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## Investment Efficiency Analysis of the Iraqi Banking Sector: An Analytical Study for the Period 2004–2022

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**Abstract:** This study aims to analyse the investment efficiency of the banking sector in Iraq for the period 2004-2022, using the model, where all data for Iraqi banks were obtained from the Iraq Stock Exchange, and according to the regular sample method, the size of the studied sample was (39) private banks with (428) observations, and as a result, the unbalanced panel data was used according to the ordinary least squares (OLS) method to estimate the relationship between revenue growth and banking investment growth. The private banking sector in Iraq had excessive investment at the beginning of the study period due to the economic and political conditions that Iraq went through before 2004. After that year, banks began to increase their investment activity significantly. As a result of the improvement of conditions, these banks began to achieve a relative balance between their investments and their achieved returns. The study also proved that banks with huge assets are more efficient than small banks

due to the accumulation of investment management experiences and skills. There are also fundamental reasons that can limit the achievement of efficiency within institutions, which is the information asymmetry that occurs between managers and shareholders, which can exacerbate the agency problem and push managers to enter into losing projects in pursuit of their interests, in addition to the information asymmetry that occurs between investors and managers, where managers may hide important information about the company's overall performance and try to mislead external financing providers to raise funds. These results can help managers in the studied Iraqi banks determine the extent of investment efficiency their banks have reached to address shortcomings or weaknesses and reduce financial losses that may occur in the future.

**Keywords:** Investment efficiency, Iraqi banking sector, private banks, information asymmetry, over-investment.

## Introduction

The Iraqi banking sector, especially the private sector, suffers from a decline in its financial performance and a rise in the size of its bad loans. This is what the Central Bank of Iraq has repeatedly stated. Therefore, diagnosing under- or over-investment in Iraqi banks can help them identify their strengths and weaknesses in a way that leads to achieving a general balance that increases the profits achieved and removes the specter of loss. The theoretical and philosophical foundations of investment efficiency are based on the fact that achieving a general balance between the size of the revenues achieved and the amount of actual investments is the most important thing that determines the extent of the success of banks and achieving shareholder satisfaction. No institution can continue its work and practice its activity if its investments are not commensurate with the size of its profits. Therefore, the investment efficiency of Iraqi private banks will be analysed using the model (Biddle et al., 2009) which was built on the basis that revenues are an indicator of banking investments, and indicating whether these banks enjoy investment efficiency or have excessive investments or suffer from a deficiency in investment.

Investment efficiency is a function of risk, return, and the total cost of managing an investment, considering the constraints that investors must operate within. These constraints include a range of financial and non-financial elements, such as the time available to the investment institution to manage its investments, the accountability it exercises as a fiduciary agent for shareholders' money, or the existing legal regulations. Accordingly, investment efficiency combines financial and non-financial efficiency (Hodgson et al., 2000). Hu et al. (2022) define it as a comparison of the actual results obtained by the institution through investment with the consumed inputs, i.e. it is the proportional relationship between the outputs and inputs of the institution's investment, which can be used to measure whether the institution's project is worth investing in. It is also defined as the institution's efficient investment by implementing projects with a vibrant present value under a scenario where there are no financial frictions in the market such as adverse selection or agency costs. Consequently, underinvestment misses investment opportunities with a positive net present value without adverse selection. In contrast, overinvestment is defined as overinvestment. According to Biddle et al. (2006), it is an investment in new projects that generate negative cash flows. Investment efficiency is also a criterion for determining the quality of a company's investment in its assets, and it is one of the factors determining the growth and future cash flow of companies (Moradi et al., 2022). The efficiency of investment in the institution can be a vital factor in determining financial success. It is defined as all investment projects that companies create and at the same time achieve a net present value, that is, their cash flows are positive. The higher the net present value of expected cash flows in the future, the greater the companies' profits (Rahmanian Koushkaki & Bahremandjouy, 2022). Ideally, managers' fiduciary duty requires them to critically evaluate investment projects and select only those that enhance the firm's value. However, previous research shows that managers do not always allocate resources efficiently. Managers tend to

waste money either by overusing funds in worthless projects, or by not taking advantage of them by withholding investments despite profitable opportunities. It hinders investment efficiency (Naeem & Li, 2019). From the above, we can conclude a clear concept of investment efficiency in banks, which distinguishes them from other institutions. The financial mediation function that banks perform requires them to maintain adequate liquidity to meet the demands of depositors and at the same time achieve satisfactory returns for bank owners. Accordingly, investment efficiency in banks is defined as the efficient employment of available financial resources in a way that leads to achieving positive returns to maximise the value of the bank to meet the desires of shareholders, and maintain optimal liquidity to satisfy depositors, and achieve a general balance in the amount of investments, in a way that prevents excess or deficiency in the employment of funds.

Investment efficiency has been explained according to different theories. According to Keynes's internal rate of return theory, which is the first theory, investment efficiency is determined by the marginal production of capital (Tsoulfidis, 2024). This is done by institutions comparing investment projects based on their investment efficiency. Projects with an investment efficiency that exceeds the prevailing interest rate in the market, in the presence of projects with different returns, companies invest until the marginal investment efficiency equals the interest rate in the market (Gao & Yu, 2020). As for Tobin's Q Theory, it is believed that investments reach a certain point at which the marginal rate of return in which the investment was made equals the total cost (Jorgenson, 1963). Investments that pass this point can be described as having investment efficiency. Still, in previous studies of investment efficiency, the challenge is the mechanism through which the unobservable movements of promising projects can be controlled in the future. As represented by Tobin's Q Theory, Brainard and Tobin (1968) and Tobin (1969) found a comprehensive solution to this challenge. The *Q Theory* is characterised by its ability to provide data on the general conditions of markets in the future, which are essential for investments, without entering into detailed knowledge of the general conditions of supply and demand. In the *Q Theory*, the investment spending of any company is determined by the letter *Q*. It represents the total value of the company's shares to the cost at which the exported capital is replaced (Eklund, 2010). The asymmetric information theory has also identified the fundamental determinants of the state of over- and under-investment that institutions face, as it believes that enhancing the efficiency of the institution's investments is one of the most essential activities that management wants to achieve, and that it also has a pivotal role in achieving future growth, and because of the separation between shareholders and management, The reason for the asymmetry of information is the emergence of a significant limitation for the institution, namely the agency problem, which in turn leads to a reduction in investment efficiency (Zhao et al., 2023). Information asymmetry is when one party has information not known by the other parties, so that only one party will know some specific consequences. In contrast, the other parties do not have such information they need (Nurcholisah, 2016).

