

Is there risk reduction in conglomerate acquisition?



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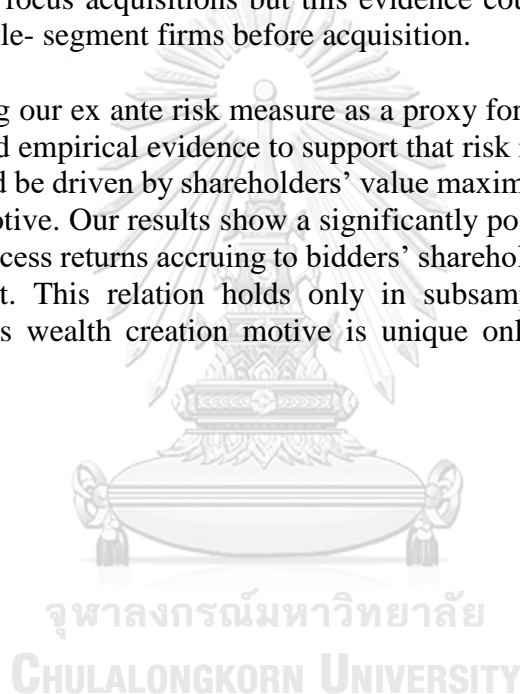
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By using our ex ante risk measure as a proxy for risk reduction attempt by managers, we find empirical evidence to support that risk reduction in conglomerate acquisitions could be driven by shareholders' value maximization motive rather than agency driven motive. Our results show a significantly positive association between announcement excess returns accruing to bidders' shareholders and the extent of risk reduction attempt. This relation holds only in subsample of diversifying deals implying that this wealth creation motive is unique only to diversifying type of acquisition.



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## TABLE OF CONTENTS

	<b>Page</b>
ABSTRACT (THAI) .....	iii
ABSTRACT (ENGLISH).....	iv
ACKNOWLEDGEMENTS.....	v
TABLE OF CONTENTS.....	vi
LIST OF TABLES.....	viii
Chapter 1.....	9
Introduction.....	9
Chapter 2.....	12
Literature Review and Hypothesis Development .....	12
2.1 Literature Review .....	12
2.1.1 Risk reduction in conglomerate acquisitions.....	12
2.1.2 Agency motive of risk reduction through corporate diversification .....	13
2.1.3 Empirical evidence of risk reduction (increase) in conglomerate acquisition .....	14
2.2 Hypothesis development.....	15
Chapter 3.....	18
Methodology and Sample Selections.....	18
3.1 Measure of risk .....	18
3.1.1 Portfolio Risk .....	18
3.1.2 Combined Firm Risk .....	19
3.1.3 Periods for calculating pre- acquisition variance and correlation of firm's equity .....	22
3.2 Sample Selection and deal classification.....	23
3.2.1 Market reactions to acquisition announcement by acquirers with various degree of expected risk reduction attempt.....	29
3.3 Market reaction to acquisition announcement.....	29

3.3.1 Potential influence on announcement- period gain to acquirer's shareholders .....	32
Chapter 4 .....	36
Empirical results .....	36
4.1 Is there risk reduction in conglomerate acquisition? .....	36
4.2 Is risk reduction by means of conglomerate acquisition good or bad for shareholders? .....	43
4.2.1 Univariate analysis of market reactions to acquisition announcement ....	43
4.2.2 Regression analysis of announcement- periods gains to diversifying deals with various degree of risk reduction attempts .....	46
Chapter 5 .....	53
Conclusions.....	53
REFERENCES .....	2
VITA.....	20



## LIST OF TABLES

	<b>Page</b>
Table 1:Sample distributions across sample period.....	24
Table 2:Acquirer risk before the acquisition. ....	28
Table 3: Control variables employed in H2.....	32
Table 4:Risk effect by type of acquisition .....	39
Table 5: Risk measures broken down by various subsample of acquirers' segments prior to the acquisition .....	40
Table 6: Risk effect after the acquisition by number of acquirers' segment prior to the acquisition .....	42
Table 7:Univariate analysis of market reactions by type of acquisitions and direction of risk changes .....	45
Table 8:Regression analysis of gains to acquiring firm's shareholders.....	50

## Chapter 1

### Introduction

Conglomerate acquisition, by definition, is a corporate strategy to enter new business or industry which is not related to firm's existing core business by means of acquisition. In spite of an extensive research indicating several motives underlying corporate diversification (Aggarwal & Samwick, 2003; Montgomery, 1994), this paper is concerned only risk reduction perspective. Existing literatures that examine a relationship between conglomerates and risk effect, most of the time, point out to a standard concept of asset diversification which predicts that risk of the overall portfolio can be reduced as long as the asset included has low correlation with each other. If we imagine portfolio of corporation just like a standard portfolio of individual investors, the concept of Modern Portfolio Theory<sup>1</sup> pioneered by Harry Markowitz, is therefore, one important mechanism through which risk reduction occurs in corporate diversification.

When risk reduction motives are discussed, the most widely discussed topic among literatures, not surprisingly, is whether it creates value to shareholders. A large body of literature has connected the motive of risk reduction, resulted from conglomerate acquisition, to the context of agency problem (Levy, 1970); (Amihud & Lev, 1981); (MAY, 1995); (Aggarwal & Samwick, 2003). The other strand of literature, on the other hand, suggests that such decrease in firm risk can create value to shareholders (Lewellen, 1971); (HANN, OGNEVA, & OZBAS, 2013).

With this fundamental concept of asset diversification together with above mentioned motives underlying risk reduction attempt, no matter this motive is driven by managers' interest or shareholders' interest, all have pointed out to possibility of risk reduction effect from corporate diversification.

Even though, the notion of risk reduction through corporate diversification has been widely claimed by both standard finance textbook as well as academic literatures, to date, there is still no empirical evidence to support this argument. Even there exists

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<sup>1</sup> See Markowitz, H., 1952, Portfolio selection. The Journal of Finance, 7, 77-91.

empirical studies finding risk increase following conglomerate acquisition (e.g., **Joehnk and Nielsen, 1974; (Baruch & Gershon, 1972);(Lubatkin & O'Neill, 1987)**, Yet, these evidences are failed to answer whether risk increase (decrease) they found are driven by diversification effect itself or not. While we do not expect to settle this contradiction among theoretical argument of risk reduction and existing evidence of (ex post) risk increase in diversifying acquisition, our study aims to answer just one fundamental question. That is “if corporate diversification is justified by a claim that it helps reduce firms’ risk exposure to economic uncertainty as most prior literatures have presumed, then as opposed to focus acquisition, do we find a potential evidence to support this argument?” That is when firms make a decision to acquire target from other industries, do they choose the target based on an expectation that it could help acquirers attain lower risk level?

In our study, we examine risk changes in conglomerate acquisitions through portfolio diversification framework. Our samples of interest are drawn from conglomerated and focused acquisition deals announced and completed during 1990 to 2019. Such examination will lead us to better understanding the real- world phenomenon behind risk reduction motive in conglomerate acquisition.

After documenting whether there is risk reduction, we turn to examining market reaction to an acquisition announcement to see the wealth effect on diversifying firms’ shareholders. If acquisition deals with high expected risk reduction attempt result in positive announcement- period gain to acquirers, it can be concluded that such attempt will add value to shareholders, indicating that risk reduction motive is driven by shareholders’ interest not managers but if it turns out to be negative, then it will be concluded to destroy shareholders’ value, implying that risk reduction following conglomerate acquisition in general is driven by managers’ self- interest. So far, a large number of literatures have examined value effect to shareholders of an acquiring firms when they make conglomerate acquisition announcement (**Matsusaka, 1993; Fuller et al., 2002; (Martin & Sayrak, 2003)**). Our study also extends these literatures which examine shareholders’ wealth effect following conglomerate acquisition but we rather examine this value effect mainly through a perspective of *risk reduction*.

Overall, our findings suggest that based on asset diversification potential, acquirers' risk is expected to decline regardless of their types of acquisitions: no matter prospect targets operate in the same or different industry as bidders. This result may contradict to a common understanding that only diversifying acquisition should be associated with a decrease in firm risk. Also, by employing our ex ante risk measure as a proxy for risk reduction attempt by managers, our results reveal an empirical support that risk decrease especially in conglomerate acquisitions is driven by shareholders' value maximization motive as the results show a positive relation between level of risk decrease and wealth increase to acquiring firms' shareholders during the announcement date. We also examine whether this value maximization motive underlying diversifying acquisition we observe is a chance result. We assess sample of diversifying and focusing deals separately. Results show that this positive association is present only in conglomerate acquisitions.

## Chapter 2

### Literature Review and Hypothesis Development

#### 2.1 Literature Review

##### 2.1.1 Risk reduction in conglomerate acquisitions

It could be perceived as a common knowledge that corporate diversification is associated with firm risk reduction. Basically, this reduction in firm risk can be generally explained by the outcome of imperfect correlation of cash flows arising from two firms operating in different types of business. In other words, all other things being equal, when the two (or more) unrelated firms are combined together to become a single entity, its operating cash flow stream is likely to be less volatile compared to its former status as a single-segment firm. It is this ex ante stabilization in operating cash flow that lead to this common perception of risk reduction in conglomerate acquisition.

So far, the notion of risk reduction through corporate diversification has been widely claimed in part of finance textbook as well as academic literatures. (Amihud & Lev, 1981) develop their hypothesis based on strong presumption that conglomerate merger is essentially an effective way to reduce firm level of risk. (Mansi & Reeb, 2002) argue that several evidences which found diversified firm, on average, were traded at discount, as suggested by (Lang & Stulz, 1994), (Berger & Ofek, 1995), (SERVAES, 1996), is stemmed from reduction in firm's risk after merger which in turn, leads to wealth transfer from shareholders to debt holders. In other words, it is the effect of conglomerate merger that make firms become less risky. As one might notice, these literatures have implicitly concluded that risk reduction is basically a definite outcome of corporate diversification.

With the effect of uncorrelated cash flow among business units together with one necessary condition of common ownership, the term "coinsurance", as first introduced by (Lewellen, 1971), also plays a significant role in explaining the outcome of risk reduction in conglomerate acquisitions. Such a decrease in risks can be thought as financial synergy accruing to the combined firm. That is when the two firms become the same entity, debt obligation of each firm will be co- insured by both of the merging firms. As the nature of their businesses whose cash flow streams do not move in perfect

relation across time, when it turns out that one segment is in trouble and unable to generate enough money to cover its debt obligation, this cash flow deficiency can be financed by cash flow surplus of the other segment unit. It is this co-insurance of debt obligation that enables firms to get lower default risk and thus potentially lead to larger debt capacity that is greater than the sum of stand- alone firm's debt capacity. This is also in line with (SHLEIFER & VISHNY, 1992) who argue that by comparing to one single segment firm of the same size, conglomerates are more likely to gain larger debt capacity. This is because conglomerate firms have more diversity of assets to be used as a collateral.

Conventional understanding among practitioners and researchers is that diversification should have nothing to do with systematic risk since the only type of risk that can be eliminated through diversification is idiosyncratic risk. However, (HANN et al., 2013) proposes an evidence that contradicts this particular view. They found corporate diversification does not only affect firm's idiosyncratic risk but also systematic risk through an avoidance of countercyclical deadweight cost that stand-alone firms cannot avoid on their own. One prominent of such costs is a financial distress cost which typically occur during the situation of low cash flow realization. This lower in systematic risk, again, can be explained by the coinsurance effect in line with (Lewellen, 1971).

### **2.1.2 Agency motive of risk reduction through corporate diversification**

A large body of literature has connected the motive of risk reduction, resulted from conglomerate acquisition, to the context of agency problem. This is because such reduction in firm risk, given no other economic benefit arising from corporate diversification, may not be beneficial to shareholders. By looking at risk reduction achieved by means of diversification from investors' point of view, (Levy & Sarnat, 1970) argue that in perfect capital market, such decrease in firm risk does not provide any additional value to shareholders because investors themselves can efficiently construct their own portfolios that could be matched with their risk and return preference. For this reason, risk diversification done at corporate level should be useless for shareholders.

One of the very first literatures that relate this risk reduction attempt to managerial motive is (Amihud & Lev, 1981). By simply explaining through mechanism of risk diversification, they set one strong presumption that conglomerate merger is essentially an effective tool for managers to reduce their firm risk. They hypothesize that managers, whose employment risk and return are linked to their firm performance (e.g., (Jensen & Murphy, 1990), will engage in conglomerate acquisition to reduce risk. This is because risk of their human capital cannot be diversified away as easily as investors diversify their investment risk. No matter it will benefit shareholders or not, managers themselves, assuming they are utility maximizer, there is a good reason to believe that they have an incentive to engage in any risk reduction activity such as conglomerate acquisition. In addition, (MAY, 1995), (Aggarwal & Samwick, 2003) propose their study that extend Amihud and Lev's work. They found evidence that managers consider their personal risk when they make an investment decision for their firms. In their testing, a proxy for firm –level risk reduction decision is a conglomerate merger decision.

