

ORIGINAL RESEARCH ARTICLE

Using financial modeling to trade-off between financial strategies

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ABSTRACT

This research aims to examine the trade-off between strategies to cope with financial failure because Iraqi banks suffer from a high level of risk. Some of these banks work more with return on investment compared to risk-free return, while others are able to achieve a higher return for the same period. In this situation, there is a need for a trade-off between the elected strategies as expressed in the following research question: How can financial strategies be traded-off to cope with financial failure? The research hypothesis is: "The trade-off between financial strategies to cope with financial failure can be achieved by using financial modeling." For the purpose of this research, the merger and acquisition strategies were used. Data was collected from the financial reports of 13 banks (covering the period of 2011–2020). Eight banks were selected and examined for their lowest and highest return on assets (ROAs). Four recorded low ROAs and the remaining four recorded high ROAs. Then, one bank was selected from each group, of which respective strategies were compared covering the period from 2016 to 2021. The financial modeling using the Excel program showed that the Eps of merger strategy is higher than the Eps of acquisition.

Keywords: merger strategy; acquisition strategy; financial modeling

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1. Introduction

Over the past years, the financial industry has suffered from a series of economic successions. It witnessed periods characterized by a mixture of contradictory economic conditions, from economic stagnation to rapid economic growth^[1,2]. These economic cycles were clearly influential in many countries, as the economic recession in both America and Europe in the 1970s did not take long to be succeeded by a period of marked economic growth in the 1980s and 1990s. A major financial crisis occurred in the year 2000, followed by another crisis between 2007 and 2012^[1,3]. The effects of these economic cycles are clearly visible in economic activities^[4,5] as such instability affects purchasing power and economic growth, the supply and demand for goods and services, and financial instruments. On this basis, it is good for financial institutions such as banks to have good policies for managing risks surrounding their financial choices, specifically with regards to merger and acquisition strategies, so as to provide as much financial stability as possible in periods characterized by economic instability^[2,6,7]. These risks are not confined to Europe and America; Iraq also suffers greatly from the high risks which affect the performance of its banks and future. The purpose of this paper is to present a proposed model for choosing the best strategy (merger or acquisition) suitable for weak Iraqi banks so as to anticipate and avoid total risks which could lead to the liquidation of those banks.

2. Theoretical review

2.1. Financial modeling

Financial modeling is a methodology that can achieve multiple results for multiple applications. The results differ according to different inputs, which reduces time and effort depending on the computing equations related to financial performance using data tables. This method supports financial decisions^[1,4].

Modeling relies on programs such as Excel or Lotus due to the flexibility that these programs offer in adding, deleting, or modifying electronic spreadsheets^[3].

Financial modeling is used in financial and accounting analysis and financial forecasting, in addition to supporting other business activities^[1]. Certain criteria are used for assessing firm value, as well as merger and acquisition strategies^[4].

2.2. Merger

This term refers to the emergence of a new entity following the merger of two or more companies, which results in the disappearance of the companies involved in the merger and leads to the preservation of their rights and obligations^[8]. Mergers take several forms, including a horizontal merger which involves competing companies, or vertical merger which is intended to achieve integration or form a conglomerate when the companies are in different fields of work^[9]. According to Koirala et al.^[9] and Chen et al.^[10], banking merger is either a choice or a result of pressure, especially when economic developments impose new visions like in the case of horizontal merger which aims to push the competitor to produce non-competing goods, even in the medium or short term^[11].

Theoretical motives for banking merger

There are several existing theoretical motives. The first is the volume motives whereby the combination of two companies through a merger leads to better exploitation of resources, and ultimately greater returns^[12]. Therefore, a set of large goals is achieved by the banking agglomeration^[13], leading to increased competition capabilities and stability in the banking market^[14] due to the large volume of specialization concentration in the banking business which would ultimately result in better banking performance^[15], high deposit protection^[16], and wider capacity^[15]. This is an appropriate way to avoid liquidation due to bank defaults^[17].

