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ESSAYS ON CORPORATE GOVERNANCE IN MERGERS AND ACQUISITIONS

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Contents

Chapter 1

Introduction

Mergers and Acquisitions (M&A) have been an interesting topic of corporate finance research for many decades. The central focus of M&A research is the cross-section analysis of returns to the shareholders of the acquirer (Fuller et al., 2002; Hackbarth and Morellec, 2008; Phalippou et al., 2015; Cai and Sevilir, 2012) and the target (Shleifer and Vishny, 1989; Bauguess et al., 2009; Fich et al., 2016; Malmendier et al., 2016). Another area of M&A research that attracts much attention of researchers is finding explanatory variables for the probability of deal completion (Comment and Schwert, 1995; Heron and Lie, 2006, 2015; Phalippou et al., 2015; Fich et al., 2011; Golubov et al., 2012). In addition, a number of papers examine the disciplinary force of takeovers which show that target firm managers are penalized for their non-value-maximizing behaviors (Palepu, 1986; Agrawal and Jaffe, 2003).[1]

This dissertation includes three essays with purpose to expand the literature of corporate finance (corporate governance) in three areas of M&A research aforementioned. Particularly, the first essay examines how learning from past acquisitions can affect the probability of success of the current M&A transaction. The second essay briefly reviews the importance of independent expert report and studies its effect on takeover premium and the outcome of

[1]The Internet appendix for Agrawal and Jaffe (2003)'s paper titled "The Disciplinary Motive for Takeovers" summarizes extensive work that supports the disciplinary motive for takeovers, also known as the inefficient management hypothesis.

the takeover transaction. The third essay formalizes the disciplinary role of takeover market by showing the relation between corporate diversification and the disciplinary pressure from takeover market.

The first essay analyzes the influence of CEO learning during programs of acquisitions on the takeover probability of success. CEO learning theory suggests that by completing more acquisitions and improving bidding skills, CEO has higher probability of succeeding in prospective transactions. The theory suggests a positive relation between the accumulated learning experience of CEO and the transaction outcome. By constructing a dataset at CEO-firm level, I show that CEO's accumulated experience significantly increases the takeover likelihood of success. Empirical evidence also suggests that CEO pays higher premium to the target that has a lower risk of valuation, therefore increasing the transaction success. I distinguish the effect of CEO learning from CEO's inherent abilities by generating a proxy for competence as the residuals of success of the first transactions in acquisition programs that are not explained by the observable attributes of firm-deal characteristics. Probit regressions show that CEO competence causes the persistence of success in acquisition programs, but it does not affect the influence of CEO experience. I also confirm the learning hypothesis that CEO listens to outsiders when making acquisition decision, although its marginal effect is lower when CEO has a higher level of experience. The results provide empirical support for the theory of CEO learning in acquisition programs and highlight the impact of CEO learning and CEO's inherent abilities on takeover success.

In this essay, I contribute to the literature of M&A in four aspects. First, I identify the influence of CEO's accumulated learning experience on the outcome of prospective transactions by testing the empirical prediction of Aktas et al. (2009)'s model. Second, I separate the effect of CEO learning from the effect of CEO's unobservable competence which can also cause the persistence of success in acquisitions programs. Third, literature documents two types of learning, learning during acquisition (Luo, 2005; Kau et al., 2008) and learning from past acquisitions (Aktas et al., 2009, 2011, 2013; Hayward, 2002). These two types

of learning can simultaneously affect the transaction outcome. I, therefore, distinguish the latter from the former by employing the empirical approach of (Luo, 2005) to control for deal announcement returns. Fourth, I support the channel through which CEO improves the transaction success by analyzing the takeover premium, and show the effect of CEO learning on the total synergy of the prospective transaction.

In the second essay, I examine the effect of the independent expert reports on premium and outcome of takeover transactions. I collect a comprehensive sample of 2888 Australian M&A transactions between 1991 and 2013. I find that a "neither fair nor reasonable" opinion forces the acquirer to increase the offer premium by five percent, ceteris paribus. The finding remains robust after controlling for the target's bargaining power measured by the residual values of initial premiums that are not explained by observable firm-deal characteristics. The target that has a weak bargaining position tends to receive less effect of an unfavorable report. In addition, a "fair and reasonable" opinion increases the probability of success while the unfavorable report does not affect the transaction outcome. The causal effect of expert opinions is identified by differences-in-differences analysis using the Duke case decision.

The second essay contributes to the literature of corporate governance with regard to the role of independent experts in four aspects. Firstly, it identifies a significant positive relation between a "fair and reasonable" opinion and the takeover probability of success. Eddey (1993) groups three opinions: FNR, "not fair but reasonable", "fair but not reasonable" into a single dummy indicator, but finds no evidence supporting the hypothetical relation. In contrast to his method, I separate the effect of a positive opinion "FR" from the negative "FNR", and estimate them in the same equation. In addition, I control for various factors including firm-deal characteristics that affect the transaction outcome rather than expert opinions and director recommendation. Secondly, the essay uses a different research approach to examine to what extent an unfavorable comment increases offer revision. Bugeja (2005) uses a probit regression to relate FNR and the frequency of being revised. His definition of a dummy indicator that equals 1 if there is offer revision is not satisfactory since there are

both positive and negative revisions.[2] In contrast, I analyze the value of offer revision rather than the probability of receiving it. I also employ a more comprehensive sample which covers the period after 2000 compared to previous studies (Bugeja, 2005; Bugeja et al., 2005; Bugeja, 2004; Eddey, 1993). Thirdly, I control for the bargaining power of the target measured by the residual values of initial premiums that are not explained by observable firm-deal characteristics. I then examine whether the target's bargaining power partially affects the influence of expert opinions on offer revision. This examination helps us to understand whether independent expert reports compensate for the weak bargaining power of the target. Lastly, expert opinions are endogenous. I attempt to identify the causal effect of expert opinions on transaction outcome and offer revision using differences-in-differences analyses.

The third essay is coauthored with Nguyen Xuan Hai at the Chinese University of Hong Kong. We theoretically and empirically that the takeover market is an effective external force of discipline for corporate diversification. First, we derive a simple model that highlights the managers' incentives to overdiversify their firm. In the absence of a takeover threat, managers may structure their firm suboptimally in pursuit of private benefits. However, facing a threat of takeover, managers will de-diversify to maximize firms' value in fear of being acquired and replaced. We also discuss the discipline role of the takeover market under competitive and non-competitive environment, and other monitoring mechanisms. Second, we test three hypotheses generated from the model: (1) anti-takeover laws increase corporate diversification; (2) the disciplinary effect is more pronounced in non-competitive industries; (3) the disciplinary effect is less when the firm is more intensively monitored. The empirical results are strongly consistent with these predictions, and robust to alternative measurements of takeover pressure and diversification, and censor and truncated data.

The third essay contributes to the literature of market for corporate control in several

[2]Bugeja (2005) creates a dummy indicator equal to 1 if there is a revision, 0 otherwise, ignoring the existence of negative revisions. Bugeja (2007), however, defines offer revision dummy as 1 if the bidder increases the offered price.

aspects. First, it fills the gap of internal corporate governance in explaining corporate diversification and diversification discount (Denis et al., 1997; Hoechle et al., 2012). On the theoretical front, we formalize the relation between private benefits of incumbent managers and the monitoring mechanism of the takeover market. Our result is consistent with the agency explanations of diversification discount (Cremers and Nair, 2005; Easterbrook and Fischel, 1996; Jensen, 1986, 1993; Jensen and Warner, 1988; Mitchell and Lehn, 1990). Moreover, we highlight that when the takeover market is efficient, each firm will operate at its optimal level of diversification. We also provide empirical analysis to support our theoretical results.

Second, we compare the takeover market's external force of discipline between competitive and non-competitive environment. We support the view that self-motivated behaviors are mitigated by product market competition Scharfstein (1988); Machlup (1967); Giroud and Mueller (2010). Giroud and Mueller (2010) finds that corporate governance only matters in competitive industries. The firm's operating performance experiences no significant effect after the laws' passage. Our results, however, indicate that the disciplinary effect of takeover market does exist in both non-competitive and competitive environment, but it is more pronounced in non-competitive industries in comparison with competitive industries.

Third, we support the substitution effect between governance mechanisms (Agrawal and Knoeber, 1996; Guo et al., 2015; Sapra et al., 2014), by showing that external takeover pressure affects the firm's diversification more when the firm is less intensively monitored. The result also supports the view of Berger and Ofek (1996) that discounted firms are good takeover targets. Strategic managers, therefore, reduce the firm's level of diversification to increase firms' value to avoid takeover threats. Finally, we complement the literature on determinants of corporate diversification (Campa and Kedia, 2002; Aggarwal and Samwick, 2003; Villalonga, 2004), and the propensity to pursue diversifying acquisitions (Hornstein and Nguyen, 2014).

My thesis has several economic implications. CEO learning theory in the context of

M&As is consistent with efficient resources allocation (Aktas et al., 2009). It is known that the takeover target has more information than the acquirer. Such information asymmetry raises the acquirer's concern for the winner's curse, i.e., the less informed acquirer is more likely to win for low quality targets by offering an over-priced bid. The CEO learning can address this problem.

The empirical evidence suggests that it is in the best interests to hire the same CEO to perform an acquisition program within a firm because it can help to save the costs of preparing for making a takeover (the acquirer usually bears the preparing costs when the bid is not completed rather than the target). In addition, CEO learning generates higher returns to the shareholders of the target because experienced CEO bids more accurately. It means that the shareholders of the target should prefer experienced bidders. Also, higher experienced CEO tends to select deals that create more synergy for their shareholders which is measured by the total announcement return of both target and acquirer.

Analysis of independent expert report shows that the target's shareholders earn more when the deal is rated as "FNR" by the independent expert. It shows that the independent expert report helps to maintain the fairness of the deal when the bidder has strong advantages compared to the target. This implies that there should be a policy to encourage all firms to have opinions from independent experts when they receive a takeover bid. In addition, the takeover target often has a weak negotiating position because it has small size compared to the acquirer and financial difficulties (or in need of capital). Third party advice can solve this problem, but it is not adequate. Evidence from Duke case implies that the court's judgment to endorse the validity and reliability of a recommendation is required.

The third essay shows that bidders are always searching for undervalued targets which can be restructured to generate value. The takeover target's managers have to optimize the firm value to avoid takeover threats instead of over diversifying the core business to gain private benefits. In other words, takeover threats reduce the agency costs. The result implies that in order to force firms running at their optimal level of diversification (or maximum firm

value), policies should be made to make it convenient for bidders to announce takeovers, so that firms are operated at their optimal value.

Quantitative analysis at firm-CEO level has shown the significant influence of CEO learning on the outcome of takeover transaction. The theory of CEO learning relies entirely on the assumption that CEO learns from completed transactions, which ignores the importance of the learning from incomplete transactions. A possible direction for future research is to derive a model which incorporate the learning from withdrawn transactions, then show how learning from completed and incomplete transactions affect the outcome and returns of the prospective transaction.

The agency-based model in Chapter 4 shows that managers adjust the firm's level of diversification to avoid takeover threat. The model directly supports the empirical evidence that firms that are traded at discount tends to be takeover targets (Berger and Ofek, 1996). Future research needs to answer whether buying "diversified" targets which are normally traded at discount will generate wealth to the shareholders. If the value loss from diversification is valuable to the outsider, more studies are needed to figure out how the bidder generates wealth from buying those diversified targets. Literature of diversification suggests that one channel through which the buyer can gain from buy a discount target is selling inefficient part of the target, refocus, and increase the firm value.

Besides the agency-based model in Chapter 4, there is an alternative theory explaining how a firm changes its size through mergers and acquisitions or divestiture to maximize its value. Warusawitharana (2008) theoretically shows that the decision of a firm to pursue acquisitions or sell its assets is motivated by growth and productivity. Existing literature, however, provides contrasting predictions. Corporate acquisitions generate negative wealth to the shareholder of acquirers (Fuller et al., 2002; Hackbarth and Morellec, 2008; Harford et al., 2011; Phalippou et al., 2015), while acquisitions of assets result in positive returns (Slovin et al., 2005). Agency explanation or hubris hypothesis can explain the negative wealth effect of the acquirer, but they fail to explain the gain from selling inter-corporate

assets. Liquidity discount hypothesis of Fuller et al. (2002) can explain the positive returns from purchasing corporate assets, but it cannot explain the positive returns to the shareholders of the asset seller (Slovin et al., 2005; Prezas and Simonyan, 2015). Answering this puzzle is similar to answering why acquisitions of corporations are inefficient investment while acquisition of assets are indeed efficient. I strongly believe in a testable theory to explain this phenomenon.

Chapter 2

CEO learning and takeover success

2.1 Introduction

Academic literature frequently discusses the central role of Chief Executive Officers (CEOs) in merger and acquisition (M&A) process. CEO's personal characteristics have been recognized as important determinants of firms' management style (Bertrand and Schoar, 2003; Kaplan et al., 2012), especially in the management of large investments such as M&As (Bao and Edmans, 2011; Yim, 2013; Custodio and Metzger, 2013). CEOs are believed to learn during the process of making serial acquisitions (Luo, 2005; Kau et al., 2008; Aktas et al., 2009, 2011, 2013). Intuitively, they draw more accurate inferences about takeover targets based on experience gained from previously completed transactions, and as a result, they complete potential bids successfully and profitably (Aktas et al., 2009).

CEO gains different sources of benefits when takeover bids succeed, such as fame (Avery et al., 1998), empire building or compensation (Grinstein and Hribar, 2004). They also face threats of being disciplined for undertaking poor quality bids (Lehn and Zhao, 2006) and failing to acquire desired takeover targets. For example, Ed Krell, who has been the CEO of Destination Maternity for over a decade, will be stepping down as the CEO of the maternity and kid's wear retailer after a sequence of failed attempts to take over Mothercare.[1] Zurich

[1]Strydom, Martin "'Ed Krell quits as Destination Maternity chief after failed Mothercare approach and

Insurance's chief, Martin Senn, has resigned under pressure of the failed takeover of Britain's RSA and stumbling performance in its core business.[2] Electrolux reports that its Chief Executive Keith McLoughlin will be forced to step down after the Swedish company's bid to take over the appliance division of General Electric failed.[3] Strict penalties and appealing compensation packages motivate CEO to learn and complete potential transactions.

Empirical investigation of CEO learning in M&A process is challenging because its associated influence is not directly observable; it is a latent variable in econometric modeling. To overcome this problem, I utilize the CEO learning model of Aktas et al. (2009) in the context of serial acquisitions. The model assumes that financial market reflects investor reactions in stock price during the announcement of M&A transactions. CEO receives such feedback and revises his own prediction about potential synergies with other targets. Given that CEO learns from completed transactions through market feedback, the model indicates a positive relation between the number of previously consummated transactions, which represents CEO's accumulated learning experience (ALE), and the outcome of prospective transactions.

In order to capture the effect of CEO learning on the takeover probability of success, I examine CEOs who announce serial transactions, i.e., acquisition programs at firm-CEO level. This sample of multiple transactions allows us to hold characteristics of the acquirer constant while examining the effect of CEO's accumulated learning experience on the outcome of takeover transactions. We, therefore, can infer the causal relation between CEO learning and transaction outcome without being affected by the new information from the acquirer.

I collect a sample of 2785 serial transactions during the period 1992-2012. Probit regressions uncover a positive and statistically significant relation between CEO learning and the

profits warning." The Telegraph, August 11, 2014, Business.

[2]Armstrong, Ashley. "Zurich Insurance chief executive Martin Senn steps down. The Telegraph, December 1, 2015, Business.

[3]Chopping, Dominic and Zander, Christina. "Electrolux CEO Keith McLoughlin Quits A Month After Collapse of GE Deal. The Wall Street Journal, January 11, 2016, Business.

takeover probability of success. Specifically, holding all other factors at mean, the likelihood of success increases 29% when CEO's accumulated learning experience increases from zero to five. I separate the effect of CEO learning from CEO competence by decomposing the outcome of the first transaction of acquisition programs into predicted success and success residuals which represent a proxy for CEO's unobservable competence. Empirical evidence shows that CEO competence is an important determinant of transaction outcome; however, it does not affect the significant effect of CEO learning. I also confirm the learning during acquisition hypothesis that CEO listens to the market reactions when making a takeover decision. However, the effect of deal announcement returns on transaction outcome is lower when CEO has a higher level of experience.

Additional analyses of deal announcement return and bid premium suggest that CEOs tend to pay higher premium to takeover targets and select deals that create more synergy wealth when they more experienced. Specifically, CEO pays 1.2%(0.5%) more premium to the prospective target when he completes one more transaction. This finding supports the learning theory that CEO bids more accurately after completing more transactions, as a result, he pays higher premium to the target due to its lower valuation risk. In addition, as ALE increases by one, the total cumulative abnormal returns of the target and the acquirer around the announcement date increase by 0.7%(0.3%), suggesting that higher experienced CEOs choose deals that generate higher synergy. I acknowledge that not only CEO, but also her management team can learn from previous acquisitions. However, the theoretical frame work does not allow us to distinguish the learning of CEO and her team. Therefore, I leave this idea for future investigation.

I contribute to the literature of M&A in four aspects. First, I identify the influence of CEO's accumulated learning experience on the outcome of prospective transactions by testing the empirical prediction of Aktas et al. (2009)'s model. Second, I separate the effect of CEO learning from the effect of CEO's unobservable competence which can also cause the persistence of success in acquisitions programs. To my knowledge, this is the first paper

controls for the managerial competence in acquisition programs. Third, literature documents two types of learning, learning during acquisition (Luo, 2005; Kau et al., 2008) and learning from past acquisitions (Aktas et al., 2009, 2011, 2013; Hayward, 2002). These two types of learning can simultaneously affect the transaction outcome. I, therefore, distinguish the latter from the former by employing the empirical approach of (Luo, 2005) to control for deal announcement returns. Fourth, I support the channel through which CEO improves the transaction success by analyzing the takeover premium, and show the effect of CEO learning on the total synergy of the prospective transaction. It is noted that my study is different from the test of learning theory of Aktas et al. (2011) and Aktas et al. (2013), since it my paper concentrates on the outcome of a takeover transaction while Aktas et al. (2011) focuses on the serial relation between the announcement return of transactions made by the same bidde, and Aktas et al. (2013) examines the time between deals.

The study of CEO learning in acquisition programs has several economic implications. CEO learning theory in the context of M&As is consistent with efficient resources allocation (Aktas et al., 2009). It is known that the takeover target has more information than the acquirer. Such information asymmetry raises the acquirer's concern for the winner's curse, i.e., the less informed acquirer is more likely to win for low quality targets by offering an over-priced bid. The CEO learning can address this problem.

The empirical evidence suggests that it is in the best interests to hire the same CEO to perform an acquisition program within a firm because it can help to save the costs of preparing for making a takeover (the acquirer usually bears the preparing costs when the bid is not completed rather than the target). In addition, CEO learning generates higher returns to the shareholders of the target because experienced CEO bids more accurately. It means that the shareholders of the target should prefer experienced bidders. Also, higher experienced CEO tends to select deals that create more synergy for their shareholders which is measured by the total announcement return of both target and acquirer.

I organize the remaining part of this chapter as follows. I present the review of literature

and hypothesis development in Section 2.2. In Section 2.3, I describe econometric modeling and sample selection procedure. Section 2.4 provides main empirical results. Various robustness tests are conducted in Section 2.5. Section 2.6 concludes the chapter.

2.2 Literature review

2.2.1 Determinants of takeover success

Following M&A literature, I identify a set of target characteristics that affect the transaction outcome including target size (Palepu, 1986; Ambrose and Megginson, 1992; Comment and Schwert, 1995; Luo, 2005; Baker et al., 2012), bidding premium (Heron and Lie, 2006, 2015), sales growth rate (Comment and Schwert, 1995; Schwert, 2000; Field and Karpoff, 2002; Sokolyk, 2011), leverage (Schwert, 2000; Daines, 2001; Sokolyk, 2011), similar industry classification (Henry, 2004; Flanagan et al., 1998).

Deal characteristics also affect the takeover probability of success. Specifically, the deterrence effect of takeover defense tactics is consistently identified (Ambrose and Megginson, 1992; Field and Karpoff, 2002; Sokolyk, 2011). In addition, competition from other bidders is likely to reduce the probability of success (Flanagan et al., 1998; Walkling, 1985; Holl and Kyriazis, 1997). However, tender offer strategy effectively increases the takeover probability of success Bates and Lemmon (2003); Betton et al. (2014); Kau et al. (2008); Baker et al. (2012). Financing structure of the deal is also identified as an important determinant of the transaction outcome (Luo, 2005; Sokolyk, 2011; Baker et al., 2012). Some authors examine the importance of market reactions in the CEO's decision process to complete a takeover transaction (Luo, 2005; Kau et al., 2008). To my knowledge, the effect of CEO learning from past acquisitions remains unexplored.

