.2

The bank obtains the percentages of variables related to future forecasts from external institutions (the International Monetary Fund, the World Bank, the Central Bank of Iraq), which were for the years (2023-2019) and as shown in Table (8) below, as follows *:

Table (8)
Future expectations ratios for economic indicators

Year	GDR.	Inf.	Unem.
2019	8.0%	6.1%	17.0%
2020	8.2%	6.0%	16.8%
2021	8.5%	5.1%	16.4%
2022	8.0%	5.0%	15.9%
2023	7.9%	4.8%	15.0%

After obtaining the future expectations, the three scenarios will be applied in the Stress Testing to study future predictions and know their impact on the expected credit loss model through the product of (Future predictions x Beta), where (Y) represents the value of (PD%) and it reaches the value of (y) through the linear regression equation as follows:

Y=a+ (B1×X1) + (B2× X2) + (B 3× X3)
a=constant.
B1= GDR. Beta coefficient .
B2=Inf. Beta coefficient .
B3= Unem. Beta coefficient .
X1= GDR.
X2= Inf.
X3= Unem.
Y=PD.
When calculating the expected credit losses for the year 2019, the bank will take the following steps:
Y=a+ (B1×X1) +(B2× X2) +(B 3×X3) - - - - - (2019)
Y=0.5+(2×8.0%) +(6× 6.1%) +(1.2× 17.0%) = 1.23%
The output (1.23%) represents the probability of default PD% for the year 2019 in the normal scenario, and through historical data the standard deviation of the three variables (Unem., GDR., Inf.) is reached and assuming that the result was as in Table (9) Below are as follows:

*** The information was obtained through field interviews with bank officials (D) on (8/8/2020).**

Table (9)
Standard deviation table of historical proportions

Standard deviation			
Year	GDR.	Inf.	Unem.
2015	2.5%	1.5%	15.1%
2016	12.6%	1.0%	14.8%
2017	-1.7%	0.1%	12.0%
2018	2.7%	0.4%	11.5%
St. deviation	16.1%	3%	53.4%

Through the results reached for the standard deviation of each variable, the bank obtains the best scenario by adding the standard deviation to each variable, and to obtain the worst scenario, it subtracts the standard deviation from each variable. Through the following equation, the following results are obtained:

$Y=a+ (B1\times X1) + (B2\times X2) + (B 3\times X3)$

$Y=0.5+(2\times 8.0\%-16.1\%) +(6\times 6.1\%-3\%) +(1.2 \times 17.0\%-53.4\%)=8.72\%$

The worst-case scenario for the probability of default (PD%) for the year 2019 is (8.72%).

$Y=0.5+(2\times 8.0\%+16.1\%) +(6\times 6.1\%+3\%) +(1.2 \times 17.0\%+53.4\%)=2.3728\%$

Through the foregoing, we have obtained the three scenarios for Stress Testing, and the ECL is extracted according to the three scenarios, and after reaching the possibility of failure, the following equation is used:

$$ECL=PD\%\times LGD\%\times EAD.$$

5-4 Bank (E)

The bank calculates the probability of default (PD%) for companies based on the ten basic features specified in the instructions of the standard and sets relative weights for each feature, as was previously explained for Bank (B), where each feature is divided into several branches and each branch carries a certain value to reach the degree of risk Bank (E) differs from bank (B) in the values given for these ratios, which are as follows:

Industry stability (14%), financial position (18%), management and control (6%), company stability (6%), competitiveness (8%), dealing with legal problems (3%), performance indicator and operational performance results (6%), financing and facilities structure (6%), cash flows (12%), balances due (21%), equal to the total (100%), and the following table shows one of the ten features and its subsidiaries for companies, as in Table (8) below:

Table (8)
Corporate credit classification

Main feature	Pointer		Relative weight	Risk (%)	Risk value (%)
	1	Cash to Assets Ratio	3%		0.00%
	2	Debt to Assets Ratio	4%		0.00%
	3	Return on assets	2%		0.00%
	4	Gross profit to sales	2%		0.00%
	5	Net profit to sales	2%		0.00%
	6	Return on equity	3%		0.00%
	7	Return on capital	2%		0.00%
		The weight	18%	0%	0.00%
Source: Prepared by the two researchers based on the data obtained from the bank.					

