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**The role of Merger & Acquisition in the banking sector**

In Partial Fulfillment of the Requirements

for the Bachelor of Science in Finance

by

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## **ABSTRACT**

This thesis focuses on the role of M&A in the banking sector. In common sense, people would expect great benefits from the merger and acquisition operations, believing that great positive outcomes are exactly the reason why the business world is so fanatic about it. However, sometimes the reality is the opposite of people's expectation. The merged companies and merging companies may suffer from operating inefficiency after the operation. Correspondingly, one of the main objectives of this thesis is to disclose the real outcomes of M&A on the merged banks in terms of their stock prices. Z-tests are employed to compare two potentially related data sets. In this thesis, I focus on comparing the difference in mean return between stock and index (KBE US Equity) during the M&A and the difference in stock return before and after the M&A. Also, the event study method is used to find out if cumulative average abnormal return exists during the event window [-30, +30].

After running a z-test, the conclusion that no significant difference is spotted in the comparison between mean return of the stock and that of the index is shown. Also, it is proved that merger operation has no significant impact on the company's stock prices. However, in the event study, the existence of some abnormal returns before the announcement periods is verified. Thus, the EMH (Efficient Market Hypothesis) is not valid in this case, meaning that the market was not operating efficiently and some investors took advantage of their inside information and earned abnormal returns before the M&A announcement.

## **1. INTRODUCTION**

Mergers and Acquisitions describe a general circumstance in which the acquiring company consolidate the acquired company together with its assets. Ever since the early 21th century, unparalleled number of M&A has been executed among banks. The reason why M&A is always a hot-button question is that huge benefits, including extrinsic benefits and intrinsic benefits, can be received by both target companies and the acquiring companies. According to numerous historical M&A events, if executed properly, the operation will be extremely profitable. One of the greatest benefits is that the stock prices would experience an unusual increase surrounding the announcement date. Thus, M&A plays a vital role in banking sectors for the positive impacts it brings. Many corporations in different fields are busy acquiring their target companies, both domestic ones and foreign ones.

This thesis is of great importance because Mergers and Acquisitions activities are occurring frequently in all different fields. The board of managers are enticed by the great economic benefits that banks and involved companies can receive . But, benefits are not always provided. Meanwhile, acquiring companies may suffer from several downturn in their operation efficiency.

The aim of this thesis is to know about the real outcomes that banks can receive from M&A activities in terms of the stock price. In order to accomplish our goals, two different research approaches are used: z test and event study. In detail, using z-test, the researcher tries to examine the difference in mean return between stock and index during the M&A event and the difference in stock return before and after the M&A. In addition, the event study method is employed to test whether there is significant CAAR during the sample period. Thirty M&A operations are collected as the sample and KBE US Equity, an ETF designated in the banking field, is employed as the market index.

The remaining parts of the thesis are organized as follows. Historical literatures will be reviewed in the next section, which focuses on the value effects, and determinants of M&A success, as well as

the impact of financial crisis on M&A outcomes. In the third section, methodology and datasets that are used will be illustrated. Then, analysis and findings together with the final conclusion of the thesis will be presented.

## **2. LITERATURE REVIEW**

In this section, historical literatures will be reviewed and categorized into several main ideas, including the basic introduction of mergers and acquisitions activities, the positive and the negative effects of the operation, determinants leading to successful M&As, and finally the role of International factors and financial crisis.

### **2.1 Merger and Acquisition**

M&A describes a general circumstance in which the acquiring company consolidate the acquired company together with its assets. This kind of operations are usually triggered by the boards of directors of both parties through several different kinds of financial transactions, such as mergers, acquisitions, direct investments, acquisition of assets, etc. Although always used together, mergers and acquisitions have minor difference. In specific, according to Subhashree, K. and Kannappan, M. (2018), a merger refers to the case in which two companies of the same size combine and form into a new one, and then operates as the new company. Meanwhile, the stocks of both companies will form into one new stock instead and will be traded as a single new stock ever since. However, as for the acquisition, things vary in terms of the existence of the acquired company. In an acquisition, the acquiring company will take over the acquired one, which will cease to exist after the operation. Despite the minor variance, mergers and acquisitions are still used interchangeably.

The reason why M&A is always a hot-button question is that huge benefits, including extrinsic benefits and intrinsic benefits, can be received by both acquiring companies and the executing banks from the M&A operations. According to numerous historical records, if executed properly, merger and

acquisition activities are extremely profitable to both the target company and the acquiring company. Thus, M&A also plays a vital role in banking sectors for the positive impacts it brings. Many large banks take such operations, both domestic ones and ones located in foreign countries, in order to expand their business and to accrue long-term benefits .

