# MANAGER'S OVERCONFIDENCE AND RISK TAKING APTITUDES AND THE CROSS INDUSTRY ACQUISITIONS

*by Nadiia Stechyshyna*

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## *1. Introduction*

According to Roll (1986), strategic business decisions are made in the environments with the asymmetric information problems and thus in environment that lacks input variables or measurement calibration. In such ill-structured decision environments, as a decision to expand to a new market through M&A, overconfidence may be especially prevalent. Extending Camerer and Lovallo's (1999) line of inquiry, I would like to examine overconfidence and risk taking behavior on the decision to do a cross industry acquisition (target and acquirer are from different industries).

There is more and more literature done in the field to explain why managers engage into risky action, since this decision, according to Palmer & Wiseman (1999), is the essence of strategic choice of the enterprise. Research of Sitkin and Weingart (1995) present evidence that individuals' perceptions of risky situations may explain why they engage into risk taking behavior. Busenitz and Barney (1997) demonstrated that the perceptual bias of managerial overconfidence may be associated with entrepreneurial behavior. Camerer and Lovallo (1999) in their laboratory setting study provide evidence that overconfidence is associated with the risky action of entering a new market. Further, managers, introducing pioneering products, in a study of Houghton, Simon (2003) were shown to be more apt to express extreme certainty of achieving success, though these products were less likely to achieve success. As defined in Klayman, Soll, Gonzalez-Vallerjo, and Barlas (1999), overconfidence is likely to occur in the situation when person's certainty in the predictions made exceeds the accuracy of the prediction itself.

Managers, according to Graham, Harvey, and Puri (2010) survey, are more inclined to take risks. This leads to the more frequent M&A activity. Since the accuracy of the standard techniques (DCF, APV, PBP etc.) is quite low (due to the high number of assumptions). The executive is thus usually ends up taking the final decision (shown in the results of the survey). Kahneman and Lovallo (1993) show that there is no guarantee that inflated expectations about the M&A deal will be corrected if the assessment is done in teams or with the external consultant. Influence of CEO's biases on the overall decision making are documented in other studies (e.g. Malmendier and Tate (2005)). Managerial overconfidence influences the speed of firm's expansion, as well as exhibits positive correlation with firm total investment and internal expansion. (Jiang F., Zhang M., Chen (2009).

Market seems to anticipate the cross industry bids as risky. This notion is confirmed in prior studies that found diversification discount (e.g. Lang and Stulz (1994), Lamont and Polk (2002)). Results received by Morck, Shleifer, Vishny (1990) are consistent with the notion that it is managerial rather than shareholders' objectives that drive bad acquisitions. Authors showed that returns of a bidder are lower when their firm diversifies or buys a rapidly growing target, other words, engages in M&A deal when decisions are made in the environments with more severe asymmetric information problem. Schneider and Spalt (2011) showed that managerial gambling aptitudes influence corporate acquisition. The effects they investigate are stronger if managers are more entrenched, if the recent performance of the acquirer has been poor, if the CEO is younger, during economic downturns and if the headquarter of the acquirer is located in the area with higher local gambling propensity. Mork, Schliefer and Vishny (1990), for example, measure negative announcement returns as a reaction to cross industry deals. Malmedier and Tate (2008) using the data 477 publicly traded US firms from 1980 to 1994 found that overconfident CEO is more likely to do diversifying mergers. The same effect holds for subsample of cash reach and cash poor firms.

This paper will mainly focus on is the impact of manager's overconfidence and risk taking attitudes on the cross industry acquisitions.

Research will consider only domestic deals made in USA during 1992-2011. Only the deals, for which all variable information is available, will be used in the final sample. Following Morck, Shleifer and Vishny (1990) acquisition worth less than 5% of the acquirer value will be omitted. Cross-industry M&A transaction will be identified based on different 2-digit SIC codes, thus, within industry transaction are those that have same 2-digit SIC code.