### **2.1.3 Empirical evidence of risk reduction (increase) in conglomerate acquisition**

Existing evidence examining the relation of conglomerate acquisition on firm risk generally conducted by examining changes in risk of an acquiring firm. That is to compare risk of acquirer before and after an acquisition to see whether corporate diversification, on average, can help lower risk of an acquirer. (Joehnk & Nielsen, 1974) were the first to conduct the study in this way but a type of risk that they pay an attention to is only a *systematic risk* of securities represented by beta estimated. Only 21 major deals of conglomerate merger were examined. The result shows that comparing to non- conglomerate acquisition, there is insignificant effect on the beta in conglomerates sample. (Baruch & Gershon, 1972), also conduct their test focusing on systematic risk. In their study, each of acquiring firms in conglomerate sample was matched with an appropriate comparable firm whose asset size and industry is relatively the same. Pair samples resulted in 69 merger deals. They find that difference of risk changes between pair of conglomerate and its comparable non- conglomerate is not significant. (Lubatkin & O'Neill, 1987) divide 297 merger samples during 1961- 1973 into 4 sub samples including 66 single-business, 41 vertical, 130 related, and 60

unrelated mergers. Not only examine changes in *systematic risk* like previous literatures, they further explore changes in *unsystematic risk* and *total risk*. Interestingly, the result suggests that unrelated mergers were associated with the largest increases in *unsystematic risk*. Furthermore, it turns out that, on average, there is no risk reduction in any type of acquisition. However, this study has some limitations. First, it fails to control for at least three necessary factors. Such factors include relative size of the merging firms, firm leverage, and overall economic condition. That is if a merger take place just before the period of high economic uncertainty, it is more likely that combined firm risk we observe, rather than reflect risk reduction potential from acquiring unrelated targets, it might reflect changes in macro-economic factors.

Even though, the mechanism and motive of risk reduction through corporate diversification is well-justified by theoretical explanation, to date, the empirical validity of this fundamental implication by conglomerate acquisition is still puzzling and left somewhat unclear. The first reason is that there was not much literature studying the relation of conglomerate acquisition and firm's risk. Also, as we may notice that numbers of sample used in prior literatures contain very small sample size which in turn making result seems less reliable. Second, existing papers so far, has been testing an effect of corporate acquisition on firm risk based on an *ex post* basis. That is to collect data, which is considered by the author a proper measure of risk, after the acquisition has been taken place and then compare it to pre-merger risk of an acquiring firm. If it turns out that post-merger risk level of the newly combined firm is less than pre-merger risk of the acquirer, then it will be concluded that there is risk reduction occurring as a result of such mergers. Although, it might sound reasonable to measure risk based on an *ex post* basis, data collected after the fact might incorporate any possible factors that may influence firm risk rather than just a diversification effect as all academics have hypothesized.

## **2.2 Hypothesis development**

Conglomerate acquisitions can be viewed as a combination of assets generating income streams that, in general, should be less correlated with each other when compared to the parties involving in focused acquisition. As a nature of conglomerates in which each of the combining firm has different exposure to economic uncertainty,



when firm was hit by one particular circumstance, the extent through which such event will affect each of the stand- alone firm will not be equal. However, as both firms become the same entity, total risk exposure will be partly eliminated. In particular, if we define risk of the combined firm as a function of its earnings volatility, risk reduction expected from any acquisition deals should depend on how bidders' and targets' assets generating returns co- vary.

Along with theoretical argument of risk diversification, firm risk reduction by means of conglomerate acquisition can be motivated by two contrast sets of arguments. The first set implies that managers pursue this firm risk reduction strategy with motivation to increase shareholders wealth (Risk reduction as value maximization motive). (**Lewellen, 1971**) argues that under two necessary conditions of uncorrelated cash flow stream among business units and common ownership, shareholders of diversified firm will gain benefit of larger debt capacity as firm's collateral, i.e., firm assets, become less risky. Given that such an increase in firm's debt capacity is utilized to exploit valuable growth opportunity or to finance positive NPV project, this will in turn create value to shareholders. Moreover, (**HANN et al., 2013**) finds that diversified firms have lower cost of capital than comparable portfolios of stand-alone firms. He argues that multi- segment firms are able to transfer resources from cash rich unit to cash poor unit during some states of nature. Thus, helping them avoid counter cyclical deadweight cost such as cost of financial distress that stand-alone firms cannot avoid on their own. This lower cost of debt together with lower in firm's systematic risk implies that conglomerate acquisition will lead to a reduction in firms' overall cost of capital. The second set of argument explains conglomerate acquisition as an existence of agency problem (risk reduction as managerial motive). This argument starts with a question do firms acquire target from another industry in order to achieve risk diversification for manager's self-interest or for shareholders' interest? (**Amihud & Lev, 1981**) argue that managers, as risk-averse economic agents, have an incentive reduce firm risk by means of conglomerate acquisition even though doing so does not create value to shareholders. This argument is consistent with (**Levy & Sarnat, 1970**) that conglomerate risk reduction in the sense of Markowitz's portfolio diversification

will not create value to shareholders because they can construct their own portfolio that has risk and return characteristics matched with their personal preference.

Considering the motives underlying corporate diversification, either value-maximizing or agency-related or both, we predict that there is risk reduction in conglomerate acquisition.

**H1: There is risk reduction in conglomerate acquisition.**

As discussed above, there exist two opposing motives for firms to diversify: agency driven motive and value maximizing motive. Value maximization motive implies that risk reduction resulted from conglomerate acquisition is value creation for shareholders while agency motive implies shareholders' value destroyed. Hence, two competing hypotheses can be stated as follows.

**H2.1: Risk reduction as a value maximization motive - *the announcement-period gain to diversifying acquirers is positively related to the extent of risk reduction.***

**H2.2: Risk reduction as agency motive- *the announcement-period gain to diversifying acquirers is negatively related to the extent of risk reduction.***

## Chapter 3

### Methodology and Sample Selections

#### 3.1 Measure of risk

To measure risk of conglomerates, we propose to apply the concept of portfolio diversification. This measure is ex ante in nature where historical price series of the two combining stocks are collected to calculate return and standard deviation of an overall portfolio. Specifically, our risk measure is derived from market movement of the firm's equity with some theoretical adjustment as a proxy for an *expectation* of the combined firm as well as individual firm risk during pre- acquisition period.

Basically, this portfolio diversification measure is not a brand new idea to rationalize the risk effect in conglomerate acquisition. **(Smith & Schreiner, 1969)** use this portfolio approach as a means to measure ex ante diversification potential of given conglomerates using Sharpe ratio. However, according to this paper, there are two main differences from ours. First, our paper has focused mainly on ex ante risk reduction perspective while Smith and Schreiner conduct their test based on both aspects of risk and return. Second, our objective is to test risk reduction in cross sectional data of merger deals but Smith and Schreiner's objective is to compare diversification efficiency between two groups which are conglomerates and mutual funds.

##### 3.1.1 Portfolio Risk จุฬาลงกรณ์มหาวิทยาลัย

To make it consistent with our study that examines risk changes faced by acquirer following an acquisition, suppose there are only two stocks, x and y, in a portfolio. Therefore, portfolio risk as presented by variance, is shown as followed

$$\text{Portfolio Variance } (\sigma_p^2) = w_x^2 \sigma_x^2 + w_y^2 \sigma_y^2 + 2w_x w_y \rho_{xy} \sigma_x \sigma_y \quad (1)$$

In order to justify that our suggested method could be a solid proxy for combined firm risk, there are four reasons to support our argument. First, since conglomerate acquisition is typically defined as a corporate strategy to acquire firm from a different industry, this procedure is equivalent to the way investors add a new asset to their existing portfolio. Conglomerates can, therefore, be visualized as a usual portfolio owned by individual investors. Second, unlike all prior literatures that measure

risk of combined firms using *ex post* data, we argue that our portfolio risk measure is able to overcome at least two main drawbacks of an *ex post* basis. First, *ex ante* measure can help us avoid problem of data contaminating with noises or any factors that could affect firm risk *after merged*. As we could see that most of the literatures, so far, when they make an argument that there will be risk reduction in conglomerate acquisition, they always point out to diversification effect. But how could risk changes after merge tell us about risk reduction from the pure effect of conglomerate acquisition? How could we know that evidence of risk increase we found is solely explained by an effect of diversification not by other things that are beyond control? As suggested by (Lubatkin & O'Neill, 1987), they conclude that management actions may have a substantial impact on risk profile of the combining businesses. Second, *ex post* measure tells us almost nothing about how risky of the target is. Using portfolio risk measure will enable us to explore further whether risk reduction (increase) that we found is caused by risk transfer from target or not or it is driven by choosing target with low correlation to bidder. Lastly, this *ex ante* measure can reflect an expected outcome of action better than an *ex post* basis does. For example, let's imagine ourselves as a firm's manager. Even theory tells us that diversification will help lower risk by just simply adding unrelated assets, how could we know which target will help reduce our firm risk? Basically, given diversification effect alone, it does not mean that acquiring any firms from other industry will guarantee risk reduction to the acquiring firms if the target has very high risk. In other words, it is difficult to guarantee what the outcome will be at the time of making a decision. Therefore, if we assume that stock price fluctuation is a reliable representative for firm's total risk, by using portfolio risk measure, it can potentially imply manager's risk reduction attempt in each of an acquisition deal.

### 3.1.2 Combined Firm Risk

Applying to portfolio at corporate level, where A is the acquirer and B is the announced target, the proxy for *expected* total risk of a combined firm AB is, then shown as followed.

$$\begin{aligned}
 & \text{Combined firm Variance } (\sigma_{cij}^2) \\
 & = w_{Ai}^2(L_{Ai}^2\sigma_{Ai}^2) + w_{Bi}^2(L_{Bi}^2\sigma_{Bi}^2) + 2w_{Ai}w_{Bi}\rho_{ABi}(L_{Ai}\sigma_{Ai})(L_{Bi}\sigma_{Bi}) \quad (2)
 \end{aligned}$$

$$\text{Changes in firm's risk } (\Delta Risk_{ij}) = \sigma_{cij}^2 - L_{Ai}^2 \sigma_{Ai}^2 \quad (3)$$

Where:

$\sigma_{cij}^2$  = combined firm's variance of deal i as if the announced target and acquirer are physically combined and j denotes types of acquisition.

j = 1: focused acquisition

j = 2: conglomerated acquisition

$\sigma_{Ai}^2$  = variance of the acquirer's stock return (*levered* return of acquirer's equity) during pre- acquisition

$\sigma_{Bi}^2$  = variance of the target's stock return (*levered* return of target's equity) during pre-acquisition

$\sigma_{Ai}$  = standard deviation of the acquirer's stock return during pre-acquisition

$\sigma_{Bi}$  = standard deviation of target's stock return during pre- acquisition

$\rho_{ABi}$  = correlation of acquirer's and target's equity return

$W_{Ai}$  = relative book total assets of acquirer to total value of a combined firm

$W_{Bi}$  = relative book total assets of target to total value of a combined firm

While  $W_A + W_B = 1$  ; *total value of a combined firm*<sup>2</sup>

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<sup>2</sup> Value of the combined firm is essentially the summation of acquirer's total assets and target's total asset where value of target also depends on a percentage acquired by bidder. For deals that targets were acquired more than trigger point of 50 %, a percentage assigned to target asset is equal to 100% minus percentage owned by the same bidder prior to the transaction. However, for deals that targets were

$L_{Ai}$  = unlevered factor of bidder's equity risk

$L_{Bi}$  = unlevered factor of target's equity risk

$$\text{While } L = \frac{\text{value of equity}}{\text{value of equity} + \text{book value of debt}} = \frac{\text{value of equity}}{\text{value of asset}}$$

### 3.1.3 Estimating firm's risk (risk of asset)

Unlike portfolio of stocks where individual investors hold only a portion of shares or part of firm's equity in their portfolio, in case of corporate acquisition, the bidder adds its target's assets, including debt and equity, to its balance sheet. As a result, we assign weights ( $W_A, W_B$ ) based on relative book value of total assets.

Since our objective is to measure risk of the whole firm not limited only to risk of equity holders, those variance and standard deviation terms in Eq. (2) should then be derived from asset price movement or weighted average of price fluctuation between debt and equity. Unfortunately, market value of assets and debt could not be directly observed so we need to estimate it. In our study, we first start with calculating standard deviation and variance of firm's equity return. However, we cannot adopt volatility of equity as a proxy for firm's risk straight away because it will overestimate risk of the whole firm. Recall, that given firm's business risk remains the same, when firm borrows more, equity holders as residual claimants on firm's assets will encounter higher risk than shareholders holding stock of the same firm but with lower debt. This incremental risk in levered firm is basically defined as firm's financial risk.