2.2.2 Review of CEO learning in M&A context

The learning-by-doing terminology refers to the hypothesis that accumulated work experience, especially the repetition of the same type of action, improves workers' productivity and adds to technical knowledge. According to the management literature, CEO of acquiring firms has abilities to learn from past acquisition experience (Harding and Rovit, 2004; Hayward, 2002). By completing takeover transactions, CEO forecasts the potential synergy of prospective deals more precisely, and targets turn to be less risky (Aktas et al., 2009). Deighton (2006) finds that CEO bids more accurately when he has higher levels of experience, i.e., the CAR's variance significantly falls from deal to deal.

Researchers postulate two types of CEO learning in M&A process. The first type is learning from past transactions. Hayward (2002) supposes that the relationship between the current acquisition's performance and similarities of its businesses with the prior acquisition's businesses shows an inverted-U shape. According to the hypothetical inverted-U shape, Aktas et al. (2013) derive a theoretical model predicting that under experience building curve, the time between deals strictly decreases with deal orders while under memory loss effect, elapses between consecutive deals increase significantly. Using a massive data set, they show evidence of CEO learning through repetitive acquisitions, especially when successive deals share significant similarities. In addition, Aktas et al. (2009) theoretically predict that CEO's past experience has a correlation with his current experience. Aktas et al. (2011) then empirically find that price premium or short-run CARs of the previous deal positively relates to the CARs of the current deal.

The second type of CEO learning is learning during the acquisition process. This type of learning refers to CEO who listens to the response of outsiders and decides whether a transaction should be consummated. Luo (2005)'s model implies that if CEO acts in the interests of shareholders, when stock market reacts positively, the transaction will be completed. He then uses the aggregate stock returns of both target and acquirer as an explanatory variable for the transaction outcome. Kau et al. (2008) confirm that managers

listen to the market when making major investment decisions, although they only use bidders' returns. They show that managers' propensity to learn is high when their interests are aligned with stockholders.

My study is different from Aktas et al. (2011) in the sense that it concentrates on the takeover likelihood of success to test the learning theory of Aktas et al. (2009) rather than focusing on the serial correlation of acquisition premiums. In addition, my study examines CEO's accumulated learning experience rather than the learning during acquisition period identified by Luo (2005) and Kau et al. (2008), and the learning by observing hypothesis of Francis et al. (2014) in that observing actions of other acquiring peers will help firms make better acquisition decisions and create values to shareholders.

2.2.3 CEO learning model

The CEO learning model of Aktas et al. (2009) presumes that financial market reflects investor reactions in stock price during the announcement of acquisition transactions. CEO gains experience from such signals and subsequently updates his bidding strategy. Particularly, CEO receives market feedback and revises his predictions about the synergistic value with other takeover targets. I define z_t, the number of previously completed deals (from time 0 to time $t-1$), as accumulated learning experience. CEO forecasts more accurately about the synergy of prospective acquisitions after completing more transactions, asymptotically, the variance of synergy, $\hat{\sigma}^2_{s,t}$, decreases when z_t increases. I define:

$$\hat{\sigma}^2_{s,t} = (\frac{1}{\hat{\sigma}^2_{s,0}} + z_t \frac{1}{\hat{\sigma}^2_{\eta}})^{-1} \tag{2.1}$$

where $\hat{\sigma}^2_{\eta}$ is the variance of the signals received from the financial market. Taking derivation of $\hat{\sigma}^2_{s,t}$ with respect to z_t, we have:

$$\frac{\partial \hat{\sigma}^2_{s,t}}{\partial z_t} = -(\frac{1}{\hat{\sigma}^2_{s,0}} + z_t \frac{1}{\hat{\sigma}^2_{\eta}})^{-2} \frac{1}{\hat{\sigma}^2_{\eta}} < 0 \tag{2.2}$$

The probability of success of CEO_i = $Pr(CEO_i$wining a bid) = $Pr(CEO_i$valuation > CEO_jvaluation) = $SUCC_{v_j^*}(v_i^*|v_i^*)$, where $SUCC_{v_j^*}(v_i^*|v_i^*)$ is the distribution of CEO_j's reservation value, v_j^*, conditional on CEO_i's reservation value. $f_{v_j}(v_i^*|v_i^*)$ is the corresponding density function.

The probability of winning the competition with respect to z_t is:

$$\frac{\partial SUCC_{v_j^*}(v_i^*|v_i^*)}{\partial z_t} = f_{v_j}(v_i^*|v_i^*)\frac{\partial v_i^*}{\partial \hat{\sigma}_{s,t}^2}\frac{\partial \hat{\sigma}_{s,t}^2}{\partial z_t} \tag{2.3}$$

One direct result from the optimal v_i^*:

$$\frac{\partial v_i^*}{\partial \hat{\sigma}_{s,t}^2} < 0 \tag{2.4}$$

The intuition behind Equation 2.4 is that for a risk averse CEO, when the perceived variance of his expected bonus increases, his reservation value will decrease. In other words, CEO pays higher price for a takeover target when the valuation risk of the bid is low.

From (2), (4) and $f_{v_j}(v_i^*|v_i^*) > 0$, Equation 2.3 implies:

$$\frac{\partial SUCC_{v_j^*}(v_i^*|v_i^*)}{\partial z_t} \tag{2.5}$$

Equation 2.5 proposes that the number of previously completed transactions (ALE) positively influences the likelihood of success of the prospective bid, and this theoretical relation can be tested in the context of repetitive acquisitions at firm-CEO level.

2.3 Methodology and sample selection

2.3.1 Econometric modeling

I employ a binary bivariate probit model to specify the functional relationship between the probability of success, CEO learning, and target and deal characteristics. I model the

underlying transaction outcome as a linear function of CEO's learning experience and other explanatory variables:

$$SUCC^*_{i,t} = \delta z_{i,t} + X_{i,t}\beta + \varepsilon_{i,t} \tag{2.6}$$

where $z_{i,t}$ represents CEO's accumulated learning experience. $X_{i,t}$ is a set of variables representing deal and target characteristics. $\varepsilon_{i,t}$ is assumed to have a standard normal distribution. Although $SUCC^*_{i,t}$ is unobservable, the bidding outcome is fully observed. I define $SUCC_{i,t}$ as:

$$SUCC_{i,t} = \begin{cases} 1 & \text{if } SUCC^*_{i,t} > 0 \\ 0 & \text{, otherwise} \end{cases}$$

I utilize the binary probit model to estimate the probability of success:

$$Prob_{i,t} = Prob(SUCC_{i,t}) = \phi(\delta z_{i,t} + X_{i,t}\beta) \tag{2.7}$$

in that δ reflects the effect of CEO learning on the takeover probability of success.

2.3.2 Sample selection

I follow Fuller et al. (2002), Billett and Qian (2008), and Antonio et al. (2013) to collect a sample of repetitive acquisitions announced by U.S. acquirers during the period 1992-2012. I require that both targets and acquirers are public firms. I drop all firms operated in financial and utility industry.[4] I then exclude all deal duplications identified by deal number in the SDC database. In order to identify acquisition programs at firm-CEO level, I match the acquisition database with the ExecuComp database using company identifier, CUSIP. Specifically, I first merge the SDC database with CRSP daily database using announcement dates and historical CUSIP, i.e., NCUSIP to identify CUSIP and PERMNO identifier.

[4]I classify bidders and targets into 48 industry portfolios defined by Fama and French (1997) based on 4-digit SIC codes. Definition of the industry groups can be retrieved from Kenneth French's website.

Subsequently, I match the merged dataset with ExecuComp database.

I define an acquisition program as CEO announces at least two transactions within five years, starting from the first deal. I exclude all programs that belong to the period 1992-2012 and have transactions between 1990-1992 and 2012-2014. After cleaning data, I obtain a comprehensive sample of 2785 observations which belong to 844 acquisition programs, spanning the period 1992-2012. I also keep the remaining sample of 1161 single transactions that do not belong to any programs in order to compute the industry year rate of success in Section 2.4. The description of all variables are shown in Appendix 2.A. I winsorize all continuous variables representing target characteristics at 1% and 99% to minimize the impact of outliners.

Table 2.1 provides the sample distribution of takeover transactions announced during the period 1992-2012 across year and industry. Column 3 shows that, M&A activity is intense during the period 1995-2000. Particularly, each year witnesses more than 200 transactions announced by serial bidders, and this intensity is consistent with the M&A wave recognized by Arikan and Stulz (2016). Remarkably, a vast majority is announced by serial acquirers, which accounts for approximately 71% of all transactions. Table 2.1 also presents the distribution of top ten industries ranked by the number of transactions including Business Services, Insurance, Electronic Equipment, Pharmaceutical Products, Chemicals, Computers, Retail, Medical Equipment, Machinery and Communication. The Business Services industry has the highest number of serial acquisitions which accounts for 8.24% of all transactions.

Table 2.2 compares statistics between the sample of single and serial transactions. It also presents the descriptive statistics of 1941 transactions that have information of historical CEO learning experience. About target characteristics, single transactions have deal size, on average, of 1022 million (4309). Transactions conducted by serial bidders have similar size of 1143 million on average, but they show a substantially higher standard deviation of 5459 million. Single and serial bidders share similar sales growth rate of 17.5% and 19.3%, respectively. However, serial bidders target firms that have a high level of debts. Specifically,

deals announced by serial bidders has a debt ratio of 0.51, while those firms targeted by single bidders has a debt ratio of 0.49.

Serial bidders are less likely to diversify. Table 2.2 shows that 84% of bidders operate in similar industries with the target. Tender offer strategy is used more popularly by single bidders. 16% of single transactions receives a tender offer compared to the ratio of 13% in the sample of multiple transactions. 74% of serial acquisition is financed by cash. 46% of them is successfully completed, and 5.5% adopts at least one defensive tactic against the acquirer, while 2.8% has more than one bidder. The sample that has complete information of CEO learning experience shows similar summary statistics with the sample of serial transactions.

Table 2.3 summarizes the outcome of serial acquisitions according to different levels of CEO learning experience. It appears that the more deals CEO completes, the higher the unconditional probability of success is. CEO, who has no historical experience, has the unconditional probability of success of 32%, while CEO, who previously completes equal or more than five bids, has a success ratio of 82%. The steady increase of the completion rate across each level of ALE is consistent with the prediction of CEO learning theory. Remarkably, the success rate of serial bidders who have no experience is significantly lower than that of single bidders.

2.4 Results

2.4.1 CEO learning and the takeover probability of success

Table 2.4 provides probit regressions of transaction outcome on ALE and other control variables representing firm-deal characteristics. The key explanatory variable, ALE, is the number of transactions CEO previously completes in acquisition programs. The dependent variable, $SUCC$, equals one if the transaction status is defined as "Completed" in the SDC M&A database. Definition of all control variables is shown in Appendix 2.A. My hypothesis predicts that ALE positively affects the success probability of M&A transactions, i.e., the

more transactions CEO consummates, the more experience they gain, and the more likely that the prospective transaction is completed.

Model 1 does not control for year and industry. Model 2 controls for year. Model 3 controls for industry. Model 4 controls for both year and industry. The coefficient of ALE in Model 1 is 0.151 (0.027) and statistically significant at 1%, suggesting that CEO learning increases the takeover probability of success. This evidence coheres with the increase of completion ratio across levels of ALE shown in Table 2.3. In addition, the effect of ALE remains positive and statistically significant to the inclusion of year and industry despite a slight reduction in Model 2, 3, and 4. To understand the economic significance of ALE, I compute the marginal effect of all variables at means for Model 1 (see Appendix 2.B). It suggests that when ALE increases one, the predicted probability of success increases by 6%(1.1%), holding other factors at mean. Similar calculation also shows that the estimated difference is 29% when ALE changes from zero to five. Although, it is difficult to tell how this significant increase transfers into actual transaction outcome, the evidence strongly supports the CEO learning theory in that ALE positively affects the outcome of the prospective transaction.

As expected, Table 2.4 shows that the likelihood that a takeover is completed is higher if the offer premium increases. $SIZE$ is statistically significant at 1%, suggesting that targets with larger size are less vulnerable to takeovers (Field and Karpoff, 2002). In addition, probit regressions indicate no evidence supporting the argument that targets add debts to avoid takeovers (Schwert, 2000). Tender offer strategy is identified as an effective method to increase the probability of success. However, defensive tactics effectively deter takeover attempts. Consistent with Luo (2005), I find a negative and statistically significant effect of cash on transaction outcome. In addition, transactions within industries are less likely to be completed. This evidence suggests that anti-trust authorities may have special interests in preventing anti-competitive combinations. Alternatively, the targets management board might deter all bids that come from rivals because they already own sufficient knowledge to

manage the target (Flanagan et al., 1998). Additional bidders for a given takeover target also reduce the likelihood that the current offer is close.

2.4.2 CEO learning and CEO competence

From the empirical evidence in Table 2.4, we interpret the positive effect of ALE on the takeover probability of success as evidence of CEO learning from previous acquisitions. However, CEO's inherent abilities could also generate persistence of success in acquisition programs. In order to differentiate between the effect of ALE and CEO competence, I utilize Gompers et al. (2010)'s two-stage methodology. I decompose the success probability of the first transaction in acquisition programs into two parts. The first part is predicted by the observable firm-deal characteristics and industry year rate of success, and the second part is the remaining residuals (first-staged regression). The latter can be interpreted as a factor including CEO competence. I then regress the outcome of the later transactions in acquisition programs on CEO learning and competence, as well as an interaction between them (second-staged regression).

In order to estimate CEO competence, I first generate industry year rate of success ($IYRS$) as the average completion ratio of takeover transactions of each year and industry during the period 1992-2012. It is noted that the first transaction in acquisition programs is properly excluded from the calculation of $IYRS$ to prevent any sort of "hard-wiring relationship. I regress the outcome of the first transaction in acquisition programs on the industry year rate of success and other target-deal characteristics. The residuals of this regression are considered as an indirect measurement of CEO competence ($INABS$). It represents a part of takeover success that cannot be explained by being involved in an easy takeover market or selecting right targets.

Table 2.5 shows the estimation results of the first-staged and the second-staged regressions. Model 1 presents OLS estimation of the first transaction's outcome with heteroskedasticity-robust standard errors. $IYRS$ is negative and statistically insignificant. This means partic-

ipating in an easy market with good timing skills does not increase the takeover likelihood of success. Model 2 displays the output of the probit regression of $SUCC$ on $INABS$, ALE and other control variables. INABS is positive and statistically significant at 1%, indicating that CEO competence is an important determinant of takeover success. However, the effect of the CEO learning experience remains positive and statistically significant, even after controlling for CEO competence. Model 3 includes an interaction term between $INABS$ and ALE to capture the effect of CEO learning conditional on different levels of competence. The interaction term of 0.113(0.093) is not statistically significant. In addition, the coefficient of ALE in Model 3 decreases slightly compared to that in Model 2; however, it remains statistically significant and strongly supports the CEO learning theory.

2.4.3 Alternative types of CEO learning

Luo (2005) and Kau et al. (2008) provide evidence that CEO decides to consummate a takeover transaction according to market reactions. In order to distinguish between this of CEO learning and learning from past experience, I employ the method of Luo (2005) to control for deal announcement returns ($DCAR$). $DCAR$ is generated as the total cumulative abnormal returns (CAR) around the announcement date of both target and acquirer. This empirical strategy can properly exclude the probability-feedback that comes from investors forecasts about the outcome of the transaction. I compute CAR by adding up stock abnormal returns from day -1 to 1 (day 0 is the announcement date). Abnormal returns are calculated as the difference between normal returns and benchmark returns predicted from the market model of which parameters are estimated based on daily stock returns and CRSP value-weighted returns during the period of 252 trading days (-262, -10).

Model 1 in Table 2.6 indicates that $DCAR$ is positive and statistically significant at 10%. This finding supports the learning during acquisition hypothesis that CEO consummates a deal when the outsiders react favorably to the deal announcement. Also noted that the effect of ALE remains positive and statistically significant after controlling for $DCAR$.

Moreover, experienced CEO may be less likely to be affected by the abnormal response of the outsiders. In short, CEO depends less on the abnormal returns generated by the transaction announcement to make a completion decision when he is more experienced. I, therefore, add an interaction between deal announcement returns and CEO learning experience in Model 3. The interaction term ($DCA*ALE$) is negative and statistically significant at 1%, suggesting that the effect of CEO learning during acquisitions is lower when he has a higher level of ALE.

2.4.4 Bid premiums, deal announcement returns and CEO learning experience

CEO learning theory suggests that the decreasing variance of CEOs perception on synergy effects enables him to pay a higher price for the target, therefore increases the probability of completing the transaction (Aktas et al., 2009). In addition, learning improves the target selection skills of the CEO, and the subsequent deal becomes less risky and more valuable. I, therefore, examine the effect of CEO's accumulated learning experience on the offer premium and the potential synergy of the prospective deal. I regress the takeover premium ($PREMIUM$) and deal announcement returns ($DCAR$) on ALE and other firm-deal characteristics. $PREMIUM$ is the ratio between the offer price and target stock price four weeks prior to the announcement date, minus one. $DCAR$ is defined as in the previous subsection. The coefficient of ALE in Model 1, Table 2.7 is positive and statistically significant at 1%, suggesting that when CEO completes one more takeover transaction, he pays 1.2%(0.5%) more premium to the takeover target. In addition, the positive relation between ALE and the deal announcement returns in Model 2 indicates that CEOs tend to select deals that generate higher synergy when they are more experienced. As ALE increases by one, the total cumulative abnormal returns of the target and the acquirer around the announcement date increase by 0.7%(0.3%).

2.5 Robustness checks

2.5.1 Unobserved Heterogeneity

Econometricians warn us about the "cluster problem" (Gibbons and Hedeker, 1994). CEO within acquisition programs have characteristics that could cause the persistence of success in acquisition programs. Estimating probit models without corrections for the correlation of the error terms will lead to imprecise results because the standard errors of the coefficients are biased (Guilkey and Murphy, 1993). I, therefore, set up a panel data with two dimensions of CEO identifier and deal orders. I then use random-effects probit models to control for the unobserved effects. Model 1 in Table 2.8 provides estimation results of the random-effects probit model. The likelihood ratio test does not reject the null hypothesis that the pool estimator is the same as the panel estimator at 1% significance level. In addition, the coefficient of ALE of 0.141(0.030) is statistically significant at 1%, which strongly supporting the hypothesis that CEO learns from past experience.

2.5.2 Alternative definition of acquisition program

It is possible that different definitions of acquisition program will affect the measurement of CEO learning and cause inconsistent results in predicting transaction outcome. A typical example is the Aktas et al. (2011)'s definition of acquisition program is a group of two successive transactions announced by the same firm and CEO. According to my baseline hypothesis with the new definition of acquisition program, the success of the prior transaction ($PRSUCC$) has a positive effect on the completion of the current transaction. Model 2 in Table 8 shows that coefficient of $PRSUCC$ is 0.47 (0.08) and statistically significant at 1%, confirming that the effect of CEO learning is robust to the alternative of definition acquisition program.

2.5.3 Missing variables

Although in Section 2.4, I control for CEOs inherent abilities and firm-deal characteristics, CEO's preferences and incentives indeed affect the transaction outcome (Agrawal and Walkling, 1994; Bliss and Rosen, 2001; Greene, 2011; Harding and Rovit, 2004). As a result, besides personal characteristics of CEO, such as tenure, gender, and age, I control for compensation factors including CEO pay slice ($SLPAY$), CEO variable pay ($VRPAY$) and CEO equity pay ($EQPAY$). $SLPAY$ represents the relative ranking of the CEO' compensation, and his abilities to extract rents (Bebchuk et al., 2011); $VRPAY$ and $EQPAY$ control for the alignment between CEO's wealth and the benefits of stockholders. Model 3 and 4 confirm the robust effect of CEO learning on transaction outcome. In Model 3, CEO's personal characteristics including AGE, $TENURE$, and $GENDER$ have no significant influence on the transaction outcome. $EQPAY$ and $SLPAY$ are also not statistically significant at 10%. However, Model 4 shows a positive but weak relation between $VRPAY$ and the probability of success, suggesting that the higher alignment between CEO and shareholders, the greater efforts he spends to acquire potential targets.

2.5.4 CEO continuity

CEO can be replaced and become CEO of other firms. The historical experience of doing acquisitions in one firm, therefore, can affect the learning in the other. I, therefore, track the identification of CEO in all acquisition programs. Subsequently, I search for the historical number of deals that CEO previously completes in other firms. I document that only seven CEOs have records of announcing M&As in other firms, and four of them complete at least one transaction. I do a probit regression which controls for the CEO's historical experience in other firms. Specifically, I include a dummy indicator equal to one if CEO completes at least one takeover in the other firm. The effect of CEO learning experience, however,

remains unchanged.[5]

2.6 Conclusion

This study examines the learning process of CEO in acquisition programs. The learning theory suggests that CEO accumulates experience and transfers it into the completion of the prospective transaction. Using a sample of 2785 serial transactions announced between 1992 to 2012, I find a clear and significant relation between ALE and the takeover probability of success. Particularly, the probability of success increases by 29% when ALE increases from zero to five, holding other factors at mean. Moreover, CEO competence significantly explains the persistence of success; however, it does not affect the robustness of the learning effect. Probit regressions also strongly support the learning during acquisition hypothesis; however, the documented effect is lower when CEO has a higher level of experience. Additional analysis of takeover premium supports the CEO learning theory in that CEO values the target higher when it becomes less risky, and CEO pays more premium to the takeover target when he is more experienced. Specifically, I find that CEO pays 1.2% more premium to the prospective target when he previously completes one more transaction. Furthermore, experienced CEO tends to select the deals that create high synergy effects. As ALE increases by one, the total cumulative abnormal returns of the target and the acquirer increases approximately 0.7%. The main effect of CEO learning on transaction outcome remains robust and economically significant to the inclusion of unobserved heterogeneity, missing variable, and CEO continuity.