In addition to the foregoing, there are motives related to the administrative and organizational aspects for achieving diversity and developing administrative work through effective leadership. Other motives are related to the strategic aspects of finding an economic block capable of achieving success and continuity^[14].

2.3. Acquisition

The acquisition of companies means the control of one company over the activity of another company, financially and administratively, by buying its ordinary shares in whole or at a certain percentage, whether with or without agreement; the important thing is that the purchased percentage allows the acquiring company to dominate the board of directors of the acquired company^[18]. Although mergers and acquisitions are similar in terms of the role played by intermediaries and the criteria used in valuation, contract, and stock arrangements, mergers and acquisitions can be distinguished through two criteria^[17].

The first criterion is related to the consideration, when the money is paid for the shares, when the deal is an acquisition, and the merger occurs when there is a stake in the company^[13]. The second criterion is related to the fate of the company. When the shares of another company are purchased and remain after the purchase, the transaction is considered an acquisition, while the merger leads to the creation of a new company^[19].

2.4. Merger and acquisition risks

Despite the positive aspects, the negative impact of these two strategies cannot be negated such as the exposure of some sectors to monopoly, especially those related to health, education, and culture^[19]. Shareholders' rights are also exposed to damage following an evaluation that is less than its value, and these two strategies are a means for skimming the market by reducing prices, getting rid of competitors, and achieving more profits by raising prices later^[17,19].

2.5. Disadvantages of mergers and acquisitions

Companies often seek to merge and acquire other companies for many strategic reasons, i.e., whether to enhance its strength by taking advantage of the strengths of each company with which it merges or acquires, to increase the market share, or to reduce competition^[20,21]. Despite the advantages and importance of merger and acquisition, there is still the existence of great risks as many merger and acquisition deals do not work out in the end^[22,23].

The reasons that often lead to the failure of mergers and acquisitions are many and varied, such as the following:

Wrong assessment: Investing in assets may look good on paper, but in reality, it may not generate revenue or profits after the completion of the deal^[24,25].

Lack of clarity during the merger process: The failure to conduct an accurate and clear assessment to identify key employees, projects, operations, vital products, and the reality of financial conditions prior to the merger would lead to the failure of the merger process^[26-28].

Cultural differences: If the merger and acquisition deal fails to develop a strong strategy that takes into account the differences in the cultural aspects of the two companies, this may eventually weaken the productivity of employees on both sides, especially if a radical change occurs in the culture in which the company operates in record time^[29].

Poor communication: If the goal behind the deal is not clear or is not communicated to the employees well, a lack of synergy between the work teams would occur thus leading to the failure to achieve the required expectations of the deal^[30].

External factors: Recession, economic collapse, or other crises and disasters that companies have no hand in can be among the factors affecting the poor performance of the merger and acquisition deal^[27,28].

Negotiation errors: When companies pay an exaggerated price to acquire another company, financial losses would usually occur and ultimately causing the acquisition deal to fail^[28].

In addition to the aforementioned reasons, other reasons include:

- The monopoly of the economic, health, and educational sectors that have a direct impact on the income, health and culture of individuals^[27,31].
- Assessment of assets at less than their value due to the absence of transparency and disclosure, which leads to damage to the shareholders' rights^[32].
- Some acquisitions aim to eliminate competition by selling at prices below cost for a limited period of time until the competitors make an exit, and the raising of prices to consumers is to compensate for the loss and achieve more profits^[30,33].
- Sometimes, some international companies buy local companies with the aim of acquiring their properties of lands and real estate assets located in distinct places. They would then move the factories to other remote areas, and the workers would choose between moving their homes, families, and children's schools to

them, or submitting their resignations. They would subsequently sell the lands and achieve imaginary gains, which exacerbates the problem of unemployment due to the loss of thousands of workers for their jobs^[34,35].

- Sometimes, the merger or acquisition is not for developing or acquiring technical skills to achieve profit, but rather for getting out of a financing crisis or escaping from bankruptcy, rendering the results more negative than positive^[36].