In the study of Modigliani and Miller (1958), both the financing and investment decisions of the company are taken independently in the absence of any frictions in the financial market, while many researchers show that financial frictions lead to making reliance on external funds more expensive than internal cash flow, because external financing contains a lemon premium or information asymmetry, in these circumstances, any investment decision taken by companies that distribute low profits leads to the depletion of their cash flows, and therefore the company is more affected by its internal funds compared to companies that grant a high dividend, because it will maintain its available investment opportunities, and because the decrease in cash flow would reduce the total investment spending of companies facing information asymmetry, so if the problems of information asymmetry impose restrictions on the amount of financing for investment purposes, they must be more influential on companies that do not distribute profits (Ascioglu et al., 2008).

The agency theory believes that there is a moral hazard when separating ownership rights in companies, and this in turn leads to the creation of an agency problem between shareholders and investors in the financial market on the one hand, and managers and owners on the other hand, due to

the different aims and interests of each of the owners and managers of companies, i.e. they have different interests. As a result, ownership dispersion led to more power being granted to managers (Eklund, 2010) in the study of Jensen and Meckling (2019) who analysed how the goals and interests of managers and shareholders differ when ownership is separated. With the dispersion of ownership and the divergence of interests, there is a great danger that managers will pursue their interests, other than the goal for which they exist, which is to maximise the institution's value. The theory of overinvestment developed by Jensen and Meckling (2019) sees that agency problems arising as a result of the separation of ownership can lead managers to increase excessive investment projects through the use of discretionary power, which means that they want to maximise their interests and implement investments that are not in the interest of maximising the value of the institution or its shareholders. In the presence of funds, managers can exaggerate the amount of investment spending, which leads to expanding the company's investments beyond the optimal size. Overinvestment achieves several advantages for managers, such as privileges, empire building, and others, Jensen and Meckling (2019). As for the free cash flow theory, the difference in interests between company owners and managers regarding dividend distributions is most severe, especially when the organisation has free cash flow. The problem lies in how managers are motivated to manage this cash flow wisely, instead of wasting it, investing it at less than its cost, or wasting it in a way that achieves investment inefficiency (Jensen and Meckling, 2019). Murphy (1985) believes that the increasing growth in the company's size increases the degree of managers' power by increasing the financial resources subject to their authority and increasing their cash rewards based on the growth of the result. When the founders do not have sufficient information to enable them to monitor the behavior of managers, the latter will have an incentive to develop the company, which will lead to excessive investment exceeding its optimal size. Accordingly, according to the theory of free cash flow, more control over cash flow must be provided here to achieve the optimal investment size. Companies seek to achieve the maximum investment efficiency by exploiting their various scarce resources efficiently, not just the issued capital, as the debts obtained from various sources must be exploited and invested efficiently in the various activities of the company, as this efficiency can be achieved by achieving a positive difference between the cost of the financial resources obtained and the amount of value achieved, and the correct adjustment of the composition of both debt and capital that form the basic structure of property rights according to the general economic conditions will contribute to increasing the profits and value of the company (Rımaz & Ayanoğlu, 2021, p. 269). Perhaps one of the most prominent and efficient ways to impose restrictions on free cash flow within the organisation is dividend distributions, as high dividend distributions can return this free cash flow from the company to its owners in the form of a dividend, reduce free cash flow somewhat, and limit negative value investment opportunities implemented by companies, thus restricting investment. Zhang and Guo (2019) and Jensen and Meckling (2019) concluded that paying cash dividends to shareholders can solve this existing problem and conflicts between company managers and owners due to the following.

- 1) Paying dividends to shareholders reduces the financial resources under the control of managers and thus reduces their authority.
- 2) Paying dividends makes the company visible to capital markets, which is useful when the company needs to raise new capital.
- 3) Debt can be part of the solution because it reduces the general tendency of managers to overinvest and thus reduces the cost of free cash flow. This means that leverage is negatively related to overinvestment. Jensen and Meckling (2019) and Myers (1977) also point out that underinvestment resulting from agency conflicts between creditors and owners can be reduced by reducing the company's debt.

### ***Research Problem***

The weakness of the private banking sector in contributing to economic development in Iraq necessitated the need to analyse investment efficiency in terms of under-investment and over-investment to diagnose strengths and weaknesses and determine the theoretical and practical reasons behind investment inefficiency. Because most of the previous literature focuses mainly on the corporate sector without considering financial institutions, this study will analyse the investment efficiency of the private banking sector in Iraq and conduct a comprehensive analysis of the financial theories that explain investment efficiency.

### ***Research Focus***

During the period between 2004–2022, researchers analysed the investment efficiency of the private banking sector for a sample of (39) banks, including commercial and Islamic banks, to provide clear insights into the investment nature of Iraqi private banks by classifying them into three main categories: efficient, over-investment banks, and under-investment banks. The conclusions of this research may apply to bank managers and shareholders who wish to maximise the value of their banks, as well as investors and financial analysts in the stock market who wish to avoid investment risks and maximise profits.