[5]In theinterestofbrevity, I do not present the estimation output of this probit regression because it is similar to the results presented in Table 2.4.

Appendix

2.A Definition of variables

Variable definition	Source
SUCC equals one if the transaction status is classified as "Completed" in the SDC database.	SDC database
VALUE is the value of transaction quoted in million dollars.	SDC database
PREMIUM equals the ratio between the offer price and target stock price four weeks before prior to announcement, minus one.	SDC database
SIZE is the natural logarithm of the transaction value.	SDC database
LEVER equals the ratio between the target' total liabilities and its total assets.	SDC database
SALEGR equals the growth rate of sales in the most recent fiscal year.	SDC database
TENDER is a binary indicator equal to one the acquirer launched a tender offer for the target.	SDC database
DEFENSE is a binary indicator equal one if the target employs at least one defensive tactic against the acquirer.	SDC database
CASH is a binary indicator equal to one if the transaction is 100% financed by cash.	SDC database
INDUS is a binary indicator equal to one if the target shares the same industry classification with the acquirer (Industry classification is based on 48 industry portfolios defined by Fama and French (1997)).	SDC database
COMPETE is a binary indicator equal to one if there is more than one entity bidding for the target.	SDC database
GENDER is a binary indicator equal to one if CEO's gender is male, and zero otherwise.	ExecuComp
TENURE is the period (years) holding CEO title in the acquirer.	ExecuComp
AGE is the natural logarithm of CEO's age.	ExecuComp
EQPAY is the sum of CEO's restricted stock grants and stock option grants scaled by his total compensation.	ExecuComp

VRPAY is generated as the difference between CEO's total compensation and salary scaled by his total compensation.	ExecuComp
SLPAY is the proposition of CEO's compensation as of the sum of the top-five executive team (Bebchuk et al., 2011).	ExecuComp

2.B Marginal effect

The table shows the probit regression analysis of the transaction outcome and the corresponding marginal effect. I compute marginal effects for each continuous regressor as $\partial E(y|x)/\partial(x)$, and $\Delta E(y|x)$ for each dummy indicator, evaluated at $x = \bar{x}$.

Dependent variable SUCC=1 if transaction is completed, 0 otherwise		
	Probit regression	Marginal effect
ALE	0.151[a]	0.060[a]
	(0.027)	(0.011)
PREMIUM	1.223[a]	0.488[a]
	(0.130)	(0.052)
SIZE	-0.040[c]	-0.016c
	(0.021)	(0.008)
SALEGR	0.124	0.0493
	(0.090)	(0.036)
LEVER	-0.249	-0.099
	(0.160)	(0.064)
TENDER (d)	1.568[a]	0.496[a]
	(0.128)	(0.025)
DEFENSE (d)	-0.365b	-0.143b
	(0.177)	(0.068)
CASH (d)	-1.364[a]	-0.478[a]
	(0.099)	(0.027)
INDUS (d)	-0.866[a]	-0.320[a]
	(0.119)	(0.038)
COMPETE (d)	-1.325[a]	-0.422[a]
	(0.201)	(0.039)
Year	No	No
Industry	No	No
N	1941	1941

Table 2.1: Distribution of M&A transactions

Table 1 provides sample distribution of 2785 serial transactions announced during the period 1992-2012 across year and industry. All acquirers are listed in the SDC M&A database and have CEOs identified in Standard and Poor's ExecuComp database. Serial transactions are defined as transactions that belong to an acquisition program. Single transactions include all remaining transactions. The industry codes are classified as Fama and French (1997)'s 48 industry portfolios.

	Single	Serial	ALE>=0
Panel A: Distribution across year			
1992	2	3	0
1993	22	59	13
1994	73	141	51
1995	69	220	111
1996	67	293	184
1997	82	266	173
1998	112	318	248
1999	96	277	206
2000	72	208	169
2001	45	133	101
2002	35	87	64
2003	39	85	65
2004	37	102	82
2005	58	100	79
2006	54	87	61
2007	60	101	79
2008	81	102	78
2009	25	63	52
2010	46	51	44
2011	40	63	55
2012	46	26	26
Panel B: Distribution across industry			
Business Services	136	325	219
Insurance	61	198	148
Electronic Equipment	86	187	125
Pharmaceutical Products	45	153	118
Chemicals	35	135	95
Computers	35	133	97
Retail	82	126	84
Medical Equipment	34	116	82
Machinery	51	98	60
Communication	29	94	73
Others	567	1220	840
Total	1161	2785	1941

Table 2.2: Descriptive statistics

Table 2 shows descriptive statistics single and serial transactions during the period 1992-2012. Acquirers are listed in the SDC M&A database and have CEO identified in Standard and Poor's ExecuComp database. All acquirers are publicly traded firms, and targets can be private, public or subsidiary. Serial transactions belong to acquisition programs which are constructed by acquirers who announce at least two transactions within five years. The remaining transactions belong to the sample of single transactions. All variables are defined in Appendix 2.A. a, b, and c denote statistically significant at 1 %, 5 %, and 10 % level, respectively.

	Serial(a)			Serial(b)			Mean difference (b-a)	ALE>0		
	Mean	Standard deviation	Median	Mean	Standard deviation	Median		Mean	Standard deviation	Median
VALUE	1022	4309	133	1143	5459	156	121	1276	6107	189
PREMIUM	0.164	0.317	0.069	0.154	0.359	0.046	-0.003	0.165	0.366	0.057
SIZE	5.017	1.845	4.894	5.086	1.87	5.053	0.069	5.229	1.863	5.244
SALEGR	1.175	0.383	1.094	1.193	0.432	1.097	0.018	1.192	0.438	1.093
LEVER	0.494	0.237	0.496	0.508	0.229	0.514	0.013^{c}	0.515	0.232	0.522
CASH	0.722	0.448	1	0.744	0.436	1	0.023	0.742	0.438	1
SUCC	0.438	0.496	0	0.46	0.498	0	0.021	0.464	0.499	0
TENDER	0.158	0.365	0	0.132	0.339	0	-0.026^{b}	0.15	0.357	0
DEFENSE	0.05	0.218	0	0.055	0.227	0	0.005	0.055	0.227	0
INDUS	0.869	0.337	1	0.842	0.365	1	-0.027^{b}	0.828	0.377	1
COMPETE	0.034	0.182	0	0.028	0.165	0	-0.006	0.029	0.167	0
N	1161			2785				1941		

Table 2.3: CEO learning and takeover success

Table 3 summarizes the average success rate across levels of CEO learning experience (ALE). ALE equals the total number of transactions CEO previously completes in acquisition programs. Completion ratio is the ratio between the total number of completed transaction and the total number of transactions in each level of experience. A transaction is completed if its status in SDC M&A database is "Completed".

ALE	Number of transactions	Completed	Failed	Completion ratio
0	724	231	493	32%
1	690	335	355	49%
2	254	142	112	56%
3	130	78	52	60%
4	56	44	12	79%
>=5	87	71	16	82%
Total	1941	901	1040	46%

Table 2.4: Probit models on completed and withdrawn transactions.

Table 4 provides probit regressions of transaction outcome on CEO learning and other control variables representing firm-deal characteristics. The dependent variable, SUCC, equals one if the transaction is completed, and zero otherwise. *ALE* equals the total number of transactions CEO previously completes in acquisition programs. Other variables are defined in Appendix 2.A. *a*, *b*, and *c* denote statistically significant at 1 %, 5 %, and 10 % level, respectively.

Dependent variable SUCC=1 if transaction is completed, 0 otherwise								
	Model 1		Model 2		Model 3		Model 4	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
ALE	0.151^a	0.027	0.162^a	0.028	0.126^a	0.029	0.141^a	0.030
PREMIUM	1.223^a	0.130	1.233^a	0.132	1.194^a	0.136	1.197^a	0.137
SIZE	-0.040^c	0.021	-0.046^b	0.022	-0.050^b	0.023	-0.056^b	0.024
SALEGR	0.124	0.090	0.104^c	0.091	0.095	0.095	0.077	0.096
LEVER	-0.249	0.160	-0.281	0.165	-0.171	0.188	-0.182	0.192
TENDER	1.568^a	0.128	1.629^a	0.132	1.648^a	0.134	1.707^a	0.137
DEFENSE	-0.365^b	0.177	-0.335^c	0.184	-0.361b	0.182	-0.347^c	0.190
CASH	-1.364^a	0.099	-1.453^a	0.105	-1.394^a	0.104	-1.504^a	0.111
INDUS	-0.866^a	0.119	-0.872^a	0.121	-1.002^a	0.129	-1.010^a	0.133
COMPETE	-1.325^a	0.201	-1.297^a	0.201	-1.337a	0.208	-1.285^a	0.208
CONST	1.387^a	0.232	2.275^a	0.527	1.924^a	0.332	2.698^a	0.581
Year	No		Yes		No		Yes	
Industry	No		No		Yes		Yes	
N	1941		1941		1941		1941	
pseudo R-sq	0.41		0.43		0.44		0.46	

Table 2.5: CEO learning experience and competence

Table 5 presents two-stage regressions distinguishing the effect of CEO learning and competence on transaction outcome. Model 1 shows the OLS estimation of the success of the first deal in acquisition programs on the industry rate of success ($IYRS$) and firm-deal characteristics. $INABS$ is the estimated residuals in Model 1. Model 2 provides probit regression of the transaction outcome on ALE and $INABS$. Model 3 adds an interaction term between ALE and $INABS$ as an explanatory variable. The dependent variable, $SUCC$, equals one if the transaction is completed, and zero otherwise. ALE equals the total number of transactions that CEO previously completes in acquisition programs. $IYRS$ is the average completion rate of each year and industry. Other variables are defined in Appendix 2.A. a, b, and c denote statistically significant at 1 %, 5 %, and 10 % level, respectively.

	Dependent variable: SUCC=1 if transaction is completed, 0 otherwise					
	Model 1		Model 2		Model 3	
	Coefficient	Robust standard error	Coefficient	Standard error	Coefficient	Standard error
IYRS	-0.056	0.056	-	-	-	-
ALE	-	-	0.094^{a}	0.037	0.090^{b}	0.037
INABS	-	-	0.418^{a}	0.115	0.284^{c}	0.159
ALE*INABS	-	-	-	-	0.113	0.093
PREMIUM	0.239^{b}	0.049	1.166^{a}	0.146	1.153^{a}	0.146
SIZE	-0.001	0.009	-0.034	0.026	-0.033	0.026
SALEGR	-0.057^{c}	0.032	0.099	0.103	0.094	0.103
LEVER	-0.011	0.064	-0.127	0.207	-0.112	0.207
TENDER	0.428^{a}	0.050	1.746^{a}	0.147	1.751^{a}	0.147
DEFENSE	0.024	0.058	-0.247	0.211	-0.237	0.211
CASH	-0.489^{a}	0.041	-1.580^{a}	0.119	-1.586^{a}	0.119
INDUS	-0.143^{a}	0.043	-1.083^{a}	0.143	-1.087^{a}	0.144
COMPETE	-0.290^{a}	0.119	-1.335^{a}	0.217	-1.330^{a}	0.217
CONST	0.982^{a}	0.078	2.305^{a}	0.748	2.262^{a}	0.748
Year	No		Yes		Yes	
Industry	No		Yes		Yes	
N	844		1702		1702	
R-sq/ pseudo R-sq	0.4		0.48		0.48	

Table 2.6: Types of CEO learning

Table 6 provides probit regressions of transaction outcome on different types of CEO learning. The dependent variable, $SUCC$, equals one if the transaction is completed, and zero otherwise. ALE equals the total number of transactions CEO previously completes in acquisition programs. $DCAR$ is the total of cumulative abnormal returns between from day -1 to day 1 of both target and acquirer, with day 0 defined as the announcement date. Other variables are defined in Appendix 2.A. a, b, and c denote statistically significant at 1 %, 5 %, and 10 % level, respectively.

Dependent variable: SUCC=1 if transaction is completed, 0 otherwise				
	Model 1		Model 2	
	Coefficient	Standard error	Coefficient	Standard error
ALE	0.137^a	0.031	0.210^a	0.038
DCAR	0.422^c	0.243	1.056^a	0.314
DCAR*ALE	-	-	-0.453^a	0.125
PREMIUM	1.104^a	0.159	1.170^a	0.162
SIZE	-0.067^a	0.026	-0.073^a	0.026
SALEGR	0.065	0.103	0.075	0.103
LEVER	-0.315	0.208	-0.32	0.209
TENDER	1.887^a	0.155	1.879^a	0.156
DEFENSE	-0.163	0.206	-0.187	0.208
CASH	-1.565^a	0.121	-1.564^a	0.122
INDUS	-0.804^a	0.146	-0.793^a	0.147
COMPETE	-1.395^a	0.237	-1.382^a	0.238
CONST	2.949^a	0.641	2.902^a	0.647
Year	Yes		Yes	
Industry	Yes		Yes	
N	1764		1764	

Table 2.7: Bid premium, deal announcement returns, and CEO experience

Table 7 provides linear regressions of takeover premium and deal announcement returns on CEO's accumulated learning experience. $PREMIUM$ is the ratio between the offer price and target stock price four weeks prior to the announcement date, minus one. $DCAR$ is the total of cumulative abnormal returns between from day -1 to day 1 of both target and acquirer, with day 0 defined as the announcement date. ALE equals the total number of transactions CEO previously completes in acquisition programs. Other variables are defined in Appendix 2.A. a, b, and c denote statistically significant at 1 %, 5 %, and 10 % level, respectively.

Dependent variable	PREMIUM (1)		DCAR (2)	
	Coefficient	Standard error	Coefficient	Standard error
ALE	0.012^b	0.005	0.007^b	0.003
SIZE	0.011^b	0.005	0.001	0.003
SALEGR	0.009	0.017	-0.002	0.011
LEVER	0.047	0.035	-0.067^a	0.022
TENDER	0.213^a	0.021	0.129^a	0.014
DEFENSE	0.153^a	0.034	0.063^a	0.022
CASH	-0.171^a	0.019	-0.030^b	0.013
INDUS	-0.169^a	0.021	-0.114	0.015
COMPETE	0.154^a	0.044	-0.028^c	0.032
CONST	0.220^b	0.108	0.232^a	0.029
Year	Yes		Yes	
Industry	Yes		Yes	
N	1941		1764	
R-sq	0.3		0.14	

Table 2.8: Robust checks

Table 8 provides various robust checks to unobserved heterogeneity, alternative definitions of acquisition program, and missing variables. The dependent variable, SUCC, equals one if the transaction is completed, and zero otherwise. Model 1 provides random-effects probit regressions of transaction outcome on CEO learning experience. Model 2 tests an alternative definition of acquisition program. Model 3 and 4 control for CEO's personal characteristics and compensation factors. ALE equals the total number of transactions CEO previously completes in acquisition programs. $PRSUCC$ is a dummy indicator which equals one if the prior bid is completed in programs of two successive transactions, zero otherwise. AGE is the natural logarithm of CEO's age. $EQPAY$ is the sum of CEOs restricted stock grants and stock option grants scaled by his total compensation. $VRPAY$ is generated as the difference between CEO's total compensation and salary scaled by his total compensation. $SLPAY$ is the proposition of CEO's compensation as of the sum of the top-five executive team. Other variables are defined in Appendix 2.A. a, b, and c denote statistically significant at 1 %, 5 %, and 10 % level, respectively.

Dependent variable: SUCC=1 if transaction is completed, 0 otherwise								
	Model 1		Model 2		Model 3		Model 4	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
ALE	0.141^a	0.030	-	-	0.136^a	0.031	0.135^a	0.031
PRSUCC	-	-	0.467^a	0.078	-	-	-	-
PREMIUM	1.197^a	0.137	1.223^a	0.137	1.196a	0.139	1.197^a	0.139
SIZE	-0.056^b	0.024	-0.043^c	0.024	-0.050^b	0.026	-0.062^b	0.027
SALEGR	0.077	0.096	0.084	0.096	0.053	0.101	0.033	0.101
LEVER	-0.182	0.192	-0.225	0.193	-0.195	0.197	-0.236	0.198
TENDER	1.707^a	0.137	1.696^a	0.138	1.664^a	0.14	1.668^a	0.14
DEFENSE	-0.347^c	0.19	-0.340^c	0.189	-0.397^b	0.193	-0.392^b	0.193
CASH	-1.504^a	0.111	-1.474^a	0.111	-1.499^a	0.114	-1.492^a	0.115
INDUS	-1.010^a	0.133	-1.058^a	0.133	-1.000^a	0.136	-0.993^a	0.136
COMPETE	-1.285^a	0.208	-1.337^a	0.207	-1.303^a	0.212	-1.277^a	0.213
AGE	-	-	-	-	0.030	0.307	0.065	0.306
TENURE	-	-	-	-	-0.021	0.099	-0.038	0.099
GENDER	-	-	-	-	0.115	0.413	0.118	0.411
EQPAY	-	-	-	-	0.102	0.160	-	-
SLPAY	-	-	-	-	0.105	0.145	0.038	0.146
VRPAY	-	-	-	-	-	-	0.441b	0.211
CONST	2.698^a	0.581	2.559^a	0.578	2.733^c	1.463	2.573^c	1.461
Year	Yes		Yes		Yes		Yes	
Industry	Yes		Yes		Yes		Yes	
N	1941		1941		1839		1839	
pseudo R-sq	-		0.46		0.45		0.45	

Chapter 3

The role of independent expert reports in Australian M&A market

3.1 Introduction

In Australian M&A market, a takeover target is required to prepare an independent expert report whenever the bidder has 30% or more interests in the target, or they share a common director. Regulations of related parties are stated in S640 Corporations Act for takeover offers and S411 Corporations Act for schemes of arrangement. This requirement is first introduced by the Companies Acquisition of Shares Act in 1980, and substituted by one of takeover provisions in the Corporate Law from January 1991.

This study asks whether independent expert reports can solve the conflict between the target's board of directors and its shareholders when the acquirer has substantial power in the decision-making process of the target, i.e., toehold or common directors. Expert advice acts as a countervailing influence to negotiate additional premiums for the target when the offer is not reasonable. Specifically, a "neither fair nor reasonable" (FNR) opinion will force the bidder to revise its offer premium. In addition, if expert opinions are effective, the takeover bid's outcome is likely to be influenced by the conclusion of independent experts.

Particularly, if a bid is concluded as "fair and reasonable" (FR), it is likely to be completed, while it will be rejected when it receives an FNR opinion.

I collect a sample of 2888 Australian M&A transactions during the period 1991-2013 from International Mergers database in Thomson SDC Platinum. Linear regressions reveal a clear and significant relationship between an FNR opinion and offer revision. Specifically, offer revision increases 5% when the independent expert rates the transaction as FNR, ceteris paribus. I then regress initial premium on observable firm-deal characteristics, and the residual values are considered as a proxy for the bargaining power of the target. I find that the positive effect of an FNR opinion on offer revision is significantly lower when the target has weak bargaining power. In addition, a takeover bid is likely to be completed when it receives a favorable opinion. Particularly, the takeover likelihood of success increases almost 6% when independent experts rate the bid as FR, ceteris paribus. Empirical evidence, however, indicates no significant relation between an FNR opinion and transaction outcome.

This study contributes to the literature of corporate governance with regards to the role of independent experts in four aspects. Firstly, it identifies a significant positive relation between a "fair and reasonable" opinion and the probability of success. Eddey (1993) groups three opinions: FNR, "not fair but reasonable", "fair but not reasonable" into a single dummy indicator, but finds no evidence supporting the hypothetical relation. In contrast to his method, I separate the effect of a positive opinion "FR" from the negative "FNR", and estimate them in the same equation. In addition, I control for various factors including firm-deal characteristics that affect the transaction outcome rather than expert opinions and director recommendation.

Secondly, the study employs a different research approach to examine to what extent an unfavorable comment increases offer revision. Bugeja (2005) uses a probit regression to relate FNR and the frequency of being revised. His definition of a dummy indicator that equals 1 if there is offer revision is not satisfactory since there are both positive and negative

revisions.[1] In contrast, I analyze the value of offer revision rather than the probability of receiving it. I also employ a more comprehensive sample which covers the period after 2000 compared to previous studies (Bugeja, 2005; Bugeja et al., 2005; Bugeja, 2004; Eddey, 1993).

Thirdly, I control for the bargaining power of the target measured by the residual values of initial premiums that are not explained by observable firm-deal characteristics. I then examine whether the targets bargaining power partially affects the influence of expert opinions on offer revision. This examination helps us to understand whether independent expert reports compensate for the bargaining weakness of the target.