The data used to conduct this research will be obtained from four main sources: CRSP, ExecuComp, Compustat, SDC. Information necessary to construct and obtain ACAR, Market Capitalization will be obtained from CRSP. ExecuComp contains necessary data on CEO. Compustat contains Balance sheet and income statement data. SCD is the main source of data that contains information on the deals as well as their characteristics.

The lay out of this paper will be as follows. In Section 2 the existing academic studies will be presented as well as discussion upon chosen overconfidence proxies will be introduced. Hypotheses that are to be tested in Section 5 will be stated in Section 3. Section 4 will contain information on the dataset construction as well as a summary statistics of the

variables. Section 5 will present main empirical results as well as obtain a broader discussion about alternative explanations of the results. Section 6 will sum up the paper and contain main conclusions as well as recommendations for further research.

## *2. Current State Of Literature*

### *2.1. M&A*

There has been a plenty of research on M&A transactions done over the past years. A number of studies, for example, showed that M&A do create value, though the most gain is attributed to the target, where acquirers suffer losses (on average). Still, having documented those facts, there are less studies that explore the issue of why companies pursue acquisition. Theory provides, though, a number of possible explanation: to capture synergies and economy of scale as well as obtain a greater level of market and, thus, bargaining power (oligopoly or monopoly creation); to move inefficiencies of the market (acquisition of poorly performing targets); agency costs, self-serving managerial behavior and entrenchment; diversification benefits and creation of internal capital markets.

Most of these theories appeared to be valid in explaining M&A activities over the course of the last century. Today though behavioral finance seem to be one of the top reasons investigated to explain M&A activity through accounting for the agency costs, entrenchment, overconfidence and overoptimism of managers.

Agency theory and managerial entrenchment has been widely discussed in the modern literature. Jensen and Meckling (1976) has shown how ownership structure of the firm can influence the overall behavior of the manager and raised the question of the agency costs as well as integrated them into the ownership structure. Agency costs arise when the principle hires an agent (manager) to provide certain service in exchange of agreed amount of compensation. With this transaction in place principle also transfers certain amount of the decision making power over the company to the agent. According to the notion of utility maximization there is a high probability that the agent will act to pursue his own interest and gains on top of or instead of pursuing principal's objectives. The principal, to minimize the agency costs, is likely to invest in monitoring or instates certain incentives to align interests of both parties (agent's and principal's). The relation described above applies to shareholders and managers in any firm. Shareholders act as principals and managers/directors act as agents.

Following the idea of aligning interests of managers and shareholder there has been a revision of managerial compensation package in 90s. In the structure of total compensation, equity part totaled to more than 50% in 2008 while in 1992 it was no more than 20% (Frydman and Jenter (2009)). Furthermore, managers are willing to buy firm's equity, make investments into it thus signaling to the market about firm performance (Lelnd and Pyle (1977)). Furthermore, incentive alignment through equity holdings and formation of commitment to the firm's performance is considered to reduce information asymmetry between external investors and insiders that I supposed to reduce the cost of raising capital. Also, manages are on average reluctant to sell their stake in the company thus reducing the probability of hostile takeover.

Himmelberg, Hubbard and Palia (1999) showed that after controlling for firm fixed effects and other observed characteristics it is impossible to conclude that managerial ownership does influence firm's performance. Morck, Shleifer, and Vishny (1988) provide support for the predicted positive relation between performance and pay for low levels of managerial ownership (<5%). This conclusion is supported by Stulz (1998). And the relationship is reverse for the stake of 5 to 25%. Hubbard and Palia (1999) showed that there is and added value to the gains of the unconstrained bidder if it acquires constrained target.

Because incumbent (manager) might want to maintain higher degree of control over the decision making in the company, he/she might repurchase outstanding shares through putting more debt on the balance sheet. It is considered that only investor that value cash over control can agree to the repurchase. Through this process management reduces the number of shares outstanding and reducing potential takeover threat (Harris and Raviv (1988)). Stulz (1988) also stressed the point that higher degree of financial leverage in the target is one of the factors that discourages potential acquisition, since the debt in place will be inherited by the acquirer. It is also limits the expansion possibilities and increases the bankruptcy probability through more stringent debt agreements and greater reliance on future cash flow (Harris and Raviv (1988)).

