Premium, Ownership and Operating performance in RTO

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A reverse takeover is an alternative method of listing instead of IPO. Compared to IPO, firms using RTO can avoid the stringent requirement of IPO and disclose less information. Hence, these transactions were viewed as suspicious transactions. The U. S-SEC also issued the warning that investors should be careful when considering investing in the RTO firm. However, it is unlikely that investors in the market can separate between the good RTO firm and the bad RTO firm because of the loose requirement of RTO which led to the arising of asymmetric information between investors and RTO firm. As a result, in this study, we aim to raise the research question about "Can we separate between good performance RTO firm and bad performance RTO firm?". We examine 59 reverse takeovers in the U.S. stock market during 2007-2018. We then suggest that the premium that a private firm paid to a public firm and ownership that a private firm obtained from a public firm after a merger might be a signal to separate between good performance RTO and bad performance RTO. By examining the relationship between these two variables and change in operating performance, we cannot find evidence that

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1. Introduction

1.1 Background

RTO or Reverse Takeover is a transaction where a private company (the acquiring company) obtains the public listing status through ac acquisition of a publicly listed company (the target company). After the event, in most cases, the newly merged company (called RTO firm) will be operated under the managerial control of the private company (Gleason et al, 2005). The reverse takeover has been used as an alternative method for private companies to list on the public.

In usual cases, RTO transactions normally start with a private firm looking for a suitable public company whose major shareholders want to exit the market. This public company, the target company, can be either a defunct company or a shell company. Once the private firm finds a suitable target, they will make a deal and purchase shares from the shareholders of the public company in order to gain the majority control. Subsequently, the new major shareholder of the public firm (which is the shareholders of the private firm) will conduct an extraordinary shareholder meeting to vote for merging with the private company. Finally, the public company will acquire the private company through an exchange of the majority of the shares of a public company. As a result, the private firm will take control over the public company and effectively becomes a public company.

RTO can be viewed as both a financing decision and an investment decision of the private firm. However, most studies try to say RTO as a financing decision of the private firm. In financing decision, RTO

provides an opportunity for the private firm to utilize the financial resource in the market as same as going public through IPO (Arellano-Osta and Bruso, 2002). Even the RTO firm cannot raise capital directly as an IPO firm does, but the RTO transaction provides the opportunity and option to the newly created firm to decide for raising funds later. Apart from that, RTO can be used as a shortcut of the IPO process. For a traditional process as IPO, a private firm require to meet certain requirements and qualifications. A private firm needs to provide various opportunities to reveal their information to the public. They need to hire the underwriter and conduct the roadshow. Meanwhile, a private firm using RTO was required only to submit their consolidated financial reports after the merger. (Chen et al, 2016). Consequently, the cost of listing via RTO is cheaper than the cost of listing via IPO (Arellano-Ostoa and Brusco, 2002) and the process of RTO is shorter than the process of IPO (Gleason et al, 2005). However, Reverse takeover is viewed as suspicious transactions and referred to as a back-door listing (Chen et al, 2016). With less stringent requirements compared to an IPO transaction, firm using RTO can conceal some bad information and bypass some useful rules and requirements of IPO that are designed to protect investors in the market. The US-SEC also concern about this vulnerability and issued the warning in 2011 to investors who invest in the stock of reverse merger companies (https://www.sec.gov/news/press/2011/2011-123.htm).

For an investment perspective, RTO transaction should be indicated as an investment activity of a private firm to purchase the target company to gain the listing status embedded in the target company (Brown et al,2010). The private firm was required to invest in this transaction by purchasing the partial shares of the listed company to gain the majority control of the target company before the RTO transaction was established. To make a private firm willing to invest in an RTO transaction, a private firm needs to trade-off between the cost of RTO and the benefit after going public. The deal should occur when the expected benefit is more than the cost of RTO. For this reason, a private firm using RTO should require the return after going public to compensate the cost of investment in RTO. There are some firms that aim to go public to utilize the benefit of public status such as increasing creditability, easier accessibility for the financial resource or investing in a potential project, but these firms cannot meet the strict requirement of IPO. Hence, they need to search for an alternative way for going public. In this case, the RTO method might be a good transaction for some firms.

With the two sides of the coin and the ambiguity in RTO, many researchers try to explain the various aspect of the reverse merger firm. Gleason et al. (2005) and Adjei et al. (2008) studied the characteristic of private firms using reverse takeover. They find that most of the private firm using RTO is small and young firm compared to IPO firms. The researchers conclude that the low cost of RTO induces the small and young firm which cannot achieve the cost of IPO to choose revere takeover method. Academic studies have been examining the stock return

of RTO firms in terms of both short term and long term. In short term, Gleason et al. (2005) study RTO firms in the U.S. stock market during the announcement date and find a positive abnormal return in stock price. The result is also in line with the study in Singapore and Thai market. Pavabutr (2020) conducted the study and show that there is a positive return in the target's stock price when the announcement occurred. In long term, Floros and Sapp (2011) find out further that the negative of long-term performance of average firm's stock price is up to –91%. It could generally be concluded that even RTO can generate a positive return in short term, but it fails to generate long-term wealth for investors.

Apart from the study on stock price, the study of operating performance should be considered. Operating performance is useful to value a firm for the medium-term and long-term investor. Additionally, the measurement by operating performance is not affected by the psychology of investors contrary to the measurement by stock price (Demsetz and Villalonga, 2001). Gleason et al. (2005) observe a little improvement in profitability of RTO in the subsequent 2 years, while they find that half of the merged firm was delisted and bankrupt. Adjei et al. (2008) also investigate the survival of RTO firms. They show that most of the reverse merger firms cannot survive in the aftermarket which is related to the warning of SEC. In conclusion, most of the researchers try to indicate that on average RTO firm is a bad firm. However, not all RTO firm is the villain. There are still some non-listed firms that use reverse takeover with good intention for listing. They can survive and have a good performance

after the merger. Even Adjei et al. (2008) find that 42% of reverse merged firms were delisted, but there still have half of the reverse merger firms that can survive after the merger.

1.2 Motivation

Although most RTO fails, not all firms fail post-RTO (Adjei et al, 2008 and Gleason et al, 2005). However, existing literatures lack the evidence why and why not some firms fail and some not. Why this evidence is important? Regarding the warning of the US SEC, RTO firm is a high-risk firm. Investors should thoroughly research the RTO company before considering investing in the RTO firm. Nevertheless, it is unlikely that investors in the market can separate between the good RTO firm and the bad RTO firm because of arising of asymmetric information. Floros and Shastri (2009) express their concern that because of the less stringent requirement compared to the IPO process, private firms using RTO may involve severely asymmetric information problem between firms using RTO and investors in the market. The private company is well-informed, while investors in the market are ill-informed. This adverse selection problem was originated from lacking the underwriter and regulatory requirements. The loose regulation and requirement allow private firms with bad intentions to use RTO to speculate stock price in the market and careless about firm operating performance. Consequently, the investor has a chance to invest in the wrong RTO firm. The wrong decision of an investor who invests in a bad RTO firm can lead to a loss and suffer from their bad performance.

In this paper, we aim to fill the gap of literature and provide the evidence why some firms fail and some not to separate between a good RTO firm and a bad RTO firm. We focus on the accounting operating performance of RTO firms rather than return on the stock price. We believe that measuring in accounting operating performance can reflect the sustainable performance of RTO firms. Also, we believe that it is useful for both mid-term and long-term investors that they can predict the future performance of the newly merged firm.

1.3 Research Question

In this paper, we aim to raise the research question about "Can we separate between good performance RTO firm and bad performance RTO firm?". The objective of this paper is to find the signal that can predict the future operating performance of the merged firm. We argue that the price premium paid by a private firm to a public firm and the ownership proportion that a private firm obtains from a public firm can be the approximate signal of the operating performance in post-RTO. We suggest that the premium in reverse merger transactions is different from the normal merger. In takeover literature, the premium can be the root of the winner's cruise because of overestimating synergy gain and agency cost between the management of the public firm and shareholders of the public firm (Gristein & Hribar,2004 and Roll,1986).

In contrast, there is no synergy gain in RTO. The acquiring company is looking for the target company only for purchasing the listing status. Most of the target company are either a shell company which is a non-operated company or a bad company that shareholder wants to exit

the market and recover from their bad investment (Gleason et al, 2005). Hence, the RTO firm should not suffer from overestimating synergy gain. Furthermore, it is likely that the agency cost between the management and shareholders of a private firm is lower than a public firm. Basically, the management of a private firm is also its major shareholders. Thus, the origination of the RTO deal should be driven by the shareholder's decision that aims to list in the market. In summary, premium in RTO should not lead to the winner's cruise effect. Private firm's shareholders are willing to pay the premium only if they are confident that the expected benefit is larger than the cost of listing via RTO. Moreover, RTO transaction is costly. Thus, the high premium might reflect the high confidence about future benefits after merging which leads to a high incentive to monitor the firm to achieve their return after using RTO.

For the ownership that a private firm obtains from a public firm, we propose that shares are the residual claim. The more shares obtain lead to more bearing the risk. The larger portion that new shareholders obtained should give an incentive to monitor the merged firm carefully. Hence, in the first hypothesis, we investigate that the ownership proportion that the private firm obtains from the public firm has a positive relationship with the operating performance of RTO firms. In the second hypothesis, we hypothesize that the price premium paid by the private firm has a positive relationship with the operating performance of RTO firms.

1.4 Contributions

We aim that the result from this research can enhance the knowledge and understanding about the reverse takeover. We hope that the result from these two variables, premium, and ownership, can help the investor to mitigate the problem of asymmetric information between investors and firms using RTO. With the suggested variable in this research, they could be the signal in RTO transactions for the investor to separate good RTO performance from bad RTO performance. Consequently, investors have less chance to invest in bad RTO firms and can avoid facing the loss of investment.