Lastly, expert opinions are endogenous. I attempt to identify the effect of expert opinions on transaction outcome and offer revision using differences-in-differences analyses. My sample covers the period 1991-2013, which allows us to use the Duke case decision as an exogenous event that changes experts' risk attitude, effort, and independence. One may concern that the result without the Duke case might be driven by unobservable characteristics of target receiving FNR, such as several information asymmetry. The Duke case is less likely to affect such unobservables, but it is likely to affect the legitimacy of the recommendation. Differences-in-differences analyses clearly identify the effect of expert opinion before and after the Duke case.

Analysis of independent expert report shows that the target's shareholders earn more when the deal is rated as "FNR" by the independent expert. It means the independent expert report helps to maintain the fairness of the deal when the bidder has strong advantages compared to the target. This implies that there should be a policy to encourage all firms to have opinions from independent experts when they receive a takeover bid. In addition, the takeover target often has a weak negotiating position because it has small size compared to the acquirer and financial difficulties (or in need of capital). Third party advice can solve this problem, but it is not adequate. Evidence from Duke case implies that the court's judgment

[1]Bugeja (2005) creates a dummy indicator equal to 1 if there is a revision, 0 otherwise, ignoring the existence of negative revisions. Bugeja (2007), however, defines offer revision dummy as 1 if the bidder increases the offered price.

to endorse the validity and reliability of a recommendation is required.

I structure this chapter as followed. Section 3.2 provides hypothesis development and the use of expert reports outside Australia. Section 3.3 describes econometric modeling and explains data collection procedure. I present empirical results in Section 3.4. Section 3.5 discusses the Duke case decision. Section 3.6 concludes the chapter.

3.2 The role of independent expert reports

3.2.1 Hypothesis development

The statutory provision of independent expert reports is issued to avoid the recurrence of circumstances in which a bidder takes advantage of its target after gaining a particular proportion of the target's shares, or to prevent the bidder from exploiting advantages arising from a common directorship.[2] According to Eddey (1993), the compulsory requirement of an expert report has two mitigating effects. Firstly, it slows down the takeover process, so that the target can have enough time to read the terms of the offer carefully. Secondly, it provides necessary information which might not be available when the bidder has a powerful bargaining position. The bidder, therefore, cannot use its competitive advantages to lower the offer premium paying to the targets shareholders. Independent expert reports act as a countervailing influence to extract higher premiums than would otherwise have been offered.

I classify expert opinions into two groups. The first group includes absolute positive and negative comments: FR and FNR. The second group consists mixed opinions: "not fair but reasonable" (NFBR) and "fair but not reasonable" (FBNR). National Companies and Securities Commission (NCSC) discusses the detailed explanation of fairness and reasonableness.[3] A fairness opinion is given when the offer price is greater than the price estimated by independent experts. Reasonableness controls for other significant factors that shareholders may

[2]Explanatory Memorandum to the Companies (Acquisition of Shares) Act 1980, Clause 84.
[3]NCSC Policy statement 102, PS 102.19, 20.

consider before accepting the offer and after having the reference of the "fairness" criterion.[4]

If the target's board of directors act in the interest of shareholders, their decision to recommend a takeover bid as "accept" will depend on how the offer generates wealth to the existing shareholders, not their personal benefits, even after considering alternative bidders that can offer a higher premium. The agency theory of Jensen and Meckling (1976) and Ross (1973), however, suggests that managers may optimize their personal benefits instead of maximizing the shareholders value. For example, they may accept low offers to exchange for their future employment in the acquirer's company or lucrative payout (Bugeja, 2007). And it is more likely to be the case when the target and acquirer have an interlocking relation, i.e., toehold and common directors.

DeAngelo (1990) argues that independent experts can resolve this conflict of interests given that their assessment of the offer price is not self-motivated. It is concerned that in the U.S. M&A market, a takeover target can rely on its pre-existing relationship with the experts to purchase favorable opinions during the negotiation process (Kisgen et al., 2009; Cai and Sevilir, 2012). In addition, the target's shareholders expect to maximize the premiums paid by the acquirer, while the independent expert' goal is to obtain a maximum amount of advisory fees without suspending his relation with the target or destroying his reputation (Kesner et al., 1994). However, in Australian M&A market, ASIC will strictly examine the independence as well as the adequacy and completeness of the experts analysis, therefore, independent advisors curb their opportunism and give advice in the interest of the target's shareholders.[5]

Hypothesis 1. *If independent experts rate a transaction as FNR, the bidder tends to increase*

[4]Details of expert opinion are discussed in ASIC Policy Statement 74 and the summary of McDonald et al. (2003).

[5]According to ASIC Regulatory Guide 111 (Section E), ASIC will consider regulatory actions if there are material concerns with the contents of the expert reports including the completeness and the adequacy of the expert's analysis or problems about the independence of an expert. Actions might include writing to the expert or the commissioning party to raise concerns, or requesting a change to an expert report. Enforcement actions are taken even without noticing the expert or the commissioning party. More serious actions might be taken such as suspending the experts license (s915C) or stop the expert from giving reports in compulsory acquisitions (S667AA and RG 157.107).

offer revision, ceteris paribus.

Researchers and practitioners criticize the independence of independent experts. Bugeja et al. (2005) document that almost 50% of reports are provided by experts who have a pre-existing business relation with the target. In addition, the target' auditors are indeed known to produce 25% of all expert reports, which raises a big concern about the standards and quality of the reporting service. Bugeja (2004) argues that independent experts tend to agree with the judgment of the target' management board because they concern about their income loss in other ongoing businesses with the target.

ASIC requires independent experts to provide reasons for reaching the conclusion that an offer is fair and reasonable, and disclose all existing business relations with the target. If their independence satisfies the ASIC's regulations, their judgment will affect the transaction outcome. Specifically, the target's shareholders will react favorably to an FR opinion, and negatively to the FNR opinion. Testing the relation between FR, FNR and the takeover outcome will clarify the independence of experts in giving opinions to the target. Additionally, if independent experts solve the agency conflict between the target's shareholders and its board of directors, the shareholders will reject or accept the bid according to their independent assessment. Controlling for the recommendation of the target's directors and firm-deal characteristics will uncover the underlying influence of expert opinion on transaction outcome.

Hypothesis 2. *The takeover likelihood of success positively relates to the FR conclusion and negatively relates to the FNR conclusion.*

3.2.2 Expert reports outside Australia

In contrast to Australian regulations, U.S. takeover targets are not required to hire an independent expert to provide an evaluation of offer price in both mergers and tender offers. DeAngelo (1990) highlights the fact that in U.S. M&A market, experts usually give a fairness

opinion in mergers, acquisitions and management buyouts, especially after the Delaware court ruling in Smith versus Van Gorkom case in 1985 (Gougis, 1992; Bowers, 2002).[6] Bowers (2002) shows that about 60% of targets provide a fairness opinion during the period 1985-1999 compared to the proportion of 19% before the Van Gorkom judgment.

In the UK, the City Code have statutory force on takeover offers, and the Panel has legislative power in respect to the rules of the City Code. The Rule 3.1 of the City Code requires that takeover targets must obtain an assessment of independent experts on whether financial terms of an offer are fair and reasonable, and shareholders can access to the substance of such advice. The requirement is important when the offer is a management buy-out or made by existing controllers. It is also required when there is significant uncertainty about the target's financial information. In addition, If experts fail to judge an offer as FNR, the reasons should be made known to shareholders and consulted by the Panel. On the acquirer side, the Rule 29 of The City Code requires that when a bidder offers to purchase the target's shares, it has to acquire outstanding convertible shares. In this case, the target's directors need to consult independent experts on the offer made to the convertible security holders.

Takeover targets in New Zealand M&A market are required to have an independent expert report to assess the fairness and reasonableness of the offer price from 1 July 2001. In contrast to Australia where a takeover target can freely select its adviser, the expert in New Zealand must be approved by the Takeover Panel. In addition, the approving procedure depends on a case-by-case basis and must satisfy the qualification and independence requirement. Moreover, auditors cannot be appointed as an independent advisor in the New Zealand market, and this regulation is similar to the US when the SarbanesOxley Act is passed in 2002 to prevent auditors from giving opinions. In Australia, it is accepted; however, experts have to disclose their current business dealings with the target as well as other business activities within two years before the issuance of the expert report. Bugeja (2004) reports that 25% of experts are target's current auditor.

[6]Smith versus Van Gorkum, 488 A. 2d 858 (Del. 1985).

3.3 Econometric modeling and sample selection

3.3.1 Econometric modeling

To estimate the effect of independent expert opinions on offer revision, I model offer revision as a linear function of different expert conclusions and a set of firm-deal characteristics:

$$\text{offer revision} = \beta_0 + \beta_1 FR + \beta_2 FNR + \gamma X + \varepsilon \tag{3.1}$$

The independent variable, offer revision, is the changing rate of offer price compared to the initial offer price. FR is the "fair and reasonable" conclusion. FNR is the "neither fair nor reasonable" recommendation. X is known as a vector of other factors affecting the offer revision. ε is the error term. We can estimate the linear model using Ordinary Least Squares (OLS) estimation.

There are two potential sources that increase offer price. Firstly, an FNR opinion assists the target to bargain higher premiums base on their own assessment. Secondly, the bid is revised upwards because it is "unfair and unreasonable", even when there is no independent assessment. I, therefore, include initial premiums in Equation 3.1 to control for the second source of influence on offer revision. Specifically, if the bid itself is "unfair and unreasonable", it is likely the initial premium will capture this unfairness and the possibility of a revision due to the unfair offer.

To study the effect of independent expert opinions on takeover outcome, I use the linear probability model and OLS estimation approach:

$$\text{takeover success} = \delta_0 + \delta_1 FR + \delta_2 FNR + \eta Z + \nu \tag{3.2}$$

The independent variable, takeover success, is a dummy indicator which equals one if the deal is completed, 0 otherwise. FR and FNR are defined as above. Z is known as a vector of other factors affecting the takeover outcome. ν is the error term.

3.3.2 Sample selection and summary statistics

I search the International Mergers database in Thomson SDC Platinum for transactions with following filtering criteria: (1) The announcement date starts from 1/1/1990 to 31/12/2013; (2) Takeover targets are Australian firms; they are classified as "AU" in the SDC database; (3) Takeover targets are publicly listed firms, classifying as "P" in the SDC database. Acquirers can be public, private or subsidiary firms from various countries. I preliminarily obtain 7857 transactions. I then drop all transactions that have unclear outcomes in the SDC database including unknown status, discontinued rumor, or pending (883 transactions dropped). I continue to delete 4086 observations with missing deal and target details. The final sample includes 2888 transactions of which complete information is available.

Table 3.1 provides an overview of Australian M&A market during the period 1991-2013. The concentration of the period starts from 2006 with 209 transactions until 2010 with 248 transactions, which accounts for 39% of all M&A activities during the period. The average size of all transactions ranges between $A324 million (2013) and $A6485 million (2001). Most of large size transactions are announced between the period 1991-2001. There is no clear pattern of completion ratio across year, and more than half of deals are successfully completed.

Figure 3.1 plots the number of independent expert reports and announced M&A transactions during the period 1991-2013. Though there is no particular trend in the number of independent reports, we can recognize that a significant proportion of takeover targets is required to have an independent expert report, or prepare for it voluntarily.

Table 3.2 provides summary statistics of the sample of 2888 Australian M&A transactions of which the deal structure has various types including takeover bid (on-market and off-market), schemes of arrangement and others. The average target total assets are approximately A$1878 million with a huge standard deviation of A$13578 million. On average, the target's market-to-book ratio is about 2.1 times, though the standard deviation is large at 3.1 times. In addition, takeover targets have 38.2% of liabilities compared to the total assets

in the most recent fiscal balance sheet.

In terms of deal-related characteristics, initial premiums, on average, are significant at 24.2%, but the median is quite low at 6.1%, suggesting that the distribution of initial premiums is right skewed. In contrast, offer revisions are very small, averaging 1.7%, and the standard deviation is substantially high at 11.5%. 59.1% of transaction value is financed by cash, and the remaining part is stock or mixed between cash and stock financing. Acquiring firms accumulate a significant amount of toehold prior to takeover bids, with an average of 6.2% (15.5%). 7.5% of targets receives an FR opinion while only 4% obtains an FNR. 8.2% of Australian takeover transactions have equal or more than one competitor. The rate of success is relatively high; 72.3% of transactions are completed which is slightly lower than the completion ratio in the U.S. market in which 75% of transactions are consummated (Baker et al., 2012). In addition, 32.9% of all transactions are cross-border deals, and 16.7% of them are recommended as "accept" by the target's board of directors.

3.4 Result and discussion

3.4.1 Independent expert reports and offer revision

I analyze the effect of independent expert opinions on offer revision. If independent experts solve the conflict of interests between the target's management board and its shareholders when the bidder has substantial advantages, the FNR opinion should positively relate to offer revision. I define offer revision as the changing rate of the final offer price compared to the initial offer. Linear regression results of Equation 1 are presented in Table 3.3. Model 1 does not control for year and industry. Model 2 controls for both year and industry. The results in Model 1 show that targets receiving an FR opinion have similar offer revision compared to those without it, ceteris paribus. However, the coefficient of FNR equals 0.05(0.01), which is statistically significant at 5%, implying that when the expert rates the deal as FNR, the target receives 5% more in offer revision, ceteris paribus. This result is consistent with the

view that independent experts reduce agency costs by forcing bad bidders to revise their offer premium.

In term of deal-related characteristics, Model 1 indicates that the initial premium has a weak and positive influence on offer revision. In addition, when cash proportion increases 1%, the offer is revised by 0.014%. The results also suggest that the more competitive the offer is, the more likely that the offer is revised. Specifically, if there is more than one bidder, the offer revision increases by 6%, ceteris paribus. The cross border dummy is statistically significant at 5%, suggesting that non-Australian acquirers increases 1.1% in offer revision for their cross border interests. Director recommendation encourages the bidder to revise its offer premium by 1.6%, even after controlling for independent expert opinions. The aforementioned conclusions remain unchanged after I control for year and industry fixed effects in Model 2, except the positive effect of initial premium. It no longer has a significant effect on offer revision.

3.4.2 Bargaining power and offer revision

ASIC requires a takeover target to prepare an independent expert report when it meets certain conditions. Experts have to explain whether the offer is fair and reasonable according to their own assessment. The substance of an expert report will add evidence on what the valuation of the target's share price should be, and assist the target to claim an offer revision when the offer price is lower than the estimated stock price, otherwise a recommendation of rejection to the target's shareholders will reduce the success likelihood of the bid. In short, the target can use an expert report as a reason to bargain, especially when it cannot reasonably explain the offer price or has no capability to explain the initial premium. Researchers doubt that independent experts provide necessary information which might not be available when takeover targets have a weak bargaining power (Eddey, 1993). Therefore, in this section, I control for the bargaining position of the target while examining the effect of expert opinions on offer revision.

ASIC has instruction on how independent experts prepare a report in that they are granted a similar access to the target's records as an auditor; therefore, they have privileged access to the target's information which is confidential and not available to other experts.[7] Bugeja (2004) adds that independent experts use similar materials to evaluate the offer as the bidder but without a conflict of interest. As a result, the target will make a more informed decision based on the assessment from an expanded set of information (Anderson and Chalmers, 1996).

In order to measure the bargaining strength of takeover targets, I employ an empirical approach similar to Gompers et al. (2010) and Nguyen (2016). Gompers et al. (2010) regress the success of serial entrepreneurs in their first ventures on the industry-year success rate, as well as a variety of company characteristics. They consider the residual values as a measurement of "managerial skill" In the context of M&A, Nguyen (2016) regresses the success of the first takeover bid in acquisition programs on a set of firm-deal characteristics and attributes the residual terms to CEO's inherent abilities in doing takeovers. In this study, I regress initial premiums on observable firm-deal characteristics that are not related to the bargaining power of the target (first-staged regression). Specifically, I include a set of variables: target size, market-to-book ratio, leverage, proportion of cash, toehold, competition, cross border and director recommendation, which are known to affect takeover premiums (Heron and Lie, 2006, 2015; Bugeja, 2005, 2004, 2007). The residuals will reflect the bargaining position of the target when receiving a takeover bid.

I drop 635 observations that have missing Australian Stock Exchange (ASX) industry code from my main sample. I then regress initial premiums on various firm-deal characteristics to get residual values. I follow Henry (2004) to classify takeover targets into different industry groups based on the first two digits of their ASX industry code. I divide my sample into two subsamples, weak and strong bargaining power. I then define $Weak$ as a binary variable coded 1 if the bargaining power is less than the median of all residuals in the same

[7] ASIC Policy Statement 75(16). Independent expert reports to shareholders, page 4.

year and industry class, and 0 otherwise. I regress the offer revision on expert opinions and firm-deal characteristics for each group. In addition, I include an interaction term, $Weak * FNR$, to reflect the degree to which an FNR opinion compensates for the target's bargaining power.

Model 1 in Table 3.4 shows the estimation results of the first-staged regression. Mode 2 and Model 3 provide regression analysis of offer revision in different groups of weak and strong bargaining power, respectively. In both models, the coefficient of FNR is statistically significant at 1%. Targets in the subsample of strong bargaining power receive 8.4% increases in offer revision when the deal is rated as FNR, ceteris paribus. However, in the other subsample, targets only obtain 2.8%.

Model 4 includes an interaction term between $Weak$ and FNR. The coefficient is negative and statistically significant at 1%, suggesting that the effect of an FNR opinion on offer revision is -6.5%(1.6%) lower when the target has a weak bargaining position. The finding is consistent with the difference in the partial effects of an FNR opinion estimated in Model 2 and Model 3. It emphasizes that an unfavorable report does not compensate for the target's bargaining weakness. Furthermore, the coefficient of $Weak$ is negative and statistically significant at 1%, indicating that other governance mechanisms fail to protect takeover targets from powerful bidders, leading to a further decrease of 1.7% (0.4%) in offer revision.

3.4.3 Independent expert report and takeover success

Table 3.5 presents the regression analysis of transaction outcome on expert opinions. If expert advice is effective, the takeover likelihood of success will positively relate to the FR and negatively relate to the FNR opinion. The empirical evidence strongly supports the positive relation between FR the takeover probability of success. Particularly, in Model 1, an FR opinion increases the probability of success by 6.1%(2.8%), ceteris paribus. After controlling for industry and year fixed effect in Model 2, the favorable opinion rises the

likelihood of success by 6.5%(3.5%), but the coefficient is less statistically significant. In contrast, the coefficient of FNR is statistically insignificant in both models. I conjecture that when independent experts rate a transaction as FNR, the offer premium tends to be revised instead of rejecting the offer immediately.

Consistent with previous literature, target size has been found negatively related to the takeover outcome. Specifically, the coefficient of target size equals -0.010(0.004), statistically significant at 5%. Table 3.5 indicates that acquired targets exhibit a better market-to-book ratio in both models, although O'Sullivan and Wong (1999) and Sudarsanam (1995) find no evidence supporting the relation between takeover outcome and the target's pre-bid performance. Specifically, market-to-book ratio is positive and statistically significant at 5% controlling for year and industry effect. The coefficient of leverage is positive but weakly significant, suggesting that targets with debt constraint and promising growth are likely to be acquired (Fidrmuc and Xia, 2016; Masulis and Simsir, 2015). In contrast with the findings of Heron and Lie (2006) and Heron and Lie (2015), I find no association between takeover outcome, initial premium and offer revision. Additionally, transactions paid by cash are less likely to be completed. Acquirers, who hold a higher proportion of the target' shares, have higher likelihood of success.

As expected, the takeover probability of success drops significantly when there is a competing bidder. Specifically, in Model 1, the success likelihood decreases about 32.3% when the transaction has more than one bidder, ceteris paribus. Cross border is positive and statistically significant at 1%, suggesting that non-Australian bidders have 15.2% higher success likelihood. Director recommendation also has a positive impact on takeover outcome. Specifically, the success likelihood rises by 20% when the targets directors recommend the transaction as "accept". The overall statistical significance and value of all coefficients are almost similar after eliminating the cross-sectional effect of year and industry.

3.5 Duke case decision

Duke case decision forces Nelson Wheeler, an independent expert, to take a responsibility for 30% of the total penalty of A$93.9 million (approximately A$28 million) for the collapse of Duke corporation due to his dishonest assessment.[8,9] Before the Duke case, independent experts view the risk of being penalized by the Court is low; however, after the Court decision, the awareness of risk in valuing and giving advice increases substantially (Bugeja, 2004; McDonald et al., 2003). Bugeja (2004) examines the relation between word length of expert reports and the Duke case to show the systematic change of the expert effort in assessing a takeover offer after the Duke case. Concerns regarding to expert independence also emerges after that (Chanticleer, 1989; Lecky and Burge, 1988). In response to these concerns, ASIC examines the hiring procedure and standards of expert reports.[10]

I use Duke case decision to identify the effect of an FNR opinion on offer revision. I model the offer revision as follows:

$$\text{offer revision} = \theta_0 + \theta_1 Duke * FNR + \theta_2 Duke + \theta_3 FNR + \theta_4 FR + vartheta X + \varepsilon \quad (3.3)$$

where $Duke$ is a dummy indicator equal to one if the takeover bid is announced after January, 1998. The differences-in-differences estimate equals θ_1. θ_2 is the time trend common to the control and treatment group. θ_3 captures the difference between FNR and other conclusions prior to the Duke case decision. X is a vector of firm-deal characteristics.