### ***Research Aim and Research Questions***

This study aims to classify Iraqi private banks into three categories: under-investment banks, efficient banks, and over-investment banks. It also aims to clarify the main reasons behind the inefficiency identified by financial theories. The study is based on three research questions: the first is whether the Iraqi banking sector has investment efficiency or not, the second is whether there is a significant variation and fluctuation in the amount of efficiency achieved by Iraqi banks, or is it close. The third is whether large banks have better investment efficiency than small banks, and the main reasons behind the inefficiency.

### ***Literature Review***

Previous studies often deal with investment efficiency with another variable to show the influence relationship, while the current study attempts to classify banks based on their investment efficiency. In a study of Ebrahimi Rad et al. (2016) examining the relationship of influence between the quality of financial information and investment efficiency among companies in Malaysia, his study did not classify investment efficiency as it is represented by three patterns: deficiency, excess and efficiency, and the study was limited to the corporate sector only, Chen et al. (2017) also studied the impact of analysts in the financial market on the efficiency of investment decisions taken by companies. This study did not conduct a theoretical analysis of all determinants of investment efficiency and was limited to the expectations of financial analysts for the corporate sector only.

In the study of García-Sánchez and García-Meca, E. (2020), who tried to analyse the relationship between the administrative capacity in financial institutions and three different types of investments: capital, research and development, and acquisition expenses. While the current study sees that the investment process in financial institutions is comprehensive, meaning that an increase in bank assets is often an investment activity to achieve returns in the study of Rehman et al. (2024), who examined the impact of environmental innovation on investment efficiency in the corporate sector. They concluded that environmental innovation has a significant and positive impact on investment efficiency at the institutional level. While the current study addressed all the theories that explained investment efficiency and are essential determinants of efficiency, our study also attempts to analyse the investment efficiency of the banking sector. Finally, the study of Wahhab and Ali (2022) sought to demonstrate the impact of the company's value on investment efficiency for 15 Iraqi banks. Still, that study did not show the efficient banks, those suffering from under- or over-investment, and those that were excessive. It was satisfied with the overall measurement of the residuals of the estimated model.

## Materials and Methods

### *Sample and Participants*

The Iraqi banking sector is generally divided into two sections, the first of which includes private banks. In contrast, the second section includes government banks, and both sections represent commercial and Islamic banks, the latter of which is consistent with the principles and beliefs of Islamic Sharia. As a result of the inability to obtain data on government banks, it was sufficient to use data on all private banks whose shares are traded on the Iraq Stock Exchange and the regular and second markets, where their number reached (40) banks in order to include all private banks in the analysis, and one bank was excluded for not disclosing its financial data on a regular basis, thus the number of the study sample reached (39) banks and the number of observations (428) observations, for the period between 2004 and 2022, and the reason for choosing these banks is to include the most significant possible number of Iraqi banks in the analysis and for the purpose of diversifying the sample to include commercial and Islamic banks, as the data was extracted from the balance sheet and the income statement, as the dependent variable (investments) was extracted from the balance sheet, which represents the net change in the company's total assets, i.e. tangible and intangible to its total assets, while net revenues, which represent (the independent variable), were extracted from the income statement.

### *Instruments and Procedures*

Most previous studies rely on two measures to measure investment efficiency, the first is simple linear regression, which places revenue growth as a primary driver for increasing investment. At the same time, various factors are included in the multiple linear deviation measure as control variables to increase the accuracy of the measurement, and both measures rely on what the residuals of both models produce to judge investment efficiency. The Biddle et al. (2009) measure is one of the most common and widely used models by previous studies to measure investment efficiency. The most important of these studies are the study of Al-Hadi et al. (2017, p. 21), Moradi et al. (2022), Rajkovic (2020), and Yahya Jafeel et al. (2023) as the institution's investment model is estimated as a function of growth opportunities measured (Revenue growth) and using residuals as a proxy for investment efficiency:

$$I_{it} = \beta_0 + \beta_1 SG_t + \varepsilon_t \quad (1)$$

Where  $I_{it}$  is the total investment of the institution during the year, and is defined as the sum of research and development expenditures, capital expenditures, and acquisition expenses minus cash receipts from the sale of property, plant and equipment and measured by total lagged assets (Biddle et al., 2009), while investment is calculated by lagged studies such as Ullah et al. (2020) and Wu et al. (2024) and others, by the net increase in tangible and intangible assets to total lagged assets, i.e. any increase in the assets of a particular institution is an increase in its investments and vice versa.

$SG_t$  represents the growth in realised revenues, and the value of the residuals achieved from the estimated model  $\varepsilon_t$  represents the deviation from the optimal level of investment. A positive value means the institution invests excessively in its investment, exceeding the expected level, according to the achieved revenue growth. As for the negative value of the residuals, it means there is a deficiency in investment, i.e., its investment is less than the expected level.

According to Ullah et al. (2020) and Wu et al. (2024), both scenarios are inefficient investments. The absolute value of the residuals is used as a proxy for inefficient investments. Moradi et al. (2022) The residuals of the estimated model are classified into three quartiles. The first quartile, i.e. the most negative residuals, are classified as underinvestment. The residuals in the last quartile, i.e. the most positive residuals, are classified as overinvestment. The residuals spanning both quartiles serve as the benchmark or efficient group corresponding to efficient investment (Biddle et al., 2009). Since the relationship between investment and revenue growth may differ between revenue decreases and

increases, Chen et al. (2011, p. 1263) added a dummy's variable  $NEG_{i,t-1}$  which has a value of 1 for negative revenue growth, and zero otherwise, as follows:

$$I_{it} = \beta_0 + \beta_1 NEG_{i,t-1} + \beta_2 SG_{t-1} + \beta_3 NEG_{i,t-1} * SG_{t-1} + \varepsilon_t \quad (2)$$

### Data Analysis

The current study uses the unbalanced panel data method due to the difference in the year of disclosure of the studied banks for their financial statements, according to the ordinary least squares (OLS) method to estimate the relationship between revenue growth and banking investment growth according to the previously mentioned equations, and infer the investment efficiency through the residuals of the estimated statistical model. Also, a comparison is made between the study sample banks according to the average values of the residuals and the graph method.