3. Methodology

(1) The research problem

Iraqi banks suffer from a high level of risk due to wars and financial and administrative corruption, which leads to a low return on investment for some banks. Their achievement of an average return over a period of time would be less than the risk-free return, while others would achieve a higher return for the same period. This could be the result of the loss or reasons related to the company’s inability to increase its value and reduce competitiveness. In light of this, the question of the research is:

How can trade-off between financial strategies help cope with financial failure?

(2) The research aims

- To use financial modeling to analyse merger and acquisition strategies.
- To examine the trade-off between merger and acquisition strategies.
- To choose the most suitable strategy.

(3) The research hypothesis

Based on the research problem, the research hypothesis is developed as below:

“The trade-off between financial strategies to cope with financial failure can be achieved by using financial modeling.”

Data was collected from 13 Iraqi banks covering the period of 2011–2020, to choose the winning and failing banks according to the lowest and highest return on assets as the following **Table 1** shows.

Table 1. return on assets of Iraqi banks from 2011 to 2020.

Years	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Avr.
Banks											
Mansour	0.029	0.028	0.03	0.019	0.017	0.012	0.011	0.014	0.071	0.03	0.0261
Summer	0.03	0.028	0.026	0.005	0.01	0.011	0.001	0.002	0.003	0.003	0.0119
Al-musul	0.041	0.034	0.024	0.009	-0.002	0.009	0.012	0.006	0.008	0.004	0.0153
National	0.01	0.021	0.026	0.011	0.004	0.041	-0.004	-0.015	-0.013	0.01	0.0091
M.East	0.027	0.029	0.027	0.005	0.008	0.018	-0.001	-0.003	-0.001	-0.005	0.018
Credit	0.02	0.052	0.019	0.021	0.019	0.01	0.014	0.011	-0.009	-0.006	0.0151
Cluf	0.09	0.027	0.061	0.044	0.012	0.007	0.007	0.001	-0.007	0.000	0.0242
Baghdad	0.02	0.019	0.018	0.015	0.004	0.017	0.006	0.004	0.009	0.018	0.013
United	0.045	0.07	0.049	0.044	0.034	0.002	-0.006	-0.033	-0.002	0.001	0.0204
Commerce	0.04	0.05	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.06	0.03
Kurdstan	0.03	0.04	0.034	0.036	0.041	0.049	0.039	0.006	0.041	0.008	0.0324
Investment	0.01	0.03	0.01	0.032	0.031	0.036	0.02	0.04	0.05	0.051	0.031
Ashur	0.06	0.05	0.044	0.022	0.044	0.013	0.036	0.01	0.011	0.031	0.0321

The results showed that out of the eight (8) banks, four (4) were failures and the other four (4) were winners. Out of the two groups of banks, two banks were chosen representing one winning bank and one failing bank to apply the financial modeling to examine the trade-off between acquisition and merger. The following **Table 2** shows the results.

Table 2. The averages of the least and highest profitability banks compared to risk free rate (0.03).

Years	Summer	Credit	Baghdad	National	Investment	Ashur	Kurdistan	Commerce
2011	0.03	0.02	0.02	0.01	0.010	0.06	0.030	0.02
2012	0.28	0.052	0.019	0.021	0.030	0.05	0.040	0.034
2013	0.026	0.019	0.018	0.026	0.010	0.044	0.034	0.027
2014	0.005	0.021	0.015	0.011	0.032	0.022	0.036	0.02
2015	0.01	0.019	0.004	0.004	0.001	0.044	0.041	0.018
2016	0.011	0.01	0.017	0.041	0.001	0.013	0.049	0.017
2017	0.001	0.014	0.006	-0.004	0.020	0.036	0.039	0.022
2018	0.002	0.011	0.004	-0.015	0.040	0.01	0.006	0.024
2019	0.003	-0.009	0.009	-0.013	0.050	0.011	0.041	0.014
2020	0.003	-0.006	0.018	0.01	0.051	0.031	0.008	0.057
Average (1)	0.0119	0.0151	0.013	0.009	0.03	0.032	0.032	0.03
Group	failure	failure	failure	failure	winners	winners	winners	winners

The table above presents the 2016–2020 data for the acquiring bank (Summer Bank) and acquired bank (National Bank).