Acquisition can be also financed through equity. The pecking order theory says that firms prefer internal sources over external and if they are forced to pursue external financing debt would be more preferable than equity. Though, the theory that was heavily debated in recent academic papers find little support in empirical line of investigation. Frank and Goyal (2003) showed that firms prefer to avoid external financing when their

internal funds are enough to cover the pursuit of investment opportunity. They also provided evidence that if internal funds are drained out, firms are more likely to use equity than debt. Helwege and Liang (1995) working in the same line of investigation showed that firms who's credit profile is high enough to obtain needed bank credit on average will be more likely to issue equity instead. Another reason for why pecking order might not be working in practice is signaling hypothesis. Myers and Majluf (1984) show that if acquirer decides to finance the transaction through equity it is a clear sign of it being overvalued. Thus the cost of equity financing increases as opposed to alternatives like debt or cash. Asquith at al. (1987) show positive returns of the bidder of the transaction is financed through cash and negative if it is an equity transaction. The papers also suggest that the returns depend on the size of the deal.

### *2.2. Cross-Industry M&A and Firms' Value*

There is a common view that enterprises that operate in multiple lines of business (cross-industry) have lower value than a portfolio of the stand-alone comparables. Lang and Stulz (1994) found that firms operating in several different industries tend to have lower Tobin's Q than the stand-alone comparables. Morck et al. (1990) and Maquiera et al. (1998) studied cross-industry acquisitions and showed that bidders on average tend to loose in value. As opposed to this, Graham, Lemmon and Wolf (2002) argue that most of the discounting comes from the fact that firms acquire already discounted businesses, thus, diversification is not a value destroying venture.

Berger and Ofek (1995) discovered the 15% discount that is usually in place for the multi industry firm. Lins and Servaes (1999) researched the same question and found similar evidence for firms operating in Japan and United Kingdom. Thus the expectation is that the market valuation and different SIC codes are negatively correlated, and thus, the CAR should be lower if cross-industry M&A is in place.

One explanation for the diversification discount is the inefficient internal market hypothesis. It says that multi line business firms tend to redistribute their internal investment resources inefficiently by overspending with inefficient segments and underinvesting into good ones. In support of the theory Berger and Ofek (1995) found that multi-line business firms tend to overinvest in the lines where the investment

opportunities are poorer with less of value creation potential and this activity is strongly correlated with lower firm valuation. Daley et al. (1997) shows that there is improvement in the performance of spun-off segments and the improvement is of higher level if the spun-off operates in unrelated business than the mother company, thus, supporting the inefficient internal market hypothesis.

Another approach at explaining the phenomena is the cross-subsidization hypothesis. Shin and Stulz (1998) show that there is a connection between the cash flow generated by one business-line and the investment made in another one. Rajan et al. (2000) developed a model where the cash flow generated can flow into the inefficient division, though, the flow itself is dependent upon the size of the investment and the opportunities created. Consistent with this notion, Lamont (1997) presents evidence that firms where core industry is oil tend to reduce their investment into the non-oil profit generating segments if there is a decline in oil prices.

Also, one of the possible explanations for the discount is the agency theory (Jensen and Meckling (1976), Jensen (1986), Hope and Thomas (2007)) and its empire-building notion. Managers might pursue cross-industry diversification and enlarge firms well beyond its optimal size to get the benefits like prestige, additional compensation, power and influence. Within this framework, Stulz (1990) showed that with the growth of the resources under manager's control growth his or her prestige. Also, few studies (e.g. Jensen and Murphy (1990), Rose and Shepard (1997)) documented the positive relation between firm size and level of managerial compensation. Thus, the valid assumption would be that managers with empire building incentives will tend to go through with diversifying M&A more often and the CARs of those transactions would be lower.

Another explanation may come from overoptimism and overconfidence of the managers. Optimistic errors tend to be most severe when managers come into unfamiliar territory and thus are more likely to appear in the area of new technology or different industry. Merrow et al. (1981) showed the magnitude of the problem studying the pioneer process plants in the energy industry. The real costs on average exceeded the one projected in the initial plan by 20%-50%. Furthermore, 80% of all venture start-ups studied by Davis (1985) haven't achieved the planed market share. Therefore, market perceives this initial plan vs. real "expectation gap" and downsizes its valuation of the combined firms' prospects.