## **2.2 Value Effects of M&A**

Driven by great economic enticements, financial institutions like banks accompanied with many other corporations have great interests in conducting M&A operations for the great immediate economic benefits as well as the potential intricate benefits that such operations bring about. Plus, one market participant's behavior affects others' behavior, driving the whole market to make similar decisions. This idea is backed by Berger, A. and his colleagues, who point out in 2004 that besides those internal effects of M&As, after the operation many external influences will also take place, affecting the behavior of other market participants.

### **2.2.1 Negative Effects of M&A**

But, there is no guarantee that this is the case all the time. Many historical studies provide an opposite points of view, they reveal that after the M&A operations, some companies suffered from minor deterioration in their "operating efficiency, including profit efficiency and cash flows return efficiency" (Beccalli E. and Frantz P., 2009). Also, many of those positive value outcomes that people are keen to talk about are actually non-existent, according to Piloff, S. and Santomero, A. (1998). In their research paper, they bolster the idea that although researchers examine particular merger and acquisition events and conclude that M&A leads to rewarding and positive results, such approach has several flaws. Thus, those research results also lose their credibility.

Similarly, Avkiran, N. (1999) brings about several essential insights in his research paper. After the mergers operation, they states, the merging corporation sometimes experiences negative effects, such

as a deteriorate in its operation efficiency, rather than positive effects. Because of the potential risks and negative effects, top managers should become more circumspect in making merger and acquisition decisions. Plus, Avkiran, N. (1999) continues his argument by saying that in only half the cases did the merging corporations actually benefitted from the operation. This results are not people would normally consider as true when it comes to M&A, but they are acquired through scientific researches.

### **2.2.2 Positive Effects of M&A**

However, there are still some positive effects. For example, “the cost efficiency is remarkably improved after the operation” (Beccalli E. and Frantz P., 2009). Most acquiring companies can derive great benefits form this accruement in cost efficiency. These benefits will be delivered along the chain through intermediate participants to the acquiring companies. Meanwhile, banks are gradually learning from their past mistakes and trying their best to make M&A operations successful and beneficial.

Facing the concerns from the public, many scholars have conducted studies focusing on the real effect of M&As using different kinds of approaches. Al -Sharkas, A. et al. (2008) compare the operating efficiency for both the merging corporations and the merged ones. Regardless of the over-simplicity, this methodology does not take input prices and output mix into account. Thus, Al and his colleagues replaced the old one with a more complex as well as proper approach, which allows them to employ statistical techniques when measuring inputs, outputs, and prices faced by each corporation.

### **2.3 Determinants of M&A Success**

In the motion of the determinants of M&A in the banking sector, Beccalli E., Frantz P. (2010) researched the possibility of forecasting the targets on the base of banks’ institutional factors. Individual investor needs to identify those potential acquirers as well as the target companies in order

to adjust their strategies accordingly. Also, to receive positive returns, managers in the banking sectors should acquire a similar mindset and in turn conduct reasonable decisions. Only in this way could the market participants predict the market trends accurately and gain profits from the operation.

Many other factors are found to influence the effectiveness of M&A operations, among which is the psychological level factors. Marks, M. and Mirvis, P (2001) argue that not until understanding the mindsets of decision-makers, could one truly grasp the reasons why M&A operations happen. Therefore, it's important to investigate the psychological factors for board of managers.

In addition, CEOs' overconfidence also plays a crucial role, especially in the international ones, an argument that is mainly founded on the research conducted by Ferris, S. Jayaraman, N. and Sabherwal, S. In 2013, Ferris also points out that in many cases, M&A were offered by top managers mostly because they overstate the possibility of a successful merger deal and of future positive gains right after the operation. Assessing the role played by various factors, Weber, Y. (1996) assures the relations between M&A success with "cultural fitness, autonomy level, and commitment of the executive boards". One can predict the potential outcomes of a merger when properly analyzing these factors.

#### **2.4 Cross-country Determinants of M&A**

Not only do domestic M&A happens a lot, cross-border operation also occurs frequently. After researching many international M&A cases, Altunbas, Y. and Marques, D. (2007) hold an opinion that broad similarities between the two parties will improve the likelihood of success. Fritsch et al. (2007) point out that not only the corporation but also the country it belongs to matters. The level of economic freedom together with the GDP growth affects the value created from the operation. Plus, different level of M&As intensities occur in different countries, according to Beitel et al. (2004), European banks, for example, are more motivated to conduct M&As because of their explicit objectives. And researchers believe that decision-makers should be aware of the difference between

the two kinds of M&A, and then take different strategies accordingly. Also, with regarding to their research, Erel et al. (2012) think three main factors is essential – “geography, currency movements, and relative stock market performance”.

However, Krachkovskaya, I. and Asquer, A. (2011) share an opposite point of view that the international M&A operations are not strongly related to the institutional environment based on their quantitative research.

## **2.5 Impact of Financial Crisis on M&A**

Financial crisis brings about great uncertainty to top managers. Micu, A and Micu I. (2016) argue that in accord with people's common sense, it is less likely for corporations to successful execute M&A during economic downturns. Therefore, top managers are less likely to conduct M&A in such conditions.