Table 3.6 provides estimation results of Equation 3. Model 1 shows that the interaction

[8]Kia Ora Gold (changed to Duke corporation after the takeover) is a corporation located in South Australia and listed on ASX with the principal business of gold mining since 1983. In 1987, Kia Ora Gold places a takeover bid over Western United Ltd. The offer price is between A$3.95 and A$4.0, which is significantly higher than the stock price of Western United at A$1.20. Directors of Kia Ora Gold then ask Nelson Wheeler to prepare a report which then values the share at A$3.22. The merged corporation, Duke, then collapses in 1989, and Justice Mullighan in the South Australian Supreme Court finds that the value of Western United is A$6.5 million rather than A$82 million as estimated by Nelson Wheeler.

[9]Duke Group ltd. (in Liq) v. Pilmer & Ors, Judgement of Honourable Justice Mullighan, January 30, 1998, Supreme Court of South Australia (Civil), Judgement No. S6529.

[10]Oldfield, Australian Financial Review, 17 December, 2001, p. 1.

term between and is positive and statistically significant at 5%. We, therefore, can conclude that an FNR conclusion has a causal effect on offer revision. FR remains statistically insignificant; θ_4 equals 0.002(0.009). After controlling for year and industry effects in Model 2, the coefficient of the time trend common to control and treatment group, θ_2, becomes negative and remains statistically significant. The effect of an FNR opinion remains robust; however, the coefficient becomes larger at 6.1%(1.8%).

In Section 3.4, we conclude that an FR report positively affects the takeover success. We again employ the differences-in-differences analysis to identify the causal effect of an FR report using Duke case. I model the transaction outcome as follows:

$$\text{takeover success} = \lambda_0 + \lambda_1 Duke * FR + \lambda_2 Duke + \lambda_3 FR + \lambda_4 FNR + \phi Z + \nu \qquad (3.4)$$

where is a dummy indicator equal to one if the takeover bid is announced after January, 1998. Differences-in-differences estimate equals λ_1. λ_2 is the time trend common to control and treatment group. λ_3 captures the effect of an FR report on the takeover success prior to the Duke case decision. λ_4 captures the effect of FNR conclusion on the takeover success prior to the Duke case decision. Z is a vector of firm-deal characteristics affecting takeover success.

Table 3.7 presents the estimation results of Equation 4. Model 1 does not control for year and industry effect. The interaction term between $Duke$ and FR, which represents the treatment effect, is positive and statistically significant at 5%, suggesting an FR opinion positively affects the takeover probability of success. I, however, find no evidence supporting the positive relation between an FNR opinion and transaction outcome. Model 2 controls for the cross-sectional effect of year and industry. Although the coefficient of the treatment effect remains positive, it is not statistically significant as shown in Model 1.

3.6 Conclusion

This study asks whether independent expert reports can solve the conflict between the target's board of directors and its shareholders when the acquirer has substantial advantages. I collect a comprehensive sample of 2888 Australian M&A transactions during the period 1991-2013 from International Mergers database in Thomson SDC Platinum. Linear regression reveals a clear and significant relationship between an FNR opinion and offer revision. Specifically, offer revision increases 5% when the independent expert rates the transaction as FNR, ceteris paribus. In addition, the effect is lower when the target has weak bargaining power. Furthermore, the probability of success increases about 6.1% when the independent expert rates the bid as FR, ceteris paribus, while an FNR opinion has no significant effect on the takeover outcome. I identify the causal effect of expert opinions on offer revision and takeover outcome by differences-in-differences analysis using the Duke case decision.

Figure 3.1: Frequency of independent expert reports in Australian M&A market

This figure plots the number of independent expert reports and announced M&A transactions during the period 1991-2013. The transaction data is obtained from the International Mergers database in Thomson SDC Platinum. Takeover targets are Australian public firms, while acquirers can be public, private or subsidiary firms from various nationalities.

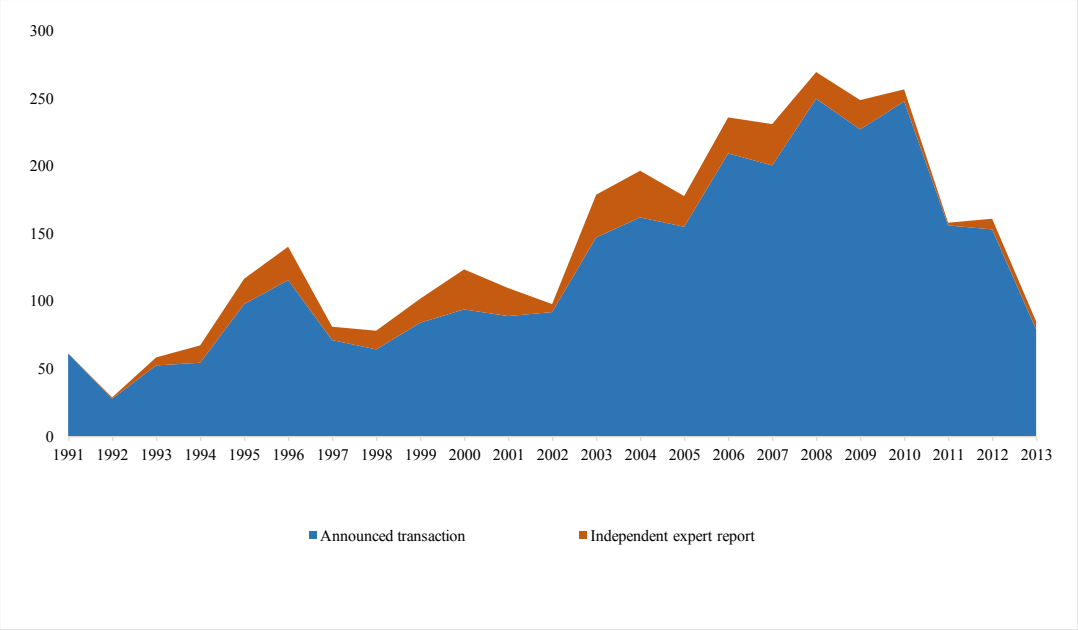

Table 3.1: Distribution of M&A transactions across year

Table 1 presents the distribution of 2888 Australian M&A transactions announced during the period 1991-2013. The transaction data is obtained from the International Mergers database in Thomson SDC Platinum. Takeover targets are Australian public firms, while acquirers can be public, private or subsidiary firms from various countries.

Year	Number of transactions	Completion ratio	Average total assets
1991	61	0.82	2983.05
1992	28	0.79	4388.89
1993	52	0.83	4679.02
1994	54	0.87	2132.47
1995	98	0.79	1773.55
1996	115	0.84	3920.36
1997	71	0.73	4005.15
1998	64	0.73	840.49
1999	84	0.70	5516.38
2000	94	0.60	4659.95
2001	89	0.52	6484.73
2002	92	0.68	571.77
2003	147	0.80	865.13
2004	162	0.78	999.98
2005	155	0.76	2712.85
2006	209	0.76	746.00
2007	200	0.73	1353.47
2008	250	0.60	1272.61
2009	227	0.72	991.32
2010	248	0.69	605.73
2011	156	0.81	2122.89
2012	153	0.66	470.24
2013	79	0.65	324.13
Total	2888	0.73	1877.97

Table 3.2: Summary statistics

Table 2 shows descriptive statistics of 2888 Australian M&A transactions announced during the period 1991-2013. Target size is the natural logarithm of the target's total assets. Market-to-book ratio equals the sum of the target's market capitalization and total liabilities, scaled by its total assets. Leverage equals the ratio between the target's total liabilities and its total assets. Initial premium equals the ratio between the initial offer price and the target's stock price one day prior to the announcement date minus one. Offer revision equals the ratio between the offer price and the initial offer price minus one. Proportion of cash equals to the ratio of cash component in financing the transaction. Toehold equals to the ratio of stock held by the acquirer in the target prior to the transaction announcement. FR is a dummy indicator equal to one if the independent expert rates the transaction as ""fair and reasonable". FRN is a dummy indicator equal to one if the transaction is rated as "neither fair nor reasonable. Takeover success equals one if the deal is successfully completed, and zero otherwise. Competition equals one if there is a competing bidder, and zero otherwise. Cross border equals one if the acquirer is not an Australian firm, and zero otherwise. Director recommendation equals one if the targets director recommends the transaction as "accept", zero otherwise.

	Mean	Median	Standard deviation
Total assets	1878	86.55	13578
Target size	4.6	4.461	2.119
Market-to-book ratio	2.087	1.172	3.098
Leverage	0.382	0.36	0.291
Initial premium	0.242	0.061	3.278
Offer revision	0.017	0	0.115
Proportion of cash	0.591	1	0.484
Toehold	0.062	0	0.155
FR	0.075	0	0.264
FNR	0.04	0	0.196
Takeover success	0.723	1	0.448
Competition	0.082	0	0.275
Cross border	0.329	0	0.47
Director recommendation	0.167	0	0.373
N	2888		

Table 3.3: Independent expert report and offer revision

The dependent variable, offer revision, equals the ratio between the offer price and the initial offer price minus one. FR is a dummy indicator equal to one if the independent expert rates the transaction as "fair and reasonable". FRN is a dummy indicator equal to one if the transaction is rated as "neither fair nor reasonable". Target size is the natural logarithm of the target's total assets. Market-to-book ratio equals the sum of the target's market capitalization and total liabilities, scaled by its total assets. Leverage equals the ratio between the target's total liabilities and its total assets. Initial premium equals the ratio between the initial offer price and the target's stock price one day prior to the announcement date minus one. Proportion of cash equals to the ratio of cash component in financing the transaction. Toehold equals to the ratio of stock held by the acquirer in the target prior to the transaction announcement. Competition equals one if there is a competing bidder, and zero otherwise. Cross border equals one if the acquirer is not an Australian firm, and zero otherwise. Director recommendation equals one if the targets director recommends the transaction as "accept", zero otherwise. ***, **, and * are statistical significant at 1%, 5% and 10%.

Dependent variable: Offer revision				
	Model 1		Model 2	
	Coefficient	Standard error	Coefficient	Standard error
FR	0.0028	0.0090	0.0114	0.0073
FNR	0.0503***	0.0108	0.0633***	0.0084
Target size	-0.0009	0.0011	-0.0001	0.0010
Market-to-book ratio	0.0003	0.0007	-0.0004	0.0006
Leverage	-0.0055	0.0077	-0.0032	0.0068
Initial premium	0.0012*	0.0006	0.0003	0.0005
Proportion of cash	0.0138***	0.0044	0.0090***	0.0036
Toehold	0.0104	0.0142	0.018	0.0123
Competition	0.0599***	0.0077	0.0722***	0.0062
Cross border	0.0105**	0.0045	0.0069*	0.0038
Director recommendation	0.0161***	0.0063	0.0114**	0.005
Constant term	-0.0002	0.0065	-0.0150	0.0134
Year fixed effect	No		Yes	
Industry fixed effect	No		Yes	
Observations	2888		2253	
R-squared	0.04		0.14	

Table 3.4: Target bargaining power and offer revision

The dependent variable, offer revision, equals the ratio between the offer price and the initial offer price minus one. *Weak* is a binary variable coded 1 if the bargaining power is less than the median of all residual premiums in the same year and industry, and 0 otherwise. FR is a dummy indicator equal to one if the independent expert rates the transaction as "fair and reasonable". FRN is a dummy indicator equal to one if the transaction is rated as "neither fair nor reasonable". Target size is the natural logarithm of the target's total assets. Market-to-book ratio equals the sum of the target's market capitalization and total liabilities, scaled by its total assets. Leverage equals the ratio between the targets total liabilities and its total assets. Initial premium equals the ratio between the initial offer price and the target's stock price one day prior to the announcement date minus one. Offer revision equals the ratio between the offer price and the initial offer price minus one. Proportion of cash equals to the ratio of cash component in financing the transaction. Toehold equals to the ratio of stock held by the acquirer in the target prior to the transaction announcement. Competition equals one if there is a competing bidder, and zero otherwise. Cross border equals one if the acquirer is not an Australian firm, and zero otherwise. Director recommendation equals one if the target's director recommends the transaction as "accept", zero otherwise. ***, **, and * are statistical significant at 1%, 5% and 10%.

Dependent variable	Initial premium		Offer revision					
	Model 1		Model 2		Model 3		Model 4	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
FR	-0.1201	0.3321	0.0116	0.0105	0.0147	0.0089	0.0093	0.0073
FNR	-0.0447	0.3800	0.0838***	0.0121	0.0275***	0.0100	0.0866***	0.0104
Target size	-0.1159***	0.0403	-0.0026	0.0016	0.0007	0.0012	-0.0017*	0.001
Market-to-book ratio	0.0269	0.0273	-0.0033*	0.0017	0.0004	0.0005	-0.0001	0.0006
Leverage	0.9148***	0.2875	0.0014	0.0138	0.0081	0.0066	0.0075	0.0071
Proportion of cash	-0.0848	0.1603	0.0017	0.0056	0.0089**	0.0039	0.0067*	0.0036
Toehold	-0.056	0.5619	0.0274	0.0171	-0.0197	0.0159	0.0143	0.0122
Competition	1.0346***	0.2810	0.2099***	0.0161	0.0494***	0.0056	0.0833***	0.0064
Cross border	-0.1001	0.1662	0.0034	0.0056	0.0072*	0.0044	0.0048	0.0038
Director recommendation	-0.0271	0.228	0.0050	0.0075	0.0177***	0.0058	0.0090*	0.0050
FNR*Weak			-	-	-	-	-0.0652***	0.0167
Weak			-	-	-	-	-0.0163***	0.0039
Constant term	0.3830	0.2429	0.0108	0.0196	-0.0260	0.0157	-0.0047	0.0135
Year fixed effect	No				Yes		Yes	
Industry fixed effect	No				Yes		Yes	
N	2253				1001		2253	
R-squared	0.014				0.19		0.16	

Table 3.5: Independent expert conclusions and takeover success

The dependent variable, takeover success, equals one if the deal is successfully completed, and zero otherwise. FR is a dummy indicator equal to one if the independent expert rates the transaction as "fair and reasonable". FRN is a dummy indicator equal to one if the transaction is rated as "neither fair nor reasonable". Target size is the natural logarithm of the targets total assets. Market-to-book ratio equals the sum of the target's market capitalization and total liabilities, scaled by its total assets. Leverage equals the ratio between the target's total liabilities and its total assets. Initial premium equals the ratio between the initial offer price and the target's stock price one day prior to the announcement date minus one. Offer revision equals the ratio between the offer price and the initial offer price minus one. Proportion of cash equals to the ratio of cash component in financing the transaction. Toehold equals to the ratio of stock held by the acquirer in the target prior to the transaction announcement. Competition equals one if there is a competing bidder, and zero otherwise. Cross border equals one if the acquirer is not an Australian firm, and zero otherwise. Director recommendation equals one if the target's director recommends the transaction as "accept", zero otherwise. ***, **, and * are statistical significant at 1%, 5% and 10%.

Dependent variable: Takeover success				
	Model 1		Model 2	
	Coefficient	Robust standard error	Coefficient	Robust standard error
FR	0.0613**	0.0282	0.0645*	0.035
FNR	0.0117	0.0433	0.0132	0.0467
Target size	-0.0099**	0.0042	-0.0142***	0.0051
Market-to-book ratio	0.0035	0.0025	0.0054**	0.0028
Leverage	0.0501*	0.0277	0.0408	0.0333
Initial premium	-0.002	0.0022	-0.0014	0.002
Offer revision	-0.0349	0.0849	0.063	0.1331
Proportion of cash	-0.1545***	0.0156	-0.1337***	0.0182
Toehold	0.1756***	0.0456	0.1274**	0.0578
Competition	-0.3236***	0.0316	-0.3496***	0.0364
Cross border	0.1517***	0.0153	0.1574***	0.0183
Director recommendation	0.2012***	0.0195	0.1830***	0.0242
Constant term	0.7614***	0.0242	1.0028***	0.0645
Year fixed effect	No		Yes	
Industry fixed effect	No		Yes	
Observations	2888		2253	
R-sq	0.14		0.19	

Table 3.6: Duke case decision and offer revision

The dependent variable, offer revision, equals the ratio between the offer price and the initial offer price minus one. FR is a dummy indicator equal to one if the independent expert rates the transaction as "fair and reasonable". FRN is a dummy indicator equal to one if the transaction is rated as "neither fair nor reasonable". *Duke* is a dummy indicator equal to one if the takeover bid is announced after January, 1998. Target size is the natural logarithm of the target's total assets. Market-to-book ratio equals the sum of the target's market capitalization and total liabilities, scaled by its total assets. Leverage equals the ratio between the target's total liabilities and its total assets. Initial premium equals the ratio between the initial offer price and the target's stock price one day prior to the announcement date minus one. Proportion of cash equals to the ratio of cash component in financing the transaction. Toehold equals to the ratio of stock held by the acquirer in the target prior to the transaction announcement. Competition equals one if there is a competing bidder, and zero otherwise. Cross border equals one if the acquirer is not an Australian firm, and zero otherwise. Director recommendation equals one if the target's director recommends the transaction as "accept", zero otherwise. ***, **, and * are statistical significant at 1%, 5% and 10%.

Dependent variable: Offer revision				
	Model 1		Model 2	
	Coefficient	Standard error	Coefficient	Standard error
Duke	0.0111*	0.0059	-0.0858**	0.0407
FNR	0.0146	0.0212	0.0198	0.0156
Duke*FNR	0.0493**	0.0245	0.0610***	0.0183
FR	0.0015	0.009	0.0116	0.0073
Target size	-0.0009	0.0011	-0.0001	0.001
Market-to-book ratio	0.0002	0.0007	-0.0004	0.0006
Leverage	-0.0039	0.0078	-0.003	0.0068
Initial premium	0.0012*	0.0006	0.0003	0.0005
Proportion of cash	0.0126***	0.0044	0.0087**	0.0036
Toehold	0.0132	0.0143	0.0172	0.0123
Competition	0.0598***	0.0078	0.0714***	0.0062
Cross border	0.0101**	0.0045	0.0069*	0.0038
Director recommendation	0.0169***	0.0063	0.0118**	0.005
Constant term	-0.009	0.0081	-0.0152	0.0134
Year fixed effect	No		Yes	
Industry fixed effect	No		Yes	
Observations	2888		2253	
R-squared	0.05		0.15	

Table 3.7: Duke case decision and takeover success

The dependent variable, takeover success, equals one if the deal is successfully completed, and zero otherwise. FR is a dummy indicator equal to one if the independent expert rates the transaction as "fair and reasonable". FRN is a dummy indicator equal to one if the transaction is rated as "neither fair nor reasonable". *Duke* is a dummy indicator equal to one if the takeover bid is announced after January, 1998. Target size is the natural logarithm of the target's total assets. Market-to-book ratio equals the sum of the targets market capitalization and total liabilities, scaled by its total assets. Leverage equals the ratio between the target's total liabilities and its total assets. Initial premium equals the ratio between the initial offer price and the target's stock price one day prior to the announcement date minus one. Offer revision equals the ratio between the offer price and the initial offer price minus one. Proportion of cash equals to the ratio of cash component in financing the transaction. Toehold equals to the ratio of stock held by the acquirer in the target prior to the transaction announcement. Competition equals one if there is a competing bidder, and zero otherwise. Cross border equals one if the acquirer is not an Australian firm, and zero otherwise. Director recommendation equals one if the target's director recommends the transaction as "accept", zero otherwise. ***, **, and * are statistical significant at 1%, 5% and 10%.

Dependent variable: Takeover success				
	Model 1		Model 2	
	Coefficient	Robust standard error	Coefficient	Robust standard error
Duke	-0.1202***	0.0218	-0.0653	0.2256
FR	-0.0589	0.0683	-0.0149	0.071
Duke*FR	0.1663**	0.0715	0.0999	0.0754
FNR	0.0105	0.0455	0.0131	0.0467
Target size	-0.0100**	0.0046	-0.0142***	0.0051
Market-to-book ratio	0.0071***	0.0028	0.0055**	0.0028
Leverage	0.0584*	0.0304	0.0425	0.0332
Initial premium	-0.0017	0.0023	-0.0014	0.002
Offer revision	0.0503	0.1277	0.0588	0.1323
Proportion of cash	-0.1438***	0.0177	-0.1341***	0.0182
Toehold	0.1416**	0.0566	0.1325**	0.0582
Competition	-0.3404***	0.036	-0.3499***	0.0365
Cross border	0.1550***	0.0173	0.1565***	0.0183
Director recommendation	0.1889***	0.0228	0.1830***	0.0243
Constant term	0.8443***	0.0335	1.0037***	0.0646
Year fixed effect	No		Yes	
Industry fixed effect	No		Yes	
Observations	2253		2253	
R-squared	0.14		0.19	

Chapter 4

Takeover pressure and corporate diversification

4.1 Introduction

Literature over last three decades suggests that diversified firms are traded at discount compared to other non-diversified firms operated in the same line of business (e.g., Berger and Ofek, 1995; Laeven and Levine, 2007; Hoechle et al., 2012). Announcements of diversifying acquisitions also significantly destroy the acquirer's value (Cornett, 2003; Hoechle et al., 2012; Malmendier and Tate, 2008; Morck et al., 1990), while restructuring activities such as divestitures increase the value of firms (Lang et al., 1995; Mulherin and Boone, 2000; Slovin et al., 2005). Researchers often attribute diversification discount to the agency problem in that the incumbent manager diversifies her firm to gain private benefits. A broad question is, then, "What discipline mechanism can ensure the firm's optimal diversification?".