As for the classification of individuals, the bank adopts the (5C.S) system, which includes a study of the customer's situation in terms of reputation, capital, ability to pay, type of guarantee, type of work, and extensions. The customer's classification is reviewed every three months and then given a certain credit rating, and because the bank did not possess historical data as a result of the bank's modernity, it resorted to using historical data similar to the nature of its work through the institutions (the International Monetary Fund, the World Bank and the Central Bank of Iraq). And due to the bank's modernity, the following ratios have been adopted based on the analysis of the current portfolio of individual customers:

1- Loss rate of 45% for the first stage (according to Basel decisions).

2- Loss rate of 100% for the second and third phases (according to Basel decisions).

3- Three scenarios are applied to the calculation results, which are assumed to be weighted as follows:

- 60% from the value of the calculation as the probability of occurrence.
- 25% of the calculation value as a lower probability of occurrence (i.e. a greater loss), (pessimistic scenario).
- 15% of the calculation value as a lower probability of loss (an optimistic scenario).

Thus, the arithmetic mean is calculated by summing the sums resulting from the three scenarios and dividing them by their number (3) in order to reach the assumed provision, and this ratio is applied to all three stages.

Where the bank refers to the historical ratios obtained from the institutions and then calculates the standard deviation of the statistical data, as was previously explained for bank (D), and after reaching the percentage (PD%), the following equation is applied:

$$ECL=PD\%\times LGD\%\times EAD$$

Accordingly, there is a difference between the requirements for calculating expected credit losses in the instructions of the Central Bank of Iraq and the requirements for calculating those losses in accordance with the International Financial Reporting Standard IFRS 9, and this can be clarified through Table (9) below:

Table (9)
The difference between the requirements of the Central Bank of Iraq, and the requirements for calculating credit losses according to IFRS 9

Sequence	Steps	Central Bank of Iraq	IFRS 9
1	Classification credit	The Central Bank of Iraq classifies loans in terms of creditworthiness into two types: (Return-producing loans) which are subdivided into: 1- Good credit. 2- Medium credit. (non-interest-bearing loans) are divided into: 1- Credit below average. 2- Doubtful credit. 3- Credit losing.	The standard classified and detailed more loans, as it classified the two types into the following: (Return-producing loans) which are subdivided into: 1- Very low risk. 2- Low risk. 3- Moderate risk. 4- Acceptable risks. 5- Fairly acceptable risk. 6- High risk. 7- Hazards that need special care. (non-interest-bearing loans) are divided into: 1- Credit below average. 2- Doubtful credit. 3- Credit lost.
2	Special ratio	The Central Bank sets certain percentages for each type of loan, and these percentages are fixed for several years and for all banks.	According to IFRS 9, the bank sets certain ratios for each type of loan, and these ratios are variable at the end of each financial period, as they differ from one bank to another and in accordance with the bank's credit policy.
3	Calculation method	According to the central bank's method, the provision for credit losses is calculated by multiplying the loan amount by the percentage of the type of loan.	According to the standard method, the provision for credit losses is calculated according to a formula and according to certain percentages specific to the bank and in line with the bank's policy.
4	The entity sets the ratios	These percentages are set by the Central Bank of Iraq and circulated to the rest of the banks.	Each bank sets its own rates that it will adopt for that year and collect the approval of the Central Bank.

5	Stages of loan default	The Central Bank of Iraq divided loans into two stages, and these two stages are divided into several degrees.	The standard divided loans into three stages, and each stage is divided into several degrees.
Source: Prepared by the two researchers through what was presented in the previous paragraphs.			