2. Literature review

In this chapter, existing literature related to reverse takeover transactions will be reviewed. The chapter is divided into 6 parts. First, we begin with 1.) The reverse takeover process and 2.) Characteristic of Reverse merger. Then, we move to 3.) Reverse merger and Asymmetric information to understand the nature of RTO. Next, we would like to introduce 4.) Survival rate and Long-term performance. Lastly, 5.) Ownership control and Agency cost and 6.) Merger and Premium to introduce the variables that we recommend to use in our hypothesis.

2.1 The Reverse Takeover Process

Reverse takeover refers to the event where a private company gains the listing status through acquiring a public company. After the completed transaction, the private firm's shareholders can change the name of the public company including the management team of the public company. Normally, there are two types of public firms that willing to participate in

a reverse takeover: a defunct company and a shell company (Arellano-Osta and Bruso, 2002) The defunct company is an inactive public company which already out of the market. One of the reasons that it transforms the active company into an inactive company is bankruptcy (Arellano-Osta and Bruso, 2002). Even these company are still having the operation, but they are not involved in real business anymore. In general, they run the company only if just preserve their listing status in the market. For a shell company, it was defined by US-SEC that a registered company that has no operation and asset (Lee et al,2014).

To begin the RTO transaction in the U.S. market, the private company (the acquiring company) searches for a publicly-traded company to use as an appropriate vehicle for listing (the target company). After finding the appropriate company, the private company will bid for the shares of the public company by offering cash or stock in order to gain the majority control. Afterward, there will be the extraordinary shareholder meeting about the merging between a public company and a private company which was conducted by the new major shareholder of the public firm (which is the shareholders of the private firm). After the transaction is completed, the newly merged company must submit the relevant document to SEC within 2 weeks (Gleason et al, 2005). Lastly, the new shareholder of a public company, the shareholder of a private firm, will take over the operation control of the merged firm. Then, the private company will become the newly public company.

2.2 Characteristic of Reverse merger

Compared to IPO firms, firms using RTO is poorer. Arellano-Osta and Bruso (2002) find that private firms using RTO is an unconfident firm. They suggest the model that a private firm with RTO is an unconfident firm about future projects (low-quality firm). Firms that are more confident about future projects and be able to achieve the cost of IPO (high-quality firm) prefer to choose IPO instead of RTO as a mechanism for listing. The idea is that high-quality firms have a high likelihood to invest and receive profit from future projects. Thus, they do not want to delay the source of funds that firms can raise immediately from an IPO. Meanwhile, firms with a low likelihood to invest might be unsure about the future project. They can delay the source of funds to invest and prefer to wait until the uncertainty of future projects is resolved. Consequently, they prefer to list via RTO to prepare the fundraising in the future.

Adjei et al. (2008) also studied the RTO sample which obtains from Securities Data Corporation during 1990-2002 and finds that most of the private firms using RTO are smaller, younger and have poorer ex-ante performance than private firm using IPO. The result consists of the study of Floros and Shastri (2009) and Gleason et al. (2005). The main reason small firms prefer to choose RTO rather than IPO is the less listing requirement and smaller cost of listing (Adjei et al, 2008 and Gleason et al, 2005). Small firms may find that cost of IPO may beyond their reach. The cost of listing via RTO is approximate 0.2%-0.4% of the total amount raised compared to 7% of the total amount raised in IPO (Arellano-Osta

and Bruso, 2002 and Chi Chen and et al, 2000). Even a firm cannot raise funds immediately as IPO does, but the lower cost of RTO makes going public easier than IPO. The small cost is not only inducing the good small firm to participate in this mechanism, but also inducing the bad firm with bad intention to seek the personal benefit in the market.

From the target firm perspective, RTO can help mitigate the bad investment of former public shareholders. RTO provides the opportunity to exit the market of a public company. Shareholders of a public company can recover some of their bad investments by selling the share to a private firm (Pavabutr, 2020). Then, they can escape from the distressing situation. Pavabutr (2020) also study an event study of RTO firm in Singapore and Thai market and find that there is a significant positive return on the target firm when the announcement of RTO occurs. The distressed firm has the highest cumulative abnormal return around RTO announcements. The result consists of the study in the U.S. market by Gleason et al. (2005). They provide the support evidence that at the announcement date of reverse takeover there is a significant increase in positive abnormal return in stock price of the public firm (target firm).

2.3 Reverse Merger and Asymmetric information

Asymmetric information was first introduced in Akerlof (1970), It is the classical problem in the economy. The concept is also known as information failure. It occurs when one party (well-informed) has greater knowledge and information than another party (ill-informed). If the information failure arises before the transaction occurs, it is called "adverse selection". For example, the seller might overclaim the ability of

their product or service to the buyer. As a result, the buyer might buy this product at an overvalued price.

In the capital market, there is also an adverse selection in the first place that private firms go public via the traditional method as IPO. Regulators try to mitigate this problem by requiring the private firm to disclose the information. The private firm has to do a roadshow where they need to present their company and answer the question from the investor. Also, they must submit the firm's prospect which contains detailed information of the company such as risk factors, detailed explanation of business, the purpose of the money raises, and business plan. They need to have the underwriter and achieve the strict requirement from the regulator to protect the benefit of uninformed investors in the market. Firms may view information disclosure as an additional cost of getting listing status.

Apart from IPO, RTO or reverse merger is an alternative method of going public. In the U.S., the requirement of RTO is less than the IPO. Firms can by bass some rules with shorter process and duration compared with IPO. Chen et al. (2016) find that the process of RTO can be done within 6 months, while IPO takes 9 to 12 months. Private firms using RTO only require to submit their consolidated financial reports after the merger (Chen et al, 2016). Private firms can go public without an underwriter. Consequently, they can avoid some additional costs of listing. Hence, Floros and Shastri (2009) describe private firms using RTO as the firm with high information asymmetry. With less requirement compared to IPO, the effect of information failure in RTO is higher than

in the IPO process. It provides the opportunity for private firms to conceal bad information. Then, the investor in the capital market will be harmed by this adverse selection.

2.4 Survival Rate and Long-term Performance

The survival rate of half of RTO firms is not good. Gleason et al. (2005) examined 121 RTO firms on AMEX, NYSE, and NASDAQ and find that the survival rate of samples is less than half after the first two years. Adjei et al. (2008) also pointed out 42% of reverse merged firms were delisted within 3 years compared with 27% of matched IPOs. Clearly, Even the cost of RTO is cheap, but the bad type will not be able to afford the cost in the long run. Moreover, the long-term performance of RTO after the merger is obviously opposite from the result in the short run. Floros and Shastri (2011) studied shell companies and found that even there are positive returns from RTO announcements, but a negative return in the long-term performance can offset the gain in the short term. The result consists of Gleason et al. (2005) that RTOs have higher short-term stock returns and riskier as compared with samples of IPOs and fail to generate long-term wealth to the shareholder. They also studied post-merger accounting performance and find that there is a little improvement in operational and profitability measures in the subsequent 2 years.

2.5 Ownership control and Agency Cost

The model of agency cost was introduced by Jensen and Meckling (1976). In the corporate, there is no alignment between shareholder's interest and manager's interest. When the agency cost is high, the managers have a large incentive to do for their personal benefit rather

than increasing shareholder's wealth. Managers will attempt to consume their benefit through the cost of the firm. As the result, the operating performance of the firm may decline.

The academic research of reverse takeover, especially operation performance, is not widely explored as IPO. In a private company, before going public via IPO, the management is mainly the same person as the shareholder. After taking a firm public, there is a dilution effect of the original owner. The alignment of interest between shareholders and managers is not the same as before. The more dilution in original entrepreneurs and management leads to the increase in agency cost. Therefore, Jain and Kini (1994) find that IPO firm in the U. S market has the positive linear relationship between ownership and the change in firm performance. The result also supports the alignment hypothesis of Jensen and Meckling (1976). However, Kim A. et al. (2002) study Thai IPO firms and find a different form of the relationship. They find a non-linear relationship between shares retained of original owners after IPO and change in performance. They show that only the "low" and "high" level of managerial ownership has a positive relationship. While the "intermediate" level of managerial ownership faces a negative relationship to change in performance. Even the pattern of correlation is different, but most of the literature suggests that there is a relationship between ownership and firm performance.

2.6 Merger and Premium

In the RTO transaction, there are premium costs on the target firm. Brown Philip and et al. (2010) study reverse takeovers on ASX and they find evidence that the shareholders of the shell company receive a significant gain from the RTO transaction. Pavabutr (2020) also calculated the premium that private firms paid to the public firm for separation firm characteristics. The author suggests a way to calculate the premium of the target firm by finding the percentage difference between the pre-consolidation issue price and the 3-month pre-announcement VMAP. The results show the premium of target firms in Singapore and Thailand are 34.2% and 12.9% respectively.

In plain M&A, there are well-known that a merger firm might suffer from overpaying the premium to the target firm which led to the Winner's curse. The cause of over-pay premium can mainly be originated from 2 reasons. The first reason is the overestimation of synergy gain. One of the main purposes of the merger is to gain synergy. Roll (1986) indicated that the bidder's firm tends to overestimate the synergy gain and paid a large premium to the target's firm. Consequently, the gain from synergy would be decreased by the overpaid premium. Another reason is the agency cost. Gristein & Hribar (2004) explain that the pain from premium has originated from the agency cost (the manager's personal objective). They find that bidder's manager tries to make the deal larger to gain personal benefits such as bonuses and reputation. However, RTO is different. The reverse takeover deal was started by the private company

which aims to list in the market by takeover the pubic company. In a private company, the management of a private firm is basically the same person as major shareholders. Thus, the RTO deal should be driven for the shareholder,s benefit. Moreover, there is no synergy gain in the shell company or defunct company because of no real operation. The premium that arises come from the cost of listing status embedded in the public firm (Brown et al, 2010).