But, different ideas are brought up by Beltrattia and his colleagues. After carrying a research of European mergers and acquisition operations that happened during 2007 to 2010, Beltrattia, A. and Paladino, G. (2013) point out that the operation was not greatly influenced by the financial crisis regarding to the return on corporations. Another unexpected phenomenon happens when the operation is announced after the completion that the acquiring companies experience a positive significant returns. To better assess this consequence, they conducted several tests. As a result, they attribute this phenomenon to the reduction of people's uncertainty after the M&A is completed.

## **3. METHODOLOGY AND DATA**

In literature review, the value effects of M&A operations and determinants leading to successful M&As are presented. Also, past studies also investigate the role of International factors and financial crisis in M&A operations in the banking sectors. However, this thesis focuses on the direct outcomes of the operation in the stock markets.

Different kinds of datasets are collected from Bloomberg, including twenty years chronicle data about the volume and deal account of M&A operations in the banking sectors, stock prices of the merged banks and the market index (KBE US Equity). Thirty M&A events are collected as the research sample.

### 3.1 Z-test

The first method employed to study the difference in mean return between stock and index as well as the difference in stock return before and after the M&A is a z-test. Z-test is normally used to compare the difference in mean between two datasets whose size is larger than 30. Thirty merged companies, of which stock prices of sixty days around the announcement date are tested (thirty days before and thirty days after the event date) are collected as the study sample.

H0: There is no significant difference in mean returns between the company stocks and the market index during the sample period.

H1: There is a significant difference in mean returns between the company stocks and the market index during the sample period.

#### Model 1: Difference in Mean Return Between Stock and Index during the M&A Event

$$z = (\bar{r}_{stock} - \bar{r}_{index}) / \sqrt{\frac{s_{stock}^2}{n_{stock}} + \frac{s_{index}^2}{n_{index}}}$$

$\bar{r}_{stock}$  : mean return of the company stock

$\bar{r}_{index}$  : mean return of the market index (KBE US Equity Index)

$s_{stock}, s_{index}$ : standard deviation of the stock and index

$n_{stock}, n_{index}$ : sample size of the stock and index

Z-test is also employed to reveal the real impact of M&A on the stock prices of the merged company by comparing the price before the event date and the price after the event date.

H0: M&A has no significant impact on the stock price during the sample period.

H1: M&A has a significant impact on the stock price during the sample period.

### Model 2: Difference in Stock Return Before and After the M&A

$$z = (\bar{r}_{\text{after}} - \bar{r}_{\text{before}}) / \sqrt{\frac{s_{\text{after}}^2}{n_{\text{after}}} + \frac{s_{\text{before}}^2}{n_{\text{before}}}}$$

$\bar{r}_{\text{after}}$  : mean return of the company stock after M&A

$\bar{r}_{\text{before}}$  : mean return of the company stock before M&A

$s_{\text{after}}, s_{\text{before}}$ : standard deviation of the stock and index

$n_{\text{after}}, n_{\text{before}}$ : sample size of the stock and index

### 3.2 Event Study

Event study approach is also employed in this thesis in order to test the validity of Efficient market hypothesis (EMH). EMH suggests that all public information about each firm are received and responded by market participants who always take rational actions towards the new information. Thus, investors' rational responses will drive the stock price of the firm to its real price level, making the real stock price reflect all public information. Under this justified hypothesis, the firm's stock price should reflect a particular event fairly. If the financial market is not efficient, then abnormal returns will occur, returns that are realized only because the abnormal event. Otherwise, the stock should maintain its normal returns. As a result, using the event study methodology, one can examine whether there is an abnormal impact of merger announcement and merger completion on the stock prices.

H0: There is no cumulative average abnormal return (CAAR) during the sample period.

H1: There is some cumulative average abnormal return (CAAR) during the sample period.

## **Normal Returns of the Stock during Event Window**

In order to estimate the market return of a security during the event window, a regression of the stock returns against the market returns (the returns on KBE US Equity index) is run. Based on the simple equation, alpha and beta are calculated using the empirical data during the estimation period, which is -240 days to -30 days.