In this paper, we examine the question from both theoretical and empirical perspectives and show that the takeover market can act as an effective external force of discipline for corporate diversification. We also discuss situations in which the influence of external takeover pressure is more pronounced, such as in non-competitive industries or when the monitoring

intensity of the manager is weak.

First, we formalize the monitoring mechanism of the takeover market in a simple principal-agent model of corporate diversification. In the absence of a takeover market, our model shows that shareholders' limited ability in diversification enforcement (i.e. shareholders cannot extract monetary penalty from the firm's manager beyond a certain limit) leads to over-diversification. This is because the manager may choose to sacrifice the firm's value in pursuit of private benefits from diversification. However, with the discipline force of the takeover market, the incumbent manager will choose the optimal level of diversification and maximizing the firm's value for fear of being acquired and replaced.

Second, we empirically test the hypothesis that state anti-takeover laws as a proxy for external takeover pressure encourage firms to increase their level of diversification. We collect a sample of 121150 firm-year observations during the period 1980-2010. The business count approach is then employed to measure corporate diversification as the firm's number of business segments. A binary variable indicating whether the firm has more than one segment is also used as a proxy for diversification. Empirical results confirm the positive relation between the anti-takeover index and corporate diversification. Specifically, the probability of being a diversified firm increases 2.5% when the state passes an anti-takeover law, *ceteris paribus*. In addition, the firm's number of segments increase 0.04 unit when the anti-takeover index increases by one. Robust checks that take into account the relative importance of each segment in measuring diversification also confirms the discipline forces of the external takeover market.

We introduce market competition to the model. We assume that the manager must at least meet the profit target that is set by the industry standard and it is higher in a more competitive industry. The model predicts that the level of corporate diversification decreases more in less competitive industries when facing takeover pressure. Using the Herfindahl-Hirschman index as a proxy for industry competition, we perform regressions in the first and last quartile. Empirical evidence confirms a large difference in the effect

of anti-takeover index on corporate diversification, approximate 0.7% in the likelihood of being a diversified firm. The effect on the number of segments is 0.015 and 0.042 when the Herfindahl-Hirschman is in the first and last quartile, respectively.

Under the assumption that the manager's private benefit from diversification is decreasing with shareholders' monitoring intensity, the level of corporate diversification decreases more when facing takeover pressure if the firm is less intensively monitored. In other words, we expect a trade-off between the governance of the takeover market and the monitoring intensity of the incumbent. Using the percentage of stock ownership by blockholders and ESOP-related blockholders as proxies for monitoring intensity, we find a significant difference in the effect of state anti-takeover index when the firm has weak and strong monitoring intensity. Specifically, the likelihood of being a diversified firm is 2.3% and 2.0% in regressions of the first and last quartile of blockholders ownership, respectively. Similarly, the influence of state anti-takeover index drops from 2.1% to 0.4% when a proportion of the firm's is owned by ESOP-related shareholders.

We concern that time-invariant factors can explain the variation of diversification at both state and firm level. Evidence from fixed effects estimation confirms the positive effect of anti-takeover index on the probability of being a diversified firm. However, when the number of business segments is used as the dependent variable, the overall statistical significance decreases substantially. We conjecture that the state-anti takeover index changes in the cross section, but it does not vary much over time, especially during the period 1996-2010. We eliminate the problem of the firm effect using random effects estimation. We find that diversification dummy increases 1.3% the number of segments increases 0.018 unit when an anti-takeover law is passed, *ceteris paribus*.

According to Billett and Xue (2007) and Upadhyay and Zeng (2016), takeover threats can be used as a measurement for the firm's takeover pressure. While Hypothesis 3 suggests a positive relation between the state anti-takeover index and corporate diversification, it implies a negative relation between takeover threat and diversification. We confirm that

a takeover threat has a negative and statistically significant effect on the firm's level of diversification. Specifically, firms are 4.7% less diversified when they face a takeover threat. In addition, the level of diversification drops 0.09 unit when the firm becomes a takeover target in one year.

Our paper contributes to the literature of market for corporate control in several aspects.

First, it fills the gap of internal corporate governance in explaining corporate diversification and diversification discount (Denis et al., 1997; Hoechle et al., 2012). On the theoretical front, we formalize the relation between private benefits of incumbent managers and the monitoring mechanism of the takeover market. Our result is consistent with the agency explanations of diversification discount (Cremers and Nair, 2005; Easterbrook and Fischel, 1996; Jensen, 1986, 1993; Jensen and Warner, 1988; Mitchell and Lehn, 1990). Moreover, we highlight that when the takeover market is efficient, each firm will operate at its optimal level of diversification. We also provide empirical analysis to support our theoretical results.

Second, we compare the takeover market's external force of discipline between competitive and non-competitive environment. We support the view that self-motivated behaviors are mitigated by product market competition (Scharfstein, 1988; Machlup, 1967; Giroud and Mueller, 2010). Giroud and Mueller (2010) finds that corporate governance only matters in competitive industries. The firm's operating performance experiences no significant effect after the laws' passage. Our results, however, indicate that the disciplinary effect of takeover market does exist in both non-competitive and competitive environment, but it is more pronounced in non-competitive industries in comparison with competitive industries.

Third, we support the substitution effect between governance mechanisms (Agrawal and Knoeber, 1996; Guo et al., 2015; Sapra et al., 2014), by showing that external takeover pressure affects the firm's diversification more when the firm is less intensively monitored. The result also supports the view of Berger and Ofek (1996) that discounted firms are good takeover targets. Strategic managers, therefore, reduce the firm's level of diversification to increase firms' value to avoid takeover threats. Finally, we complement the literature on

determinants of corporate diversification (Campa and Kedia, 2002; Aggarwal and Samwick, 2003; Villalonga, 2004), and the propensity to pursue diversifying acquisitions (Hornstein and Nguyen, 2014).

The remainder of the paper is organized as follows. Section 4.2 describes the model. Section 4.3 shows empirical methodology and sample selection. Section 4.4 provides empirical results. Section 4.5 concludes the paper.

4.2 Theory

4.2.1 Optimal Contract in a Frictionless Environment

We consider a simple model that highlights managers' incentives to over-diversify her firm due to private benefit of diversification, but refrain from doing so when being under a threat of takeover. The private benefits of diversification can be thought of as managers' empire-building ambition and/or others.

Empirically, researchers have tested the role of internal corporate governance mechanism with respect to the agency problem of diversification. Denis et al. (1997), Lins and Servaes (2002) and May (1995) find that managerial ownership has a negative correlation with the level of diversification. Besides CEOs' ownership, Aggarwal and Samwick (2003) measure the CEOs' incentives as pay-to-performance sensitivity, and show that it negatively affects firms' level of diversification. Hoechle et al. (2012) examine to what extent the effectiveness of board governance structure and show that they are important determinants of diversification discount; however, the discounted effect remains even after controlling for different sets of corporate governance factors.[1]

Building on the aforementioned literature, we choose to focus on the external force of discipline of diversification. Furthermore, the theory of market for corporate control suggests

[1]Hoechle et al. (2012) still document a significant negative relation between diversifying acquisition and the deal announcement returns after controlling for various internal corporate governance indicators.

that competition for control rights may solve the principal-agent problem (Jensen, 1986; Mitchell and Lehn, 1990; Jensen and Warner, 1988). An incumbent manager who acts against the interest of shareholders is often replaced by a better alternative management team. Firms, which are traded at discount, often become good takeover targets (Berger and Ofek, 1996).

Following Aggarwal and Samwick (2003), we begin with a multi-task principal-agent setting, in which a well-established firm hires a manager who chooses a non-verifiable action x (i.e. effort) and an amount of diversification n. The firm's value is given by:

$$\Pi = X(x)N(n).$$

Furthermore, we assume that:

- The firm's profit increase with the amount of effort the manager invests, but the marginal benefit of effort is decreasing: $X'(0) > 0$, $X' > 0$ and $X'' < 0$.
- Diversification has positive benefit (e.g. risk hedging and corporate synergy) for small n, i.e. $N'(0) > 0$.
- Marginal benefit of diversification is strictly decreasing, i.e. $N' < 0$. Furthermore, it decreases with an increasing speed, i.e. $N'' < 0$ and $N''' < 0$.
- Finally, let us denote $\bar{n}$ such that $N'(\bar{n}) = 0$.

The manager's compensation is linear in the firm's performance and diversification, which are verifiable:

$$w = w_0 + \gamma\Pi + \kappa n.$$

We can simply assume that w_0 is exogenously given by the industry standard, while γ and κ are contracted between the shareholders and the manager. The term n in the compensation function is for penalizing the diversification by managers, who have inherent

preference for diversification. The assumption of the lower limit of κ, is to make the takeover bid meaningful. If κ does not have a lower limited, then the compensation scheme can avoid takeover threats.

The manager's utility is given by:

$$\begin{aligned} U(x,n) &= w + \zeta \ln n - \frac{k}{2}x^2 \\ &= w_0 + \gamma X(x)N(n) + \kappa n + \zeta \ln n - \frac{k}{2}x^2 \end{aligned} \tag{4.1}$$

where the ζ component is her private benefit from diversification ($\zeta > 0$) that depends on the firm's total level of diversification, and the last component is her cost of exerting x.

Given γ and κ, the manager chooses x and n to maximize (4.1). The first order conditions yield:

$$\frac{\partial}{\partial x}U(x,n) = \gamma X'(x)N(n) - kx = 0, \tag{4.2}$$

$$\frac{\partial}{\partial n}U(x,n) = \gamma X(x)N'(n) + \kappa + \zeta\frac{1}{n} = 0. \tag{4.3}$$

Let $\{x(\gamma,\kappa), n(\gamma,\kappa)\}$ denote the solution to (4.2) and (4.3) above.

Anticipating the manager's actions, shareholders pick $\{\gamma,\kappa\}$ to maximize the firm's value, excluding the manager's compensation:

$$\max_{\gamma,\kappa} \Pi - w = (1-\gamma)X(x(\gamma,\kappa))N(n(\gamma,\kappa)) - \kappa n(\gamma,\kappa)$$

We have the following proposition:

Proposition 1. *Shareholders impose a level of diversification $n < \bar{n}$ by punishing the manager for diversification, e.g. $\kappa < 0$.*

Proof. See Appendix 4.A □

The proposition has a novel implication. The shareholders' preferred level of diversifi-

cation is suboptimal from the perspective of the technology (the technology indicates $\bar{n}$). The shareholders are able to "force" the manager to implement a low level of diversification precisely because she has private benefit from diversification.

Note that the result holds in a frictionless environment, where negative punishment can be written into the contract. This is often not the case in reality.

In the next section, we introduce a friction in diversification enforcement to the existing environment. We then examine how external threats of takeover can act as an extra layer of diversification discipline.

4.2.2 Limited Diversification Enforcement

A. Without Takeover Threats

Assume that diversification punishment is limited. Specifically, we assume that:

Assumption 1. $\kappa > 0$.

The assumption states that shareholders cannot impose a penalty on the manager with respect to diversification. This is to reflect a reality that while it is easy to include rewards in employment contracts, it is difficult, or even impossible, to include pecuniary penalty. In addition, the bonus of managers is rarely negative.

Thus, we have the following proposition:

Proposition 2. *Given Assumption 1, the manager will diversify the firm beyond $\bar{n}$.*

Proof. See Appendix 4.B □

Due to limited diversification punishment, the manager now has strong incentive to diversify the firm further and capitalize on her private diversification benefits.

This proposition provides a stark contrast to the previous proposition. In Proposition 1, shareholders actively elect for under-diversification. In the current case, the fiction in contracting leads to the firm being over-diversified.

When overdiversification occurs, fortunately, an active takeover market can serve as a beneficial external discipline mechanism for the shareholders, as we will see next.

B. With Threats of Takeover

Let us now assume that there is an active threat of takeover from an external firm. The takeover firm is aware of the available technology, and can also observe the level of diversification. After the manager of the original firm has chosen her effort and diversification, the takeover firm will decide whether to pursue a takeover.

If a takeover happens, we assume that the incumbent manager is replaced without any compensation.(Alternatively, we can assume that the incumbent is compensated with a lump sum payment. However, he becomes "unemployable" after being fired, and hence, would not want to be replaced.)

Let n_i and n_t denote the levels of diversification that the incumbent manager and the takeover firm, respectively, would implement.

The objective of the takeover is to earn a profit, occurring through diversification adjustment. Any adjustment comes at cost $c(\Delta n)$, where $\Delta n = n_t - n_i$. We assume that $c(0) = 0$, $c'(0) = 0$, and $c''(\Delta n) > 0$ for all Δn. In other words, the cost of diversification adjustment is increasing in the absolute amount of adjustment.

Note that we elect to not consider the adjustment in x. The reason is that effort, once exerted, is generally considered non-reversible. It can be thought of as the research and project preparation and installment that the manager has carried out. The level of effort, as we see in previous sections, is fully revealed and pinned down by the manager's first-order condition with respect to x, given γ. Any additional effort that external personnel carries out, presumably, comes at high costs and low marginal benefit.

Thus, given x^* and n_i, a takeover happens if and only if there exists Δn satisfying:

$$\begin{aligned} & X(x^*)N(n_t) - c(\Delta n) > X(x^*)N(n_i) \\ & \Leftrightarrow X(x^*)\Big(N(n_t) - N(n_i)\Big) \;\; > \;\; c(\Delta n_t). \end{aligned} \tag{4.4}$$

In other words, the takeover firm will pursue a takeover when the potential benefit from diversification adjustment exceeds the cost of doing so.

Given the setting, we have the following proposition:

Proposition 3. *Under a takeover threat, the incumbent manager will choose $n \equiv \bar{n}$.*

Proof. See Appendix 4.C □

The intuition behind the proposition is clear. Takeover firms oftentimes look for undervalued targets that can be "restructured" to increase in value after a takeover. To avoid being acquired, managers of target firms must strive to run a business that is optimal with respect to their given technology—not their private incentives.

4.2.3 Hypothesis Development

Based on our model, we develop the following hypotheses that we will test in the next section.

First, Proposition 2 and Proposition 3 together give to rise to our main hypothesis, which we test and confirm in Section 4.4.1:

Hypothesis 3. *The level of corporate diversification decreases with the external takeover pressure.*

While Proposition 2 implies that managers tend to overdiversify, Proposition 3 indicates that managers will quickly reduce the level of diversification once they realize threats of takeover.

Second, we are interested in the impact market competition may have on diversification.

To introduce market competition to our model, we assume that the manager picks (x, n) to maximize her utility subject to shareholders' additional constraint on profit $\Pi(x, n) \geq \Pi_0$. In other words, the manager must at least meet the profit target, Π_0, which is set by the industry standard. If the manager fails to meet the profit target, she will be replaced.

We assume that the profit constraint, Π_0, is higher in more competitive industries, and thus, more likely to bind. It then follows that in more competitive industries, managers is bounded in their pursuit of private benefit of diversification. This is consistent with previous literature. Specifically, while research by Parrino (1997) and De Fond and Park (1999) has shown that CEO turnover is higher in competitive industries than in noncompetitive ones (more likely to be replaced), De Bettignies and Baggs (2007) show that more competitive industries provide stronger contractual incentives but lower pays to managers.

While Proposition 2 implies that firms have strong incentives to over-diversify, the profit constraint may limit diversification—at least more so in competitive industries than in non-competitive ones. Meanwhile, Proposition 3 indicates that an active takeover market can force the manager to pick the optimal level of diversification with respect to the firm's technology.

It follows that the takeover pressure is more pronounced in industries whose low competitiveness leads to weak diversification discipline.

Thus, we have the following hypothesis, which is tested and confirmed in Section 4.4.2:

Hypothesis 4. *The level of corporate diversification decreases more in less competitive industries when facing takeover pressure.*

Finally, we are interested in the impact monitoring intensity may have on corporate diversification.

Following Sapra et al. (2014), we assume that the manager's private benefit from diversification, ζ, is decreasing with shareholders' monitoring intensity.

It is then straightforward, using the manager's first-order condition with respect to n given by (4.3), to show that n is decreasing in ζ. In other words, when the monitoring intensity increases, the manager enjoys less private benefit from diversification, and hence, will diversify less. (The manager will continue to overdiversify, i.e. $n > \bar{n}$, as long as $\zeta > 0$.)

When a takeover pressure appears, the manager reverts to $\bar{n}$, as noted by Proposition 3. It follows that takeover pressure has smaller impact when monitoring intensity is higher.

Thus, we have the following hypothesis, which is tested and confirmed in Section 4.4.3:

Hypothesis 5. *The level of corporate diversification decreases more when facing takeover pressure if the firm is less intensively monitored.*

We shall continue with our empirical analysis to test the aforementioned hypothesis.

4.3 Empirical analysis

4.3.1 Methodology

We follow Campa and Kedia (2002) and model the firm's level of corporate diversification as a linear function of the external takeover pressure and other firm specific characteristics as follows:

$$\textit{Corporate diversification}_{i,t} = \alpha + \beta \textit{External takeover pressure}_{i,t} + \theta z_{i,t} + \gamma_t + \eta_k + v_{i,t}, \quad (4.5)$$

where *external takeover pressure* can be the level of anti-takeover laws in the state that the firm is located, or a binary indicator equal to one if the firm receives a takeover bid at time $t + 1$ (the details of these measurements are discussed in the next section). According to hypothesis 3, β is predicted to be positive when the anti-takeover index is used as the proxy for the external takeover pressure, while it supposes to be negative when the proxy is takeover threat. The variables γ_t and η_k capture year and industry fixed effects respectively. $z_{i,t}$ is a set of firm characteristics which are known as determinants of corporate diversification (Lins

and Servaes, 2002; Villalonga, 2004; Hoechle et al., 2012; Hornstein and Nguyen, 2014). $z_{i,t}$ includes firm size, leverage, liquidity, return on assets, sales growth rate, net property, plant and equipment, investment, advertising expense, and R&D expense.

4.3.2 Proxy for corporate diversification

Literature documents two approaches to measure corporate diversification, the business count or the strategic approach. The classification using the strategy approach relies heavily on the user's judgment (Martin and Sayrak, 2003). In addition, the survey for a large sample of firms are not publicly available. In our study, we use the business count approach to measure the level of corporate diversification.

We count the number of business segments of which 4-digit SIC code is not duplicated. Previous literature measures corporate diversification using a dummy indicator to distinguish between a single-segment and multiple-segment firm (Berger and Ofek, 1995; Campa and Kedia, 2002; Hoechle et al., 2012; Laeven and Levine, 2007). This indicator compares a diversified firm with the non-diversified firm, but it ignores the differences in the diversification levels of diversified firms. We, therefore, provide empirical analyses using both discrete and binary measurements.

4.3.3 Proxy for takeover pressure

We use two proxies to capture the takeover pressure. We first follow Sapra et al. (2014) and Bebchuk and Cohen (2003) to use the number of state anti-takeover laws as a proxy for the external takeover pressure. The state-level anti-takeover index comes from five different laws called Control Share Acquisition, Fair-price, Business Combination, Poison Pill Endorsement, and Constituencies Statutes. Each passed law increases one unit in the anti-takeover index and the score varies between 0 and 5. Since Sapra et al. (2014) covers the index between 1980-1995, we update the state anti-takeover laws using the dataset of Bebchuk and Cohen (2003) which covers the period 1986-2001. We extend the coverage of the dataset

to 2010 using a more detail table of state takeover laws which are passed in the last five decades and summarized by Cain et al. (2017). According to Giroud and Mueller (2010) and Sapra et al. (2014) the state-level anti-takeover index can be considered as an exogenous measurement for takeover pressure.

Table 4.1 shows the state-level anti-takeover index at the end of all calendar years that have a change in the index (which equals to the number of the anti-takeover laws that were passed). The table also presents the index of listed sates before the changes. We see that most variation or changes in the anti-takeover index happen between the period 1980-1995. After 1995, only a few of states have passed an anti-takeover law, such as Connecticut, Iowa, Maryland, Michigan, Mississippi, Texas, Vermont, Wyoming, and Maine.

Following Billett and Xue (2007) and Upadhyay and Zeng (2016), we also measure use takeover threats as a proxy for the firm's takeover exposure. Although at time t the takeover exposure is unobservable, but the comprehensive coverage of takeover database allows use to observe whether a firm receives a takeover threat at time $t + 1$. Analyzing the effect of receiving a takeover threat on corporate diversification provides support for the monitoring role of the takeover market. It is noted that β is expected to be negative when takeover threats are used as a proxy for external takeover pressure.