From the evidence of researchers, it could be concluded that most of the firm using RTO is a poor performance firm. A firm that cannot achieve the IPO cost will choose RTO as an alternative method in which they can conceal some bad information and avoid the cost of listing. Consequently, RTO firm is a firm with severe information asymmetry. It is unlikely that investors in the market can separate between a good RTO firm and a bad RTO firm. Half of RTO firms cannot survive in the market after the merger. However, there are still have a good performance RTO firm among the fail RTO firm. The gap of existing academic studies still lacks the evidence to answer this ambiguity. Hence, we will propose the hypothesis to fill this gap in the next chapter.

3. Hypothesis Development

To complete the transaction of RTO, the shareholders of a private firm must decide how many shares they would like to obtain from the public company. Since shares are the residual claim, the shareholders will bear the risk related to the number of shares that they owned. Also,

shares are the commitment of the shareholders that will take responsibility for the firm. Hence, the private firm that aims to obtain large amounts of shares from a public company should send the confidence signal to the market that they will intensively monitor the firm carefully with their best intention to protect their benefit.

Also, An IPO academic study suggests that level of ownership has a relationship with a change in operating performance - e.g. Jain and Kini (1994) and Kim et. al. (2002). The researchers explain that the high original ownership will decrease the agency cost because shareholders and manager might be the same person. Firms with low agency cost will cause an improvement in operating performance. However, there is an argument that if the manager is not the same person as the shareholder, there might provide an opportunity for the manager to create the agency cost. Managers do not need to bear the risk of bad investment so they can consume the personal benefit during being employed. In this case, we believe that the high portion of ownership still good for the operating performance because it provides an incentive to the shareholder to monitor the manager carefully. Thus, the level of ownership structure should relate to the operating performance of the firm.

H1: The proportion of ownership that a private firm obtained from a public company in an RTO transaction has a positive relationship with the operating performance of the remaining firm post-RTO.

Apart from the percentage ownership that the private firm obtains from the public company, we purpose that the premium that the

private firm paid to the public firm should play a role in predict the operating performance. In RTO transactions, there are arising of "Premium" (see Brown Philip and et al, 2010 and Pavabutr, 2020). The premium varies depending on each deal. Private firms prefer to pay a premium as long as they expect that the future benefit after going public is more than the premium cost. The premium in the reverse merger is different from the premium in the normal M&A. In normal M&A, the premium was viewed as the cause of the winner's curse. There are two main reasons why the premium is bad in normal M&A.

First, the bidder's firm willing to pay the premium because of expected synergy gain in the future. Bidder's hope that there is a synergy gain after the merger and they still have a gap of gain to pay the premium for making the deal complete. Nonetheless, the bidder often tends to overestimate the synergy gain which makes them suffering from over-pay premium (Roll,1986). Second, agency cost is also considered as the cause of the winner's curse. Gristein & Hribar (2004) explain that the pain from premium has originated from the manager's objective. They found that the bidder's manager tried to make the deal larger to gain personal benefits such as bonuses and reputation.

However, we argue that the problem in normal M&A should not be exiting in the reverse takeover. First, there is no synergy gain in RTO transactions in both shell companies and defunct companies. In most cases, these types of companies are not involved in the real business (Arellano-Osta and Bruso, 2002). They run the operation only to preserve

their listing status. On the other hand, the private firm paid the premium to the public firm (target company) only for acquiring the listing status embedded in the target firm (Brown et al, 2010). Thus, the private firm should not suffer from overpaid premium for the synergy gain to the public firm in RTO transactions. Secondly, the RTO deal was driven by the shareholder decisions to aim the listing status. The private firm was owned by a few shareholders. It means that the owner has significant control over the firm. In this case, the manager is the same person as the owner. Consequently, the same interest might decrease the premium suffering from agency cost. Shareholders will try their best to make the deal worthy because the money that is paid comes from their pocket. In summary, we believe that the premium that a private firm paid to a public firm is not a villain in a reverse takeover.

Next, we suggest that the premium could reflect the confidence level of the private firm using RTO. Since Reverse takeover is costly. Firms must pay costs such as merger advisory, due diligence cost, and including premium cost. To make firms willing to pay a premium, the expected future benefit needs to exceed the RTO cost. With the suggestion of Arellano-Osta and Bruso (2002), the RTO firm is an unconfident firm. The private firm that willing to pay the higher premium should be more confident about the exceed benefit that they will gain after RTO than the private firm that willing to pay a lower premium. More confidence should lead to more probability to invest in the potential

project and monitor the project carefully to make sure that the project can generate revenue to the merged firm in the future as they expected.

If a firm is more confident about future prospects, but why does the firm choose RTO instead of IPO? Adijei et al. (2008) find that most private firms that participate in RTO mechanisms are small firms and younger firms. The more restrictive and longer process of IPO (Gleason et al,2005) led to these small and younger firms cannot afford the cost of going public via IPO. They tend to choose RTO as a tool for going public.

Apart from that, reverse takeover should be viewed as an investment activity of private firm shareholders because they need to invest in the shell or defunct company and upgrade their firm status. Consequently, Bidders should require a return to compensate according to the amount of investment that invests in RTO. In summary, the high premium that private firm paid should be the signal that the bidder has the motivation to invest in a potential project and manage the firm with their best afford to receive the return that they expected before the transaction occurred and survive in the market after the merger.

H2: The price premium paid by a private firm for common stocks of a public company in an RTO transaction has a positive relationship with the operating performance of the remaining firm post-RTO.

4. Methodology
4.1 Measures of operating performance
In academic study, the main measurements of firm performance are stock return and operating performance. Regarding Gleason and et al.

(2005), they find that RTO stocks tend to be speculative. The majority shareholders have an incentive to manipulate stock prices. To avoid this problem, we decide to measure firm performance in terms of operating performance. Also, operating performance is useful to calculate the value of the firm for the medium-term and long-term investor. Moreover, operating performance can reflect the sustainable performance of firm. Since this is the first paper to test the relationship on operating performance in reverse takeover firms (to our best knowledge). We choose Kim et al. (ownership and operating performance in an emerging market, 2002) as an example of how to measure operating performance because a lot of researchers cite this paper. Also, they provide clear explanations for each variable. Then we adapt the concept they measure, the operating performance of an IPO, into the operating performance of RTO. Kim A. et al. (2002) suggest that there are two ways to measure operating performance: Operating return on Total Asset (EBIT/TA) and Operating cash flow divide by the total asset (CF/TA). Operating returns on assets is useful to reflect the efficiency of asset utilization. Operating cash flow is also a primary component in NPV which is used to calculate the value of a firm.

For the testing period, we use the same testing period as Gleason et al. (2005) used in their reverse takeover research. They studied the accounting performance of the merged firm for 1 and 2 years after the transaction. Lee et al. (2014) also studied Chinese reverse merger firm performance by beginning with the year that RM's first 10-K filling.

Hence, we decided to use 0-2 years as a testing period to capture the change in operating Performance. The testing period of operating performance is the change from year 0 (T=0, RTO year) to year 1 (T=1),2 (T=2)

4.2 Measures of premium and ownership

Many researchers measure the premium in the various way with different length time (see; Pavabutr, 2020, Moeller et.al, 2004, Officer ,2003, and Antoniou et.al,2008). However, the premium in the RTO transaction is not specified in the term sheet of the deal. Furthermore, SDC Thomson does not provide any premium data that non-listed firm need to pay to listed firm for using RTO.

In this paper, we apply the concept of measuring the premium from Pavabutr (2020) The researcher calculated the premium of RTO transactions in the Singapore and Thailand market with the concept of the difference between stock price. We believe that this measuring concept is in line with the RTO concept. In RTO, the non-listed firm needs to bids for the listed firm by offering cash and/or their stock for the stock of the listed firm to start the RTO transaction (Gleason et al, 2005). Hence, the difference between stock price before and after the deal announcement should fairly reflect the premium that the non-listed firm must pay. Then, we determine the premium paid by a private firm for common stocks of a public firm by using the difference between the Announcement price and the average 3-month preannouncement price of the target company (listed

firm) divined by the average 3-month preannouncement price of the target company (listed firm).

$$Premium_i = \frac{Announcement\ Price_i - Avg.\ 3\ months\ pre\ announcement_i}{Avg.\ 3\ months\ pre\ announcement_i}$$
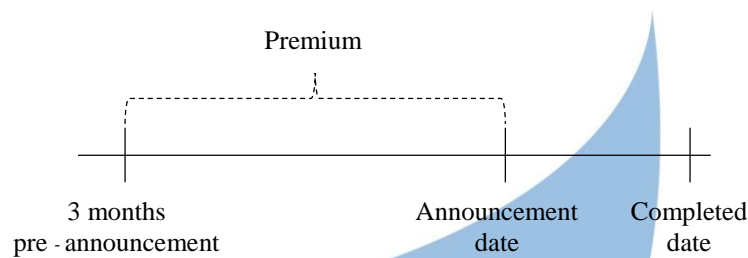
We use the price difference relative to the average 3 months before the announcement because it captures the minimum period that the RTO deal has not started. In most RTO cases, the process of transaction takes between 1and 3 months (Gleason et al, 2005). Hence, using the period less than 3 months before the announcement might capture the stock price that the market already reflected the RTO information. We consider using the average price rather than the price at a point in time because we want to avoid the effect of good or bad news on the specific date.

For the proportion of ownership that a private firm obtains from a public company in an RTO transaction, we obtain the data from SDC Thomson. We measure based on the information when the deal is completed and assumes no change in shares of a new shareholder (private company) during the testing period following the concept of Jain and Kini (1994).

4.3 Empirical Model

With our hypothesis, we suggest that the relationship between premium and RTO's operating performance should be the linear relationship. The firms with higher premiums should have an incentive to manage the firm closely and have well-perform compared to firms with a lower premium. Hence, we will use the regression in linear form. We also propose that the relationship between the percentage of ownership and post-RTO operating performance should be the linear relationship. Because private firms with a large fraction of share should motivate shareholders to monitor firms carefully for increasing their wealth because they take the larger responsibility. Also, significant ownership can align incentives between manager and shareholder. The less severe agency cost leads to improvements in operating performance.