As it has been shown from the foregoing that all banks adopt the formula for calculating expected credit losses (ECL=PD%LGD%× EAD). However, they differ among themselves by calculating the probability of default (PD%), as there is a large difference between the banks of the research sample with regard to the calculation process, and each bank is unique in a certain way.

Table (10)

Probability of default (PD%) for each bank

Bank	Methodology for calculating expected credit losses
Bank (A)	Bank (A) in calculating the probability of default (PD%) for individuals depends on six characteristics (age - work - geographic location - maturity date - guarantee - extension). In calculating the probability of default (PD%) for companies, it depends on six features also (the company's age - the company's activity - cash flow - the degree of disclosure - capital - profits), and Bank A is unique in its reliance on six attributes and this is what distinguishes it from other banks.
Bank (B)	Bank (B) in calculating the probability of default (PD%) for individuals and institutions depends on ten characteristics alike, which are (industry stability - financial position - management and control - company stability - competitiveness - dealing with legal problems - performance indicator and operational performance results -Finance structure and facilities - cash flows - balances payable). Bank (B) is distinguished from the banks in the research sample by relying on ten characteristics for each of the individuals and institutions, and bank (B) is distinguished from the rest of the banks in that it transfers the loan to the second stage when it exceeds 90 days, while the rest of the banks transfer the loan to the second stage if it exceeds 30 days.
Bank (C)	Bank (C) in calculating the probability of default (PD%) depends on the use of statistical equations that were reached after studying, effort and the participation of experts in this field by setting the equations, where the economic deviation of the tool is extracted, the square of the economic deviation, returning the natural logarithm of the origin of the debt LN, and calculating the period to default, and then reaching the probability of default (PD%). Bank (C) is distinguished from the rest of the banks in that it follows the statistical equations and the numbers are obtained from (the main page of the Economic Indicators page - Iraq) and follow the last evaluation published on the page.
Bank (D)	Bank (D) relies on calculating the probability of default (PD%) for individuals by testing stressful conditions to study future predictions by linking historical data with future predictions that are obtained from external institutions (World Bank - International Monetary Fund - Central Bank of Iraq), And its adoption in calculating the

	probability of default, as for companies, it relied on the Moody, s matrix, and this distinguishes it from the rest of the banks.
Bank (E)	**In calculating the probability of default (PD%) for companies, Bank (E) relies on the ten features that were mentioned in the criterion and is unique from the rest of the banks in that it restricted the features to companies only. As for calculating (PD%) for individuals, it relied on the stressful conditions test.**
Source: Prepared by the two researchers through what was presented in the previous paragraphs.	

Accordingly, there is a difference between Iraqi banks regarding the method of calculating expected credit losses contained in the instructions of the Central Bank of Iraq. The reason for the difference between the methodologies for calculating expected credit losses (ECL) between banks is attributed to several reasons, including the nature of the bank's work, the size of the bank's investment portfolio, the bank's capital, and the date of the bank's establishment. If the bank is ancient, this means that it possesses historical data that can be linked to current conditions and future predictions, but if the bank is new, it will lack historical data and resort to external institutions such as (the International Monetary Fund - the Central Bank - the World Bank). Likewise, if the bank deals with foreign banks and has foreign transactions, it resorts to external institutions or international rating companies such as (Moody,s - Fitch). The impact of the different methodologies is reflected on the banks and not on society. The bank must choose a methodology that suits its investment portfolio, the nature of its work, the nature of the borrowers it deals with, and the size of the capital. As well as the size of the provision for credit losses that must be maintained by the bank and its impact on net profits and dividends to shareholders.