(4) Applying financial modeling

This research used the Excel program to fulfil the financial modeling:

Testing the expected cash flow:

$$g = (x1-x0)/x0 \quad (1)$$

where, g is growth, $x1$ is current cash flow, and $x0$ is previous cash flow.

The growth is showing in **Table 3**.

Table 3. The growth of two banks.

	F	E	D	C	B
3	years	summer Cf.	growth	national Cf.	growth
4	2016	3760.4	-	23,501.8	-
5	2017	400.6	-0.89	-2695.4	-1.11
6	2018	912.6	1.28	-7912.5	1.94
7	2019	1008.7	0.11	9164.2	-2.16
8	2020	1066.8	0.06	19,828	1.16
9	2021	1167	0.09	26,122	0.32
10	-	Avr.	0.13	Avr.	0.03

Modeling: $D5 = (E5 - E4)/E4$, $B5 = (C5 - C4)/C5$, $D10 = \text{AVERAGE}(D5:D9)$, $B10 = \text{AVERAGE}(B5:B9)$

The growth of the acquiring bank is more than that of the acquired bank over the 2016–2021 period. This encourages the process of acquiring or merger.

3.1. Acquisition strategy

To know and analyze the acquisition strategy, the net value of the acquiring bank (the National Bank) must be found from the expected cash flow based on the following:

$$ECFs = \sum_{i=1}^t Cfi(1 + g), i = 1, 2, \dots; t \text{ is 4 years} \quad (2)$$

where, CFs is the expected cash flow, Cfi is cash flow of last year, and g is growth.

The net value is shown in **Table 4** below.

Table 4. National Bank CFs.

	F	E
14	Years	$Cfi(1+g)$
15	2021	26,872.96
16	2022	27,645.52
17	2023	28,440.28
18	2302	29,257.89
19	2025	30,099.01
20	ECFs =	142,315.66

Modeling: E20 = SUM (E15:E19)

After finding the expected cash flow, its present value must be found as the following:

$$P.V. = \sum_{i=1}^t ECFs(1/(1+k)), i = 1, 2, \dots; t \text{ is 4 years}; k = \text{adjusted discount rate} \quad (3)$$

The research assumes that the Iraqi financial market is inefficient, so the capital asset pricing model cannot be used. Hence,

$$K = r \times C.V \times d \quad (4)$$

where, r is risk free rate (0.05), $C.V$ is coefficient of difference, and d is coefficient of difference in units = 0.95 unit for each one of the coefficient of difference, as in the following table:

$$C.V = \partial/X \quad (5)$$

Table 5. $C.V$ of National Bank.

	F	E	D	C	B
23	National Cf.	$x - X$	$(x - X)^2$	∂	$C.V$
24	23,501.80	12,167.12	148,038,727.98	14,218.637	1.25
25	-2695.40	-14,030.08	196,843,238.34		
26	-7912.50	-19,247.18	370,454,066.27		
27	9164.20	-2170.48	4,710,997.90		
28	19,828.00	8493.32	72,136,428.00		
29	26,122.00	14,787.32	218,664,734.20		
30	11,334.68		1,010,848,192.69		

Modeling: F30 = AVERAGE (F24:F29), E24 = F24 - F30, D24 = E24², C24, C23 = (D30/5)^{0.5}, B24 = C24/F30

The discount rate as in the following table:

Table 6. Discount rate.