Since the measuring model of change in operating information is not vast as in IPO academic study, we decide to use the control variables following the suggestion of Kim A. et al. (2002). We assume that the result from the IPO firm might still hold in the RTO firm. Our controlling variables are Firm Size, Capital Expenditure, Sales Growth, and Debt. Although there is Firm Age variable in Kim et al (2002) model, we decide to cut off because of the limitation of private firm's information.

Firm Size was calculated by taking natural log of the total asset for the year proceeding the RTO. In IPO literature, Mikkelson et al (1997) provide evidence that firm size at IPO year has a positive relationship with firm performance. Large firms tend to have a better performance after going public compared to small firms. The result is in line with the

study of Lee (2009). The researcher measures the firm size as log of the total asset and finds that firm size plays an important role to explain the profitability of firms. We expect that the Firm Size variable might have a positive relationship with EBIT/TA and CFO/TA

Capex is the percentage change in capital expenditure divided by total assets from year T=1 relative to T =0 and year T=2 relative to T=0. Capex is widely used as a control variable in IPO literature. Capex is used to capture any change in the asset. The firm which has increased in the asset should have more ability to generate a revenue stream. Hence, we consider capital expenditure as a control variable. We expect that the Capex variable might have a positive relationship with EBIT/TA and CFO/TA

Sales Growth variable is defined as the percentage change in total revenue from year T=1 relative to T =0 and year T=2 relative to T=0. Sales growth was widely used as a control variable in measuring operating performance (e.g. Kim et al, 2002 and Faitouri, 2014). The change in sales should affect directly EBIT and CFO. If a firm has an effective operation (the total cost is less than the total revenue), the increase in sales should lead to a higher profit margin. In contrast, if a firm has an ineffective operation (the total cost is more than the total revenue), the increase in sales should lead to a higher loss. We expect that the merged firm might have a positive linear relationship with the operating performance. The reason is that the new shareholder should

manage the firm with their best to prevent the loss in equity which will decrease their wealth in the company.

Debt variable is calculated by the percentage change in Debt to Total Asset from year T=1 relative to T =0 and year T=2 relative to T=0. The increase in debt can reduce the agency problem in the firm following the free cash flow theory by Jansen (1986). In the firm operation, there is a free cash flow problem that manager use to consume their personal benefit. The increase in debt will create the interest burden for the firm which lead to manager has less ability to consume their personal benefit. Moreover, it forces the manager indirectly to manage the firm carefully. We expect that the increase in debt might result in a positive relationship with EBIT/TA and CFO/TA

Regression equation

$$Change\ in\ Performance_i = \alpha + \beta_1 Premium_i + \beta_2 Ownership_i + \beta_3 Firm\ Size_i$$
$$+\beta_4 Sales\ Growth_i + \beta_5 Capex_i + \beta_6 Debt_i + \varepsilon_i$$

4.4 Expected Result

Table 1: Expected result relative to dependent variable

Variable	Definition	Expected outcome to EBIT/TA	Expected outcome to CFO/TA
Premium	The percentage difference between the announcement price and avg. 3-month pre announcement price	Positive correlation	Positive correlation
Ownership	The proportion of ownership that a private firm obtained from a public company in an RTO transaction	Positive correlation	Positive correlation
Firm size	Log of total asset in the end of merged year	Positive correlation	Positive correlation
Capex	Percentage change in capital investment to total asset relative to the merged year (T=0)	Positive correlation	Positive correlation
Sales Growth	Percentage change in total revenue relative to merged year (T=0)	Positive correlation	Positive correlation
Debt	Percentage change in debt to total asset relative to merged year (T=0)	Positive correlation	Positive correlation

5. Sample Data and Descriptive Statistics

5.1 Sample Data

Step	Process	Remained Sample (Deals)
1	Searching RTO deals in U.S. market during 2007-2018 from SDC Thomson.	506
2	Screening for the company that has an available information about the proportion of ownership structure.	287
3	Exclude the deal that is not trading in NYSE, NASDAQ and AMEX.	97
4	Searching in on the web search and exclude deal that is not precisely reverse takeover. Searching the available deal information and accounting performance in US-SEC (10K)	59

Table 2: Screening Process

In this study, we use the sample of the merged firm using RTO that are listed in the U.S. stock market especially in NYSE, NASDAQ, and AMEX between 2007 – 2018. We exclude the firm traded on the OTC market. The reason is that we need to concern about the accessibility of the completed and reliable information. The market monitoring in the OTC market is less stringent and disclose less information compare to in NYSE, NASDAQ, and AMEX market (Chen et al., 2016). The screening process of the RTO sample is illustrated in Table 2. We start by searching RTO deals in Security Data Company by Thomson Reuter. We find a total of 506 deals that completed the RTO transaction. In the format of the SDC database, the target means the company that needs to do a reverse takeover and the acquirer means the listed company that was reversed takeover. Then, we filter the deal that declared the percentage own

between acquirer and target after post-merger and we get a total of 287 deals. Next, we exclude the deal that is not trading in NYSE, NASDAQ, and AMEX. In this step, we get a total of 97 deals which indicate that most RTO deal was traded in the small market such as OTC and Pink sheet. However, the database of a reverse takeover in SDC also contains the deal between a public company and a public company. Thus, some deal is not precisely reverse takeover and we need to exclude it. To ensure that our sample is merged between non-listed and listed company, we also search the deal information in the web search. There are some deals that we cannot find any RTO deal information. Thus, we decide to cut-off those deals. After that, we gather accounting data after the merger by searching in the 10-K annual report of each firm and gather the stock price of the listed firm to calculate the premium from Data stream. There are some firms that we cannot find any information about the stock price for calculating the premium. Finally, we get the total of 59 firms using

RTO between 2007 - 2018 that have the completed information. The summary of the RTO sample in each year is shown in figure 1.

Figure 1: Historical number of test sample using RTO during 2007-2018

For measuring the change in operating performance, we measure the change of accounting performance relative to the data in the annual report of year 0 or the end of the merged year. The comparison with the end of the year by using the annual report has both the strong point and weak point. For the strong point, using the data from the company's annual report has more accurate and reliable compared to re-calculating data by using a quarterly report. Because this data was reviewed by the audit. Furthermore, if the firm changes their accounting policy, the firm will be required to recalculate their accounting data and need to report the adjusted data in the annual report. However, the comparison with this
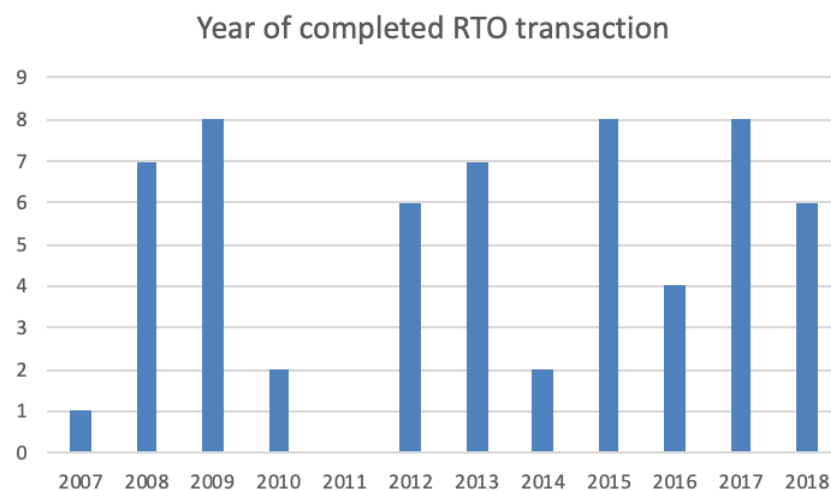
method might capture the effect of change in performance when the deal was completed in the first period of the year which might lead to the weak point in our report. Thus, we decide to compare the month that the

RTO deal was completed in our sample and reported in figure 2. In figure 2, it shows that most of RTO deal in our sample were completed in the second half of the year. When we trade-off with the benefit of the annual report, the effect of the change in performance of the first period of the year in our sample might be less. As a result, we pay more attention to the reliability and accuracy of accounting data by using the data from the annual report than re-calculating the accounting data by using the quarterly report.
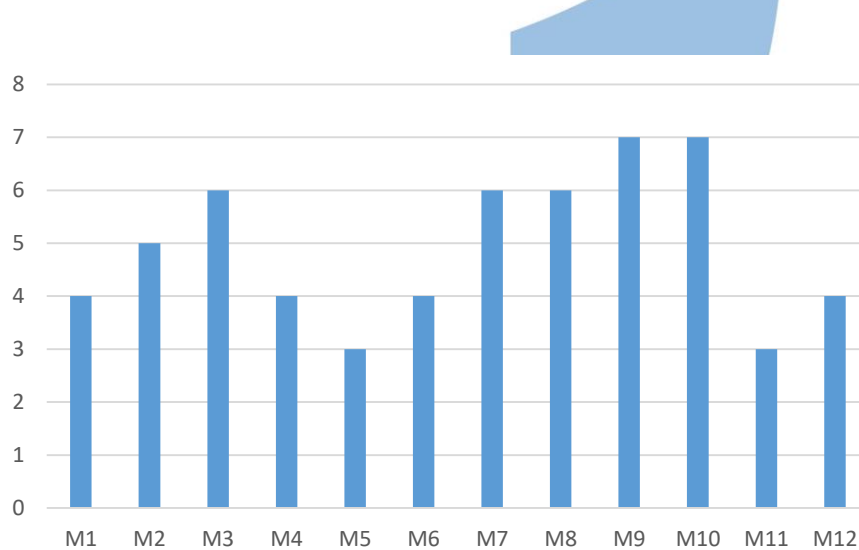
Figure 2: Month that the deal was completed

Literature	Source of data	Market	Year Start	Year End	Sample Size
Adjei et al. (2008)	SDC	All US Stock Market	1990	2002	286
Gleason et al. (2005)	SDC	AMEX, NYSE, NASDAQ	1987	2001	121
In this study	SDC	AMEX, NYSE, NASDAQ	2007	2018	59
Arellano-Ostoa and Brusco (2002)	SDC	OTC, AMEX, NYSE, NASDAQ	1990	2000	52

Table 3: Sample Size Comparison

With the limitation of information in RTO, we concern that our sample size might too small. Thus, we compare our sample size with other RTO literature studied in the U.S. market to find the benchmark. The comparison is shown in table 3. We find that the paper of Arellano-Osta and Bruso (2002), which is the famous literature in the RTO field, also faces the problem of the limitation data in RTO. Nevertheless, our sample size is more than the paper Arellano-Osta and Bruso (2002). Apart from that, Green (1991) also suggests the rule of thumb that the sample size for regression should be not less than 50+8(p) where p is the number of predictors. In our equation, there is 1 predictor per regression (ownership regression and premium regression), therefore a minimum sample size for this test should be 58 samples. Our sample size has 59 samples. Reaching the minimum suggestion of sample size together with comparing with other literature, our sample size for this test should be sufficient.