### Results

The residuals of the statistical model represent the difference between actual and expected performance, as the most negative residuals show that actual investments In light of the revenues expected investments in under of the achieved revenues, and on the contrary, the positive residuals show that actual investments are more significant than expected investments In the light of the achieved revenues, while the residuals close to zero or those in the middle of the most damaging and positive residuals represent that actual investments are close to expected investments and with the size of current revenues, so that the institution is characterized by investment efficiency, and in under of that, the banks in the study sample will be divided into three equal groups, the first group represents the banks that suffer from a lack of investment, i.e. the most negative banks in the residuals of the statistical model, while the middle quarter represents the banks that have investment efficiency or the reference group, and the residuals of the model are close to statistical zero, i.e. they are in the middle of the two quarters, while the last quarter represents the banks that overinvest and achieve low profits that are not commensurate with the growth of their investments, and the following paragraphs represent that.

#### Underinvested Banks

Table 1 shows banks suffering from underinvestment, meaning that their investments are low and are characterised by inefficiency. The highest bank that achieved the most negative residuals is the Tigris and Euphrates Bank with an average of (-28.8%), and the highest achieved percentage was (14.5%), while the lowest achieved percentage was (-98.93%) with a standard deviation of (29.5%). Perhaps the main reason behind this is the severe decline in its investments from 2014 to 2019. Accordingly, the bank was facing significant problems in increasing the size of its investments in light of its revenues, and the failure to balance the bank's investments and the size of its revenues will lead to its bankruptcy or its achievement of continuous losses in the future. The lowest percentage of harmful residuals was for the Islamic South Bank, as the average residuals amounted to (-14.5%). As for the highest percentage achieved by the bank from the residuals, it was (14.20%) compared to (-63.1%) for the lowest percentage achieved, with a standard deviation of (25.5%). This indicates that the bank suffers from a lack of investment, but it is better than the other banks that suffer from a lack of investment within the same classification. It is noted that the investments made by the bank have tended to rise, but this rise does not match the level of profits achieved, which has grown significantly from 2020 to 2022. Accordingly, the bank must achieve continuous harmony between the growth of its investment and its profits achieved to achieve the general balance that represents the investment efficiency sought by all highly efficient institutions.

**Table 1**

*Residuals of the Statistical Model for Underinvested Banks (First Quarter)*

Sequence	Bank	Code	Max	Min	SD	Average
1	Dijlah &Furat	BDFD	14.55%	-98.93%	29.53%	-28.85%

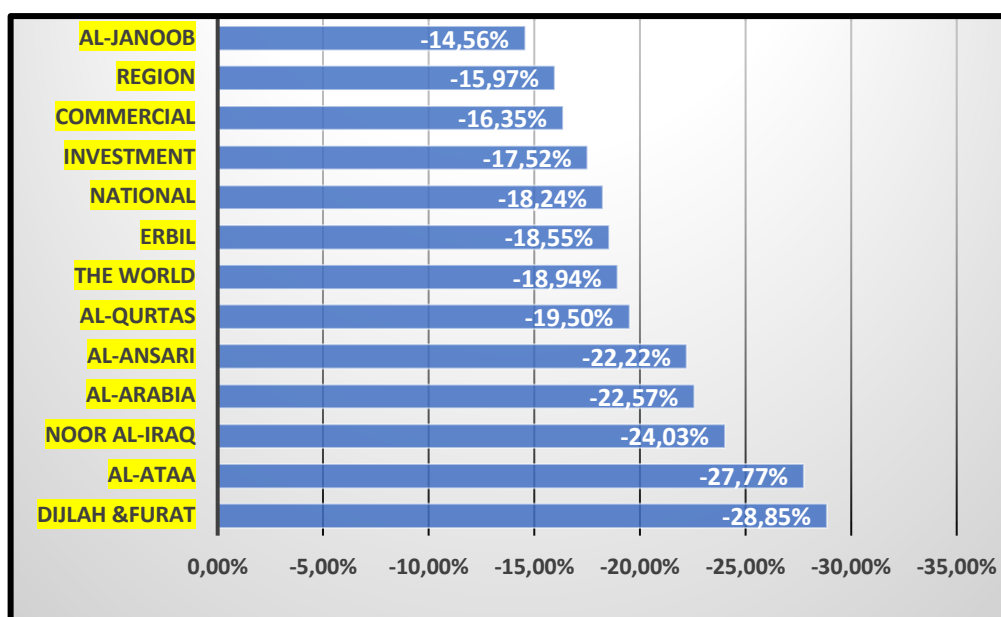
2	Al-Ataa	BLAD	-9.64%	-49.16%	15.23%	-27.77%
3	Noor Al-Iraq	BINI	-2.90%	-55.96%	16.31%	-24.03%
4	Al-Arabia	BAAI	14.31%	-45.60%	22.67%	-22.57%
5	Al-Ansari	BANS	-9.92%	-46.97%	14.51%	-22.22%
6	Al-Qurtas	BQUR	2.30%	-56.11%	23.18%	-19.50%
7	The World	BWOR	25.02%	-47.21%	23.04%	-18.94%
8	Erbil	BEIR	-3.12%	-43.96%	11.90%	-18.55%
9	National-IS	BNAI	13.84%	-35.25%	12.20%	-18.24%
10	Investment	BIBI	53.58%	-148.90%	39.28%	-17.52%
11	Commercial	BCOI	69.49%	-45.74%	27.17%	-16.35%
12	Region	BRTB	72.74%	-44.14%	35.52%	-15.97%
13	Al-Janoob	BJAB	14.20%	-63.11%	25.59%	-14.56%

Source: Model outputs.