To transform the *observed* risk of equity, generally derived from firms with leverage, into asset risk, i.e., risk of equity as if firm has zero debt in their capital structure, we propose (**Hamada, 1972**) methodology as an adjustment factor of *levered* firm's standard deviation of equity return. According to Hamada (1972), it has been proved that if MM Theory (**Modigliani & Miller, 1958**) and the Capital asset pricing model are valid, it is possible to estimate risk of the asset by unleveraging equity risk

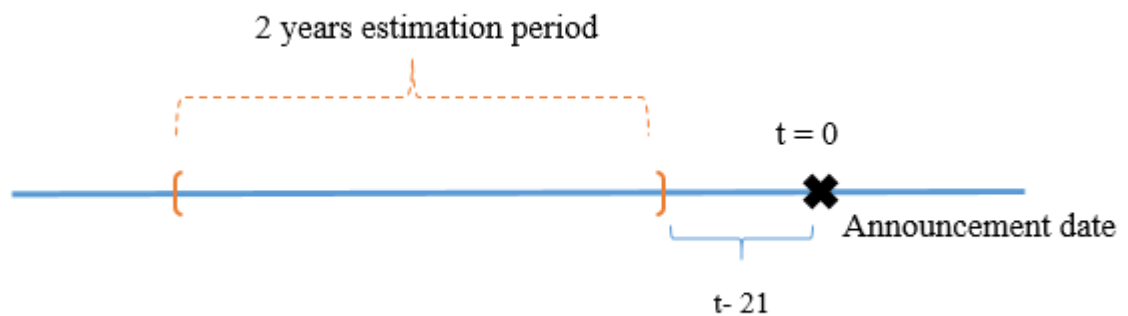
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acquired less than 50%, a percentage assigned to target asset is equal to percentage owned after the acquisition minus percentage owned before the acquisition (if any)

of a *levered* firm. In this case, our unlevered factor is defined as a ratio of firm's total equity over firm's total value of asset.

### 3.1.3 Periods for calculating pre- acquisition variance and correlation of firm's equity

We obtain variance and correlation of stocks during pre-acquisition period using weekly returns. In our study, *weekly return* is preferred to *daily return* due to our concern of possible problem of thin trading (Brealey, Cooper, & Kaplanis, 2019). This is because there will be more chances that these infrequent traded stocks especially, small stocks whose trading volume is low due to limited number of buyers and sellers each day will be over- volatile. Since our objective of getting stock returns and thus standard deviation is to use it as a proxy for risk, this thin trading can be highly problematic if stock price volatility we observe does not truly reflect firm's risk characteristics.



To estimate variance and covariance of firms' equity return, we start with day "t = 0" when each acquisition deal was officially announced, the estimation period in which stock returns are gathered to estimate variance and correlation is 2 years but this is 2 years<sup>3</sup> backward starting from day t- 21. This is to avoid stock price fluctuation that may arise from information leakage of acquisition deal.

<sup>3</sup> We also adopt the estimation periods of 1 year and 3 years as a robustness check in the appendix C and appendix D, respectively.

If our first hypothesis holds, we expect to find changes in firm's risk ( $\Delta Risk_j$ ), on average, is negative when  $j = 2$  or if it turns out that ( $\Delta Risk$ ) are negative for both  $j = 1$  and  $2$  then we expect that  $(\Delta Risk_2) < (\Delta Risk_1)$  to reflect that risk reduction is essentially a dominant outcome that is unique to diversifying acquisitions.

According to Eq. (2), combined firm's variance ( $\sigma_{cij}^2$ ) could be lower or higher than pre- acquisition variance of acquirer ( $L_{Ai}^2 \sigma_{Ai}^2$ ) depending on the last two terms on the right hand- side of this equation. These include size of the target they acquire relative to bidder ( $W_A, W_B$ ), pre- acquisition variance of target's relative to bidder ( $L_{Bi}^2 \sigma_{Bi}^2$ ), and correlation of acquirer and target's returns ( $\rho_{ABi}$ ). However, for the case that acquirer is riskier than target ( $L_{Ai}^2 \sigma_{Ai}^2 > L_{Bi}^2 \sigma_{Bi}^2$ ), the combined firm's risk is *always* less than acquirer's risk pre- acquisition.<sup>4</sup>

### 3.2 Sample Selection and deal classification

The announcements of M&A transactions are collected from the Thomson Financial (SDC Platinum) Worldwide Merger and Acquisition database. Such transactions must be announced and completed within January 1, 1990 to December 31, 2019. Since series of stock price are needed so that proxy for firm risk and announcement excess return could be obtained, it requires that both of acquirer and target must be publicly traded firm having historical stock prices available on Datastream and Worldscope for at least 2 years before announcement date. Moreover, since accounting data such as book value of asset and book value of equity are required to calculate risk of combined firm as part of unlevered factor, all deals included in our sample must have these accounting data available. In addition, we require that the acquirer must hold less than 50% of the shares in the target before an acquisition announcement. For deal classification, we follow a common way which defines diversifying acquisition as a deal in which the acquirer and target have different primary 2-digit SIC codes (**Berger & Ofek, 1995**); (**SERVAES, 1996**); (**Morellec & Zhdanov, 2008**). While, focused acquisitions are defined as deals in which the acquirer and target share the same primary 2 digit SIC codes.

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<sup>4</sup> See appendix B



A total of 11,277 deals are survived from our criteria. From initial sample, 8408 deals are domestic acquisitions and 2869 deals are cross border acquisitions<sup>5</sup>. Among domestic acquisitions, 3900 deals are classified as diversifying while the rest, 4508 deals, are focusing. **Table 1** reports sample distribution by acquisition types across sample periods. As shown in **Figure 1**, the number of all domestic deals fluctuate across years but increase rapidly from 1994 to its peak in 2007. However, the trend reverts to a downtrend after 2007. It appears that diversifying deals seem to be the one that drags a number of entire domestic deals down as focused deals remain stable during those periods. By comparing the number of diversifying deals and focusing deals, focus acquisitions tend to be greater than diversifying almost every year. Regarding to diversification perspective, the number of diversifying within domestic country and cross borders tend to move perfectly together as the orange line and yellow line overlap each other since 1990 until 2000. Both lines are then diverted after year 2000 where the industrial diversifying line is located above cross border line. This evidence indicates that during recent periods, when managers have an option to diversify, international diversification is much less common than industrial diversification.

*Table 1:*

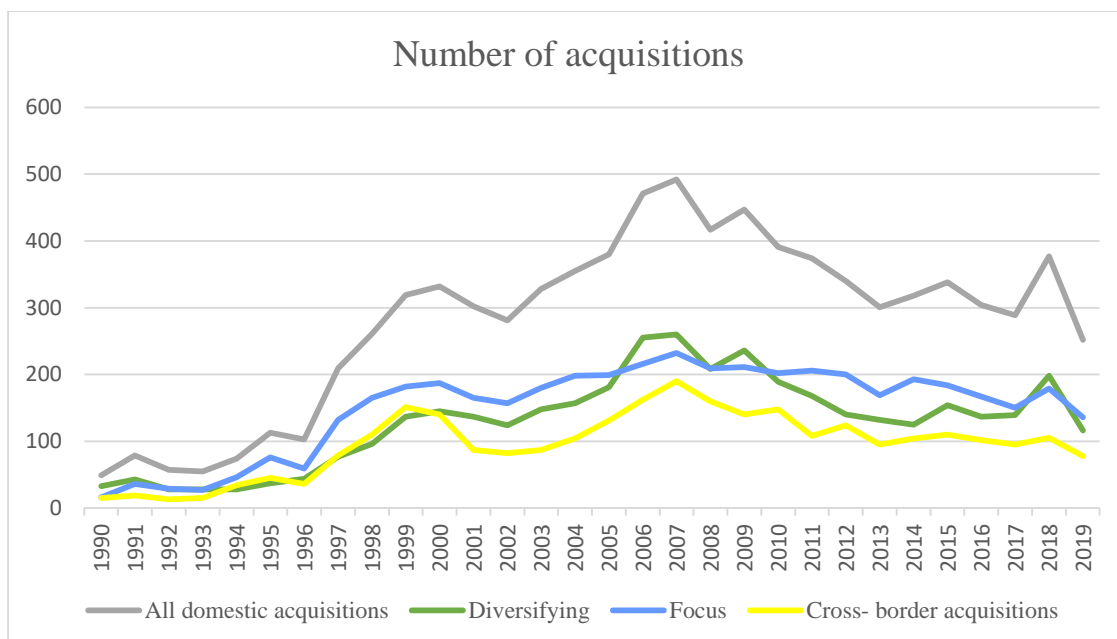
Sample distributions across sample period.

The sample consists 11,277 acquisition deals announced during 1990 –2019. Among full sample, 8408 deals are domestic acquisitions while 2869 are cross- border acquisitions. Focusing acquisitions are defined as deals in which both of acquirer and target share the same primary 2 digits SIC code while diversifying acquisitions are deals that acquirer and targets have different primary 2 digits SIC codes. Only deals that the targets have not been acquired by the bidder more than 50% are included in the sample. Both of bidder and target are publicly traded firms whose stock price and required accounting data are available on Thomson Reuter Datastream for at least 2 year before the acquisition announcement.

Year	Number of acquisitions			All cross- border acquisitions
	All domestic acquisitions	Diversifying	Focus	
All	8408	3900	4508	2869
1990	49	33	16	15

<sup>5</sup> Even cross- border acquisition is considered as one alternative way for firm to diversify no matter oversea targets are operating in the same or different industry, our main objective is to examine risk effect among industrial diversification. We therefore exclude cross- border deals from our analysis from table 2 onward to make its scope manageable.

1991	79	43	36	19
1992	57	28	29	13
1993	55	28	27	15
1994	74	28	46	34
1995	113	37	76	45
1996	103	44	59	36
1997	209	77	132	79
1998	261	96	165	110
1999	319	137	182	151
2000	332	145	187	140
2001	302	137	165	87
2002	281	124	157	82
2003	328	148	180	87
2004	355	157	198	104
2005	380	181	199	131
2006	471	255	216	162
2007	492	260	232	190
2008	417	208	209	160
2009	447	236	211	140
2010	391	189	202	148
2011	374	168	206	108
2012	340	140	200	124
2013	301	132	169	95
2014	318	125	193	104
2015	338	154	184	110
2016	304	137	167	102
2017	289	139	150	95
2018	377	198	179	105
2019	252	116	136	78



**Table 2** reports acquirer's risk characteristics before acquisition. Regarding to domestic deals, as can be seen from the first row, majority of single- segment acquirers (66%) still remain acquiring targets within the same industry (remain focus), only 34 % of the deals that turn to diversify. The percentage of acquirers engaging in industrial diversification, as can be seen from the third column, was increasing as the number of acquirers' segment increase. By looking at acquirer's risk characteristics before making an acquisition, it is not surprising that firms operating in one segment are riskiest compared to an already diversified firms and the risk pattern shows that on average, risk seems to be lower and lower when firms have more and more segments consistent to portfolio diversification prediction.

By comparing between diversifying and focusing deals, it is interesting that among deals of single- segment acquirers, high risk firms, as reflected by higher risk than average, tend to make focus acquisitions rather than diversifying. On the contrary, among deals of multi- segments acquirers, the result shows the opposite direction. It turns out that diversified acquirers with high risk are the ones that tend to diversify. These result patterns may indicate that, on average, single- segment firms engaging in focus acquisitions in general are high growth firms that still want to exploit growth opportunity in their current core business rather than exploring new growth opportunities or trying to stabilize their earnings through diversification.

If one main motives that drive firm to diversify is to reduce risk (no matter they do it for reducing managers' employment risk (**Amihud & Lev, 1981**); (**MAY, 1995**); (**Aggarwal & Samwick, 2003**) or reduce risk for shareholders), then it is more likely to observe high risk firms are supposed to be the one that diversify. Our results show that this inspected pattern appear only in multi-segment acquirers.



Table 2

Acquirer risk before the acquisition.

Mean and median of acquirer risk *before* an acquisition are reported. Risk of acquirers are represented by adjusted standard deviation of acquirer's stock return 2 years prior 21 days of the announcement date. Deals are divided into groups based on an acquirers' number of segments before the acquisition announcement: single- segment; 2 segments; 3 to 4 segments; and 5 or more segments. For each group, numbers of deals are then divided by types: diversifying and focusing.



Table 2: Acquirer pre- acquisition risk by number of segments (%)

Number of segments	All domestic deals						Diversifying			Focusing		
	Count	%	Mean	Median	Count	%	Mean	Median	Count	%	Mean	Median
1	2283	27.15	3.965	2.815	776	33.99	3.599	2.365	1507	66.01	4.153	3.156
2	2382	28.33	2.908	1.920	906	38.04	3.466	2.353	1476	61.96	2.565	1.643
3-4	2168	25.78	2.594	1.961	1196	55.17	2.746	2.046	972	44.83	2.406	1.845
>=5	1575	18.73	1.921	1.531	1022	64.89	2.003	1.559	553	35.11	1.770	1.463
Total count	8408				3900				4508			

### 3.2.1 Market reactions to acquisition announcement by acquirers with various degree of expected risk reduction attempt

To test our second hypothesis, one way to evaluate whether risk reduction through conglomerate acquisition is good or bad for shareholders is to examine the effect of diversification on the value of acquirer's equity.

In this part, sample size is dropped to 7,951 deals since one of our control variables requires EBITDA and CAPEX to compute *free cash flow* variable. There are 456 deals that do not have data available on Thomson Reuter Datastream. Thus, these deals are then dropped from our sample while examining H2.