The estimated normal return will be calculated from the Market Model where the banking sector index will be used as indicator of market return:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t}$$

$R_{i,t}$  denotes the normal return on the Company stock in the period t [-30, +30]

$R_{m,t}$  denotes the normal return on the KBE US Equity index in the period t [-30, +30]

$\alpha_i$  denotes the constant in regression and is calculated in estimation period [-240,-30]

$\beta_i$  denotes the intercept in regression and is calculated in estimation period [-240,-30]

### **3.2.1 Abnormal Return**

The abnormal return will be calculated as:

$$AR_{i,t} = R_{i,t} - E(R_{i,t})$$

$AR_{i,t}$ : Abnormal return

$R_{i,t}$ : actual return

$E(R_{i,t})$ : estimated normal return

### **3.2.2 Average Abnormal Return**

$$AAR = \frac{1}{N} \sum_{i=1}^N AR_{i,t}$$

### **3.2.3 CAARs (Cumulative Average Abnormal Returns) with t-statistics**

$$CAAR(t_1, t_2) = \sum_{t=t_1}^{t_2} AAR_{i,t}$$

CAAR are simply calculated by adding all abnormal returns between t1 and t2. However, to investigate whether the EMH is working and whether there was any significant ARs during the event, different CAARs that represent different periods are calculated. Mainly three period analyses are taken out. Firstly, abnormal returns in combined periods around the announcement date are tested. The second analysis examines the unusual activity before the announcement. Last but not least, how the stock price moves after the event date is also presented.

#### **4. ANALYSIS AND FINDINGS**

In last section, the methodologies that are employed in this thesis are introduced, together with the dataset and model. In short, M&A volume and deal count of M&A from 1998 to 2019 are collected to illustrate the impact of economic downturns or financial crisis. Stock prices of thirty companies and the price of KBE US index that examined the performance of banking field as a whole are collected to show the impact of M&A using z-test. Plus, the event study method is adopted to investigate if abnormal return exists during the event period. The analysis and findings will be demonstrated in this section.

##### **4.1 M&A and Economic Context**

**Figure 1: Volume and Deal Count of M&A in the Banking Sector from 1998 to 2019**

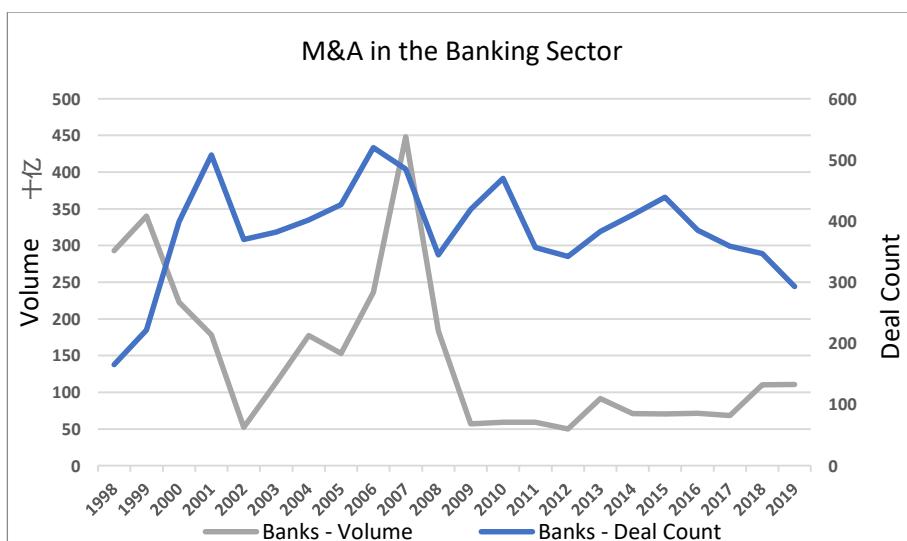


Figure 1 shows the volume and deal count of Merger & Acquisition operations happened each year from 1998 to 2019. As illustrated in the table, both factors fluctuated a lot in the past, showing a pattern corresponding to the economic context. In 2002, the burst of the global Internet bubble caused the credit market to shrink sharply. Similarly, around 2008, the famous US subprime debt crisis happened, leading to a global credit market turmoil. The impact of 2002 and 2008 financial crisis is shown in the M&A field as well. In 2002, the volume of M&A in banking sector reached its lowest point. In 2008, reacting to the subprime crisis, the volume experienced a sharp drop, from 450 billions to 50 billions. The deal count of M&A also shares a similar trend: decreasing during economic austerities and gradually recovering afterwards. This result shows that top managers are reluctant to execute M&A operations when the economic is bad, partly because the possibility of successful M&A is relatively low compared with other times.

This finding is consistent with past literature. Just as Micu, A and Micu I. (2016) argued, financial crisis brings great uncertainty to managers. Therefore, it is less likely for corporates to successfully execute M&As during financial crisis. Therefore, top managers are less likely to conduct M&A in such conditions and the deal count drops greatly correspondingly.

#### **4.2 Difference in Mean Return Between Stock and Index during the M&A Event**

One would normally expect no significant difference in mean returns between the company stocks and the market index during the sample period if the stock price follows its usual patterns. In most cases, returns of the company stock would not surpass or leave behind those of the market index greatly.