A comparison can be made between the banks listed in Table 1 by classifying them into three quarters to make a comparison between them. The first quarter is represented by the Dijlah &Furat Bank, Al-Ataa Bank, Noor Al-Iraq Bank, while the Arab Bank, Al-Ansari Bank, Al-Qurtas Bank, Al-Alam Bank, and Erbil Bank. The second quarter represents the least efficient banks compared to their counterparts in the third quarter, namely the National Bank, Investment Bank, Commercial Bank, Regional Bank, and Islamic South Bank. In other words, the third quarter is better than the first and second quarters, as shown in Figure 1. However, the banks classified in this quarter remain those lacking in investment. They need to balance the growth in the size of their investments and the growth in revenues, meaning that they must increase their investments due to ample profitable opportunities.

**Figure 1**

*Underinvested Banks*



Source: Prepared by the authors based on data from Table 1.

**Efficient Banks**

Increasing the ability of banks to reduce the gap between current and expected investments with achieved revenues is sufficient to increase their efficiency significantly, as Table 2 shows the residuals of the statistical model for the second quarter of the study sample banks, which is represented by the most efficient banks among the study sample banks. Cihan Bank achieved the lowest value of residuals compared to the rest of the efficient banks, as the average residual percentage reached (-12.6%), while the highest percentage of estimated residuals reached (35.4%) and its lowest percentage reached (-41.4%) with a standard deviation of (22.7%), and despite the bank achieving a negative average

residual, meaning that it has a deficiency in investment. The growth in investments does not match the growth in profits to some extent; the bank remains better than the rest of the banks that were classified among the banks that suffer from a deficient investment. The rest of the banks come in sequence according to the residual percentage.

As for the Bank of Baghdad, it achieved the highest percentage of residuals, as its average percentage of residuals was (2.8%) and it achieved a percentage of (40.2%) as the highest. In comparison, its lowest percentage was (62.2%) with a standard deviation of (97.8%). Despite the bank's positive residuals, it is characterised by investment efficiency compared to the rest of the banks that suffer from a lack of investment or excessive investment. Accordingly, the bank has achieved a general balance between the money it has invested and the amount of incoming cash flow.

**Table 2**

*Residuals of the Statistical Model for Banks with Investment Efficiency (Second Quarter)*

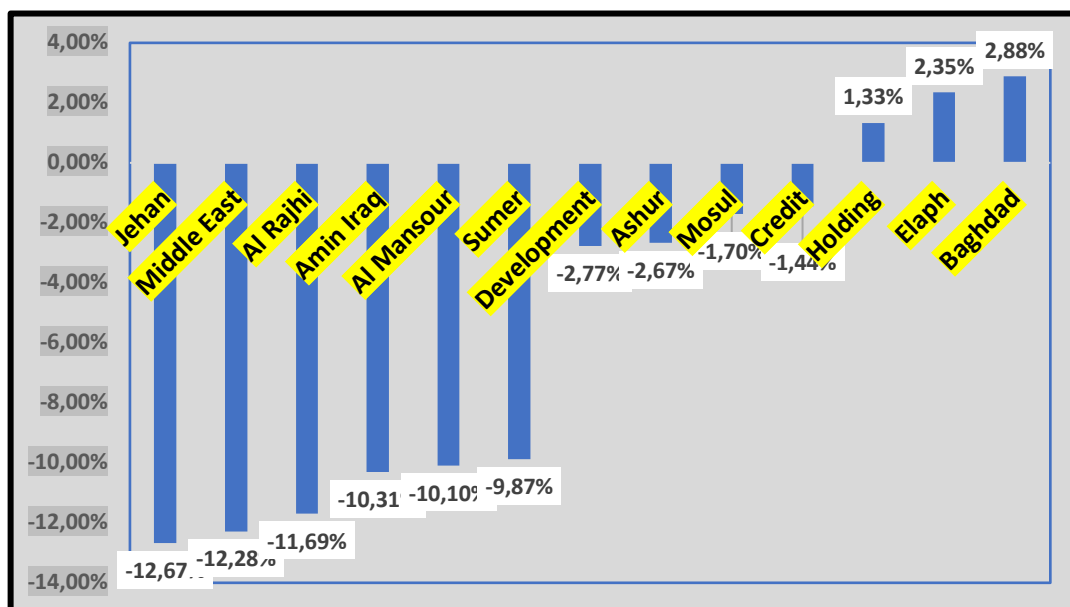
Sequence	Bank	Code	Max	Min	SD	Average
1	Jehan	BCIH	35.47%	-41.43%	22.78%	-12.67%
2	Middle East	BIME	34.45%	-45.36%	20.72%	-12.28%
3	Al Rajhi	BRAJ	19.12%	-38.36%	20.72%	-11.69%
4	Amin Iraq	BAME	72.30%	-45.79%	43.15%	-10.31%
5	Al Mansour	BMNS	50.98%	-88.07%	29.41%	-10.10%
6	Sumer	BSUC	85.38%	-56.71%	37.13%	-9.87%
7	Development	BIDB	7.32%	-12.60%	7.19%	-2.77%
8	Ashur	BASH	113.97%	-57.54%	45.30%	-2.67%
9	Mosul	BMFI	174.91%	-55.55%	53.05%	-1.70%
10	Credit	BROI	635.72%	-6790%	148.38%	-1.44%
11	Holding	BQAB	74.13%	-46.23%	37.01%	1.33%
12	Elaph	BELF	162.29%	-67.81%	65.65%	2.35%
13	Baghdad	BBOB	402.03%	-62.20%	97.86%	2.88%

Source: Model outputs.