6 -Conclusions and Recommendations

6-1 Conclusions

In this research, the most important conclusions are presented as follows:

- **The difference in the multiplicity of methods of forecasting expected credit losses is due to the flexibility granted by IFRS 9 standard, as it leaves to the management the freedom to choose the method that suits the unit's business model.**
- **Credit is classified according to the instructions of the Central Bank of Iraq into five sub-sections, while according to the International Financial Reporting Standard IFRS 9, the credit rating has been divided into ten sub-grades, which gives more detail to the degree of credit risk and better analysis.**
- **The banks of the research sample agree among themselves by adopting the equation for calculating expected credit losses(ECL=EAD× LGD%× PD%) , but they differ among themselves in the method of calculating the probability of default (PD%), the sources of obtaining its information and the basis for its calculation. This is due to fundamental reasons specific to the bank, including the age of the bank, the nature of its work, and the difference in the size of investment portfolios from one bank to another.**

6-2 Recommendations

Through the conclusions that were presented in the previous section, the two researchers recommend the following in order to overcome the challenges facing the banks listed in the Iraqi Stock Exchange when applying the International Financial Reporting Standard IFRS 9 through:

- **Establishing the infrastructure first so that the standard can be applied correctly. The Iraqi environment needs an integrated and comprehensive banking system due to the large number of analytical tables related to the standard, especially the branches of government banks, where they constitute (40%) of the banking sector, which is a large segment of the banking sector and that these banks are not keeping pace with the application standard.**
- **Adopting internal metrics that reflect the real reality of the borrower and at the same time it is necessary to keep pace with modern international developments while maintaining privacy related to nature and the challenges facing us. For example, in 2014, ISIS occupied 121 banking branches, including 84 branches belonging to government banks and 37 private banks branches, which led to Losses estimated at (900) billion Iraqi dinars at that time, as large quantities of files related to customers and sponsors were destroyed and burned, and a large number of referenced historical data were destroyed.**

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طرق التنبؤ بخسائر الائتمان في عينة من البنوك العراقية
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مستخلص البحث:

يتركز التوجه العام في المصارف العراقية نحو تطبيق معايير الإبلاغ المالي الدولية ولاسيما معيار الإبلاغ المالي الدولي IFRS 9 "الأدوات المالية" , إلى جانب التوجيهات الصادرة في تعليمات البنك المركزي العراقي لسنة2018 الخاصة بتطوير نماذج الخسائر الأئتمانية المتوقعة , وعدم التقيد بطريقة محددة لإحتساب تلك الخسائر وتخويل إدارات المصارف بإعتماد طريقة إحتساب الخسائر التي تلائم طبيعة نشاط المصرف والثبات على إستخدامها من فترة لأخرى , وتتمحور مشكلة البحث في إختلاف منهجيات إحتساب الخسائر الأئتمانية المتوقعة على وفق تعليمات البنك المركزي العراقي مقارنة بمتطلبات إحتساب تلك الخسائر على وفق IFRS 9 , فضلاً عن إختلاف المصارف المدرجة في سوق العراق للأوراق المالية فيما بينها , ويهدف البحث إلى عرض طرق التنبؤ بالخسائر الأئتمانية المتوقعة في عينة من المصارف العراقية ومقارنتها مع متطلبات IFRS 9 وتعليمات البنك المركزي العراقي في هذا الصدد , وقد توصل البحث إلى مجموعة من الإستنتاجات أهمها أن معيار الإبلاغ المالي الدولي IFRS 9 لم يتم تطبيقه في المصارف العراقية بشكل كامل لحد الآن , كما أن هناك إختلاف بين المصارف في طرق إحتساب الخسائر الأئتمانية المتوقعة وفق المعيار المذكور, وبناءً على ما جاء من إستنتاجات قدم البحث مجموعة من التوصيات أهمها ضرورة تهيئة البنى التحتية في البيئة العراقية أولاً ليتم تطبيق المعيار بشكل صحيح من خلال إخضاع الموظفين لدورات تدريب لتعريفهم بالمعيار IFRS 9 وأساليب تطبيقه ومتطلباته.

المصطلحات الرئيسة للبحث : الخسائر الأئتمانية المتوقعة , معيار الإبلاغ المالي الدولي IFRS 9

*البحث مستل من رسالة ماجستير