Model 1:

$$z = (\bar{r}_{stock} - \bar{r}_{index}) / \sqrt{\frac{\bar{s}_{stock}^2}{n_{stock}} + \frac{\bar{s}_{index}^2}{n_{index}}}$$

$\bar{r}_{stock}$  : mean return of the company stock

$\bar{r}_{index}$  : mean return of the market index (KBE US Equity Index)

$S_{stock}$ ,  $S_{index}$ : standard deviation of the stock and index

$n_{stock}$ ,  $n_{index}$ : sample size of the stock and index

**Table 1: Z-test Results of Model 1**

z	P (Z<=z) two-tails	Correlation
1.6449	0.6461	0.6461

Using a z-test to examine the relationship between the two factors, the researcher finds out that the p-value is 0.6461, which is larger than 0.1, our confidence level. Thus, the null hypothesis that there is no significant difference in mean returns between the company stocks and the market index during the sample period is not rejected. There is, however, a medium positive relationship between the two data sets for the correlation is 0.6461. This means that the stock price shares a similar, if not strong, moving trends. If the market is suffering from negative economic impacts, the stock prices would probably change correspondingly in the same direction. This is reasonable because KBE US Equity Index is a ETF reflecting the movements of those main banks in the US. Thus, every single bank should experience the similar impact, no matter good or bad impact.

This result is not what people normally expect because companies execute mergers and acquisitions only because they anticipate great jump in their stock prices or some long-term positive effects. And stock market participants would normally receive some abnormal benefits from the M&A operations, benefits that would reflect on the company's stock prices. However, this results show that the commonly accepted theory does not apply to this case perfectly. The null hypothesis is accepted, which represents that there is no significant difference in mean returns between the company stocks and the market index during the sample period and thus equity holders cannot receive great accruements.

#### **4.3 Difference in Stock Return Before and After the M&A**

The null hypothesis of this test is that M&A has no significant impact on the Stock price of the merged company during the sample period. If the stock return does not alter greatly, then the argument that M&A does not alter the behaviors of stock prices would be buttressed.

$$z = (\bar{r}_{\text{after}} - \bar{r}_{\text{before}}) / \sqrt{\frac{s_{\text{after}}^2}{n_{\text{after}}} + \frac{s_{\text{before}}^2}{n_{\text{before}}}}$$

$\bar{r}_{\text{after}}$  : mean return of the company stock after M&A

$\bar{r}_{\text{before}}$  : mean return of the company stock before M&A

$s_{\text{after}}, s_{\text{before}}$ : standard deviation of the stock and index

$n_{\text{after}}, n_{\text{before}}$ : sample size of the stock and index

**Table 2: Z-test Results of Model 2**

z	P (Z<=z) two-tails	Correlation
1.6449	0.5302	0.0027

Similar to the previous hypothesis, this hypothesis is employed to show the direct impact of M&A on the company itself. A z-test is employed to compare the difference in stock return before and after the M&A operation. The p-value of this z-test is 0.5302, which is still larger than 0.1. Therefore, it is implied that the null hypothesis cannot be rejected and that M&A has no significant impact on the stock return. Also, the correlation is only 0.0027, meaning that there is barely any relation between the two data sets. Therefore, the mean return of the stock does not change its past pattern after the event from a statistical perspective.

Still, this result further reveals the harsh truth of M&A -- merged banks would not experience significant changes in its stock prices after the operation. But many past literatures state similar findings. For example, such result is consistent with the argument of Avkiran, N. (1999), who says that only half of the merged companies would benefit from the operation. However, model 3 discussed above only tests the stock prices. Many other factors, such as operating efficiency,

profitability, and regional advantages, are taken into account by top managers when deciding whether to execute such operations or not.

#### 4.4 Event Study

According to the Effective Market Hypothesis (EMH), all publicly available information about every firm is received and responded by market participants, driving the stock price to its real price level. Therefore, there should be no significant cumulative average abnormal return (CAAR) during the sample period. In other words, CAAR should be zero all the time. However, if the M&A information was leaked and some investors traded based on the inside information, there would be positive or negative abnormal returns before the announcement date.

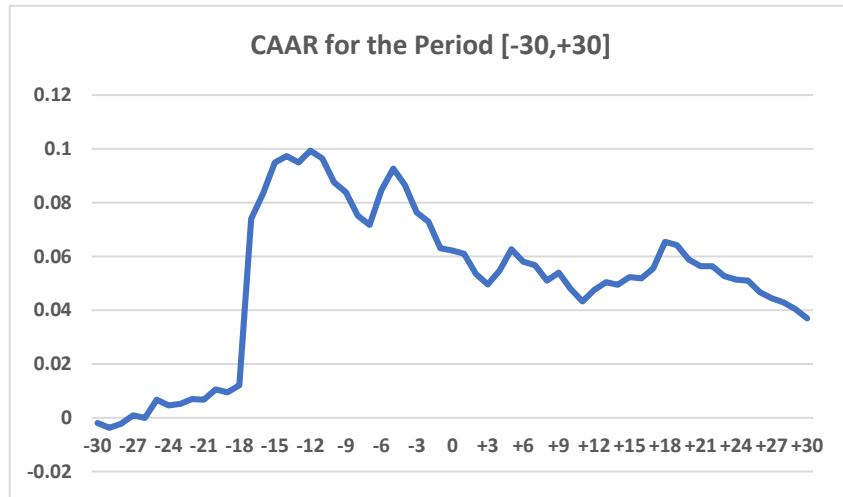
**Table 3**  
**Cumulative Average Abnormal Returns (CAARs) for the Target Bank**