However, during 2007-2008, the U.S. stock market face with a financial crisis that might generate a different result. We are concerned about the result and check the result by run a regression with the sample that excludes data 2007-2008 (Appendix A and B), but the result is similar to the reported results with the sample in 2007-2018. Hence, we include the data in 2007-2008 to our sample data for a larger sample size. After that, we calculate the percentage change of each testing variable by using the absolute method for the denominator following the method using in the wall street journal.

5.2 Descriptive Statistics

Period T(0,1) (One year after merger)						
Variable	Obs	Mean	Median	Std. Dev.	Min	Max
Change in EBTI/TA	59	-3.033	0.133	19.707	-145.796	25.369
Change in CFO/TA	59	2.776	0.311	19.404	-31.384	141.797
Firm Size	59	19.926	19.606	2.804	13.861	25.183
Capex	59	2.103	0.005	13.173	-0.975	101.153
Sales Growth	59	0.470	0.220	1.369	-1.000	10.000
Debt	59	0.525	0.032	1.487	-0.769	7.762

Table 4: Descriptive Statistics of Period (0,1)

Table 4 shows the change in the variable from year 0 (merged year) to year 1. During the first year after the reverse takeover, the median change in operating performance of both EBIT/TA and CFO/TA is positive. It indicates that on average RTO firm has an improvement in operating performance. The median change in CFO/TA is 31.1%, meanwhile, the median of change in EBIT/TA is 13.3%. The range of a change in EBIT/TA is from -14,580% to 2,537%. The huge change in operating performance in some firm indicates that RTO firm is not a mature firm which relates to the study of Adjei et al (2008) that most of RTO firm is a small firm. The Capex variable has a little increase after the merger. The median of change in the Capex variable is 0.5% from the merged year. During the first year, the data also show that RTO has improved in Sales Growth. The median of sales growth is 22%. Lastly, the median of change in debt to total asset is 3.2%. It indicated that on average, RTO firms have generated more debt in the first year compared to the merged year.

Period T(0,2) (Two year after merger)						
Variable	**Obs**	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**
Change in EBTI/TA	59	0.212	0.456	5.501	-21.190	26.193
Change in CFO/TA	59	5.426	0.298	33.917	-10.468	255.521
Firm Size	59	19.926	19.606	2.804	13.861	25.183
Capex	59	0.618	0.068	2.756	-1.000	19.059
Sales Growth	59	0.744	0.395	1.960	-1.000	13.250
Debt	59	0.973	0.027	4.082	-1.000	29.196

Table 5: Descriptive Statistics of Period (0,2)

Table 5 shows the change in the variable from year 0 (merged year) to year 2. We find that firm also has an improvement compared to the merged year, on average, in terms of both EBIT/TA and CFO/TA. The result consists with Gleason et al. (2005) that observe a little improvement in profitability of post RTO in subsequent 2 years. Compared to table 4, we see that the RTO firm has better performance, on average, in terms of EBIT/TA in year 2 than in year 1. The median of change in EBIT/TA in T(0,2) is 45.6% compared to 13.3% of the median of change in EBIT/TA in T(0,1). However, we observe that the RTO firm has a little decrease in CFO/TA in 2 years compared to 1 year after the merger. The median of change in CFO/TA in T(0,2) is 29.8% compared to 31.1% of the median of change in CFO/TA in T(0,1). Firm has increased its Capex in year 2 compared to year 1 after the merger. The median of Capex in T(0,2) is 6.8%, while the median of Capex in T(0,1) is 0.05%. It indicates that firm has increased their investment in the second year after the merger. The minimum value of change in Capex is -100%. It means that some firm has cut down their Capex to 0. The median of Sales growth is 39.5%. The

minimum value of Sales Growth is -100%. It implies that some firms cannot generate revenue in the second year. The median of the Debt variable is 2.7%. Because some firms cannot survive in the second year, we determine the total asset and debt of that firm equal to 0. Consequently, we see the minimum value of the Debt variable is -100%

6. Empirical Result and Discussion

6.1 Correlation coefficient

Variable	Change in EBIT/TA	Ownership	Premium	Firm Size	Capex	Sales Growth	Debt
Change in EBIT/TA	1						
Ownership	-0.034	1					
Premium	-0.0361	0.6267	1				
Firm Size	-0.0441	-0.3883	-0.1705	1			
Capex	-0.0196	0.2424	0.2147	-0.0793	1		
Sales Growth	-0.0238	0.0651	0.0952	0.0372	0.0063	1	
Debt	-0.3434	0.0896	-0.2227	-0.3095	-0.0071	-0.0338	1

Table 6: correlation coefficients for EBIT/TA in T(0,1)

Variable	Change in CFO/TA	Ownership	Premium	Firm Size	Capex	Sales Growth	Debt
Change in CFO/TA	1						
Ownership	-0.0276	1					
Premium	0.0064	0.6267	1				
Firm Size	0.1122	-0.3883	-0.1705	1			
Capex	0.0163	0.2424	0.2147	-0.0793	1		
Sales Growth	0.0013	0.0651	0.0952	0.0372	0.0063	1	
Debt	0.3512	0.0896	-0.2227	-0.3095	-0.0071	-0.0338	1

Table 7: correlation coefficients for CFO/TA in T(0,1)

The correlation coefficient of each pair variable for change in CFO/TA and change in EBIT/TA 1 year after the reverse takeover was reported in table 6 and table 7. The table 6 and 7 show that premium and ownership variable seems to move in the same direction. We observe the negative correlation coefficient between change in EBIT/TA and ownership variable. The direction of the paired variable between EBIT/TA and premium is also the same as the direction of the paired variable between EBIT/TA and ownership. However, for change in CFO/TA, we observe the opposite direction when compare with

ownership and premium. For premium, we observe the positive correlation coefficient with the change in CFO/TA. Meanwhile, we observe the negative correlation coefficient between change in CFO/TA and ownership. However, with all pair variables, we do not observe the correlation above absolute 0.8. It indicates that we might less likely to face multicollinearity.

Variable	Change in EBIT/TA	Ownership	Premium	Firm Size	Capex	Sales Growth	Debt
Change in EBIT/TA	1						
Ownership	-0.099	1					
Premium	-0.0434	0.6267	1				
Firm Size	0.0859	-0.3883	-0.1705	1			
Capex	-0.0756	0.2308	0.235	0.0067	1		
Sales Growth	-0.3832	0.0719	0.1423	-0.0174	0.24	1	
Debt	0.0159	0.1215	-0.3445	-0.3152	-0.0762	-0.0804	1

Table 8: correlation coefficients for EBIT/TA in T(0,2)

Variable	Change in CFO/TA	Ownership	Premium	Firm Size	Capex	Sales Growth	Debt
Change in CFO/TA	1						
Ownership	-0.0176	1					
Premium	0.0125	0.6267	1				
Firm Size	0.102	-0.3883	-0.1705	1			
Capex	-0.0741	0.2308	0.235	0.0067	1		
Sales Growth	-0.0197	0.0719	0.1423	-0.0174	0.24	1	
Debt	0.147	0.1215	-0.3445	-0.3152	-0.0762	-0.0804	1

Table 9: correlation coefficients for CFO/TA in T(0,1)

Table 8 and 9 report the paired variable for 2 years after the reverse merger. We find that the direction of correlation coefficient of both pair variable of change in EBIT/TA and ownership and pair variable of change in EBIT/TA and premium is the same, a negative relationship. For the

change in CFO/TA, we observe the negative correlation coefficient when paired with the ownership variable. While we observe the positive correlation of pair variable between premium and change in CFO/TA. For all pair variables, we do not observe a correlation above absolute 0.8. It indicates that we might less likely to face multicollinearity.

6.2 Multicollinearity

To detect multicollinearity, we check by calculating the variance inflation factor (VIF). VIF show how much the variance of the coefficient estimate is being inflated by multicollinearity. If the value of VIF exceeds 10, it might be concluded that we face the multicollinearity problem.