	F	E	D
33	D	Rf	k
34	0.95	0.05	0.06

Modeling: D34 = F34 × E34 × B24

Net value:

$$\text{Net value} = \text{firm } P.V - \text{Debt} \quad (6)$$

$$\text{New equity (equity after acquisition)} = \text{net value} + \text{acquiring bank equity} \quad (7)$$

$$\text{Eps} = \text{equity/number of shares} \quad (8)$$

$$\text{The market value of share} = \text{earnings per share ratio (Eps)/}k \quad (9)$$

$$P/E = \text{market value/Eps} \quad (10)$$

The above equations are in **Table 7**.

Table 7. Equation indicators.

	F	E	D
37	Details	Acquired bank	Acquiring bank
38	$ECFs P.V =$	112,903.73	-
39	2021 debits	1,463,171	-
40	Net value	-1,350,267.27	-
41	Equity	307,484	264,093
42	New equity	-	-1,323,857.366
43	Shares number	250,000	250,000
44	Book value before	1.263448	1.056372
45	Book value after	-	-5.30
46	Eps	0.104	0.005
47	Market value	1.75	0.08
48	P/E	16.7825	16.7897

Modeling: $E48 = E47/E46$, $D48 = D47/D46$

The table shows that the new equity is minus because the net value of National Bank is negative as the present value of the cash flows for 4 years is less than the debits; hence, the Eps of Summer Bank becomes negative and the estimated market value becomes negative too. Therefore, the acquisition is not financially feasible.

3.2. Merger strategy

Merger strategy needs P/E ratio to acquire > P/E ratio of the acquired bank >1 (11)

The comparison is showing in the following table:

Table 8. Comparison of the E/p.

	F	E	D	C
53	-	P/E ratio of acquiring > P/E ratio of	acquired =	1.0004
54	Total Cf. =	27289	-	-
55	Total equity =	571577	-	-

Modeling: $C53 = D48/E48$, $E54 = E9 + C9$, $E55 = E41 + D41$

The table shows the E/p of the acquiring bank is more: $16.7825/16.7897 = 1.0004$.

The table shows the Total Cf. at the year of merger, i.e., 2021 and the total according to the following:

$$\text{Total Cf.} = \text{acquired Cf.} + \text{acquiring Cf.} \quad (12)$$

$$\text{Total equity} = \text{acquired equity} + \text{acquiring equity} \quad (13)$$

To find the total shares after merger, the research needs to find the exchange ratio from **Table 9**.

$$\text{Premium from } 0.1, 0.11, 0.12, \dots \text{ and more} \quad (14)$$

$$\text{Exchange ratio} = \text{acquiring book value} / (\text{acquired book value} + \text{premium}) \quad (15)$$

$$\text{Acquired new share number} = \text{shares number} / \text{exchange ratio} \quad (16)$$

$$\text{New shares after merger} = \text{acquiring shares} + \text{acquired new shares} \quad (17)$$

Table 9. Merger indicators.

J	I	H	G	F	E	D	C	B	A
1	2	3	4	5	6	7	8	9	10
Acquired B. value	Premium	(1) + (2)	Acquiring B. value	(4)/(3)	Acquired shares	Acquired new shares (6)/(5)	Acquiring shares	Merger shares 7 + 8	Eps = Total Cf./ (9)
62	1.263448	0.1	1.056372	0.77477982	-	322,672	250,000	572,672	0.047652033
63	1.263448	0.11	1.056372	0.76913869	250,000	325,039	250,000	575,039	0.047455919
64	1.263448	0.12	1.056372	0.76357912	250,000	327,405	250,000	577,405	0.047261414
65	1.263448	0.13	1.056372	0.75809933	250,000	329,772	250,000	579,772	0.047068496
66	1.263448	0.14	1.056372	0.75269764	250,000	332,139	250,000	582,139	0.046877146
67	1.263448	0.15	1.056372	0.74737238	250,000	334,505	250,000	584,505	0.046687346
68	1.263448	0.16	1.056372	0.74212195	250,000	336,872	250,000	586,872	0.046499077
69	1.263448	0.17	1.056372	0.73694477	250,000	339,238	250,000	589,238	0.046312321
70	1.263448	0.18	1.056372	0.73183932	250,000	341,605	250,000	591,605	0.046127058
71	1.263448	0.19	1.056372	0.72680412	250,000	343,972	250,000	593,972	0.045943272
72	1.263448	0.2	1.056372	0.72183774	250,000	346,338	250,000	596,338	0.045760944