Windows	CAARs (%)	t-value
<i>Combined periods</i>		
[-1, +1]	- 0.012	- 0.274
[-5, +5]	- 0.022	- 0.266
[-10, +10]	- 0.049	- 0.423
[-20, +20]	0.052	0.325
[-30, +30]	0.037	0.189
<i>Prior to announcement date</i>		
[-5, -1]	- 0.022	- 0.387
[-10, -1]	- 0.033	- 0.423
[-20, -1]	0.056	0.502
[-30, -1]	0.063	0.459
<i>After announcement date</i>		
[+1, +5]	0.000	0.008
[+1, +10]	- 0.014	- 0.180
[+1, +20]	- 0.003	- 0.030
[+1, +30]	- 0.025	- 0.184

*Source: Bloomberg*

This table shows the CAARs of combined, prior to, and after announcement. Expected return is calculated using empirical data of the estimation window [-240, -31].

**Figure 2: CAAR for the Period [-30,+30]**



The CAAR (Cumulative Average Abnormal Return) and its t-statistics are presented in Table 3. Three different analyses are employed, with the first part investigating the abnormal returns in combined periods. For example, during the combined periods [-1, +1], [-2, +2], and [-5, +5], CAARs are -0.012%, -0.023%, and -0.022% and the t-values are -0.274, -0.410, and -0.266, respectively. Even though the combined periods are closely around the announcement date, the statistic level is too low to represent valid abnormal returns. In addition, after calculating the t-value of all periods, it is found out that all of the t-statistics are not statistically significant at any confidence level. In detail, the highest t-value is only 0.502, which is much lower than the significant ratio 1.96. Although not statistically significant, the CAAR is still not usual. Based on this evidence, it can be concluded that the EMH loses its effectiveness around the M&A announcement. It is reasonable to speculate that there was a leakage of information prior to the announcement date and insiders traded on the company's stock and created abnormal returns. Then after the information became public, it lost its value and market participants were not able to make abnormal returns out of it. CAAR gradually returned to its original level and the EMH became effective again.

Based on these results, the null hypothesis is not rejected and instead, it is shown that there is some CAAR during the sample period. Although the CAAR is not statistically significant, an unusual pattern surrounding the announcement date can still be observed. Figure 2 presents the CAAR values over the event window [-30, +30]. Thirty days prior to the announcement date, the company's stock is stable, with its CAAR lingering around 0. However, a huge jump of the abnormal return starting from day [-18] can easily be spotted and the value stays at a relatively high level until the information becomes public when t=0.

Overall, these results verify the existence of some abnormal returns around the pre-announcement periods. Thus, the EMH (Efficient Market Hypothesis) is not valid in this case, meaning that the market was not operating efficiently and some investors took advantage of their inside information and earned abnormal returns before the M&A announcement. Such findings are consistent with the past literature in terms of the invalidation of EMH. For example, Kiymaz (2001) observed no statistically significant CARs after, but prior to the announcement. He concludes that market participants who initially own the stock use inside information for their trading. And after the announcement, the market quickly adjusted to the new information, leaving no further abnormal profits. Kiymaz's finding is exactly the same as the finding of this thesis. Similarly, Adnan and Hossain (2016) put forward their findings that both the merged and merging companies obtained an upward trend in their CAAR value prior to the announcement. The CAAR reached a unusually high level, but three days after the announcement, it fall down to the original level -- zero.

## 5. CONCLUSION

This thesis is conducted among 30 M&As that happened among banks in order to find out the real outcomes of M&A on the merged banks surrounding the announcement date. This thesis is of great importance because mergers and acquisitions are pursued by top managers almost blindly. Different kinds of data are collected from Bloomberg, including twenty years chronicle data of the volume and deal count of M&A operations, stock prices of the merged banks and those of the

market index (KBE US Equity). Z-test comparing the mean return and event study method is adopted as the methodology. From Table 1, which shows the volume and deal count of M&A operations in banking sectors from 1998 to 2019, it is shown that during economic downturns, deal count and volume drop greatly together. Therefore, it is concluded that the top managers of potential acquiring companies are reluctant to execute M&A operations when there are economic downturns, partly because the possibility of successful M&A is relatively low compared with other times. After running two z-tests, the null hypotheses are not rejected. Instead, it is concluded that there is no significant difference in mean returns between the company stocks and that of the market index and that M&A has no significant impact on the merged company in terms of its stock price. However, in accordance with the past literature, the results of the event study verify the existence of some abnormal returns around the pre-announcement periods. Thus, EMH is not valid in this case, meaning that the market was not operating efficiently and some investors took advantage of their inside information and earned abnormal returns before the M&A announcement.