$A.\ Change\ in\ Performance_i$
$$= \alpha + \beta_1 Ownership_i + \beta_2 Firm\ Size_i + \beta_3 Sales\ Growth_i + \beta_4 Capex_i + \beta_5 Debt_i + \varepsilon_i$$

Variable	VIF	1/VIF
Firm Size	1.3	0.77
Ownership	1.25	0.80
Debt	1.11	0.90
Capex	1.06	0.94
Sales Growth	1.01	0.99
Mean VIF	1.15	

Table 10: Variance inflation factor (VIF) for equation A in T(0,1)

Variable	VIF	1/VIF
Firm Size	1.3	0.77
Ownership	1.26	0.79
Capex	1.13	0.88
Debt	1.12	0.89
Sales Growth	1.07	0.94
Mean VIF	1.18	

Table 11: Variance inflation factor (VIF) for equation A in T(0,2)

For equation A which use for finding the relationship between change in operating performance and ownership variable, we calculate the value of VIF and report the result in table 10 and 11. We find that the value of VIF of both 1 year and 2 years after reverse merger is lower than 10. It can be concluded that we don't have multicollinearity in equation A.

$$B.\ Change\ in\ Performance_i$$
$$= \alpha + \beta_1 Premium_i + \beta_2 Firm\ Size_i + \beta_3 Sales\ Growth_i + \beta_4 Capex_i + \beta_5 Debt_i + \varepsilon_i$$

Variable	VIF	1/VIF
Debt	1.26	0.79
Premium	1.14	0.87
Firm Size	1.14	0.88
Capex	1.01	0.99
Sales Growth	1	1.00
Mean VIF	1.11	

Table 12: Variance inflation factor (VIF) for equation B in T(0,1)

Variable	VIF	1/VIF
Debt	1.15	0.87
Firm Size	1.12	0.89
Sales Growth	1.07	0.93
Capex	1.07	0.94
Premium	1.03	0.97
Mean VIF	1.09	

Table 13: Variance inflation factor (VIF) for equation B in T(0,2)

Table 12 and 13 report the value of VIF in equation B for both 1 year and 2 years after the reverse merger. The equation B is the equation that was used for finding the relationship between premium and change in operating performance which relates to our second hypothesis. The result for both periods suggests that none of the variable that has the VIF exceed than 10. This mean that we don't have multicollinearity in

equation B at the variable in both year 1 and 2 years after the reverse merger.

6.3 Heteroskedasticity

For heteroskedasticity, it refers to the situation that the variance of the error term is not constant. The consequences of heteroskedasticity will lead to the bias in standard error which causes the significant test to be biased. To detect the heteroskedasticity, we apply the Breusch - Pagan test. The null hypothesis is that the error variances are all equal which means homoscedasticity is present. If the p-value is less than 0.05, the null hypothesis was rejected. As a result, we might face the heteroskedasticity.

$A. Change\ in\ Performance_i$
$$= \alpha + \beta_1 Ownership_i + \beta_2 Firm\ Size_i + \beta_3 Sales\ Growth_i + \beta_4 Capex_i + \beta_5 Debt_i + \varepsilon_i$$

Change in performance	Change in EBIT/TA	Change in CFO/TA
1 year after merger		
F-statistic	3.77*	3.17*
P-value	0.0054	0.0142
2 year after merger		
F-statistic	0.65	0.68
P-value	0.6608	0.6391

* $p < 0.05$

Table 14: Breusch-Pagan test for equation A

Table 14 reports the results of the Breusch-Pagan test for heteroskedasticity of equation A for 1 year and 2 years after the merger. The result shows that in the case of 1 year after the reverse merger, we reject the null hypothesis that we have homoscedasticity for equation A.

$$B. Change\ in\ Performance_i$$
$$= \alpha + \beta_1 Premium_i + \beta_2 Firm\ Size_i + \beta_3 Sales\ Growth_i + \beta_4 Capex_i + \beta_5 Debt_i + \varepsilon_i$$

Change in performance	Change in EBIT/TA	Change in CFO/TA
1 year after merger		
F-statistic	4.31*	3.64*
P-value	0.0023	0.0066
2 year after merger		
F-statistic	0.38	0.88
P-value	0.8608	0.5010

*$p < 0.05$

Table 15: Breusch-Pagan test for equation B

The Breusch-Pagan test for heteroskedasticity of equation B for 1 year and 2 years after the reverse merger was reported in table 15. The result shows that we face the heteroskedasticity for 1 year after the merger.

To deal with heteroskedasticity, we use Robust standard error (White's robust standard error) by using the command "robust" after regression command in STATA. With this method, Stata will adjust the standard error to robust standard error automatically. Hence, if heteroskedasticity is present, the result should be reliable.

6.4 Premium and Ownership

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
Ownership	59	0.677	0.675	0.156	0.341	0.983
Premium	59	0.149	0.020	0.695	-0.336	5.113

Table 16: Descriptive Statistics of Ownership and Premium

Following the descriptive statistic in Table 16, it shows that the median proportion of ownership that a private firm obtained from a public company in an RTO transaction is 67.5%. The maximum value of the ownership variable is 98.3 %, while the minimum is 34.1%. It could be concluded that on average, non-listed firm obtained shares from the listed firm in the high proportion.

For the premium variable, we calculated by taking the difference between the stock price of the target firm at the announcement date and the average stock price of the target firm 3-month pre-announcement date compared to the average stock price 3-month pre-announcement date of the target firm. The statistic shows that the median of the premium variable is 2%. It means that the RTO deal was traded on the premium on average. The minimum value of the premium variable is -51.0%. It indicates that the RTO deal was traded on both premium and discount price

6.5 Mann-Whitney U test

	1 Year after merger			
Variable	Chang in EBIT/TA		Change in CFO/TA	
	Ownership >= 60%	Ownership < 60%	Ownership >= 60%	Ownership < 60%
N	38	21	38	21
Median	0.1947237	-0.3409398	0.3772186	-0.0712785
z-statistic	-0.475		-0.063	
P-value	0.6348		0.9495	
	2 Year after merger			
Variable	Change in EBIT/TA		Change in CFO/TA	
	Ownership >= 60%	Ownership < 60%	Ownership >= 60%	Ownership < 60%
N	38	21	38	21
Median	0.4276001	0.5962252	0.2603918	0.3714233
z-statistic	0.04		1.156	
P-value	0.9684		0.2478	

Table 17: MWU test for ownership variable in 1 year and 2 years after RTO

Since our first hypothesis is to find whether the different level of ownership proportion plays a role to imply the change in operating performance or not, we decide to conduct the Mann-Whitey U test, one kind of the non-parametric test, to find the difference of the median of change in operating performance between 2 groups of ownership proportion. The first group is the RTO transaction where a private firm obtained the shares from the public firm are greater than or equal to 60%. While the second group is the RTO transaction where the private firm obtained the shares from the public firm is less than 60%. We use the 60% ownership as a separation between the high and low proportion of ownership because it relates to the median of ownership in our sample. If the proportion of ownership that private firm obtains from public firm play the role to imply the change in operating performance, we expect to

see the difference between low ownership proportion and high ownership proportion.

The report of MWU test for ownership variable in 1 year and 2 years after RTO was shown in table 17. For 1 year after RTO, the result suggests that we cannot reject the null hypothesis because the p-value of both EBIT/TA and CFO/TA is more than 0.05. We cannot find the significant difference between the 2 groups in both EBIT/TA and CFO/TA terms. For 2 years after RTO, the result also the same as 1 year after RTO for both EBIT/TA and CFO/TA. In short, we cannot find the significant difference between the 2 groups of ownership level.

	1 Year after merger			
Variable	Change in EBIT/TA		Change in CFO/TA	
	Trade on Premium	Trade on Discount	Trade on Premium	Trade on Discount
N	42	17	42	17
Median	0.1295329	0.1331269	0.2077612	0.3114155
z-statistic	0.05		0.05	
P-value	0.96		0.96	
	2 Year after merger			
Variable	Change in EBIT/TA		Change in CFO/TA	
	Trade on Premium	Trade on Discount	Trade on Premium	Trade on Discount
N	42	17	42	17
Median	0.6136333	0.0623106	0.1674408	0.4938547
z-statistic	-0.971		0.619	
P-value	0.3317		0.5357	

Table 18: MWU test for premium variable in 1 year and 2 years after RTO

For the second hypothesis, we suggest that the premium that private firm paid to public firm has a positive relationship with a change in operating performance. So, we separate the change in performance into 2 groups. The first group is determined as a group that RTO deal was

traded on premium price. The second group is determined as a group that RTO deal was traded on discount price. We expect that if premium plays a role to imply a change in operating performance, we should see the difference of performance between the two groups. However, the result in table 18 suggests that for both 1 year and 2 years after the reverse merger, we do not observe any significant difference of a change in operating performance between RTO deal that was traded on premium and RTO deal that was traded on discount.

However, with the Mann-Whitey U test, we might fail to capture the effect of the others control variable. Consequently, we cannot find a significant difference for both the ownership and premium hypotheses. Thus, we need to conduct another test method by controlling the effect of the control variable which we report in the next sector.
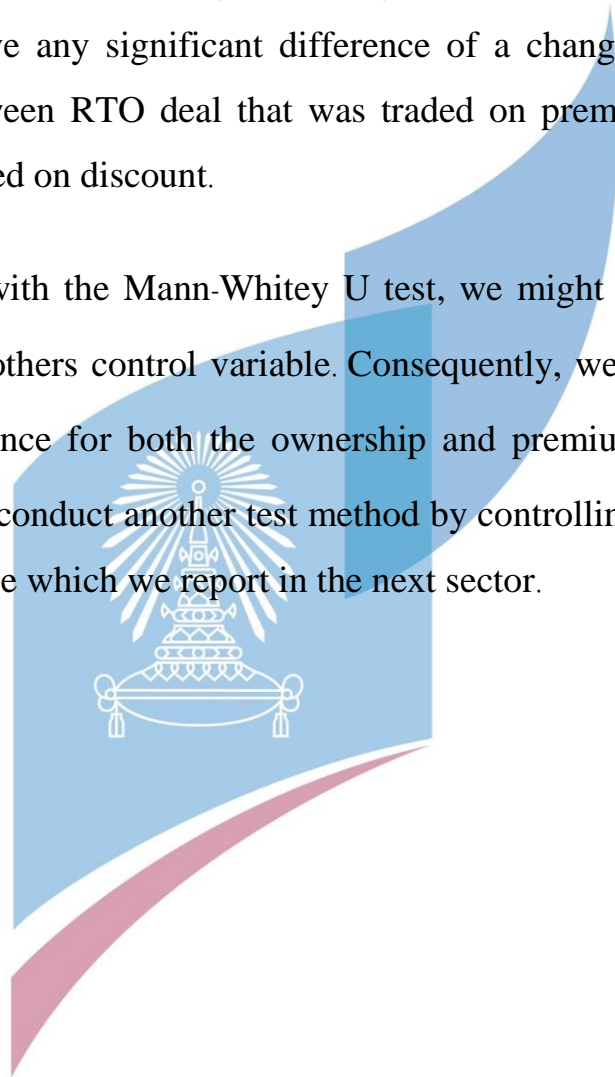
6.6 Ownership and Operating Performance