### 3.3 Market reaction to acquisition announcement

The announcement-period returns are estimated using standard market-adjusted excess return as followed:

$$ER_i = r_i - r_m \quad (4)$$

Where  $r_i$  is the return on an acquirer of deal  $i$  and  $r_m$  is the value-weighted market index return. Since our sample is not limited to only firms in specific country, market returns ( $r_m$ ) that are assigned on each deal will be vary according to each bidder's country. Given that the record dates of acquisition announcement we draw from SDC are correct and all market participants can access to this kind of information on the same date, it should be most efficient to analyze market reaction on the exact date reported by SDC. However, the fact that not all investors are able to access this information on the same date and there also exists an evidence that not all deal dates reported by SDC are correct. We therefore need a proper event window for market reaction estimation. To avoid other information or noises that could have an effect on stock price movement surrounding the announcement date, we try to minimize the length of event window to be as short as possible. In this study, we propose event window of (-2, +2). According to Fuller et al. (2002), they report that for a random sample of 500 deals, the announcement dates reported by SDC are correct for 92.6%. Also, the recorded dates that are inaccurate are off by no more than two days. We therefore estimate the cumulative excess returns (CERs) over the five-day period (-2,

+2) surrounding the announcement date (day  $t=0$ ) as it should capture the announcement effect without causing considerable noise..

We prefer this standard market adjustment model (**Fuller, Netter, & Stegemoller, 2002**);(**Ekkayokkaya & Paudyal, 2015**) to the conventional methodology by (**Brown & Warner, 1985**) because it does not require long pre- event period to estimate the model parameters. Such a long pre- event period can be a major problem especially for frequent acquirers because there will be more chances that our estimated parameter will be contaminated with prior acquisition attempt that occur during the estimation period.



To examine how market responds to the acquisition announcement by bidders with various degree of risk reduction attempt, our regression model is presented as followed:

$$CERS_i = \alpha_1 D_{1i} + \alpha_2 D_{2i} + \beta_1(D_{1i} \cdot |\Delta Risk_i|) + \beta_2(D_{2i} \cdot \Delta Risk_i) + \beta_3 Total\ asset_i + \beta_4 TobinsQ_i + \beta_5 FCF_i + \beta_6 Leverage_i + \beta_7 RelativeSize_i + \beta_8 Cash_i + \beta_9 Stock_i + \varepsilon_i$$

(5)

Where  $CERS_i$  is cumulative excess return estimated over the five- day period (-2, +2) surrounding the announcement date of deal i. Our main explanatory variable of interest is a level of acquirer's risk reduction  $|\Delta Risk_i|$  that we estimate from Eq. (3) as a proxy for manager's risk reduction attempt.  $D_1$  and  $D_2$  are dummy variables.

$$D_1 = 1 \text{ if acquisition deal } i \text{ has } \Delta Risk_i < 0 ; \text{ equal to } 0 \text{ if otherwise}$$

$$D_2 = 1 \text{ if acquisition deal } i \text{ has } \Delta Risk_i > 0 ; \text{ equal to } 0 \text{ if otherwise}$$

$\hat{\beta}_1$  and  $\hat{\beta}_2$  represent the magnitude of expected risk reduction (increase) toward acquirers' announcement excess returns. Even though, our main objective is to examine a relation between *risk decrease* and wealth effect to shareholders of diversifying acquirers, our regression model also takes into account factor of *risk increase*. According to Eq. (5),  $\hat{\beta}_2$  can be used as a reflection of wealth effect to shareholders as a result of risk increase level. If it is significantly positive, it could imply that risk increase by means of corporate acquisition is wealth creation for shareholders because positive  $\hat{\beta}_2$  means that when risk is expected to increase, wealth accruing to acquiring firms' shareholders, which is proxy by CERs, is also increase. On the other hand, if it turns out as negative, it can imply that such increase in risk is perceived as wealth destroyed to shareholders.

If our hypothesis of *risk reduction as value maximization motive* holds, then we expect to find that  $\hat{\beta}_1$  is significantly positive in diversifying deals implying that risk



decrease through means of conglomerate acquisition is value creation to shareholders of diversifying firms (The larger the size of risk reduction, the higher the wealth creation to shareholders of the acquiring firms.) However, if hypothesis of *risk reduction as agency motive* holds, then  $\hat{\beta}_1$  should be significantly negative reflecting that risk reduction by means of conglomerate acquisition is value destruction to shareholders (The larger the size of risk reduction, the higher the wealth destroyed to shareholders).

Since the variations in acquiring firms and deal characteristics can also have a potential influence on announcement- period gain to acquirer's shareholders (Morellec & Zhdanov, 2008); (Ekkayokkaya & Paudyal, 2015), lists of our control variables for such variations are shown in Table 3.

### 3.3.1 Potential influence on announcement- period gain to acquirer's shareholders

Table 3

: Control variables employed in H2

Variable	Measurement	Predicted sign
<b><u>Acquirer characteristics</u></b>		
<i>Total asset</i>	$total\ asset = Ln(BV\ of\ total\ assets)$ where BV of total asset <sup>6</sup> was for year ending before the announcement date (day 0)	-
<i>Tobin's q</i>	$Tobin's\ q = (BV\ of\ total\ asset - BV\ of\ equity + market\ cap.) / BV\ of\ total\ asset$ where market cap. is observed 11 days before day 0	+/-
<i>Free cash flow</i>	$FCF = (EBITDA - CAPEX) / (BV\ of\ total\ asset - BV\ of\ equity + market\ cap.)$	-
<i>Leverage</i>	$Leverage = (BV\ of\ total\ asset - BV\ of\ equity) / (BV\ of\ total\ asset - BV\ of\ equity + market\ cap.)$	+

<sup>6</sup> Value of assets are deflated to year 2000 and stock market index is used as deflator

### Deal Characteristics

<i>Relative size</i>	<i>Relative size = (transaction value - fees - expenses)/ market cap.</i>	( - )
<i>Cash</i>	dummy variable equal to 1 if deals are financed with 100% cash	+
<i>Stock</i>	dummy variable equal to 1 if deals are financed with 100% equity	-

### Acquirer characteristics

- Total Asset** represents size of the acquirer which is denoted by acquirer's book total assets for fiscal year ending before the announcement date ( $t = 0$ ). (Morellec & Zhdanov, 2008) reports that large firms experience significant shareholders wealth losses when making an acquisition announcement of public firms. This finding is supported by evidence that acquisition premium paid increases with size of the acquirer even after controlling for other firm and deal characteristics. Consistent with hubris hypothesis (Roll, 1986) that overconfident managers systematically overestimate the return of their investment projects that is why they overpay. As a result, we expect that there is negative association between bidder gains and size.
- Tobin's q** is denoted by acquirer's market value divided by book total assets<sup>7</sup>. We use Tobin's q as a proxy for acquiring firm's prospect where firms with value of q below one are defined as firms with an anticipated decline in their current activities. For this variable, we have no prior expectation regarding the sign of beta coefficient because of the two contradictions in the literature. As suggested by (Lang & Stulz, 1994), they show that low q bidders have lower

<sup>7</sup> Firm market value is book total assets minus book value of common equity plus market cap where market cap. is the market value of common equity observed 11 days before day 0.

announcement returns. This is because firms that choose to diversify are poor performers relative to firms that do not. Therefore, acquiring firms with poor prospects should experience announcement -period losses. However, there is another argument of relation between acquirer's prospect (Tobin's q) and their announcement return. Given that firm's decision to diversify reflects profit-maximizing search for new growth opportunities (**Matsusaka, 1993**), it is more likely that firms with low Tobin's q will tend to diversify to exploit this opportunity. Thus, under this argument, it is predicted that diversifying acquisition by firms with low Tobin's q should create wealth to shareholders.

- **Free cash flow** is the ratio of earnings before interests, taxes and depreciation minus capital expenditure to firm market value. This variable is drawn from free cash flow hypothesis (**Jensen & Murphy, 1990**) which predicts that managers of firms with large free cash flow are more likely to undertake value-destroying acquisition. Thus, we predict that there is negative relation between acquirer's free cash flow and shareholders' wealth.
- **Leverage** is acquirer's book total assets minus book value of common equity scaled by firm market value. This variable is also drawn from free cash flow hypothesis (**Jensen & Murphy, 1990**) which suggests that debt is an effective tool to curtail wasteful spending by managers. This is because the interest payments on debt will limit the amount of free cash flow available for wasteful spending. With such argument, we predict that firm with low debt will be more likely to engage in such value-destroying acquisition and thus, result in value destroying to shareholders of the acquiring firms.

#### **Deal characteristics**

- **Stock<sub>i</sub> (Cash<sub>i</sub>)** represents method of payment which is a dummy variable taking value of one if deals are financed with 100 % equity (cash). (**TRAVLOS,**

1987), (FISHMAN, 1989), and (Martin & Sayrak, 2003) found that merger and acquisition deal in which cash is used as a method of payment have greater abnormal returns at the bid announcement than those firms using stocks. This is consistent with the context of (Myers & Majluf, 1984), when insiders, i.e., managers are assumed to know more about their firm's true value, any corporate decisions including bidder's choice of payment may signal valuable information to a less informed party or investors that market price of stock is currently under or overvalued. Consequently, we should observe that  $\hat{\beta}$  is negative for  $Stock_{ij}$  and positive for  $Cash_{ij}$

- **RelativeSize<sub>i</sub>** represents relative deal size to size of bidding firm. For this variable, it is proxy by the ratio of transaction value after fees and expenses to market cap of the acquirer.

## Chapter 4

### Empirical results

In this section, we provide 2 main sets of empirical results including risk changes in conglomerate and focus acquisitions estimated from our suggested Eq. (3). The second set of empirical test is to answer whether risk reduction through means of conglomerate acquisition is driven by motive consistent to shareholders' best interest or managers' self-interest. In this section, we conduct regression analysis to examine how the degree of risk changes that were obtained from H1 is associated with acquirer's equity returns surrounding the announcement period.

#### 4.1 Is there risk reduction in conglomerate acquisition?

To address our first hypothesis, we estimate asset risk of acquirers and combined firms in percentage format using Eq. (2). If risk is reduced in conglomerate acquisition then the difference between combined firms' risk and acquirers' risk in diversifying deals, on average, should be negative,  $\Delta Risk_{j=2} < 0$ . Interestingly, the result in **Table 4** reveals that risk of acquirers is expected to reduce not only in diversifying but also in focused acquisitions. It reports that mean (median) risk of acquirers in diversifying deals before acquisition is 2.8884% (1.9628%) and risk of combined firm is 2.5819% (1.8355%), thus the difference or changes in risk is -0.3065% (-0.1273%). Among focusing deal, it shows that mean (median) risk of acquirers before acquisition is 2.9641% (2.0103%) and risk of combined firm is 2.6885% (1.8907%), hence acquirers' changes in risk is -0.2756% (-0.1196%). We conduct paired t-test and Wilcoxon signed-rank test. Both statistics show that all values are significant at 1% level<sup>8</sup>. Since our preliminary evidence suggested that risk decrease in both types of deals, to explore further whether such reduction is essentially a dominant outcome unique for diversifying acquisitions, we conduct independent sample t-test and two-sample Wilcoxon rank-sum (Mann-Whitney) test. If things work

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<sup>8</sup> These results are still robust even we switch estimation periods to 1 year and 3 years. Results are reported in appendix C and appendix D

as the literatures and finance textbook have suggested then, we must at least observe risk is reduced more in diversifying than focusing deals. The results are shown in **Table 5**. For **Panel A**, we include entire sample of domestic acquisitions into consideration. The results in the last column show that acquirers' risk in diversifying sample is reduced more relatively to their focus counterparts where the mean difference is -0.0308% and median is -0.0077%. Yet, only median value that turns out significant.

As one might concern that the extent of risk reduction may be driven by bidders' self- characteristics such as their numbers of segment prior to the acquisition. For instance, if bidders have such a high risk prior to the acquisition, it is more likely that their risk may reduce more relative to other group of bidders with lower risk as the room for their reduction is larger. Referring to result in **Table 2**, former risk of the acquirers can be varied according to number of their businesses. It shows that single-segment firms are riskier than multi- segments firms and risk tend to be lower as their number of segments increase. Thus, to further address this issue, we provide additional tables presented in **Panel B** and **Panel C** of **Table 5**. These two tables also report risk characteristics but for subsample of deals in which acquirers *are single- segment firms* and *diversified firms (having more than 1 segment)*, respectively. We also report one more table, **Table 6**, which reports risk changes by numbers of acquirer segments in more detail.

When deals of single- segment acquirers are analyzed alone, as can be seen in **Panel B**, the difference of risk changes between diversifying and focusing deals are no longer statistically significant<sup>9</sup>. Moreover, results by mean and median are not in the same direction. Mean result is reported as -0.0346% while median result is reported as 0.0668% implying that based on our available data, we cannot conclude whether which

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<sup>9</sup> We also find that the difference of risk changes between diversifying and focusing deals are not statistically significant even when subsamples of deals in which *both* of bidders and targets are *single- segment firms* were analyzed alone. As a robustness test, we also report results of other estimation periods such as 1 year and 3 years. As reported in Appendix E, the results are in line with our based result that risk reduction is not significantly difference between diversifying and focusing deals.

type of deals is better at risk minimizing. However, in **Panel C**, when we analyze only subsample of multi- segments acquirers, we find that acquirers' risk is reduced more in diversifying acquisitions since the difference between the two groups are shown as negative and significant at 5 % level in mean and 1% level in median where mean difference is -0.0683% and median is -0.0116%. With this result, it leads us to dig down further whether risk reduction in diversifying are still greater than focusing even we divided deals into groups of acquirers' number of segment before an acquisition.