However, this thesis has some limitations. For example, the sample size is not bountiful enough, with only thirty M&As being observed. Future studies should use a much larger sample size to make the research more reliable and representative. Also, changes in the profitability of the merged banks are not tested in this thesis, which only focuses on the stock prices. The impact of M&A on the acquiring banks is omitted as well. It is worthwhile to compare the impact on the target company with that on the acquiring company. Future studies should cover this part to better investigate the mechanism of M&A in the banking sectors and the real outcomes of M&A operations on both the target bank and the acquiring bank.

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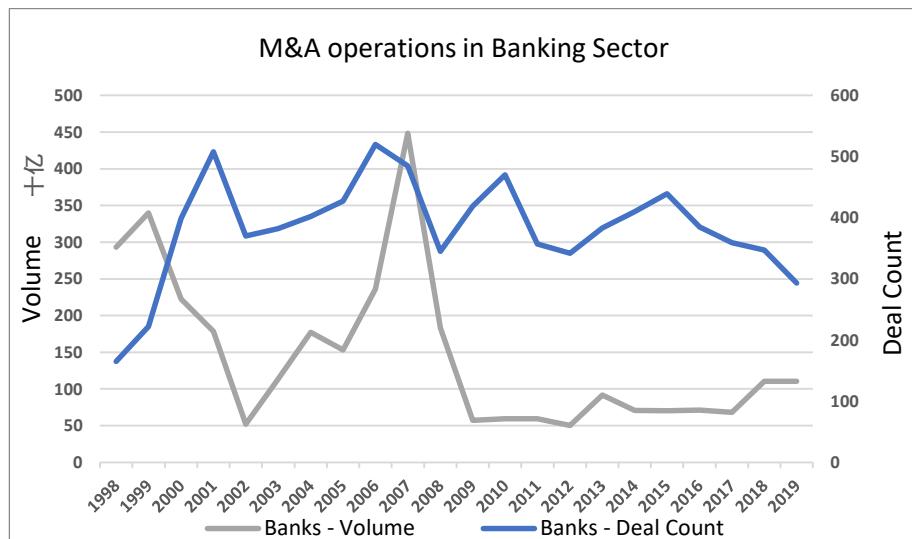
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## 7. TABLES AND FIGURES

**Figure 1: Volume and Deal Count of M&A in the Banking Sector from 1998 to 2019**



**Table 1: Z-test Results of Model 1**

z	P (Z<=z) two-tails	Correlation
1.6449	0.6461	0.6461

**Table 2: Z-test Results of Model 2**

z	P (Z<=z) two-tails	Correlation
1.6449	0.5302	0.0027

**Table 3: Cumulative Average Abnormal Returns (CAARs) for the Target Bank**

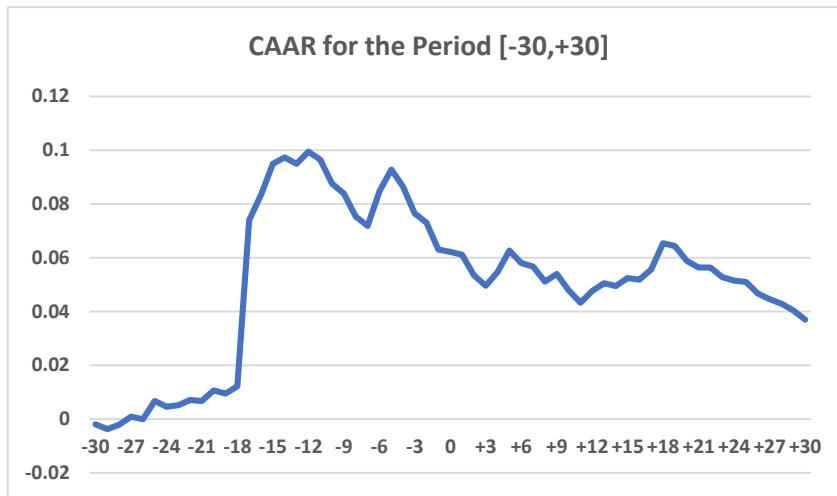
Windows	CAARs (%)	t-value
<i>Combined periods</i>		
[-1, +1]	- 0.012	- 0.274
[-5, +5]	- 0.022	- 0.266
[-10, +10]	- 0.049	- 0.423
[-20, +20]	0.052	0.325
[-30, +30]	0.037	0.189
<i>Prior to announcement date</i>		
[-5, -1]	- 0.022	- 0.387
[-10, -1]	- 0.033	- 0.423
[-20, -1]	0.056	0.502
[-30, -1]	0.063	0.459
<i>After announcement date</i>		
[+1, +5]	0.000	0.008

[+1, +10]	- 0.014	- 0.180
[+1, +20]	- 0.003	- 0.030
[+1, +30]	- 0.025	- 0.184

Source: Bloomberg

This table shows the CAARs of combined, prior to, and after announcement.  
Expected return is calculated using empirical data of the estimation window [-240, -31].