Although all the banks listed in Table 2 are classified as efficient banks, we can give a more accurate classification in terms of their degree of investment efficiency and their comparison with the rest of the banks, as it can be said that Al-Qadib Bank is the bank that has the average residual ratio over all the banks in the study sample, i.e. its residual ratio is closest to zero, as the average residual ratio for the bank reached (1.3%), while the highest ratio for the bank reached (74.1%), compared to (-46.2%) as the lowest residual ratio, with a standard deviation of (37.0%), and thus the bank achieved a kind of balance between its investments and revenues. In contrast, the banks before and after these banks varied their residuals between negative and positive residuals, as shown in Figure 2, which shows that each of the Credit Bank, Mosul, Ashur, Development, Sumer, Mansour, Amin Iraq, Rajih, Middle East and Jehan are among the banks that achieved harmful residuals, despite that Its realised residuals remain less than the banks that were classified among the banks suffering from a lack of investment as in Table 3, while Elaf and Baghdad Bank are among the banks that achieved positive residuals, despite that they are more efficient in investment than the banks that were classified among the banks suffering from excessive investment as in Table 1.

**Figure 2**

*Efficient Banks*



Source: Prepared by the authors based on Data from Table 2.

**Over-Invested Banks**

Overinvestment is the bank's excessive expansion of its investment activities in a way that does not match the revenues achieved, meaning that the revenues are low. Therefore, this can cause banks to incur significant losses and bear high costs due to the size of their assets. Table 3 shows that Gulf Bank is one of the banks that achieved the lowest percentage of the residuals of the statistical model at the level of overinvested banks, as the average percentage of residuals reached (3.11%). The highest value of residuals represented a percentage of (158.3%). In comparison, the percentage of (-56.2%) represented the lowest percentage achieved, with a standard deviation of (47.3%). Therefore, the bank has an excess in the amount of its investments, as it does not match the size of the revenues achieved by the bank, but it remains better than the rest of the banks that achieved higher residuals.

As for the highest percentage of residuals for the statistical model, i.e. the bank with the most excessive investment, the Union Bank is the most excessive, as the bank achieved an average residual of (39.4%), and perhaps the main reason behind this excess is that the bank increased the size of its investments after 2004, as the bank's investment growth series took an excessive increase in a way that does not match the size of the achieved revenues. Also, the highest percentage achieved for the residuals reached (603.7%), while the percentage (-62.3%) represented the lowest percentage achieved from the model's residuals, with a standard deviation of (159.5%).

**Table 3**

*Residuals of the Statistical Model for Over-Invested Banks (Third Quarter)*

Sequence	Bank	Code	Max	Min	SD	Average
1	Gulf	BGUC	158.32%	-56.26%	47.34%	3.11%
2	Asia	BAIB	62.88%	-48.72%	42.18%	3.84%
3	International	BINT	100.80%	-32.46%	44.72%	4.82%
4	Trans Iraq	BTRI	288.37%	-44.06%	95.18%	5.41%
5	Trust	BTRU	68.44%	-48.30%	36.44%	7.86%
6	Iraqi	BIIB	198.97%	-40.78%	54.95%	8.83%
7	Al-Mashreq	BAMS	61.42%	-38.13%	35.91%	11.46%
8	Al-Mustashar	BMUI	64.16%	-9.87%	30.61%	11.77%
9	Al-Taif	MTAI	57.88%	-15.61%	30.25%	18.05%

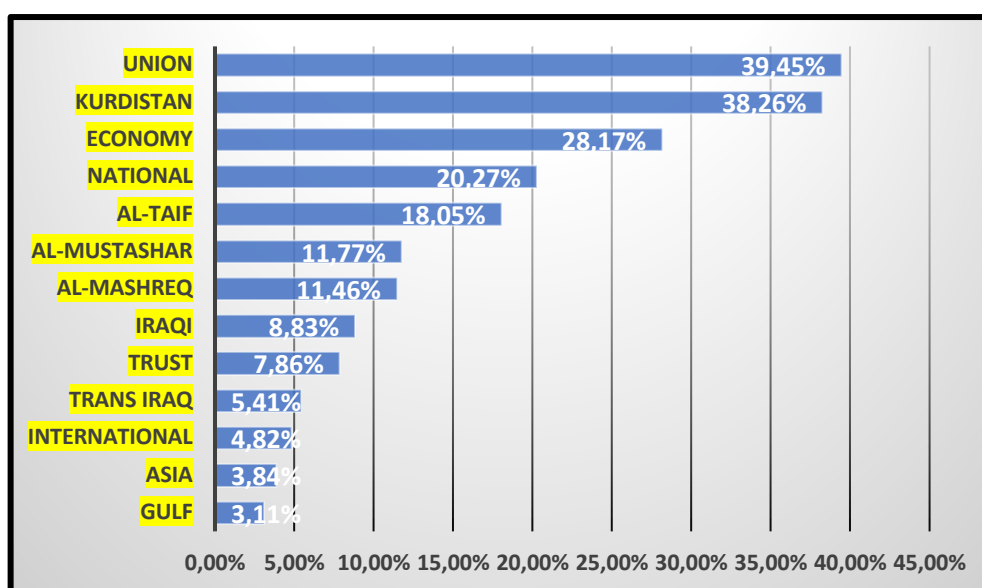
10	National	BNOI	369.08%	-45.78%	8866%	20.27%
11	Economy	BEFI	553.61%	-94.77%	133.62%	28.17%
12	Kurdistan	BKUI	794.28%	-125.20%	199.71%	38.26%
13	Union	BUOI	603.79%	-62.35%	159.55%	39.45%

Source: Model outputs.