**Table 6** reveals that within multi- segments acquirers, risk of acquirers is expected to decline more in diversifying than focusing deals. As can be seen in the last column (Diversify – Focus) that every numbers turn out as negative value. Nevertheless, there is only subsample of 2 segments acquirers that mean and median are both statistically significant at 1% level where mean is reported as -0.2157% and median is reported as -0.0491%. For subsample of acquirers having 3- 4 segments, even both mean (-0.0753%) and median (-0.0251%) are shown as negative numbers, only mean value that turns out statistically significant. For highly diversified subsample having segments greater than 5, mean value is reported as -0.0299% and median is reported as -0.0288%. However, it is only median that is significant.

In sum, by applying the concept of Modern Portfolio Theory by Harry Markowitz and (Hamada, 1972) methodology as a derivation of our measure for firm risk, our findings offer results consistent with a common knowledge that corporate diversification is associated with firm risk reduction. However, our results also report that such decrease in firm risk remains significant even when acquirers engage in focusing type of deal. With this result, it may illustrate that asset diversification potential is also pronounced even when the two assets, i.e., firms from similar industry are combined together. In addition, we find that, on average, risk is expected to decline more in diversifying than focusing deals. However, this result holds only for deals in which acquirers are multi -segments firm, i.e., already diversified firms.

Table 4

Risk effect by type of acquisition

Risk measure for the sample of firms with completed acquisitions from January 1990 to December 2019. The sample consists of 8,408 domestic deals where 3,900 deals (46.4%) are categorized as diversifying acquisitions and 4,508 deals (53.6%) are categorized as focus acquisition. *Acquirer risk* is represented by firm's adjusted standard deviation computed from acquirer's stock price movement 2 year prior 21 day before the announcement date. *Risk of combined firm* is also adjusted standard deviation but it belongs to the bidder and the target as if they are combined.

The mean and median differences between combined firm risk and acquirer risk are measured by paired t-test and Wilcoxon signed-rank test, respectively. In parentheses is p-value for statistical significance \*\*\*Significant at the 0.01 level, \*\*Significant at the 0.05 level, and \*Significant at the 0.10 level.

(%)	Entire domestic sample			Diversifying			Focus		
	Acquirer risk	Combined firm risk	Difference	Acquirer risk	Combined firm risk	Difference	Acquirer risk	Combined firm risk	Difference
Mean	2.9290	2.6390	-0.2899*** (0.000)	2.8884	2.5819	-0.3065*** (0.000)	2.9641	2.6885	-0.2756*** (0.000)
Median	1.9851	1.8631	-0.1219*** (0.000)	1.9628	1.8355	-0.1273*** (0.000)	2.0103	1.8907	-0.1196*** (0.000)
obs.	8408			3900			4508		



Table 5

Risk measures broken down by various subsample of acquirers' segments prior to the acquisition

This table shows mean and median of risk measure on acquirers, targets, combined firms as well as change in acquirer's risk. Panel A reports risk measure for the entire domestic sample. Panel B and C report risk characteristics for subsample of single-segment acquirers and subsample of diversified acquirers, respectively. For firm types, single-segment or diversified, they are categorized based on a number of acquirers' first 2-digit SIC codes. To be more specific, if *all* of acquirer's SIC codes reported by SDC Platinum having the same first 2 digits, we will classify this firm as a single-segment firm. However, if firms have more than one difference in the first 2 digits, we will classify them as diversified firms (multi-segment firms).

Mean significance of changes in firm risk in each sample group are based on one-sample t test. The mean and median differences between diversifying and focus acquisition are measured by independent sample t-test allowing for unequal variances and two-sample Wilcoxon rank-sum (Mann-Whitney) test, respectively. In parentheses is p-value for statistical significance \*\*\*Significant at the 0.01 level, \*\*Significant at the 0.05 level, and \*Significant at the 0.10 level.

	All		Diversifying		Focus		Diversify - Focus	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
<i>Panel A: Entire domestic sample</i>								
<i>Acquirer risk</i>	2.9290	1.9851	2.8884	1.9628	2.9641	2.0103	-0.0757 (0.278)	-0.0475 (0.824)
<i>Target risk</i>	3.7809	2.6268	3.7152	2.7221	3.8377	2.5300	-0.1225 (0.182)	0.1921*** (0.000)
<i>risk of combined firm</i>	2.6390	1.8631	2.5819	1.8355	2.6885	1.8907	-0.1065* (0.065)	-0.0552 (0.786)
<i>changes in firm risk</i>	-0.2899*** (0.000)	-0.1219	-0.3065*** (0.000)	-0.1273	-0.2756*** (0.000)	-0.1196	-0.0308 (0.286)	-0.0077*** (0.000)
<i>no. observation</i>	8408		3900		4508			

(%)	All Sample		Diversifying		Focus		Diversify - Focus	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
<i>Panel B: Subsample of single segment acquirers</i>								
<i>Acquirer risk</i>	3.9647	2.8147	3.5990	2.3649	4.1530	3.1560	-0.5541*** (0.002)	-0.7912*** (0.000)
<i>Target risk</i>	4.9550	3.3556	4.2330	2.9443	5.3268	3.7337	-1.0938*** (0.000)	-0.7895*** (0.000)
<i>risk of combined firm</i>	3.5258	2.5383	3.1372	2.1196	3.7259	2.8439	-0.5887*** (0.000)	-0.7243*** (0.000)
<i>changes in firm risk</i>	-0.4389*** (0.000)	-0.2764	-0.4617*** (0.000)	-0.2453	-0.4271*** (0.000)	-0.3121	-0.0346 (0.681)	0.0668 (0.210)
<i>no. observation</i>	2283		776		1507			
<i>Panel C: Subsample of diversified acquirers</i>								
<i>Acquirer risk</i>	2.5429	1.7931	2.7119	1.8789	2.3671	1.6735	0.3448*** (0.000)	0.2054*** (0.000)
<i>Target risk</i>	3.3432	2.4199	3.5866	2.6536	3.0900	2.0787	0.4966*** (0.000)	0.5749*** (0.000)
<i>risk of combined firm</i>	2.3085	1.7055	2.4440	1.7843	2.1675	1.5904	0.2765*** (0.000)	0.1938*** (0.000)
<i>changes in firm risk</i>	-0.2344*** (0.000)	-0.0876	-0.2679*** (0.000)	-0.0946	-0.1996*** (0.000)	-0.0831	-0.0683** (0.015)	-0.0116*** (0.002)
<i>no. observation</i>	6125		3124		3001			

Table 6

Risk effect after the acquisition by number of acquirers' segment prior to the acquisition

This table shows changes in acquirer risk reported separately by number of acquirer's segments prior to the acquisition. Only domestic deals are included in this table. Mean significance of changes in firm risk for each sample group is based on one sample t- test. The mean and median differences between diversifying and focus acquisition are measured by independent sample t-test allowing for unequal variances and two-sample Wilcoxon rank-sum (Mann-Whitney) test, respectively. In parentheses is p-value for statistical significance \*\*\*Significant at the 0.01 level \*\*Significant at the 0.05 level and \*Significant at the 0.10 level In brackets is the sample size

<i>Number of acquirer segment pre-acquisition</i>	Entire domestic sample		Diversifying deals		Focusing deals		Diversify - Focus	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
1	-0.4389 (0.000) [2283]	-0.2764	-0.4617 (0.000) [776]	-0.2453	-0.4271 (0.000) [1507]	-0.3121	-0.0346 (0.686)	0.0668 (0.210)
2	-0.3526 (0.000) [2382]	-0.1335	-0.4862 (0.000) [906]	-0.1598	-0.2705 (0.000) [1476]	-0.1107	-0.2157*** (0.002)	-0.0491*** (0.006)
3≤Segment≤4	-0.1964 (0.000) [2168]	-0.1298	-0.2301 (0.000) [1196]	-0.1225	-0.1550 (0.000) [972]	-0.0974	-0.0752** (0.040)	-0.0251 (0.422)
Segment >=5	-0.1081 (0.000) [1575]	-0.0467	-0.1186 (0.000) [1022]	-0.0555	-0.0887 (0.000) [553]	-0.0267	-0.0299 (0.227)	-0.0288** (0.023)
<i>Total sample</i>	8408		3900		4508			

## 4.2 Is risk reduction by means of conglomerate acquisition good or bad for shareholders?

In this section we examine a relation between estimated risk reduction and announcement period gain to shareholders of acquiring firms. If the capital markets' assessment to acquisition announcement is unbiased, this announcement gain (loss) should be a good reflection of wealth creation (destroy) to shareholders. Recall, that our observations are reduced to 7,951 deals due to insufficient data to calculate one of our control variables.

### 4.2.1 Univariate analysis of market reactions to acquisition announcement

As shown in **Table 7**, acquirer's announcement- period excess returns, on average (median), are negative except for subsample of deals in which risk is expected to decline when firms engage in diversifying acquisition. If we look at diversifying deals alone, we find that mean of CERs in subsample of deals with risk decrease is statistically significant at 1% level where CERs shows up as 0.4108%. Even median result also reports positive CERs of 0.0328%, it is insignificantly different from zero. These findings indicate that corporate diversification can turn out as a bright side as well as a dark side for shareholders depending on whether such diversification attempt is expected to increase or decrease risk to acquirers. In terms of focusing deals, the results report that CERs are all negative. Nevertheless, only subsample of deals with expected risk increase reports that mean and median of CERs are significant at 5% and 1% respectively where mean of CERs is -0.7410% and median of CERs is -0.7354%. These results together indicate that markets are more likely to favor risk reduction only in diversifying deals and at the same time punishing focusing deals that are expected to enhance risk to the acquirers.<sup>10</sup>

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<sup>10</sup> Apart from presenting announcement returns by direction of risk changes, we also report univariate analysis of market reactions by types of acquisition and *level of risk decrease (increase)* in Appendix F. However, the pattern is not clearly observed

Univariate result from **Table 7** appears that markets tend to favor diversifying deals which are expected to result in risk reduction to acquirers. Even it might be too soon to make a conclusion based on univariate result, this preliminary evidence may offer a support of our H2.1 that risk reduction by means of conglomerate acquisition could be considered as value creation for shareholders. However, since many other factors including *acquiring firms* and *deal characteristics* also have a potential influence on market response to an acquisition announcement, we therefore, control for these variations and analyze them through multivariate regression framework as represented in **Table 8**.



*Table 7*

Univariate analysis of market reactions by type of acquisitions and direction of risk changes.

This table represents equity market reactions to an acquisition announcement for the entire domestic sample of 7951 deals. The sample deals are divided into group of risk increase (decrease). We divide sample into diversifying and focusing. We proxy for investor reactions using the (-2, +2) cumulative excess returns (CERs) in percentage format around the announcement date (day 0). Risk increase is a deal where expected risk of the combined firm is greater than acquirer's risk, i.e., positive changes in firm risk. The mean and median are measured by one- sample t test and one-sample Wilcoxon signed rank test, respectively. In parentheses is p-value for statistical significance \*\*\*Significant at the 0.01 level, \*\*Significant at the 0.05 level, and \*Significant at the 0.10 level.

CERs	Entire domestic deals			Diversifying			Focusing		
	obs.	mean	median	obs.	mean	median	obs.	mean	median
Risk increase	1176	-0.3928*	-0.4733***	594	-0.0515 (0.862)	-0.2014 (0.373)	582	-0.7410** (0.019)	-0.7354*** (0.002)
Risk decrease	6775	0.1792* (0.054)	-0.0584 (0.454)	3097	0.4108*** (0.004)	0.0328 (0.487)	3678	-0.0159 (0.896)	-0.1514 (0.101)
Entire sample	7951			3691			4260		

#### 4.2.2 Regression analysis of announcement- periods gains to diversifying deals with various degree of risk reduction attempts

Since our objective is to examine whether risk reduction through means of conglomerate acquisition is value creation or destroy to shareholders, our main variable of interest is  $D_1 \cdot |\Delta Risk_i|$  where beta estimated will capture a relation between the announcement excess return and level of risk decrease.

**Panel A** of **Table 8** includes all domestic samples both diversifying and focusing deals. Model (1) represents regression coefficient estimated without incorporating any control variables. The results show that coefficients of D1 and D2 which are dummy variables for deals with risk reduction and risk increase are statistically significant at 1% and 5%, respectively. Since coefficient of D1 (0.187) is positive while D2 (-0.459) is negative, these beta estimates together provide evidence that regardless of acquisition types and other potential factors that may affect announcement return to bidders' shareholders, on average, markets tend to be more favorable to deals with expected risk reduction rather than risk increase.