4.3.4 Data collection

The state anti-takeover index is obtained from Sapra et al. (2014), Ang et al. (2000), and Bebchuk and Cohen (2003) and revised with the database of Cain et al. (2017) to extend the data period to 2010. The information of takeover threats is obtained from SDC platinum database (We specifically discuss the sample selection in Subsection 4.4.5).

Following Hoechle et al. (2012), Campa and Kedia (2002) and Berger and Ofek (1995), we construct a sample of firms between 1980 and 2010. We start with a universal sample of all listed firms in Center for Research in Security Prices (CRSP) database between 1980 and 2010. We then merge it with Compustat database to get accounting information of firms

and form a CRPS-Compustat matched sample. We drop all financial and utility firms from our sample, i.e., firms that have four-digit SIC code between 4900 and 4999, and 6000 and 6999 are excluded.

Next, we identify the number of industrial segments for each firm from Compustat Segments database by following procedures. First, we discard segments that have missing information of total assets and sales. Segments are required to have a standard 4-digit industrial classification (SIC) code. Only business or operating segments are considered to measure corporate diversification. Second, we drop segments which have the same SIC code. We measure a firm's level of diversification as the number of business segments of which 4-digit SIC code is not duplicated. We also construct a binary variable indicating a diversified firm which equals one if the firm has more than one business segment. The Compustat Segments sample is then merged with the CRSP-Compustat matched sample. After deleting all observations that have missing information to construct our necessary variables, we have completed sample of 121150 firm-year observations. In addition, all continuous variables are winsorized at the 1% and 99% percentiles to eliminate the effect of outliers. Definition of all variables are shown in Appendix 4.D. Summary statistics

4.3.5 Descriptive statistics and univariate comparison

Table 4.2 presents summary descriptive statistics of all variables and univariate comparisons between diversified and non-diversified firm. Firms have an average number of 1.5 business segments and a standard deviation of 1.00. On average, the state anti-takeover index is 1.27 and a mean of 0, suggesting that a majority of firms are not covered by state anti-takeover laws. In addition, 4% of firms is going to receive a takeover threat within a year.

The leverage ratio is 24% on average and varies substantially across firms. The liquidity ratio is large at 17% while the first quartile shows the rate of holding liquid assets of less than 5%. Although more than 50% of firms have return on total assets greater than 6%, the average ratio for all firms is only 0%. The first quartile has a negative sales growth rate of

-3%, but the last quartile has a ratio larger than 28%. Table 4.2 also shows that 29% of the firm's total assets is the net property, plan and equipment and 7% is the mean of capital expenditure. On average, firms spend 1% and 5% on advertising and R&D respectively.

In the last column of Table 4.2, we provide univariate analysis of the raw data. The state anti-takeover index is higher in the group of diversified firms than it is in the group of non-diversified firms. Also, the unconditional probability of receiving a takeover threat within a year is lower when the firm is diversified. Our preliminary analyses support the negative relation between the external takeover pressure and the firm's level of diversification. Other comparisons suggest that diversified firms have a larger size, a higher leverage ratio, more returns from their assets, and larger fixed assets than non-diversified firms. In contrast, they hold less liquid assets, grow slowly in sales, and spend less on advertising and R&D.

4.4 Empirical Results

4.4.1 Takeover pressure and corporate diversification

We estimate Equation 4.5 and present the regression results in Table 4.3. We predict that sate anti-takeover laws encourage firms to diversify, and β is positive. We include various firm characteristics to ensure the independent effect of external takeover pressure. industry and year fixed effects are also controlled to account for inter-temporal variations that may affect the relation between external takeover pressure and corporate diversification.

In Model 1, we use a binary variable as an indicator of a diversified firm. Empirical evidence suggest that a firm is more likely to diversified from its core-business when the state anti-takeover index is higher. Specifically, the probability of being a diversified firm increases 2.5% when the state passes an anti-takeover law. In Model 2, we use the raw number of business segments as a proxy for corporate diversification. The coefficient of *anti-takeover index* is positive and statistically significant at 1%, which implies that a firm increases the number of segment by 0.04 unit when the anti-takeover index increases by one.

Overall, the findings suggest that the level of corporate diversification decreases with the external takeover pressure.

The size of the firm's assets is positively relate to its level of diversification, consistent with previous literature (Rajan et al., 2000; Anderson and Reeb, 2003; Colak, 2010). Rajan et al. (2000) argue that over-sized firms increase their level of diversification to improve the internal capital market efficiency. In addition, large-size firms will have greater resources to acquire or invest in businesses that are unrelated to their core business Anderson and Reeb (2003). Leverage ratio is negative and only statistically significant in Model 2. Similar to Villalonga (2004), the effect of negative and statistically significant in both models, suggesting that diversified firms tend to use liquid assets to fund their diversified investment opportunities.

We also find that factors indicating the firm's performance are negatively related to the level of corporate diversification. Specifically return on assets and sales growth rate negatively affect the firm's diversification. This evidence is consistent with the view of Campa and Kedia (2002) in that firms increase their number of industry segments to search for lucrative opportunities when they perform poorly in their current operations.

Berger and Ofek (1995), Campa and Kedia (2002), and Villalonga (2004) suggest that firms that have a high level of investment in current operations tend to have a low level of diversification. Empirical results imply that the firm's level of capital expenditures negatively affects its level of diversification. In particular, 1% increase in investment leads to a decrease of -0.37% in the probability of being a diversified firm. We also document a negative relation between the firm's advertising as well as R&D expense and its level of diversification.

4.4.2 Takeover pressure and Industry competition

Proposition 2 suggests that the manager tends deviate from the firm's optimal level of diversification and gain private benefits. Such self-motivated behavior is mitigated by product market competition because inefficient firms are eliminated from the market (Scharfstein, 1988). Machlup (1967) shows that optimizing the firm's value and maximizing the manager's

private income is the same goal when the industry is competitive. However, non-competitive industries often leave room for managerial slack (Giroud and Mueller, 2010), and it raises the importance of external takeover forces as a discipline mechanism.

We, therefore, introduce the industry competition into the model. Under the assumption that managers have to satisfy the profit target set by the industry standard, and the such requirement is stricter (higher) in more competitive industries. The model predicts that the effect of anti-takeover laws on corporate diversification is more pronounced when the firm operates in non-competitive industries.

We use Herfindahl-Hirschman index as a benchmark for industry competitiveness which is well examined in industrial organization theory (Tirole, 1988; Curry and George, 1983). The index is measured as the total of squared market shares,

$$HHI_{kt} = \sum_{i=1}^{N_k} s_{ikt}^2 \tag{4.6}$$

where s_{ikt} is the market share of firm i in industry k in year t. s_{ikt} is measured as the firm's sales scaled by the total sales of all firms operated in the same industry defined by 4-digit SIC code. The higher Herfindahl-Hirschman index is the lower the competition. The 25th and 75th percentile are 0.11 and 0.3, respectively. We estimate Equation 4.5 using the observations in the first and last quartile.

Table 4.4 presents regression results. Empirical evidence in all models confirms that anti-takeover index positively affects the firm's level of diversification. Specifically, in the first and second column, a unit increase in anti-takeover index leads to an increase of 1.7% and 2.4% in the probability of being a diversified firm. Similar positive effects are found when the number of business segments is the proxy for diversification. Strikingly, we confirm that the influence of external takeover pressure is higher when the Herfindahl-Hirschman index is higher, suggesting that the increase in corporate diversification is larger for firms in less competitive industries.

So far, we conclude that anti-takeover laws create incentives for the manger to over-

diversified her firm and gain private benefits and the law passage has a significantly higher effect in non-competitive industries.

4.4.3 Takeover pressure and Monitoring

Besides the disciplinary force of the takeover market, other governance mechanism can also monitor managers. In section 4.2, we follow Sapra et al. (2014) and assume that the private benefit from diversification decreases with the shareholders' monitoring. As a result, the manager will diversify less and the takeover pressure has a smaller effect on the level of diversification.

We use (i) the percentage of shares own by blockholders and (ii) the percentage held by all ESOP-related blockholders as proxies for monitoring intensity. The data of blockholders ownership is obtained from WRDS blockholders between 1996 and 2001. Table 4.5 provides estimation results of Equation (4.5) for the first and last quartile of the blockholders' ownership. It also shows estimation results for the group that has ESOP-related blockholders ownership and the remaining group. Evidence confirms the positive effect of state anti-takeover laws on the firm's measurements of diversification, excluding firms that have zero ownership of ESOP-related blockholders. The effect of anti-takeover index reduces from 2.3% (Model 1) to 2% (Model 2). The overall statistical significant also decreases substantially. In Model 3, the likelihood of being a diversified firm drops 2.1% to 0.4% when the firm has some ownership of ESOP-related blockholders. The result is similar when the number of segments is used as a proxy for corporate diversification. Our evidence suggests that the influence of the state-anti takeover index is lower when the firm is more intensively monitored by blockholders.

4.4.4 Unobserved heterogeneity

It is reasonable to concern that time-invariant factors can explain the variation of corporate diversification at firm level. We consider the following unobserved effects model:

$$Corporate\ diversification_{i,t} = \alpha + \beta External\ takeover\ pressure_{i,t} + \theta z_{i,t} + \kappa_i + \gamma_t + v_{i,t}, \quad (4.7)$$

where κ_i is the firm fixed effect. Other variables are defined as in Equation 4.5. It is unlikely that a firm changes its state of incorporation or its core industry of operations, the latent effect, κ_i, also takes into account the unobserved effects at the state and industry levels. We estimate Equation 4.7 using both fixed effects and random effects.

Model 1 and 2 in Table 4.6 report results of the fixed effects estimation. The coefficient of anti-takeover index in Model 1 is positive and statistically significant at 1%, suggesting that passage of anti-takeover laws encourages corporate diversification. The economic significance of anti-takeover index, however, is small in comparison with 2.5% in the cross-section regression (Table 4.3). In Model 2, we observe a similar effect of anti-takeover index, but it is not statistically significant at 10% level.

We concern that the standard error of anti-takeover is large in Model 2 because our variable of interest varies in the cross section, but does not change much over time. As can be seen in Table 4.1, the number of anti-takeover laws only vary slightly in several states after 1995. Hence, it is reasonable to apply random effects estimation to consistently estimate β. As recommended by Wooldridge (2010), we include industry fixed effects to take into account systematic differences across industries. Estimation results in the last two columns are consistent with our main hypothesis that corporate diversification decreases with the external takeover pressure. Specifically, Model 3 shows an increase of 1.3% in the likelihood of being a diversified firm, while the number of segments reduces by 0.018 in Model 4 when the state anti-takeover index increases by one unit. The results are similar when the standard errors are fully robust and clustered by states of incorporation.

4.4.5 Takeover threats and corporate diversification

We also follow Billett and Xue (2007) and Upadhyay and Zeng (2016) to measure use takeover threats as a proxy for the firm's takeover exposure. Billett and Xue (2007) study the pre-repurchase takeover pressure on the firm's decision to buy back shares. Upadhyay and Zeng (2016) shows that R&D firms increase cash holdings in anticipation of a takeover threat. Similarly, we analyze the impact of receiving a takeover threat at time $t+1$ on the firm's corporate diversification at time t. Our hypothesis suggests a negative relation between receiving takeover threat and corporate diversification. In contrast to the state-level anti-takeover index, our hypothesis suggests a negative relation between receiving a takeover bid and corporate diversification.

The information of takeover threats is obtained from SDC platinum database. Only domestic U.S. transactions are selected. Nonstandard deal types, including undisclosed value, spin-offs, recapitalizations, self-tenders, exchange offers, repurchases, acquisition of minority stake, acquisitions of remaining interest, and privatizations, are excluded from the sample. Only transactions with the value of equal or greater than $1 million are selected. In addition, we include only transactions in that the acquirer holds less than 50% of the target prior to the announcement date and seeks to acquire more than 50% after. Last, we require that targets are identified in CRSP database. We match the SDC data with our main data and construct a binary variable indicating whether the firm receives a takeover bid with one year.

Table 4.7 reports the estimation results of Equation 4.5 using takeover threats as a proxy for external takeover pressure. In all specifications, we find that takeover threat has a negative and statistically significant relation with the level of diversification. Specifically, diversification dummy is statistically significant at 1% in Model 1, suggesting that a firm is 4.7% less likely to be diversified when it anticipates a takeover bid. The effect reduces to 1.7% when the model controls for fixed effects. In addition, Model 3 shows that a firm reduces its level of diversification by 0.09 unit when it perceives a takeover threat. The absolute effect of external takeover pressure drops to 0.03 when the firm becomes a takeover

target in one year when fixed effects estimation is applied. Overall, the findings is consistent with the positive effect of anti-takeover laws on corporate diversification.

4.4.6 Robustness checks

Censored and truncated data

Compustat segment database captures a maximum number of ten business segments for each firm. In this case, ordinary least squares estimations do not provide consistent estimates of parameters since the censored data does not represent the population. Specifically, our dataset has a left-censoring limit of ten and a right-censoring limit of one. We, therefore, use generalized Tobit models to obtain a consistent estimate of state anti-takeover index when the number of segments is used as a proxy for corporate diversification.[2] Overall, the empirical results (untabulated) consistently support our main hypothesis that anti-takeover laws encourage managers to diversify.

Measurement of corporate diversification

Researchers argue that simple counting the number of SIC codes does not take into account the relative importance or distribution of the firm's sales or asset in each industry segment. Berry (1971) and McVey (1972) introduce a Herfindahl-based measurement of corporate diversification to resolve the problem of the discrete proxy. Jacquemin and Berry (1979) propose another continuous measurement which accounts for the degree of relatedness within industries (at 2-digit SIC code) while considering the relative importance of each industry segment (at 4-digit).

The first Herfindahl-based proxy is measured as follow

$$H = (1 - \sum_{i=1}^{n} P_i^2), \tag{4.8}$$

[2]Generalized Tobit models provide heteroskedasticity-consistent standard errors.

where P_i is the share of i^{th} industry based on sales or total assets of each segments. n is the firm's number of industry segments. The Entropy measurement weights each P_i by $log(1/P_i)$ instead of P_i as the Herfindahl-based method. The Entropy measure of total diversification at 4-digit SIC code is:

$$E_T = \sum_{i=1}^{n} P_i log(1/P_i) \tag{4.9}$$

Table 4.8 presents Pearson correlation coefficients between measurements of diversification. Both asset-based measurement are highly correlated with the number of business segments. However, when sales is used to calculate the weight of each segment, the correlation deviates substantially from the business count strategy. In addition, the coefficient of Entropy sales-based proxy is lower than the proxy calculated by Herfindahl sales-based method in column 2 and 3.

We re-estimate Equation 4.5 using a set of continuous measurement of diversification. Evidence in Table 4.9 confirms the positive relation between state anti-takeover index and diversification. In particular, when anti-takeover index increases one unit, the Entropy measurements increase 0.006, while Herfindahl-based diversification increases 0.011, *ceteris paribus*.

4.5 Conclusion

In this paper, we theoretically and empirically show that the takeover market can serve as an effective external monitoring mechanism, preventing managers from overdiversifying their firms in pursuit of private benefits.

On the theoretical front, we provide a simple principal-agent framework of diversification and conceptualize the role of the takeover market in a formal setting. Consistent with corporate finance research over past decades, our model shows that firms can be overdiversified due to managerial private incentives, and thus, have suboptimal value. This is a direct result of weak internal governance, specifically due to shareholders' limited enforcement capacity.

In this environment, the takeover market is a beneficial layer of discipline, forcing managers to maximize firms' value for fear of being acquired and replaced.

On the empirical front, we test three hypotheses generated from the model: (1) anti-takeover laws increase corporate diversification; (2) the disciplinary effect is more pronounced in non-competitive industries; (3) the disciplinary effect is less when the firm is more intensively monitored. We construct a sample of 121150 firm-year observations during the period 1980-2010. We employ the business count approach to measure corporate diversification and employ two proxies for takeover pressure, anti-takeover laws and takeover threats.

Empirical evidence shows that the anti-takeover index has a positive and statistically significant relation with the level of diversification. Specifically, the probability of being diversified drops 2.5% and the level of diversification reduces 0.04 unit when the anti-takeover index increases one. Also, the effect of takeover pressure is more pronounced in non-competitive and low monitoring environment. Regression shows a different of 0.7% in the probability of being a diversified firm when the Herfindahl-Hirschman index is in the first and last quarter. The level of diversification reduces 0.042 unit for the subsample in non-competitive industries, while it only decreases 0.015 in competitive industries. In addition, we use the proportion of stock ownership by blockholders and ESOP-related blockholders as proxies for monitoring intensity. We find a significant difference in the effect state anti-takeover index when the firm has weak and strong monitoring intensity. Specifically, the likelihood of being a diversified firm is 2.3% and 2.0% in regressions of the first and last quartile of blockholders ownership, respectively. Similarly, the influence of state anti-takeover index drops from 2.1% to 0.4% when a proportion of the firm's is owned by ESOP-related blockholders. The findings are similar when the number of business segments are used as a proxy for diversification. The findings are robust to the censor and truncated data, continuous measurements of diversification, and an alternative proxy for takeover pressure (takeover threat).

Overall, our paper shed light on the broad question, "What discipline mechanism can ensure firms' optimal diversification?" According to our analysis, an active takeover market can

be very effective in reigning in managers' private diversification incentives. We also examine and verify that production competition and other monitoring mechanisms are important in preventing overdiversification—consistent with standard views on corporate governance. Moreover, our analysis shows that the effect of takeover threat is more pronounced when the industry is not competitive and the monitoring intensity is weak, providing further support to the hypothesis that corporate governance mechanisms could be substituted. Our results withstand several tests for robustness, such as censored and truncated data, and measurement of diversification.

Appendix

4.A Proof of Proposition 1

Proof. The manager's first-order conditions (4.2) and (4.3) imply that:

$$\gamma = \frac{kx}{X'(x)N(n)}, \tag{4.10}$$

$$\kappa = -\zeta\frac{1}{n} - \frac{kx}{X'(x)N(n)}X(x)N'(n). \tag{4.11}$$

Thus, by the revelation principle, shareholders can choose (x, n) directly to maximize the value of the firm, excluding the manager's compensation:

$$\begin{aligned}\max_{x,n}\Pi - w &= \left(1 - \frac{kx}{X'(x)N(n)}\right)X(x)N(n) \\ &\quad + \left(\zeta\frac{1}{n} + \frac{kx}{X'(x)N(n)}X(x)N'(n)\right)n.\end{aligned}$$

Thus, the first-order condition with respect to n is:

$$\begin{aligned}\frac{\partial}{\partial\Delta n}(\Pi - w) &= \frac{kxX(x)}{X'(x)}N(n)N'(n) + X(x)N'(n) \\ &\quad + \frac{kxX(x)}{X'(x)}\frac{nN(n)N''(n) - nN'(n)^2}{N(n)^2} \\ &= 0.\end{aligned} \tag{4.12}$$

Furthermore, it is straightforward to verify that $\frac{\partial^2}{\partial n^2}(\Pi - w)$ is negative.

Recall that $N'(\bar{n}) = 0$. Hence,

$$\frac{\partial}{\partial n}(\Pi - w)\Big|_{n=\bar{n}} = \frac{kxX(x)}{X'(x)}\frac{\bar{n}N(\bar{n})N''(\bar{n})}{N(\bar{n})^2}.$$

Since $N''(n) < 0$, it follows that $\frac{\partial}{\partial n}(\Pi - w)\Big|_{n=\bar{n}} < 0$.

Thus, for n that solves (4.12), it must be that $n < \bar{n}$.

Furthermore, for $n < \bar{n}$, it is straightforward from (4.11) that $\kappa < 0$. □

4.B Proof of Proposition 2

Proof. Evaluating $\frac{\partial}{\partial n}U(x,n)$ at $n = \bar{n}$, we have:

$$\begin{aligned}\frac{\partial}{\partial n}U(x,n)\Big|_{n=\bar{n}} &= \Big(X(x)N'(n) + \zeta\frac{1}{n} + \kappa\Big)\Big|_{n=\bar{n}} \\ &= \kappa + \zeta\frac{1}{\bar{n}}.\end{aligned}$$

It is straightforward to verify that $\frac{\partial^2}{\partial n^2}U(x,n) < 0$.

Given Assumption 1, $\frac{\partial}{\partial n}U(x,n)\Big|_{n=\bar{n}} > 0$.

Thus, for any n that solves the manager's first order condition (4.3), it must be the case that $n > \bar{n}$. □

4.C Proof of Proposition 3

Proof. Let $F(n_t) = X(x^*)\Big(N(n_t) - N(n_i)\Big) - c(n_t - n_i)$. It follows that $F(n_i) = 0$.

Then, we have:

$$F'(n_t) = X(x^*)N'(n_t) - c'(n_t - n_i)$$

Thus, $F'(n_i) = X(x^*)N'(n_i)$, which is positive for $n_i < \bar{n}$ and negative for $n_i > \bar{n}$.