Over-invested banks can be classified into three quarters. The first quarter represents the least over-invested banks, which are Gulf, Asia, International, Trans-Iraq and Trust Bank, while the last two quarters represent the most over-invested banks, which are located within the second and third quarters, namely the Iraqi Bank, Al-Mashreq, Al-Mustashar and Al-Tayf, which are located within the second square, and Al-Tayf, Al-Ahli, Al-Eqtisad, Kurdistan and Al-Ittihad Banks, which are located within the last quarter, as shown in Figure (3).

**Figure 3**

*Over-Invested Banks*



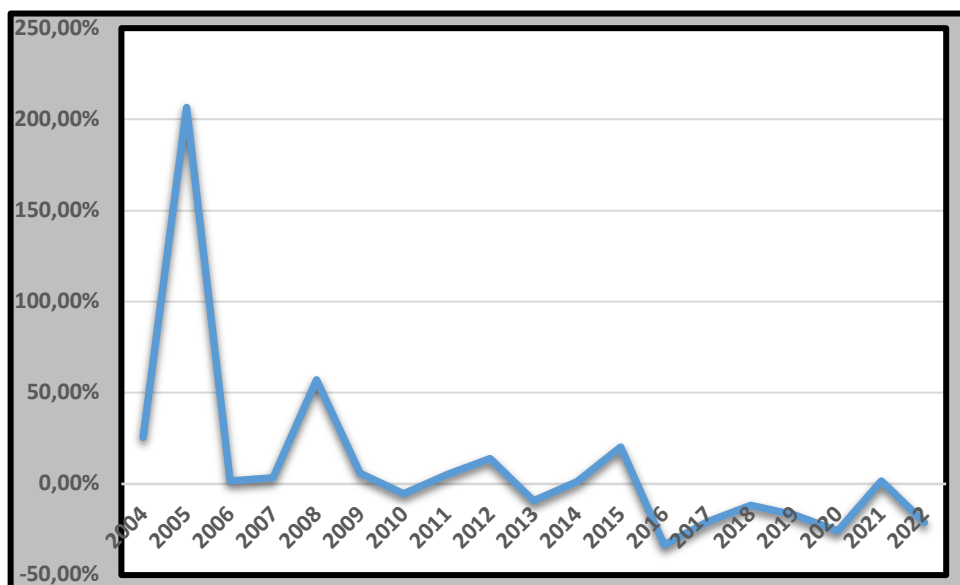
Source: Prepared by the authors based on data from Table 3.

### **Total Investment Efficiency of the Banking Sector**

The investment efficiency of the banking sector can be found by finding the average investment efficiency for each year and for all selected Iraqi banks. Figure 4 shows the average total investment efficiency of private banks in Iraq, as it is noted that the time series took a fluctuating path, as the standard deviation reached (50.4%), while the average residual ratio reached (10.3%) for all banks from 2004 to 2022, and thus it can be said that the banks in the study sample have excessive investment, as the highest achieved percentage of residual ratios reached (206.5%) in 2005, and perhaps the main reason behind this is the increase in the volume of activity of these banks after the US invasion of Iraq in 2003, as Iraq was suffering from a comprehensive blockade that undermined banking activities before that period, while the lowest achieved percentage reached (33.5%) in 2016, as the volume of investments did not match the revenues achieved, meaning that Iraqi banks during that period had from underinvestment, as shown in Figure 4.

**Figure 4**

*Average Total Investment Efficiency of Private Banks in Iraq (%) for Year 2004–2022*



*Source:* Prepared by the authors based on the results.

## **Discussion**

This study aims to answer three research questions: the first is whether the Iraqi banking sector has investment efficiency or not, the second is whether there is a significant variation and fluctuation in the amount of efficiency achieved by Iraqi banks, or is it close. The third is whether large banks have better investment efficiency than small banks and the main reasons behind the inefficiency. The results of our current study are important and valuable because they established a general classification of private banks in Iraq according to their investment efficiency and identified the most critical reasons that prevent banks from achieving a general balance between the size of their investments and their achieved revenues. This can help both policy makers and decision makers within banks to take urgent measures to understand the biased behaviors that can contribute to neutralising the behavioral biases taken by the managers of these banks.

Although Iraqi banks are diagnosed as over-invested banks, this diagnosis may be misleading due to the high percentage of residuals estimated from the statistical model in 2004 as a result of the increased activity of Iraqi banks after the US invasion, as Iraq was suffering from a comprehensive blockade that undermined the work of banks before that year. Therefore, it is necessary to follow up on the classification of each bank. The current study is consistent with the studies of Ullah et al. (2020) and Wu et al. (2024) that classified institutions into over-invested, under-invested, or efficient institutions, based on the change in assets. The current study considered any operation carried out by banks that leads to an increase in their assets as an investment activity. One of the main reasons behind the extreme volatility in the estimated model residuals is the security and economic situation that Iraq has been going through since 2004, the sectarian war in 2007, and the war against the terrorist organisation ISIS in 2014, in addition to the unstable economic situation that Iraq is going through as a result of its dependence on a single resource, namely oil, in the formation of the gross domestic product, which made the country's economy as a whole exposed to continuous crises that affected the investment decisions of banks.

The current study is consistent with the findings of Salehi et al. (2022) on the main reasons behind the institution's deviation from optimal investment. The current study identified two main reasons: the first is the information asymmetry that occurs between the institution's managers and its shareholders, which makes managers more likely to engage in opportunistic behavior to achieve their interests, and

the second is the information asymmetry between external investors and managers, as managers can hide essential information about the institution's performance to raise external funds, especially if there is an urgent need for that. However, there is a difference in identifying these reasons. While our results differ from what was reached by Al-Naimi and Al-Battat (2022), who identified the reasons for deviation from the optimal level as a difference in the structure of information and the extent of its accuracy that companies disclose without identifying the parties with whom information asymmetry may occur.