Variable	Model A		Model B	
	T(0,1)	T(0,2)	T(0,1)	T(0,2)
	Change in EBIT/TA	Change in EBIT/TA	Change in CFO/TA	Change in CFO/TA
Ownership	-8.450	-1.980	3.168	9.897
	(-0.68)	(-0.31)	(0.27)	(0.51)
Firm Size	-1.365	0.121	1.781	2.196
	(-0.97)	(0.38)	(1.30)	(1.11)
Capex	-0.0321	0.0602	0.0494	-0.914
	(-0.53)	(0.43)	(1.01)	(-0.88)
Sales Growth	-0.367	-1.079*	0.0621	0.236
	(-0.57)	(-2.17)	(0.11)	(0.21)
Debt	-5.282	0.0182	5.598	1.613
	(-0.99)	(0.11)	(1.11)	(0.79)
Cons	32.89	-0.102	-37.93	-46.21
	(0.95)	(-0.01)	(-1.11)	(-0.95)
N	59	59	59	59
R-Squared	0.1487	0.156	0.1794	0.0515

t statistics in parentheses

="* p<0.05   ** p<0.01   *** p<0.001"

Table 19: Regression result for the relationship between ownership and operating

performance

The result of the regression using the change in EBIT/TA and CFO/TA from year 0 (merged year) to 1 year and 2 years after the reverse takeover in equation A are reported in table 19. The dependent variable in model A is the percentage change in EBIT/TA, while in model B is the percentage change in CFO/TA. Both of model was considered as a linear relationship between change in operating performance and ownership that non-listed obtained from the listed company after the merger which relates to the first hypothesis.

The result shows that both model A and model B in every test period has a very low R-squared. The range R-square in model A and model B is 0.0515-0.1794. Moreover, the coefficient of ownership variable is not significant at any level. It means that we can not find the linear relationship between change in operating performance and the ownership portion of the new shareholder. Our suggested explanation is that non-listed firm, in the most sample of RTO firms, agrees to obtain a high portion of shares from the listed firm following the mean of ownership in our sample, 67.7%. Consequently, there are both bad and good firm performance with the same range of ownership. Thus, we fail to hypothesize that the proportion of ownership that a private firm obtained from a public company in an RTO transaction has a positive relationship with the operating performance of the remaining firm post-RTO. The ownership variable does not explain the operating performance of RTO firm after the merger. However, we see the 5% significant level in the Sales Growth variable of model A in T(0,2). The coefficient of the Sales Growth variable has a negative sign which opposite to our expectation. The negative coefficient means that the increase in sales causes suffering in EBIT/TA. Our suggested reason is that RTO firm has inefficiency to manage the cost of operation. The result of Sales Growth also consists with the suggestion of Arellano-Osta and Bruso (2002) that RTO firm is a low-quality firm. For other control variables, we do not find the evidence that those variables relate to the change in operating performance in RTO firm.

6.7 Premium and Operating performance

Variable	Model A		Model B	
	T(0,1)	T(0,2)	T(0,1)	T(0,2)
	Change in EBIT/TA	Change in EBIT/TA	Change in CFO/TA	Change in CFO/TA
Premium	-3.825	0.418	5.226	6.919
	(-0.89)	(0.77)	(1.20)	(0.86)
Firm Size	-1.419	0.189	2.033	2.412
	(-0.99)	(0.76)	(1.47)	(1.22)
Capex	-0.0326	0.0279	0.0291	-0.888
	(-0.57)	(0.29)	(0.61)	(-1.00)
Sales Growth	-0.378	-1.083*	0.00355	0.195
	(-0.65)	(-2.09)	(0.01)	(0.18)
Debt	-5.490	0.0247	5.904	1.752
	(-1.00)	(0.15)	(1.16)	(0.82)
Cons	28.94	-2.844	-41.68	-44.97
	(0.97)	(-0.57)	(-1.45)	(-1.20)
N	59	59	59	59
R-Squared	0.162	0.1561	0.2113	0.0687

t statistics in parentheses

="* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$"

Table 20: Regression result for the relationship between premium and operating performance before cut-off outlier

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
Premium	59	0.149	0.020	0.695	-0.336	5.113

Table 21: Descriptive Statistics of Premium before cut-off outlier

In table 20, regression results in equation B using EBIT/TA and CFO/TA from year 0 (merged year) to 1 year and 2 years after reverse takeover as the dependent variable are reported. In this regression, we replace the ownership variable with the premium variable which we suggest a linear relationship between change in operating performance and premium that a private company paid to a public company. Change in

EBIT/TA is a dependent variable in model A, meanwhile, Change in CFO/TA is a dependent variable in model B. The result in table 20 suggests that we do not find the significance in the premium variable for both model A and model B. However, we concern that our sample might capture the outlier which might cause the biased result. Table 21 provide the descriptive statistic of the premium variable. The result shows that the maximum value of the premium is 511% which is very high. Hence, we decide to cut-off the outlier and report the result in table 23.

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
Premium	58	0.063	0.020	0.226	-0.336	1.000

Table 22: Descriptive Statistics of Premium after cut-off outlier

Variable	Model A		Model B	
	T(0,1)	T(0,2)	T(0,1)	T(0,2)
	Change in EBIT/TA	Change in EBIT/TA	Change in CFO/TA	Change in CFO/TA
Premium	-29.66	3.721	36.84	66.68
	(-1.08)	(1.10)	(1.40)	(1.10)
Firm Size	-1.123	0.160	1.671	1.899
	(-0.94)	(0.69)	(1.44)	(1.06)
Capex	0.183	-0.0811	-0.234	-2.861
	(0.94)	(-0.56)	(-1.23)	(-1.15)
Sales Growth	0.605	-1.169*	-1.199	-1.345
	(0.53)	(-2.19)	(-1.05)	(-0.89)
Debt	-4.890	0.00347	5.170	1.368
	(-1.06)	(0.02)	(1.25)	(0.80)
Cons	23.21	-2.305	-34.66	-35.22
	(0.93)	(-0.49)	(-1.41)	(-0.99)
N	58	58	58	58
R-Squared	0.2293	0.1713	0.3158	0.2001

t statistics in parentheses
="* $p<0.05$ ** $p<0.01$ *** $p<0.001$"

Table 23: Regression result for the relationship between premium and operating performance after cut-off outlier

The descriptive of the statistic of premium after cut-off outlier is reported in table 22. The maximum value of the premium is 100%. For the result from testing after cut-off outlier, table 23, the coefficient of a premium variable is also not significant at any level for both model A and B which relate to the result before cut-off the outlier. The result suggests that we cannot find the evidence that the high or low premium can imply a change in operating performance. However, the result consists with one of our suggestions that premium in RTO is different from the premium in the normal merger. Because if premium in RTO is bad as premium in the normal merger (Gristein & Hribar ,2004 and Roll,1986), we should observe the significant negative relationship between premium coefficient and change in operating performance.

For the coefficient in the Sales Growth variable, we also find the negative coefficient with 5% significant level in model A 2 years after the reverse takeover. The negative coefficient in sales indicates that RTO firm has less ability to manage cost. For other control variables, we do not find the evidence that those variables relate to the change in operating performance in RTO firm.

7. Conclusion

In this study, we conduct the research and aim to shed the light on the new angle of reverse takeover. A reverse takeover is an alternative method of listing instead of IPO. The firm that cannot achieve the IPO

requirement which is more stringent monitoring and requirement than reverse takeover tends to use reverse takeover as an option for going public. The firm can bypass or shortcut some regulations and requirements with a shorter process. As a result, it provides an opportunity and incentive for the bad firm to conceal their bad performance. Adjei et al. (2008) point out that firms using RTO are smaller, younger, and have poorer ex-ante performance than private firm using IPO. Gleason et al. (2005) also state that RTO firm failed to generate long-term wealth for the shareholder. Moreover, Adjei et al. (2008) also show that most of RTO firms cannot survive after the merger. Consequently, most of RTO academic studies indicate RTO as a villain. However, not all RTO firm is a bad firm. With the high asymmetric information of RTO firm (Floros and Shastri, 2009), the investor cannot separate the good RTO from bad RTO and might have a chance to suffer from investing in a bad RTO firm. However, the existing academic study lack of the evidence that why some RTO firm is a food firm, but some firm is not.

Thus, to shed the light on this gap of literature, we suggest the ownership that non-listed firm obtained from the listed firm and the premium of the listed firm in RTO transaction could imply the performance of the newly created firm. We propose that the ownership variable might lead to the new shareholder of the merged firm has an incentive to monitor firm carefully because of bearing the risk of the merged firm. Also, we suggest that RTO is an investment activity of a non-listed firm for acquiring the listing status. The firm which willing to

pay a high premium should reflect the confidence level that they have about the benefit of listing. The firm that pays a high premium should manage the merged firm with their best afford to achieve the expected benefit. We also argue that the premium of RTO and normal M&A is different. In normal M&A, the premium is bad. It leads to the winner's cruise which arises from the expected synergy gain and personal benefit of manager decision (Gristein and Hribar ,2004 and Roll,1986). In contrast, in RTO, there is no synergy gain and the deal was driven by the shareholder of the non-listed firm to acquire listing status. Thus, premium in RTO should be not bad as premium in normal M&A

We explore this study in the U.S. stock market (NYSE, NASDAQ, and AMEX) with 59 samples during 2007-2018. We find that the median of change in operating performance is positive for both 1 year and 2 year after RTO. The result consists with Gleason et al. (2005) that observe a little improvement in profitability of post RTO. However, the median change in operating performance in subsequent 2 years is also more than the median change in operating performance in 1 year after the reverse merger. It indicated that RTO firms have improved in operating performance in 2 years after the reverse merger. We also observed a little increase in capex in 1 year after the merger. Compared to 1 year after the reverse merger, we find that firm has increased in capex and sales in 2 years after the reverse merger.