Modeling: H62 = I62 + I62, F62 = G62/H62, D62 = E62/F62, B62 = D62 + C62, A62 = E54/B62

The table shows the new Eps of the acquiring bank is 0.05 at premium 0.1 while the Eps before the merger was 0.005. When the premium is increased, the Eps ratio decreases because of the breadth of the shares base, but initial dilution is performed on Summer Bank because the exchange ratio is about 0.08 for each share of the international bank. It achieved Eps 0.1 before the merger while after the merger, the Eps ratio is about 0.001 so its Eps decreases about 10%.

To complete the analysis of the future effect on Eps in the acquiring bank, the expected growth rate should be extracted.

$$\text{Expected growth} = \text{Cf. relative weight} \times \text{Cf. growth} \quad (18)$$

The following table shows the expected growth.

Table 10. Expected growth.

	H	G	F	E	D
76	Banks	Growth	Cf. at 2021	Cf. relative weight	Expected g
77	Acquiring	0.13	1167	0.04	0.01
78	Acquired	0.03	26,122	0.96	0.0287
79	Σ	0.16	27,289	100%	0.040

Modeling: $G77 = D10$, $G78 = B10$, $E77 = F77/F79$, $D77 = E77 \times G77$, $E78 = F78/F79$, $D78 = E78 \times G78$, $F79 = F77 + F78$

From the above table, the exceptive growth is 4% while the growth of the acquiring bank is 13% and the acquired bank is 3%. To confirm the results, the earning per share ratio must be reviewed.

Table 11 presents the Eps ratio after growth.

Table 11. Eps ratio after growth.

	G	F	E	D
84	Years	Cf. growth by 4%	Merger shares	Eps
85	2022	28,380.56	572,672.3162	0.050
86	2023	29,515.7824	572,672.3162	0.052
87	2024	30,696.4137	572,672.3162	0.054
88	2025	31,924.2702	572,672.3162	0.056

Modeling: $F85 = E54 + (E54 \times 0.04)$, $D85 = F85/E85$

Although the expected rate of international bank decreased from 13% to 5%, this is the growth of Total Cf.. Hence, Eps will increase from 0.5% to 5% and the acquired bank from 1% to 5%. Therefore, the merger strategy is the best.

4. Discussion of results

The results show that acquisition is not financially feasible as the estimated market value is negative. This means that the firm will lose its value, thus leading to bankruptcy and the firm's liquidation strategy. Hence, the acquisition strategy is not suitable for getting rid of failure. The merger strategy shows that the growth in total cash flow and earnings per share increased for both banks to 5%. This growth enables the new entity (after the merger) to increase its financial leverage as a result of the reinvestment of retained earnings and the ability to increase dividends which reflects the firm's value. From another side, the merger strategy develops the market by offering new products and expanding credit policy due to the absorption of new financial deposits resulting from the increase in financial leverage. Hence, the merger strategy is suitable for getting rid of failure. Also, the results show that financial modeling can lead to the best strategy.

5. Conclusion

The research on the trade-off between two strategies using financial modeling for future situation in dealing with financial failure showed that the merger strategy is more suitable than the acquisition strategy.

Author contributions

Conceptualization, MMM and KMT; methodology, MMM; software, MMM; validation, MMM and KMT; formal analysis, MMM; investigation, MMM; resources, KMT; data curation, MMM; writing—original draft preparation, MMM; writing—review and editing, MMM; visualization, MMM; supervision, MMM; project administration, KMT; funding acquisition, MMM and KMT. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare that they have no conflict of interest.

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