In other words, if the incumbent manager chooses $n_i < \bar{n}$, the takeover firm will pursue a

takeover and earn a profit through more diversification. Meanwhile, if the incumbent chooses $n_i > \bar{n}$, the takeover firm can earn a profit post-takeover through de-diversification.

Thus, to avoid having the firm taken over by an external company and being replaced, the incumbent must implement $n_i \equiv \bar{n}$. □

4.D Definition of variables

Variable name	Definition	Data source
Number of segments	is the number of business segments of which the 4-digit SIC of each segment is not duplicated.	Compustat segments
Diversification dummy	equals one if the number of business segments is greater than one, zero otherwise.	Compustat segments
Anti-takeover index	is the number of anti-takeover laws that were passed in each state.	Hand collected
Takeover threat	is a dummy indicator which equals one if the firm receives a takeover bid in year $t+1$.	SDC Platinum
Log(total assets)	is the natural logarithm of the firm's total assets.	Compustat
Leverage	is the ratio between the total debts and the total assets ((item #9 + item#34) / item #6)	Compustat
Liquidity	is the ratio of cash and short-term investments divided by the total assets (item #1/ item #6)	Compustat
Return on assets	is the earnings before interest and taxes scaled by the total assets (item #ebit/item #6)	Compustat
Sales growth rate	is the sales growth rate measured by the ratio between sales of year t and year $t-1$, minus one (item #12/lagged item #12−1).	Compustat
Nppe	is the net property, plant and equipment scaled by the firm's total assets (item #8/ item#6).	Compustat
Investment	is the total capital expenditure divided scaled by the total assets (item #128/item #6).	Compustat
Advertising expense	is the advertising expense scaled by the total asset. We set advertising expense equal zero if it is missing or has a negative value (item #45/item#6)	Compustat
R&D expense	is the research and development expense scaled by the total assets. We set R&D expense equal to 0 if it is missing or has a negative value (item #46/item#6).	Compustat

Table 4.1: **State anti-takeover laws**

State Name	Year	Index before	Change	Anti-takeover index
Arizona	1987	0	4	4
Colorado	1989	0	1	1
Connecticut	1984	0	1	1
Connecticut	1989	1	1	2
Connecticut	1997	2	1	3
Connecticut	2003	3	1	4
Delaware	1988	0	1	1
Florida	1987	0	2	2
Florida	1989	2	2	4
Georgia	1985	0	1	1
Georgia	1988	1	1	2
Georgia	1989	2	2	4
Iowa	1989	0	2	2
Iowa	1997	2	1	3
Illinois	1984	0	2	2
Illinois	1989	2	2	4
Indiana	1986	0	4	4
Indiana	1989	4	1	5
Kansas	1989	0	1	1
Massachusetts	1987	0	1	1
Massachusetts	1989	1	3	4
Maryland	1983	0	1	1
Maryland	1988	1	1	2
Maryland	1989	2	1	3
Maryland	1999	3	2	5
Michigan	1984	0	1	1
Michigan	1988	1	1	2
Michigan	1989	2	1	3
Michigan	2001	3	1	4
Minnesota	1984	0	1	1
Minnesota	1987	1	2	3
Minnesota	1991	3	1	4
Missouri	1984	0	1	1
Missouri	1986	1	3	4
Mississippi	1985	0	1	1
Mississippi	1990	1	1	2
Mississippi	1991	2	1	3
Mississippi	2005	3	1	4
North Carolina	1987	0	2	2

North Carolina	1990	2	1	3
Nebraska	1988	0	2	2
New jersey	1986	0	2	2
New jersey	1989	2	2	4
Nevada	1987	0	1	1
Nevada	1989	1	1	2
Nevada	1991	2	3	5
New York	1985	0	3	3
New York	1989	3	1	4
Ohio	1982	0	3	3
Ohio	1990	3	2	5
Oklahoma	1987	0	1	1
Oregon	1987	0	1	1
Oregon	1989	1	2	3
Oregon	1991	3	1	4
Pennsylvania	1988	0	1	1
Pennsylvania	1989	1	3	4
Pennsylvania	1993	4	1	5
Rhode island	1990	0	4	4
South Carolina	1988	0	3	3
Tennessee	1988	0	4	4
Tennessee	1989	4	1	5
Utah	1987	0	1	1
Utah	1989	1	1	2
Virginia	1985	0	1	1
Virginia	1988	1	2	3
Virginia	1992	3	1	4
Washington	1987	0	2	2
Washington	1998	2	1	3
Wisconsin	1984	0	2	2
Wisconsin	1987	2	3	5
Texas	1997	0	1	1
Texas	2006	1	2	3
Vermont	1998	0	1	1
Vermont	2008	1	1	2
Wyoming	1989	0	1	1
Wyoming	1990	1	2	3
Wyoming	2009	2	1	3
Maine	1988	1	1	2
Maine	2003	2	1	3
Idaho	1988	1	4	5
Kentucky	1988	1	2	3
Kentucky	1989	3	1	4
Louisiana	1987	1	1	2

Louisiana	1988	2	1	3
North Dakota	1993	0	1	1
New Mexico	1987	0	1	1
South Dakota	1990	0	5	5

Table 4.2: Descriptive statistics

This table provides summary statistics for a sample of CRSP listed firms between 1980-2010 which have segments' information on Compustat Segments database and accounting information on Compustat annual. Diversification dummy equals one if the number of business segment is greater than one, zero otherwise. Other variables are defined in Appendix 4.D. The last column shows univariate comparisons of all variables' mean between diversified and non-diversified firms. ***, **, and * are statistically at 1%, 5%, 10%, respectively.

		Full sample					Div. =0	Div.=1	(1)-(0)
Variable name	N	Mean	S.D.	0.25	0.5	0.75	Mean	Mean	Δ Mean
Number of segments	121150	1.51	0.98	1	1	2	-	-	-
Diversification dummy	121150	0.29	0.46	0	0	1	-	-	-
Anti-takeover index	121150	1.27	1.81	0.00	0.00	3.00	1.13	1.59	0.46***
Takeover threat	121150	0.04	0.19	0.00	0.00	0.00	0.04	0.03	-0.01***
Log(total assets)	121150	4.72	2.12	3.20	4.59	6.13	4.33	5.66	1.33***
Leverage	121150	0.24	0.22	0.04	0.20	0.36	0.22	0.27	0.05***
Liquidity	121150	0.17	0.21	0.02	0.08	0.24	0.20	0.10	-0.10***
Return on assets	121150	0.00	0.25	-0.03	0.06	0.12	-0.02	0.05	0.08***
Sales growth rate	121150	0.29	0.94	-0.03	0.10	0.28	0.33	0.18	-0.15***
Nppe	121150	0.29	0.23	0.11	0.23	0.42	0.28	0.32	0.04***
Investment	121150	0.07	0.08	0.02	0.05	0.09	0.07	0.06	-0.01***
Advertising expenses	121150	0.01	0.04	0.00	0.00	0.01	0.02	0.01	0.00***
R&D expenses	121150	0.05	0.10	0.00	0.00	0.05	0.06	0.02	-0.04***

Table 4.3: Anti-takeover index and Corporate diversification

This table provides regression analysis of corporate diversification on takeover pressure. N. segments is the number of business segments of which the 4-digit SIC of each segment is not duplicated. Div. dummy equals one if the number of business segment is greater than one, zero otherwise. Anti-takeover index is the number of anti-takeover laws that were passed in each state. Other variables are defined in Appendix 4.D. Robust standard errors that are clustered by firm are presented in parentheses. ***, **, and * are statistically at 1%, 5%, 10%, respectively.

	Div. dummy	N. segments
	(1)	(2)
Anti-takeover index	0.025***	0.040***
	(0.002)	(0.005)
Log(total assets)	0.062***	0.181***
	(0.002)	(0.008)
Leverage	-0.010	-0.071**
	(0.015)	(0.032)
Liquidity	-0.255***	-0.452***
	(0.015)	(0.031)
Return on assets	-0.142***	-0.444***
	(0.011)	(0.026)
Sales growth rate	-0.005***	-0.011***
	(0.001)	(0.002)
Nppe	-0.034	-0.164***
	(0.023)	(0.053)
Investment	-0.366***	-0.695***
	(0.033)	(0.065)
Advertising expense	-0.362***	-0.738***
	(0.092)	(0.209)
R&D expense	-0.457***	-0.790***
	(0.028)	(0.061)
Constant	0.477***	2.138***
	(0.089)	(0.401)
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
No. of Obs.	112150	112150
R-Squared	0.19	0.22

Table 4.4: Product market competition

This table provides regression analysis of corporate diversification on takeover pressure for competitive and non-competitive industry defined by Herfindahl-Hirschman index. N. segments is the number of business segments of which the 4-digit SIC of each segment is not duplicated. Div. dummy equals one if the number of business segment is greater than one, zero otherwise. Anti-takeover index is the number of anti-takeover laws that were passed in each state. Other variables are defined in Appendix 4.D. Robust standard errors that are clustered by firm are presented in parentheses. ***, **, and * are statistically at 1%, 5%, 10%, respectively.

	Div. dummy		N. segments	
	H<25%	H>75%	H<25%	H>75%
	(1)	(2)	(3)	(4)
Anti-takeover index	0.017***	0.024***	0.015*	0.042***
	(0.004)	(0.004)	(0.008)	(0.008)
Log(total assets)	0.049***	0.075***	0.130***	0.232***
	(0.004)	(0.004)	(0.012)	(0.014)
Leverage	-0.044*	0.018	-0.091*	-0.049
	(0.024)	(0.028)	(0.051)	(0.060)
Liquidity	-0.295***	-0.221***	-0.496***	-0.442***
	(0.024)	(0.028)	(0.048)	(0.069)
Return on assets	-0.101***	-0.168***	-0.260***	-0.574***
	(0.017)	(0.021)	(0.035)	(0.055)
Sales growth rate	-0.006***	-0.002	-0.015***	-0.003
	(0.002)	(0.003)	(0.004)	(0.006)
Nppe	-0.149***	0.040	-0.327***	-0.108
	(0.040)	(0.040)	(0.084)	(0.093)
Investment	-0.302***	-0.377***	-0.619***	-0.630***
	(0.048)	(0.066)	(0.092)	(0.128)
Advertising expense	-0.153	-0.623***	-0.133	-1.078***
	(0.168)	(0.160)	(0.374)	(0.403)
R&D expense	-0.332***	-0.559***	-0.448***	-0.960***
	(0.041)	(0.059)	(0.078)	(0.139)
Constant	0.344***	0.405***	1.583***	1.931***
	(0.048)	(0.093)	(0.090)	(0.386)
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of Obs.	30075	30417	30075	30417
R-Squared	0.19	0.22	0.22	0.28

Table 4.5: Monitoring intensity

This table provides regression analysis of corporate diversification on takeover pressure for different subsamples defined by stock ownership of blockholders. *sumblks* is the percentage held by all blockholders for that firm-year. *sumesop* is the proportion held by all ESOP-related blockholders. Other variables are defined in Appendix 4.D. Robust standard errors that are clustered by firm are presented in parentheses. ***, **, and * are statistically at 1%, 5%, 10%, respectively.

	Div. dummy				N. segments			
	sumblks <25%	*sumblks* >75%	*sumesop* =0%	*sumesop* >0%	*sumblks* <25%	*sumblks* >75%	*umesop* =0%	*sumesop* >0%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Anti-takeover index	0.023**	0.020*	0.021***	0.004	0.041	0.017	0.030**	0.02
	(0.010)	(0.010)	(0.006)	(0.022)	(0.029)	(0.020)	(0.014)	(0.048)
Log(total assets)	0.067***	0.079***	0.076***	0.116***	0.293***	0.180***	0.245***	0.512***
	0.015	0.018	0.009	0.031	(0.048)	(0.037)	(0.027)	(0.080)
Leverage	-0.139	-0.114	-0.018	-0.241	0.19	-0.409**	-0.049	-1.429**
	(0.130)	(0.106)	(0.067)	(0.237)	(0.355)	(0.181)	(0.145)	(0.577)
Liquidity	-0.799***	-0.448***	-0.469***	-0.595	-1.623***	-0.868***	-1.005***	0.643
	(0.125)	(0.136)	(0.080)	(0.485)	(0.378)	(0.249)	(0.171)	(1.111)
Return on assets	-0.295*	-0.422**	-0.404***	-0.343	-0.839*	-0.882***	-0.740***	-1.993
	(0.159)	(0.174)	(0.083)	(0.559)	(0.429)	(0.308)	(0.169)	(1.386)
Sales growth rate	-0.072**	-0.017	-0.032*	-0.129	-0.034	0.029	-0.034	0.203
	(0.035)	(0.036)	(0.019)	(0.099)	(0.111)	(0.083)	(0.048)	(0.308)
Nppe	-0.081	-0.373**	-0.211**	-0.332	-0.204	-0.522	-0.385*	-1.295*
	(0.166)	(0.150)	(0.093)	(0.286)	(0.385)	(0.325)	(0.204)	(0.684)
Investment	-0.641	0.042	-0.137	0.693	-1.088	-0.619	-0.687	1.591
	(0.439)	(0.310)	(0.202)	(0.703)	(0.857)	8	(0.442)	(1.658)
Advertising expense	0.051	-1.236**	-0.448	1.737	1.361	-2.863***	-0.312	-8.196*
	(0.587)	(0.593)	(0.325)	(1.492)	(2.175)	(0.990)	(0.929)	(4.849)
R&D expense	-0.989***	-1.588***	-1.290***	-2.48	-1.406*	-3.030***	-1.854***	-11.427***
	(0.288)	(0.451)	(0.204)	(1.955)	(0.795)	(0.892)	(0.464)	(3.911)
Constant	-0.342*	0.410	0.195	0.261	-0.949	1.988***	1.006	0.499
	(0.199)	(0.262)	(0.221)	(0.369)	(0.684)	(0.713)	(0.664)	(0.818)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Obs.	1269	1298	4581	449	1269	1298	4581	449
R-Squared	0.34	0.27	0.25	0.47	0.37	0.31	0.28	0.52

Table 4.6: Unobserved heterogeneity

This table provides regressions of corporate diversification on takeover pressure which take into account time-invariable factors that can explain the variation of corporate diversification at firm level. Results from both fixed effect and random effect estimation are shown. N. segments is the number of business segments of which the 4-digit SIC of each segment is not duplicated. Div. dummy equals one if the number of business segment is greater than one, zero otherwise. Anti-takeover index is the number of anti-takeover laws that were passed in each state. Other variables are defined in Appendix 4.D. ***, **, and * are statistically at 1%, 5%, 10%, respectively.

	Div. Dummy	N. segments	Div. Dummy	N. segments
	(1)	(2)	(3)	(4)
Anti-takeover index	0.003***	0.003	0.013***	0.018***
	(0.001)	(0.002)	(0.001)	(0.002)
Log(total assets)	0.061***	0.151***	0.058***	0.151***
	(0.001)	(0.003)	(0.001)	(0.002)
Leverage	0.030***	0.030**	0.023***	0.011
	(0.006)	(0.013)	(0.006)	(0.012)
Liquidity	-0.133***	-0.254***	-0.165***	-0.294***
	(0.008)	(0.015)	(0.007)	(0.014)
Return on assets	-0.037***	-0.126***	-0.049***	-0.164***
	(0.006)	(0.012)	(0.006)	(0.011)
Sales growth rate	0.005***	0.008***	0.002***	0.005**
	(0.001)	(0.002)	(0.001)	(0.002)
Nppe	-0.024**	-0.124***	-0.021**	-0.111***
	(0.010)	(0.021)	(0.009)	(0.019)
Investment	-0.072***	-0.153***	-0.117***	-0.220***
	(0.016)	(0.032)	(0.016)	(0.031)
Advertising expense	0.109**	0.147*	-0.016	-0.052
	(0.045)	(0.090)	(0.040)	(0.080)
R&D expense	-0.003	0.061	-0.102***	-0.101***
	(0.019)	(0.038)	(0.017)	(0.034)
Constant	0.144***	1.289***	0.248***	1.528***
	(0.009)	(0.017)	(0.052)	(0.105)
Fixed effect	Yes	Yes	No	No
Random effect	No	No	Yes	Yes
Industry fixed effects	No	No	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of Obs.	121150	121150	121150	121150

Table 4.7: Takeover threats and corporate diversification

This table provides regression analysis of corporate diversification on takeover threat. N. segments is the number of business segments of which the 4-digit SIC of each segment is not duplicated. Div. dummy equals one if the number of business segment is greater than one, zero otherwise. Takeover threat is a dummy indicator which equals one if the firm receives a takeover bid within a year. Other variables are defined in Appendix 4.D. Robust standard errors that are clustered by firm are presented in parentheses. ***, **, and * are statistically at 1%, 5%, 10%, respectively.

	Div. dummy		N. segments	
	(1)	(2)	(3)	(4)
Takeover threat	-0.047***	-0.017***	-0.091***	-0.030***
	(0.006)	(0.005)	(0.013)	(0.009)
Log(total assets)	0.064***	0.061***	0.184***	0.152***
	(0.002)	(0.004)	(0.008)	(0.009)
Leverage	-0.012	0.030**	-0.074**	0.031
	(0.015)	(0.012)	(0.032)	(0.026)
Liquidity	-0.280***	-0.134***	-0.493***	-0.255***
	(0.015)	(0.015)	(0.032)	(0.027)
Return on assets	-0.137***	-0.037***	-0.436***	-0.127***
	(0.011)	(0.009)	(0.026)	(0.017)
Sales growth rate	-0.008***	0.004***	-0.015***	0.008***
	(0.001)	(0.001)	(0.002)	(0.002)
Nppe	-0.036	-0.024	-0.168***	-0.124**
	(0.023)	(0.025)	(0.053)	(0.054)
Investment	-0.395***	-0.072***	-0.742***	-0.154***
	(0.033)	(0.022)	(0.065)	(0.043)
Advertising expense	-0.372***	0.110	-0.754***	0.148
	(0.092)	(0.087)	(0.209)	(0.165)
R&D expense	-0.483***	-0.003	-0.832***	0.062
	(0.028)	(0.027)	(0.062)	(0.049)
Constant	0.462***	0.140***	2.114***	1.284***
	(0.092)	(0.019)	(0.407)	(0.040)
Fixed effect	No	Yes	No	Yes
Industry fixed effects	Yes	No	Yes	No
Year fixed effects	Yes	Yes	Yes	Yes
No. of Obs.	121150	121150	121150	121150
R-Squared	0.18	0.05	0.22	0.05

Table 4.8: Pearson Correlation Coefficients of diversification measurements

	N	N. segments	Div. dummy	Entropy asset	Entropy sales	Herf asset	Herf sales
Number of segments	121,150	1					
Diversification dummy	121,150	0.81***	1				
Entropy asset-based	121,150	0.68***	0.78***	1			
Entropy sales-based	121,150	0.21***	0.24***	0.30***	1		
Herf asset-based	121,150	0.75***	0.77***	0.98***	0.30***	1	
Herf sales-based	121,150	0.42***	0.44***	0.55***	0.95***	0.56	1

Table 4.9: Anti-takeover index and continuous measurements of diversification

This table provides regression analysis of corporate diversification on takeover pressure using continuous measurements of diversification as dependent variables. Anti-takeover index is the number of anti-takeover laws that were passed in each state. Other variables are defined in Appendix 4.D. Robust standard errors that are clustered by firm are presented in parentheses. ***, **, and * are statistically at 1%, 5%, 10%, respectively.

	Entropy asset-based	Entropy sales-based	Herf asset-based	Herf sales-based
	(1)	(2)	(3)	(4)
Anti-takeover index	0.006***	0.006***	0.011***	0.011***
	(0.001)	(0.001)	(0.001)	(0.001)
Log(total assets)	0.020***	0.020***	0.042***	0.042***
	(0.001)	(0.001)	(0.001)	(0.001)
Leverage	-0.008*	-0.029	-0.019**	-0.035*
	(0.004)	(0.023)	(0.008)	(0.021)
Liquidity	-0.101***	-0.116***	-0.180***	-0.189***
	(0.005)	(0.018)	(0.008)	(0.017)
Return on assets	-0.043***	-0.040***	-0.090***	-0.085***
	(0.003)	(0.004)	(0.006)	(0.006)
Sales growth rate	-0.002***	-0.001	-0.004***	-0.003*
	(0.000)	(0.002)	(0.001)	(0.002)
Nppe	-0.030***	-0.026***	-0.062***	-0.054***
	(0.007)	(0.007)	(0.012)	(0.012)
Investment	-0.097***	-0.164**	-0.172***	-0.225***
	(0.009)	(0.069)	(0.016)	(0.059)
Advertising expense	-0.082***	-0.067**	-0.127**	-0.098*
	(0.028)	(0.028)	(0.051)	(0.051)
R&D expense	-0.146***	-0.138***	-0.257***	-0.246***
	(0.009)	(0.011)	(0.016)	(0.017)
Constant	0.138***	0.150***	0.236***	0.234***
	(0.028)	(0.032)	(0.057)	(0.055)
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of Obs.	121150	121150	121150	121150
R-Squared	0.21	0.02	0.23	0.08

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