To investigate the relationship between ownership and change in operating performance and the relationship between premium and change in operating performance, we conduct the Mann-Whitey U test to find the

difference of change in operating performance between 2 groups. For the ownership variable, we divined the group into a group that private firm obtained a high proportion of ownership and the group that has a low proportion of ownership. The result suggests that we cannot find a significant difference of change in operating performance between 2 groups of ownership proportion. For the premium variable, we also divined the sample into 2 groups. A first group is a group that RTO trade on premium price and the second group is a group that RTO trade on discount price. The result shows that we cannot find a significant difference of change in operating performance between 2 groups of premium. However, with the Mann-Whitey U, we might fail to capture the effect of the controlling factor. Hence, we move to the second test which is a linear regression.

For regression analysis, we apply the concept of the testing model following the IPO literature concept (Kim et al, 2002). Chang in EBIT/TA and CFO/TA relative to merged year (T=0) was considered as a dependent variable. Then, we use the control variable as suggested in IPO literature. We suggest that both two models should have a linear relationship related to our hypothesis.

The regression result shows that we cannot find the evidence that the ownership that private firm obtained from the public firm in RTO has a relationship with the change in operating performance of the merged firm. For the relationship between premium and change in operating performance, we also cannot find the evidence that premium can imply a change in operating performance for both 1 year and 2 years after the

reverse merger. Even we exclude the outlier from the sample, but the result is the same as before excluding the outlier. However, the result of the premium variable consists with one of our suggestions. We propose that premium in RTO is not bad as premium in normal M&A. If the premium is bad, we should observe the negative coefficient. Furthermore, the result from regression also suggests that the RTO firm is a low-quality firm which relates to the suggestion of Arellano-Osta and Bruso (2002). Although RTO firms have a growth in sales, they cannot generate a positive NPV project for the firm.

We aim that our result might be useful to investors in the market who is interested in investing in an RTO firm. Even private firm has obtained the high proportion from public firm or private firm paid the high premium to public firm, but it does not imply that those firm will have a better performance after the merger.
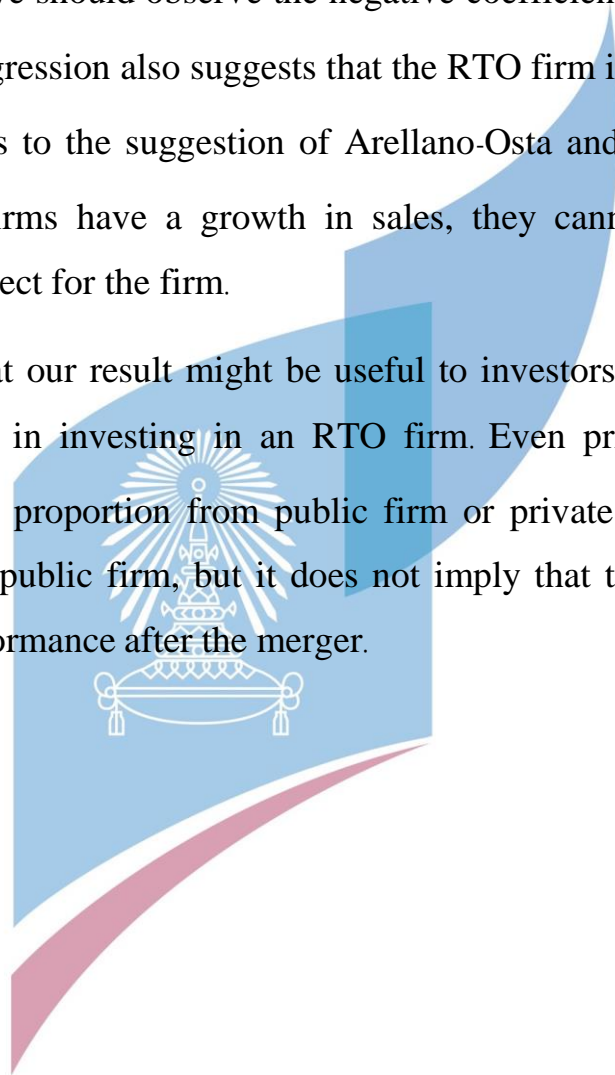
8. Appendix A.

Regression result of sample excluding 2007-2008 for the relationship between ownership and operating performance
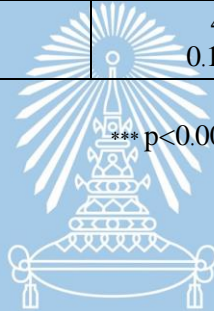
Variable	Model A		Model B	
	T(0,1)	T(0,2)	T(0,1)	T(0,2)
	Change in EBIT/TA	Change in EBIT/TA	Change in CFO/TA	Change in CFO/TA
Ownership	-13.44	-1.619	8.036	7.837
	(-0.76)	(-0.19)	(0.54)	(0.35)
Firm Size	-2.219	0.236	2.701	2.439
	(-0.95)	(0.50)	(1.24)	(1.03)
Capex	-0.0574	0.134	0.0761	-0.894
	(-0.70)	(1.09)	(1.04)	(-0.86)
Sales Growth	-0.397	-1.249**	0.628	0.528
	(-0.55)	(-2.75)	(0.78)	(0.36)
Debt	-6.181	0.0562	6.825	1.699
	(-0.95)	(0.32)	(1.11)	(0.77)
Cons	55.81	-2.722	-61.66	-49.98
	(0.95)	(-0.18)	(-1.13)	(-0.85)
N	47	47	47	47
R-Squared	0.1603	0.1873	0.2148	0.0469

t statistics in parentheses
="* p<0.05   ** p<0.01   *** p<0.001"

9. **Appendix B**.

Regression result of sample excluding 2007-2008 for the relationship between premium and operating performance

Variable	Model A		Model B	
	T(0,1)	T(0,2)	T(0,1)	T(0,2)
	Change in EBIT/TA	Change in EBIT/TA	Change in CFO/TA	Change in CFO/TA
Premium	-107.0	9.847	102.8	178.4
	(-1.59)	(1.66)	(1.71)	(1.59)
Firm Size	0.895	0.0715	-0.178	-1.340
	(1.24)	(0.30)	(-0.28)	(-0.83)
Capex	0.853	-0.218	-0.810	-6.849
	(1.59)	(-1.01)	(-1.69)	(-1.56)
Sales Growth	5.347	-1.582**	-4.949	-5.264
	(1.62)	(-3.21)	(-1.67)	(-1.66)
Debt	-2.191	-0.0436	3.035	-0.112
	(-0.78)	(-0.28)	(1.18)	(-0.13)
Cons	-17.34	-0.498	3.029	31.50
	(-1.16)	(-0.09)	(0.22)	(0.94)
N	47	47	47	47
R-Squared	0.4112	0.2291	0.4701	0.4103

t statistics in parentheses
="* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$"
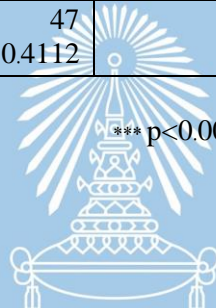
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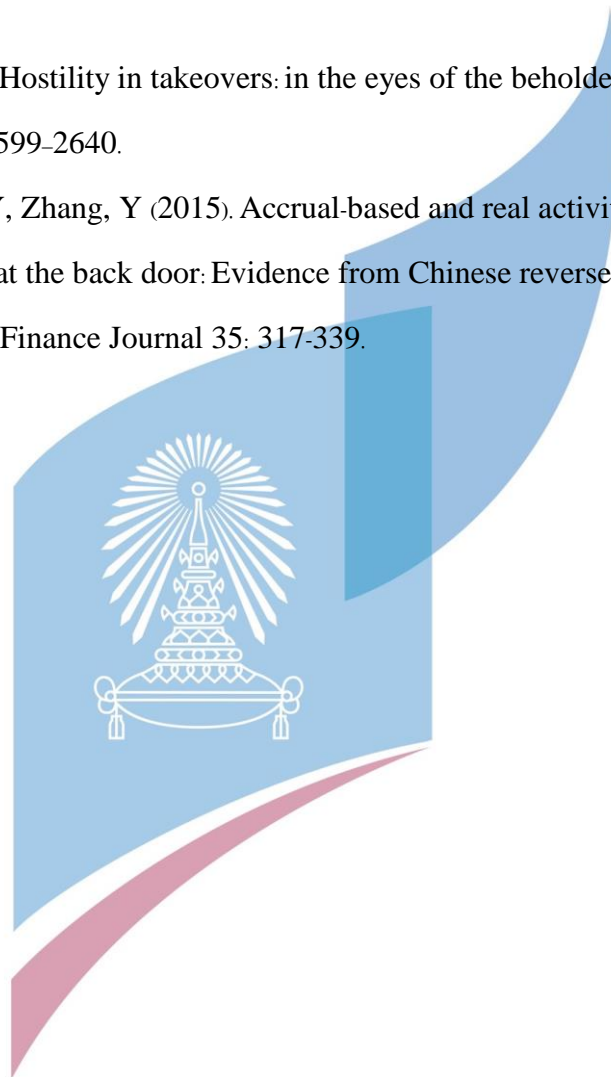
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