**Figure 2: CAAR for the Period [-30,+30]**



## 8. APPENDIX

### Appendix A (Volume and Deal Count of M&A Operations in the Banking Sectors)

Date	Banks - Volume	Banks - Deal Count
1998	2.92996E+11	165
1999	3.39895E+11	222
2000	2.22638E+11	399
2001	1.78434E+11	508
2002	52115779584	370
2003	1.13482E+11	382
2004	1.77267E+11	402
2005	1.53146E+11	427
2006	2.36218E+11	520
2007	4.48429E+11	485
2008	1.83363E+11	345
2009	57148989440	419
2010	59364737024	470
2011	59292659712	357
2012	50196762624	342
2013	91490074624	383
2014	70809747456	410
2015	70413402112	439
2016	71222517760	385
2017	68235468800	359
2018	1.1032E+11	347
2019	1.10662E+11	293

### Appendix B (Z-test Results of Model 1)

z-Test: Two Sample for Means		
	Variable 1	Variable 2
Mean	0.000821017	0.000199823
Known Variance	0.003150512	0.000199
Observations	1830	1830
Hypothesized Mean Difference	0	
z	0.459157661	
P(Z<=z) one-tail	0.323060476	
z Critical one-tail	1.281551566	
P(Z<=z) two-tail	0.646120952	
z Critical two-tail	1.644853627	
CORR	0.10615947	
Since p > 0.1, we do not reject the Null hypothesis that There is no significant difference in mean returns between the stock and the market index during the event period		

### Appendix C (Z-test Results of Model 2)

z-Test: Two Sample for Means		
	Variable 1	Variable 2
Mean	0.001937	-0.000312
Known Variance	0.005775	0.005773
Observations	899	899
Hypothesized Mean Difference	0	
z	0.627591	
P(Z<=z) one-tail	0.265136	
z Critical one-tail	1.281552	
P(Z<=z) two-tail	0.530272	
z Critical two-tail	1.644854	
COOREL	0.00274	
<b>Since p &gt; 0.1, we do not reject H0 that M&amp;A has no significant impact on the Stock price of the merged company</b>		

### Appendix D (Cumulative Average Abnormal Returns (CAARs) for the Target Bank)

window	CAAR	t(number of days in window)	t-statistics of CAR
		CAR/(StandardDeviation*(number of days) <sup>(1/2)</sup> )	
SD		0.025049931	
(-30, +30)	0.037	61.000	0.189
(-20, +20)	0.052	41.000	0.325
(-10, +10)	-0.049	21.000	-0.423
(-5, +5)	-0.022	11.000	-0.266
(-2, +2)	-0.023	5.000	-0.410
(-1, +1)	-0.012	3.000	-0.274
(-5, -1)	-0.022	5.000	-0.387
(-10, -1)	-0.033	10.000	-0.423
(-20, -1)	0.056	20.000	0.502
(-30, -1)	0.063	30.000	0.459
(+1, +5)	0.000	5.000	0.008
(+1, +10)	-0.014	10.000	-0.180
(+1, +20)	-0.003	20.000	-0.030
(+1, +30)	-0.025	30.000	-0.184

**Appendix E (CAAR for the Period [-30,+30])**

-30	-0.002 0	0.06216351
-29	-0.0037382 +1	0.06105233
-28	-0.0021594 +2	0.05346247
-27	0.00090424 +3	0.04956338
-26	-9.464E-05 +4	0.05464034
-25	0.00673728 +5	0.06262013
-24	0.00458822 +6	0.05798463
-23	0.00517808 +7	0.05673567
-22	0.00701251 +8	0.05105366
-21	0.0067463 +9	0.05393368
-20	0.01058851 +10	0.04786667
-19	0.00941526 +11	0.04323797
-18	0.01212562 +12	0.04760072
-17	0.07397885 +13	0.05044628
-16	0.08337311 +14	0.04944001
-15	0.09495761 +15	0.0523519
-14	0.09729049 +16	0.05181428
-13	0.09493443 +17	0.0555822
-12	0.09940054 +18	0.06544272
-11	0.09647513 +19	0.06425413
-10	0.0875343 +20	0.05882314
-9	0.08386805 +21	0.05633892
-8	0.07522059 +22	0.05636353
-7	0.07177509 +23	0.05272916
-6	0.08468577 +24	0.05142259
-5	0.09271585 +25	0.05099889
-4	0.0866213 +26	0.04671528
-3	0.07642341 +27	0.04451048
-2	0.07294671 +28	0.04289701
-1	0.06299219 +29	0.04038793
	+30	0.03697471