Model (2) and model (3) report the results after we incorporate all the control variables including firm and deals characteristics mentioned in section 3.3.1. Given that the number of acquisition deals is fluctuated across years as reported in **Table 1**, we therefore, include year fixed effect in model (2). We also incorporate industry fixed effect in model (3) to capture an unobservable industry specific factors that may have an impact on acquirers' announcement returns. For model (4), we include both year and industry fixed effect.

Our H2.1, stating that *risk reduction in conglomerate acquisition is driven by value maximization motive*, predicts a positive sign for  $\hat{\beta}_1$ . Specifically, this positive value will indicate that there is a marginal wealth increase to diversifying firms' shareholders for every increase in level of risk reduction attempt. On the other hand, our H2.2 stating that *risk reduction is driven by managers' agency motive*, predicts a

negative sign for  $\hat{\beta}_1$  to reflect that for every increase in risk reduction attempt, it will result in wealth decrease to shareholders of diversifying firms. Based on results from entire domestic sample reported in **Panel A**, it shows that even  $\hat{\beta}_1$  are consistently positive across all models, they are not statistically significant at any conventional level. However, in **Panel B** where subsample of diversifying deals were analyzed alone, the results turn out that  $\hat{\beta}_1$  are now positively significant at 5% level across all models<sup>11</sup> except model (1). According to reported results,  $\hat{\beta}_1$  in model (2), model (3), and model (4), are reported as 0.262, 0.237, and 0.229, respectively. The empirical findings presented above are consistent with shareholders' value maximization motive in line with our H2.1. This is because our results reveal a marginal increase in announcement excess return for additional increase in level of firm risk reduction attempt. Regarding to the coefficient of  $D2 \cdot \Delta Risk$  in **Panel B**, all the betas estimated are reported as negative value except in model (1). Even though, they are not statistically significant, these results together are also in line with our H2.1.

To find out whether such wealth increase as a result of risk reduction attempt is unique to diversifying type of deal, we run another regression which *included only focusing acquisitions*. As can be seen in **Panel C**,  $\hat{\beta}_1$  are no longer significant in any model. Moreover, as opposed to diversifying acquisition, sign of beta estimated turn out as negative. Though not significant, it indicates that market, on average, reward (punish) acquirers with prospect of risk reduction differently between diversifying and focusing acquisition.

For result of control variables reported in **Panel A**,  $Ln(Asset)$ , which is generally used to capture size of bidders, are statistically significant at 1% level in all models. The result shows sign as predicted reflecting that market tends to react negatively to

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<sup>11</sup> We also report regression analysis using 1 year and 3 years window period in appendix G and appendix H. Result of window 3 years in panel B where subsample of diversifying deals were regressed,  $\hat{\beta}_1$  are reported as positive value consistent with our base result using 2 years estimation period. However, these estimated betas are not statistically significant at the conventional levels



deals with large acquiring firms. This result is in line with (Morellec & Zhdanov, 2008). One plausible explanation can be explained by hubris hypothesis by (Roll, 1986). He reports that managers in large firms tend to overestimate their investment project and end up paying too much premium on targets. Therefore, this might explain why we observe net wealth loss to shareholders. Coefficient of *FCF* is also reported as negative sign and statistically significant at 1% level in all models. Interestingly, it seems that markets tend to react very badly to firms with large free cash flow since coefficients are lowest (highest negative value) among all variables. This result provides a support of free cash flow hypothesis (Jensen & Murphy, 1990). It is no surprising that markets would react negatively to firm with large free cash flow on hand because instead of paying out to shareholders, managers may keep it to store resources under their control. Given the real world situation where there exist information asymmetry and thus, adverse selection (situation in which shareholders do not know which managers are good or bad) and moral hazard problem, even free cash flow is ideally spent to exploit positive NPV projects, there is still reasons for markets to suspect that firms with too much cash flow may reflect a symptom of agency problem. In line with free cash flow hypothesis, coefficients of *leverage* also turn as positive numbers with 1% significant level. If market believes that debt is an effective tool to limit wasteful spending by manager, then this might be a supporting reason why we observe positive association between leverage and acquirers' announcement returns. In terms of payment method, as can be seen from variable *all cash*, they are reported as positive value with 1% significant level. On the contrary, variable *all stock*, even they are not significant, beta estimated show up as negative numbers. These signs appear as expected and in line with results by (TRAVLOS, 1987), (FISHMAN, 1989) and, (Martin & Sayrak, 2003). One explanation could be derived from the context of (Myers & Majluf, 1984) that under asymmetry information where managers know true value of their firms while investors do not, stock payment may convey an information that currently, stock prices are overvalued. Therefore, if market perceive that this stock is now overvalued, there is not surprising to see selling pressure to suppress the market

price down during the announcement date. Moreover, method of payment can also send an information to the market how managers are confident about their expected synergy. If managers are confident, there will be no reason to pay with stock since part of the profit accruing to them will be shared to other parties. For *Tobins Q*, betas estimated are not significant in any model implying that this factor when analyzed with other variables might not be strong enough to explain announcement return to the acquirer. The results for the control variables in **Panel B** and **Panel C**, coefficient of *Ln (Asset)*, *FCF*, and *All Cash* are still consistent with the results reported in **Panel A**, only Leverage that is left insignificant in **Panel B**.

In sum, the results from **Table 8** altogether provide empirical support for value maximization motive underlying conglomerate acquisition which is in line with our H2.1. Specifically, there is a marginal increase in shareholders' wealth of acquirers when firms engage in diversifying acquisition with expectation to reduce risk. Even though, we find that risks are expected to decline in both types of deals as documented in session 4.1, this positive relation of shareholders' wealth increase and level of risk reduction attempt is present only in subsample of diversifying acquisitions, implying that this evidence of wealth creation motive we found is unique only in diversifying acquisitions. Even though, it has been argued by prior literatures that diversifying at corporate level should not create value to shareholders since investors can diversify their portfolio on their own (**Levy & Sarnat, 1970**) and some literatures relate this risk reduction attempt to agency motive (**Amihud & Lev, 1981**); (**MAY, 1995**); (**Aggarwal & Samwick, 2003**), our results argue that this might not be the case because risk decrease resulted from diversifying at corporate level can deliver some benefits that shareholders cannot achieve on their own. One such example is financial synergy due to the co-insurance effect (**Lewellen, 1971**) which results in lower in firm's default risk and thus larger in firm's debt capacity. Also, to the extent that co- insurance can help diversified firms avoid counter- cyclical deadweight cost such as cost of financial distress during the economic downturn, this will in turn reduce firm's cost of capital (**HANN et al., 2013**). Given that such increase in firm's debt capacity and lower in

firm's cost of capital are utilized to exploit valuable growth opportunity or to finance positive NPV project, this will therefore be a supportive reason why risk decrease at corporate level can potentially generate value to shareholders.

**Table 8**

Regression analysis of gains to acquiring firm's shareholders

In all models, the dependent variable is acquirer announcement- period gain. We proxy for acquirer announcement- period gain using the (-2, +2) cumulative excess returns (CERs) in percentage format around the announcement date (day 0). D1 and D2 are dummy variables taking value of one if deals are expected to gain risk decrease (increase) and equal to zero if otherwise.  $|\Delta Risk_{ij}|$  is absolute value of risk decrease. The industry fixed effects represent acquires' primary 2- digits SIC industries. All other explanatory variables are defined as in Table 7. The robust standard errors are clustered by firms. In parentheses is p- value for statistical significance. Panel A reports regression analysis for the entire sample of domestic acquisition. Panel B and C report regression analysis for subsample of diversifying acquisitions and focus acquisitions, respectively

**Panel A:** Regression analysis for all domestic acquisitions

Explanatory variables	(1)	(2)	(3)	(4)
D1	0.187* (0.058)	0.591 (0.651)	3.481*** (0.000)	1.888 (0.232)
D2	-0.459** (0.039)	-0.0348 (0.979)	2.924*** (0.001)	1.286 (0.421)
D1 · $ \Delta Risk $	0.0215 (0.840)	0.147 (0.163)	0.102 (0.336)	0.114 (0.278)
D2 · $\Delta Risk$	0.216 (0.444)	-0.0124 (0.967)	0.00831 (0.978)	-0.0178 (0.954)
Ln(Asset)		-0.214*** (0.000)	-0.203*** (0.000)	-0.187*** (0.000)
Tobin's Q		-0.0226 (0.260)	-0.0229 (0.241)	-0.0176 (0.336)
FCF		-3.077*** (0.002)	-3.515*** (0.000)	-3.291*** (0.001)
Leverage		1.271***	1.950***	1.796***

		(0.002)	(0.000)	(0.001)
Relative size		0.00204	-0.0207	-0.00994
		(0.974)	(0.745)	(0.875)
All cash		0.964***	0.872***	0.838***
		(0.000)	(0.000)	(0.000)
All stock		-0.0967	0.0281	0.0602
		(0.710)	(0.914)	(0.818)
Observations	7,951	7,951	7,951	7,951
Adjusted R-squared	0.001	0.022	0.022	0.028
Industry FE			Yes	Yes
year FE		Yes		Yes

**Panel B: Regression analysis for subsample of diversifying acquisitions**

Explanatory variables	(1)	(2)	(3)	(4)
D1	0.460***	0.915	3.636***	1.223
	(0.002)	(0.569)	(0.001)	(0.541)
D2	-0.0851	0.586	3.402***	0.999
	(0.779)	(0.725)	(0.003)	(0.620)
D1 · $ \Delta Risk $	0.123	0.262**	0.237**	0.229**
	(0.237)	(0.029)	(0.042)	(0.045)
D2 · $\Delta Risk$	0.136	-0.212	-0.296	-0.333
	(0.864)	(0.547)	(0.406)	(0.347)
Ln(Asset)		-0.241***	-0.208***	-0.189**
		(0.000)	(0.005)	(0.011)
Tobins Q		-0.0303	-0.0374	-0.0310
		(0.327)	(0.219)	(0.313)
FCF		-4.158**	-4.206**	-4.062**
		(0.024)	(0.017)	(0.025)
Leverage		0.666	1.141	1.077
		(0.294)	(0.116)	(0.145)
Relative size		0.0473	0.0218	0.0310
		(0.224)	(0.589)	(0.441)
All cash		0.796***	0.780***	0.790**
		(0.008)	(0.010)	(0.012)
All stock		0.0541	0.229	0.147
		(0.906)	(0.621)	(0.752)
Observations	3,691	3,691	3,691	3,691
Adjusted R-squared	0.002	0.023	0.020	0.025

Industry FE		Yes	Yes
year FE	Yes		Yes

**Panel C:** Regression analysis for subsample of focus acquisitions

Explanatory variables	(1)	(2)	(3)	(4)
D1	-0.0711 (0.592)	0.192 (0.933)	-1.991** (0.013)	-2.836 (0.249)
D2	-0.869*** (0.009)	-0.668 (0.776)	-2.776*** (0.003)	-3.718 (0.140)
D1 · $ \Delta Risk $	-0.158 (0.476)	-0.0997 (0.660)	-0.140 (0.541)	-0.120 (0.597)
D2 · $\Delta Risk$	0.345 (0.455)	0.259 (0.562)	0.395 (0.388)	0.317 (0.485)
Ln(Asset)		-0.159*** (0.009)	-0.192*** (0.002)	-0.171*** (0.007)
Tobins Q		-0.0181 (0.457)	-0.0173 (0.355)	-0.0113 (0.592)
FCF		-2.710** (0.033)	-3.284** (0.011)	-3.087** (0.018)
Leverage		1.758*** (0.001)	2.590*** (0.001)	2.205*** (0.003)
Relative size		-0.169 (0.594)	-0.322 (0.313)	-0.255 (0.432)
All cash		1.147*** (0.000)	1.016*** (0.000)	0.984*** (0.000)
All stock		-0.0901 (0.778)	0.0400 (0.900)	0.105 (0.743)
Observations	4,260	4,260	4,260	4,260
Adjusted R-squared	0.001	0.024	0.029	0.035
Industry FE			Yes	Yes
year FE		Yes		Yes

## Chapter 5

### Conclusions

The notion of risk reduction in corporate diversification has been widely claimed in parts of finance textbooks as well as academic literature. Nevertheless, the accuracy of this claim has not yet well documented. Even there exist some literatures examining risk effect following corporate diversification, there is still no empirical evidence to support this argument. We argue that ex post risk measure that were applied in prior studies have some drawbacks. One major drawback is that it may unintentionally capture management's action that could alter risk profiles of the combining unit.

In our study, we examine risk effect in conglomerate acquisitions through portfolio diversification framework. In contrast to much of previous studies, our measure of firm risk is essentially based on ex ante model. Our key finding is consistent with theoretical expectation that based on asset diversification potential, there is risk decrease in diversifying acquisitions. However, the more interesting evidence here is that we also observe risk decrease in focusing type of deals. We further document that among deals in which both of bidders and targets are single- segment firms, acquirers' risk reduction are not statistically different between focusing and diversifying acquisition. Nevertheless, results from multi- segment acquirers reveal that risk is expected to decline more in diversifying than focusing deals. These findings together may indicate that based on perspective of firms' risk effect driven by asset diversification potential, we could not observe any evidence to strongly support the notion that firms especially those single- segment acquirers diversify to reduce risk as our results indicate that risk is expected to decline no matter firms engage which type of acquisition.