The current study differs from the results reached by Wahhab and Ali (2022), who reached the existence of a general trend among Iraqi banks, i.e. the absence of variation in the amount of achieved investment efficiency, while the current study sees that there is a significant variation in the amount of investment efficiency because the current study was distinguished by taking a more extended time series for the period between 2004–2020. This variation can be explained by the unstable conditions that Iraq went through during that period, which greatly affected the investment decisions of Iraqi banks. This leads to an important conclusion: the longer the period of investment efficiency analysis, the greater the differential and variance in the investment efficiency of the institutions studied.

The study also reached results that may be somewhat unique, which is that large banks may enjoy greater investment efficiency than small banks. The Bank of Baghdad, the Middle East, Ashur and Credit are all large banks at the forefront of Iraqi private banks regarding the size of assets. They have been classified as efficient or reference banks compared to other banks. This may be due to the accumulated investment experiences and skills that these banks enjoy and their ability to achieve economies of scale and scope to a large extent.

Finally, our results can provide the Central Bank of Iraq with the necessary information about the investment nature of the banking sector and take measures and procedures that can help improve the investment efficiency of banks that are over-invested or suffer from under-investment. This can contribute to achieving competition with government banks. These results can also help both shareholders and bank managers in making an investment decision based on achieving a balance between actual and expected investments based on the size of revenues to avoid falling into losses that may occur when increasing the size of investment in losing projects or when avoiding profitable projects with a favourable current value. These results can also help financial analysts within the financial market determine the investment performance of banks and compare it with their stock prices to make a more rational decision when buying or selling.

There are still many undiscovered logical views about the investment nature of Iraqi banks due to the presence of government banks that control the general situation of the sector. Therefore, there is an urgent need to conduct studies that include all Iraqi banks and include a more significant period to cover all economic periods of the banking sector and compare the government and private banking sectors. There is an opportunity to introduce more advanced methods to measure the investment efficiency of banks that distinguish them from companies, primarily since banks are distinguished from other institutions by their financial brokerage activities, which require them to maintain adequate liquidity.

### ***Limitations of the Study***

The current study provides a valuable contribution by classifying private banks in Iraq according to their investment efficiency and identifying the fundamental reasons behind the inefficiency. However, it is worth noting that some restrictions affect the general results of the study. Perhaps the most prominent of these restrictions is not considering government banks when classifying, as these banks constitute the most significant percentage of the total sector. The lack of analysis of the investment efficiency of government banks is due to their failure to conduct annual financial disclosure of their financial statements. Another restriction is represented by measuring investment, as it was measured according to the change in total assets, whether tangible or intangible. The increase in some types of assets may not be for investment, such as increasing fixed assets or cash. The current study also treated banks as if they were a company. In contrast, financial mediation distinguishes banks from other

institutions, which requires them to keep cash to meet depositors' withdrawals. Accordingly, the current study sees the need to search for different measures that more accurately determine investment efficiency within financial institutions. Finally, the study lacks controlling variables that govern the relationship between investments and revenues as a percentage. q Tobin's or profitability ratio or cash flow and other variables,

Despite the aforementioned research limitations, the present study provides valuable findings on the overall classification of investment efficiency of private banks in Iraq which can help stakeholders such as managers, shareholders, financial analysts and policy makers in identifying the nature of investment efficiency and the causes of inefficiency for rational decision making.

## **Conclusions and Implications**

This study deals with the analysis of the investment efficiency of the private banking sector in Iraq and the fundamental reasons that lead to investment inefficiency by addressing many financial theories that described investment efficiency or set general determinants for it, such as the Keynesian theory, Tobin's theory, agency theory, and free cash flow. Our results indicate that the private banking sector in Iraq had excessive investment at the beginning of the study period due to the economic and political conditions that Iraq went through before 2004. After that year, banks began to increase their investment activities significantly. As a result of the improvement of conditions, these banks began to achieve a relative balance between their investments and their realised revenues. The study also proved that banks with large financial centers are more efficient than small banks due to the accumulation of investment experiences and skills. The study concluded that there are fundamental reasons that can limit the achievement of efficiency within institutions, which is the state of information asymmetry that occurs between managers and shareholders, which can exacerbate the agency problem and lead managers to enter into losing projects in pursuit of their interests, as well as the information asymmetry that occurs between investors and managers. Managers may hide important information about the company's overall performance and try to mislead external fund providers (investors) to raise funds.

These results are valuable for policy makers, managers, shareholders and financial analysts in Iraq because they provide a general classification of private banks according to their investment efficiency and can help in making balanced investment decisions within institutions in a way that prevents over- or under-investment, limits their exposure to losses and contributes efficiently to raising their financial performance. The research results can also help achieve a clearer understanding of the fundamental determinants of investment efficiency to prevent unsound investment behavior that leads the bank to deviate from its optimal performance. Or by accelerating the payment of profits to shareholders to reduce the opportunistic behavior that bank managers may fall into and make the bank more capable of obtaining external financing in the event of under-investment.

## ***Suggestions for Future Research***

For future academic works the necessity of studying the investment efficiency of Iraqi government banks because they constitute the most significant part of the banking sector, and explaining the strengths and weaknesses that distinguish them from private banks In addition to studying a comparison with banks operating in developed countries under advanced financial systems to diagnose the reasons for the severe fluctuation in the amount of investment efficiency of Iraqi banks and to try to benefit from banks operating in those countries.

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## **Conflict of Interest**

None.

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