Apart from examining firm's risk perspective, we also analyze risk reduction relation toward shareholders' wealth of diversifying acquirers. That is to examine

whether risk reduction through corporate acquisition is essentially motivated by shareholders interest or managers' self- interest. By using our ex ante risk measure as a proxy for managers' risk reduction attempt and announcement excess returns surrounding announcement date as a proxy for wealth effect to acquiring firms' shareholders, we find empirical support for the hypothesis that risk reduction through conglomerate acquisition is driven by value maximization motive consistent with shareholders' interest. This is because our results indicate that there is significant positive association between the level of risk reduction attempt and shareholders' wealth of the acquiring firms. The results further indicate that this relation is pronounced only in diversifying not in focusing deals, implying that the evidence of wealth creation motive is unique only to diversifying acquisition. Even though, our study does not aim to deliver the absolute answer whether corporate diversifications, in general, are good or bad for shareholders, our study provides one empirical evidence based only on risk reduction perspective that corporate diversification can also generate value to shareholders if such diversification attempt is expected to reduce risk of the combined entity.



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## Appendix A: unlevered factor of firm's equity risk

Regarding to **Hamada (1972)**, if the MM theory is valid, a systematic risk of an unlevered firm ( $\beta_A$ ) or risk of firm as if it has no debt in its capital structure can be estimated from beta estimated of a levered firm ( $\beta_B$ ). That is:

$$\beta_A = \left(\frac{E}{A}\right)_{t-1} \cdot \beta_B \quad (1a)$$

The first term on the right- hand side of eq. (1a) can be regarded as the *adjustment factor* of individual firm leverage.

Where E = value of firm's *total equity* at the beginning of the period

A = value of firm's *total asset* at the beginning of the period (i.e., the sum of firm's value of debt and equity)

Recalls beta estimate of firm i:

$$\begin{aligned} \beta_{Bi} &= \frac{Cov(R_{Bi}, R_M)}{Var(M)} = \frac{\rho_{Bi,M} \cdot \sigma_{Bi} \cdot \sigma_M}{\sigma_M \cdot \sigma_M} \\ &= \frac{\rho_{Bi,M} \cdot \sigma_{Bi}}{\sigma_M} \end{aligned} \quad (2a)$$

Then substitute the RHS of (2a) into the RHS of (1a), we get:

$$\beta_A = \left(\frac{E}{A}\right)_{t-1} \cdot \frac{\rho_{Bi,M} \cdot \sigma_{Bi}}{\sigma_M}$$

With some re- arrangement:

$$\beta_A = \left[\left(\frac{E}{A}\right)_{t-1} \cdot \sigma_{Bi}\right] \left[\frac{\rho_{Bi,M}}{\sigma_M}\right] \quad (3a)$$

From eq. (3a), the adjustment factor,  $\left(\frac{E}{A}\right)_{t-1}$ , will only affect standard deviation term,  $\sigma_{Bi}$ , not the correlation,  $\left[\frac{\rho_{Bi,M}}{\sigma_M}\right]$  because the correlation by structure is the covariance that is rescaled by the two standard deviation. Therefore, the range of the covariance is now bounded between value of -1 and 1. This is why we adjust firm's leverage directly to variance and standard deviation terms as can be seen in eq. (2)

### Appendix B : Standard deviation of levered firm's equity return

$$\text{Combined firm Variance } (\sigma_c^2) = w_A^2 \sigma_A^2 + w_B^2 \sigma_B^2 + 2w_A w_B \rho_{AB} \sigma_A \sigma_B \quad (1b)$$

$$\text{Changes in firm's risk } (\Delta \text{Risk}) = \sigma_c^2 - \sigma_A^2 \quad (2b)$$

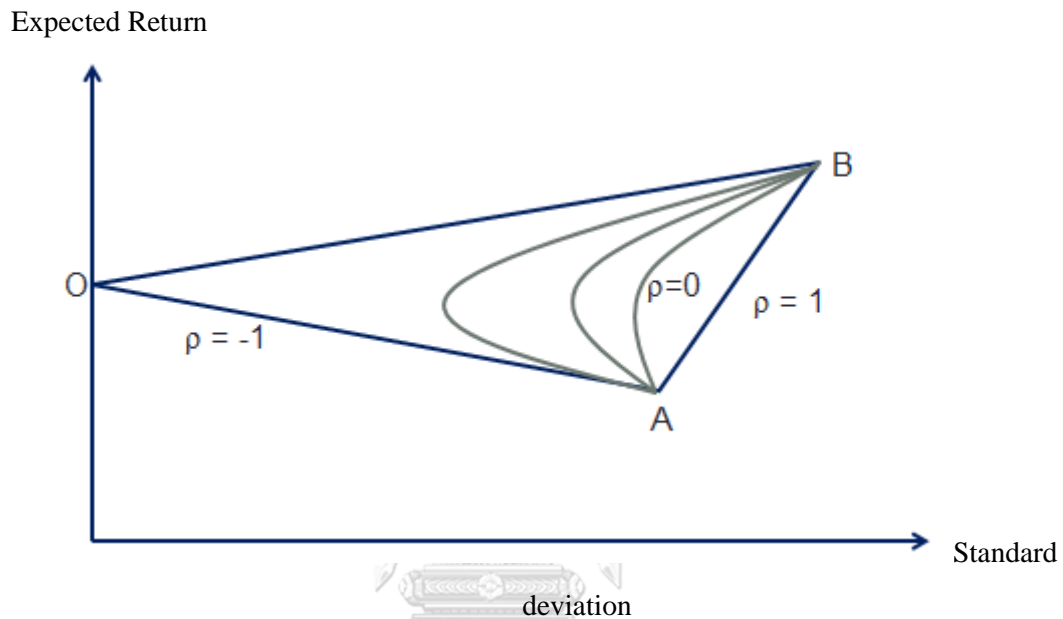


Figure 1: Correlation and diversification benefit  
<https://financetrain.com/effect-of-correlation-on-diversification/>

As illustrated by Eq. (1b), (2b) and figure 1, suppose that bidder's and target's standard deviation of equity return before the acquisition are presented by point A and B, respectively. Each point on concave curve represents possible standard deviation of combined firm. According to conventional concept of portfolio diversification, risk of a portfolio can be reduced as long as the two assets have low correlation with each other. However, our main objective is to examine changes in risk of a bidder. Thus, it implies that we set  $\sigma_A^2$  just like a benchmark to see whether  $\sigma_{cij}^2$  will be higher or lower than  $\sigma_A^2$ . By structure,  $\sigma_c^2$  can be lower or higher than  $\sigma_A^2$  depending on relative weight, correlation, and relative risk of bidder and target.

For the case that target is riskier than bidder ( $\sigma_B > \sigma_A$ ) as shown in figure 1, combined firm's risk  $\sigma_c^2$  can be larger or lower than bidder's risk depending on those factors mentioned above. However, for the case that bidder is riskier than target ( $\sigma_B < \sigma_A$ ), regardless of target's size it acquires and correlation, risk of combined firms will always lower than bidder ( $\sigma_{c_{ij}}^2 < \sigma_A$  or  $-\Delta Risk_{ij}$ )



## Appendix C

### Robustness test: Measure of risk changes (1 year window period)

Measure of risk changes for the sample of firms with completed domestic acquisitions from January 1990 to December 2019. The sample size increases to 9,347 deals where 4,432 deals (47.4%) are categorized as diversifying acquisitions and 4,915 deals (52.6%) are categorized as focus acquisition. *Acquirer risk* is represented by firm's adjusted standard deviation computed from acquirer's stock price movement 1 year prior 21 day before the announcement date.

(%)	Entire domestic sample			Diversifying			Focus		
	Acquirer risk	Combined firm risk	Difference	Acquirer risk	Combined firm risk	Difference	Acquirer risk	Combined firm risk	Difference
Mean	2.9307	2.6465	-0.2842*** (0.000)	2.8477	2.5470	-0.3007*** (0.000)	3.0055	2.7363	-0.2692*** (0.000)
Median	1.9443	1.8194	-0.1249*** (0.000)	1.8847	1.7836	-0.1011*** (0.000)	1.9990	1.8683	-0.1307*** (0.000)
obs.	9347			4432			4915		

Risk effect after the acquisition reported by numbers of acquirers' segment

	Entire Sample		Diversifying deals		Focusing deals		Difference	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
<i>Number of acquirer segment pre-acquisition</i>								
1	-0.4218 (0.000) [2572]	-0.2092	-0.4843 (0.000) [887]	-0.2574	-0.3888 (0.000) [1685]	-0.2025	-0.0955 (0.362)	-0.0549** (0.040)
2	-0.3473 (0.000) [2697]	-0.1270	-0.4550 (0.000) [1079]	-0.1454	-0.2754 (0.000) [1618]	-0.1185	-0.1796*** (0.007)	-0.0269 (0.337)
3<Segment<=4	-0.1950 (0.000) [2399]	-0.0920	-0.2190 (0.000) [1360]	-0.0841	-0.1635 (0.000) [1039]	-0.1258	-0.0555 (0.137)	0.0417 (0.289)
Segment >= 5	-0.0995 (0.000) [1679]	-0.0428	-0.1035 (0.000) [1106]	-0.0265	-0.0919 (0.000) [573]	-0.0160	-0.0116 (0.657)	-0.0105*** (0.081)
<i>Total sample</i>	9347		4432		4915			

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## Appendix D

### Robustness test: Measure of risk changes (3 years window period)

Measure of risk changes for the sample of firms with completed domestic acquisitions from January 1990 to December 2019. The sample reduces to 7,589 deals where 3,537 deals (46.6%) are categorized as diversifying acquisitions and 4,052 deals (53.4%) are categorized as focus acquisition. *Acquirer risk* is represented by firm's adjusted standard deviation computed from acquirer's stock price movement 3 years prior 21 day before the announcement date.

(%)	Entire domestic sample			Diversifying			Focusing		
	Acquirer risk	Combined firm risk	Difference	Acquirer risk	Combined firm risk	Difference	Acquirer risk	Combined firm risk	Difference
Mean	2.9539	2.6473	-0.3066*** (0.000)	2.8673	2.5593	-0.3080*** (0.000)	3.0295	2.7242	-0.3053*** (0.000)
Median	2.0101	1.8657	-0.1443*** (0.000)	2.0018	1.8696	-0.1322*** (0.000)	2.0205	1.8636	-0.1569*** (0.000)
obs.	7589			3537			4052		



Risk effect after the acquisition reported by numbers of acquirers' segment

	Entire Sample		Diversifying deals		Focusing deals		Difference	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
<i>Number of acquirer segment pre-acquisition</i>								
1	-0.5009 (0.000) [1980]	-0.2744	-0.4745 (0.000) [685]	-0.3022	-0.5148 (0.000) [1295]	-0.2367	0.0403 (0.695)	-0.0655 (0.2082)
2	-0.3806 (0.000) [2143]	-0.1558	-0.4849 (0.000) [800]	-0.2099	-0.3184 (0.000) [1343]	-0.1443	-0.1664** (0.035)	-0.0655** (0.015)
3 ≤ Segment ≤ 4	-0.1795 (0.000) [1982]	-0.1572	-0.2377 (0.000) [1092]	-0.1441	-0.1079 (0.000) [890]	-0.1025	-0.1298** (0.019)	-0.0416 (0.715)
Segment ≥ 5	-0.1103 (0.000) [1484]	-0.0443	-0.1218 (0.000) [960]	-0.0605	-0.0891 (0.000) [524]	-0.0480	-0.0327 (0.197)	-0.0124*** (0.048)
<i>Total sample</i>	7589		3537		4052			

## Appendix E

### Robustness test: Risk changes for subsample of single-segment acquirers and singled-segment targets across window periods

Measure of risk changes for the sample of firms with completed domestic acquisitions from January 1990 to December 2019 by several risk estimation periods. Only single-segment acquirers and single-segment targets are included in this table.

The mean and median differences between diversifying and focus acquisition are measured by independent sample t-test allowing for unequal variances and two-sample Wilcoxon rank-sum (Mann-Whitney) test, respectively. In parentheses is p-value for statistical significance \*\*\*Significant at the 0.01 level. \*\*Significant at the 0.05 level. and \*Significant at the 0.10

window periods	Entire Sample		Diversifying deals		Focusing deals		Difference	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
<i>1 year</i>	-0.4754 [1602]	-0.2541	-0.5867 [364]	-0.2275	-0.4427 [1238]	-0.3213	-0.1440 (0.539)	0.0938 (0.118)
<i>2 years</i>	-0.5077 [1409]	-0.3158	-0.6000 [310]	-0.2235	-0.4817 [1099]	-0.2225	-0.1183 (0.518)	-0.0010 (0.266)
<i>3 years</i>	-0.5821 [1201]	-0.2595	-0.5925 [272]	-0.2489	-0.5791 [929]	-0.1674	-0.0134 (0.946)	-0.0815 (0.239)

## Appendix F

Univariate analysis of market reactions by acquisition types and degree of risk decrease/ increase.

This table reports equity market reactions to an acquisition announcement. The sample deals are divided into level of risk decrease/ increase and types of acquisitions. Panel A reports subsample of risk decrease while Panel B reports subsample of risk increase. In this table, our sample are then divided into four equal parts based on level of risk changes, i.e., quartile, where the first quartile of Panel A refers to the group of observations that has the highest degree of risk reduction and the second quartile is the second largest and so on. The mean and median are measured by one- sample t test and one-sample Wilcoxon signed rank test, respectively. In parentheses is p-value for statistical significance \*\*\*Significant at the 0.01 level, \*\*Significant at the 0.05 level, and \*Significant at the 0.10 level.

Panel A: Subsample of risk decrease

CERs	All domestic deals			Diversifying			Focusing		
	obs.	mean	median	obs.	mean	median	obs.	mean	median
Quartile 1	1694	0.2979 (0.2465)	-0.0473 (0.8776)	764	0.9255 (0.0236)	0.0296 (0.3019)	930	-0.2178 (0.5041)	-0.2085 (0.4707)
Quartile 2	1694	0.2503 (0.1791)	0.0526 (0.9367)	723	0.2536 (0.4155)	-0.0536 (0.8761)	971	0.2478 (0.2768)	0.1226 (0.8254)
Quartile 3	1694	0.1527 (0.3304)	-0.1739 (0.1065)	717	0.4155 (0.0812)	-0.0270 (0.9909)	977	-0.0401 (0.8473)	-0.2570** (0.0343)
Quartile 4	1693	0.0157 (0.8904)	-0.0293 (0.9886)	893	0.0939 (0.5636)	0.0752 (0.3934)	800	-0.0717 (0.6509)	-0.1945 (0.3610)
Total	6775			3097			3678		

Panel B: subsample of risk increase

CERs	All domestic deals			Diversifying			Focusing		
	obs.	mean	median	obs.	mean	median	obs.	mean	median
Quartile 1	294	-0.0423 (0.8708)	-0.0867 (0.8772)	202	0.1336 (0.6636)	-0.0645 (0.332)	92	-0.4284 (0.3794)	-0.3886 (0.4737)
Quartile 2	294	0.0070 (0.9856)	-0.4656 (0.1090)	159	0.3471 (0.5350)	-0.2765 (0.7167)	135	-0.3934 (0.4658)	-1.0453** (0.0498)
Quartile 3	294	-0.6944 (0.1103)	-0.7437* (0.0772)	120	0.1380 (0.827)	-0.4308 (0.9436)	174	-1.2685** (0.0322)	-1.0148** (0.0246)
Quartile 4	294	-0.8414 (0.1485)	-0.8654 (0.0524)	113	-1.1445 (0.2692)	-1.0095 (0.1695)	181	-0.6522 (0.3470)	-0.7958 (0.1709)
	1176			594			582		

## Appendix G

### Robustness test: Regression analysis of announcement- period returns to acquiring firm's shareholders (1 year window period)

In all models, the dependent variable is acquirer announcement excess returns. We proxy for acquirer announcement- period gain using the (-2, +2) cumulative excess returns (CERs) in percentage format around the announcement date (day 0). D1 and D2 are dummy variables taking value of one if deals are expected to gain risk decrease (increase) and equal to zero if otherwise.  $|\Delta Risk|$  is absolute value of risk decrease. The industry fixed effects represent acquires' primary 2- digits SIC industries. All other explanatory variables are defined as in Table 3. The robust standard errors are clustered by firms. In parentheses is p- value for statistical significance. Panel A reports regression analysis for the entire domestic acquisitions. Panel B and C report regression analysis for subsample of diversifying and focus acquisitions, respectively

#### Panel A: Regression analysis for all domestic acquisitions

Explanatory variables	(1)	(2)	(3)	(4)
D1	0.0915 (0.469)	0.655 (0.624)	6.311 (0.298)	4.662 (0.446)
D2	-0.368* (0.0570)	0.178 (0.895)	5.857 (0.334)	4.171 (0.495)
D1 · $ \Delta Risk $	-0.280 (0.279)	-0.276 (0.332)	-0.310 (0.278)	-0.297 (0.294)
D2 · $\Delta Risk$	0.474** (0.016)	0.389* (0.058)	0.411** (0.049)	0.388* (0.062)
Ln(Asset)		-0.196*** (0.000)	-0.180*** (0.000)	-0.169*** (0.001)
Tobin's Q		-0.0667* (0.071)	-0.0643* (0.070)	-0.0549 (0.118)
FCF		-2.271** (0.030)	-2.632** (0.012)	-2.381** (0.025)
Leverage		1.566*** (0.000)	2.287*** (0.000)	2.161*** (0.000)
Relative size		-0.129 (0.443)	-0.159 (0.361)	-0.140 (0.414)
All cash		0.990*** (0.000)	0.948*** (0.000)	0.920*** (0.000)
All stock		-0.205	-0.101	-0.0708

		(0.426)	(0.696)	(0.784)
Observations	8,884	8,884	8,884	8,884
Adjusted R-squared	0.003	0.022	0.023	0.027
Industry FE			Yes	Yes
year FE		Yes		Yes

**Panel B:** Regression analysis for subsample of diversifying acquisitions

Explanatory variables	(1)	(2)	(3)	(4)
D1	0.366** (0.039)	0.124 (0.937)	6.130 (0.304)	4.006 (0.519)
D2	-0.127 (0.634)	-0.285 (0.858)	5.807 (0.329)	3.710 (0.550)
D1 · $ \Delta Risk $	-0.335 (0.315)	-0.309 (0.384)	-0.308 (0.383)	-0.309 (0.372)
D2 $\Delta Risk$	0.180 (0.437)	-0.006 (0.979)	-0.0803 (0.721)	-0.106 (0.630)
Ln(Asset)		-0.193*** (0.002)	-0.161** (0.020)	-0.148** (0.034)
Tobins Q		-0.0533 (0.141)	-0.0573* (0.097)	-0.0510 (0.133)
FCF		-3.799** (0.023)	-3.960** (0.014)	-3.751** (0.022)
Leverage		1.250** (0.031)	1.686** (0.012)	1.691** (0.013)
Relative size		0.0762 (0.628)	0.0670 (0.672)	0.0786 (0.614)
All cash		0.744*** (0.009)	0.744*** (0.008)	0.769*** (0.008)
All stock		-0.315 (0.468)	-0.201 (0.647)	-0.251 (0.567)
Observations	4,219	4,219	4,219	4,219
Adjusted R-squared	0.007	0.026	0.026	0.031
Industry FE			Yes	Yes
year FE		Yes		Yes

**Panel C: Regression analysis for subsample of focus acquisitions**

Explanatory variables	(1)	(3)	(4)	(5)
D1	-0.102 (0.447)	1.581 (0.507)	-2.063** (0.023)	-2.262 (0.361)
D2	-0.681** (0.018)	1.019 (0.674)	-2.651*** (0.009)	-2.903 (0.251)
D1 · $ \Delta Risk $	-0.0943 (0.706)	-0.142 (0.594)	-0.178 (0.513)	-0.145 (0.591)
D2 · $\Delta Risk$	0.871*** (0.010)	0.821** (0.016)	0.926*** (0.005)	0.853** (0.013)
Ln (Asset)		-0.182*** (0.003)	-0.199*** (0.001)	-0.186*** (0.004)
Tobins Q		-0.114 (0.254)	-0.1000 (0.319)	-0.0752 (0.454)
FCF		-1.854 (0.185)	-2.311 (0.101)	-2.122 (0.137)
Leverage		1.711*** (0.005)	2.616*** (0.002)	2.328*** (0.007)
Relative size		-0.337 (0.325)	-0.485 (0.171)	-0.398 (0.264)
All cash		1.226*** (0.000)	1.172*** (0.000)	1.170*** (0.000)
All stock		0.022 (0.945)	0.114 (0.723)	0.162 (0.615)
Observations	4,665	4,665	4,665	4,665
Adjusted R-squared	0.002	0.023	0.024	0.028
Industry FE			Yes	Yes
year FE		Yes		Yes

**No. of observation**

Diversifying acquisition	4,219	47.49%
Focusing acquisition	4,665	52.51%
Entire sample	8,884	

## Appendix H

### Robustness test: Regression analysis of announcement- period returns to acquiring firm's shareholders (3 years window period)

#### Panel A: Regression analysis for all domestic acquisitions

Explanatory variables	(1)	(2)	(3)	(4)
D1	0.169* (0.0995)	1.045 (0.440)	3.949*** (0.000)	2.014 (0.205)
D2	-0.135 (0.577)	0.807 (0.562)	3.723*** (0.000)	1.753 (0.274)
D1 · $ \Delta Risk $	-0.025 (0.840)	0.006 (0.965)	-0.0215 (0.874)	-0.022 (0.868)
D2 · $\Delta Risk$	-0.219 (0.304)	-0.235 (0.202)	-0.238 (0.212)	-0.243 (0.189)
Ln (Asset)		-0.241*** (0.000)	-0.230*** (0.000)	-0.212*** (0.0000)
Tobins Q		-0.102 (0.106)	-0.0982 (0.107)	-0.0887 (0.140)
FCF		-1.912* (0.078)	-2.303** (0.036)	-2.050* (0.065)
Leverage		0.909** (0.046)	1.738*** (0.003)	1.596*** (0.006)
Relative size		-0.0741 (0.657)	-0.104 (0.537)	-0.0867 (0.611)
All cash		0.963*** (0.000)	0.866*** (0.000)	0.855*** (0.000)
All stock		-0.119 (0.662)	-0.004 (0.989)	0.026 (0.93)
Observations	7,201	7,201	7,201	7,201
Adjusted R-squared	0.001	0.022	0.021	0.0427
Industry FE			Yes	Yes
year FE		Yes		Yes



**Panel B:** Regression analysis for subsample of diversifying acquisitions

Explanatory variables	(1)	(2)	(3)	(4)
D1	0.405*** (0.006)	0.889 (0.588)	3.794*** (0.000)	1.040 (0.609)
D2	0.174 (0.598)	0.899 (0.600)	3.918*** (0.000)	1.165 (0.570)
D1 · $ \Delta Risk $	0.0382 (0.798)	0.165 (0.329)	0.145 (0.391)	0.139 (0.410)
D2 · $\Delta Risk$	0.261 (0.526)	-0.102 (0.813)	-0.220 (0.619)	-0.272 (0.546)
Ln (Asset)		-0.256*** (0.000)	-0.223*** (0.004)	-0.207*** (0.007)
Tobins Q		-0.069 (0.324)	-0.0762 (0.295)	-0.069 (0.338)
FCF		-3.581** (0.040)	-3.666** (0.032)	-3.502** (0.045)
Leverage		0.405 (0.545)	0.911 (0.242)	0.813 (0.303)
Relative size		0.008 (0.933)	-0.009 (0.938)	0.006 (0.959)
All cash		0.878*** (0.005)	0.837*** (0.008)	0.880*** (0.007)
All stock		-0.073 (0.879)	0.087 (0.858)	-0.004 (0.993)
Observations	3,361	3,361	3,361	3,361
Adjusted R-squared	0.001	0.025	0.020	0.026
Industry FE			Yes	Yes
year FE		Yes		Yes

**Panel C: Regression analysis for subsample of focus acquisitions**

Explanatory variables	(1)	(2)	(3)	(4)
D1	-0.029 (0.831)	1.413 (0.550)	-0.849 (0.369)	-1.854 (0.464)
D2	-0.521 (0.132)	0.926 (0.700)	-1.265 (0.219)	-2.354 (0.358)
D1 · $ \Delta Risk $	-0.071 (0.705)	-0.096 (0.650)	-0.120 (0.586)	-0.111 (0.605)
D2 · $\Delta Risk$	-0.285 (0.142)	-0.198 (0.277)	-0.206 (0.320)	-0.208 (0.278)
Ln (Asset)		-0.191*** (0.004)	-0.223*** (0.001)	-0.197*** (0.004)
Tobins Q		-0.184 (0.137)	-0.170 (0.174)	-0.148 (0.233)
FCF		-1.247 (0.404)	-1.723 (0.255)	-1.485 (0.333)
Leverage		0.935 (0.153)	1.961** (0.035)	1.694* (0.065)
Relative size		-0.108 (0.779)	-0.222 (0.566)	-0.159 (0.690)
All cash		1.068*** (0.000)	0.909*** (0.001)	0.916*** (0.001)
All stock		-0.0749 (0.821)	0.029 (0.930)	0.107 (0.746)
Observations	3,840	3,840	3,840	3,840
Adjusted R-squared	0.001	0.023	0.026	0.032
Industry FE			Yes	Yes
year FE		Yes		Yes

**No. of observation**

Diversifying	3,361	46.67%
Focusing	3,840	53.33%
Entire sample	7,201	

## VITA

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**DATE OF BIRTH** 20 December 1993  
**PLACE OF BIRTH** Bangkok, Thailand  
**INSTITUTIONS ATTENDED** Chulalongkorn University  
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