On the other hand, there are theories and studies that predict positive correlation between the cross-industry diversification and the combined firms' value. The reasoning includes the fact that diversifying cash flow sources one would reduce the cash flow volatility and thus the likelihood of the distress or bankruptcy as in Lewellen (1971).

Another argument that supports the diversification hypothesis is related to the capital market theory. If internal capital market redistributes resources better than the external then the cross-industry M&A would be beneficial since it maximizes the size the internal market and, thus, the scope of investment opportunities.

### *2.3. Overconfidence and Risk Taking*

In the literature there can be defined three approaches to define overconfidence. First, it can be defined following Oskamp (1965), Brenner et al. (1996) as systematic biases in calibration that should mean that the assigned probabilities exceed the true accuracy. Other words, overconfidence is associated with people overestimating the knowledge and skills they have as well as the quality of the information they have at hand to deliver their judgments - internal uncertainty (Kahneman and Tversky (1982)). The tendency to be overconfident is weaker (Budescu, and Du (2007)) if the source of uncertainty is external (boxing match outcome).

Second, overconfidence is accessed based on the fact that the individual exhibits excessive certainty about the accuracy of delivered estimates regarding uncertain continuous quantity. For example, the researchers (Lichtenstein, Fischho and Phillips (1982), Russo and Schoemaker (1992)) would ask to access the water volume in Atlantic Ocean as well the confidence interval for the judgment (e.g. 90%) and will afterwards estimate the overconfidence by the number of answers that fall out of the confidence intervals (on average, only 50% of the answers are within 90% interval).

Third, overconfidence is determined as a state of mind when person considers to be better than average (e.g. better driver) with respect to his/her skills. Research (e.g. by Svenson (1981) provide proof that people tend to have positive self-evaluation and be over optimistic about the future. Taylor and Brown (1988) in their showed that certain psychological characteristics may influence the fact that an individual exhibits higher then

on average self-evaluation. Berber and Odean (2001) present evidence that in the financial industry men have a tendency to be more overconfident than women trading higher stock volume and through by undertaking excess trading reduce their net returns.

### *2.4. M&A and Overconfidence*

M&As provide additional proof of overconfidence phenomena as well as to the notion of illusion of control. Wide research on the subject gives evidence of bidder to have negative cumulative abnormal retunes (on average), though we see a high number of M&A deals and takeovers to be closed each year. Within the hubris hypothesis of Roll, acquirers tend to overpay for the targets since they overestimate the economy of synergies and due to assessment of current management as being weak and "incompetent". Biding firms thus overestimate the control they will establish over the targets operations as well as the speed and quality of improvements they will establish as well as underestimate the current manager's effort. Another explanation arises from the competition framework where overconfidence arise under the assumption of individuals underestimation of the opponent and his/her skills and experience (Roll (1986)). Malmadier and Tate (2008) find that the likelihood of M&A to take place is 65% higher if the bidder is run by the overconfident manager.

Some researchers suggest that the likelihood of overconfidence to arise is when the predictions are made for the less repetitive decisions. According to studies of Murphy and Winkler (1977) and (1982) meteorologists will forecast the rain way more accurately than they forecast tornado. Winkler and Poses (1993) studying doctor's predicting power towards patient mortality rate in intensive care units and diagnosing disease suggest that the presence of frequent feedback decreases overconfidence, while lack of or ambiguous feedback do the reverse. Thus we can conclude that overconfidence is presumed to be of a greater extent if the decision is made in non-repetitive, ambiguous environment with little or no feedback. Strategic business decision as M&A represent ill-structured non-frequent decision environment that thus very much goes into the framework of the previously mentioned studies.

Following the logic introduced in Tversky and Kahneman (1974) one can assume that information about successful and pioneering M&A transaction is more likely to be available to the managers. On the other hand, if to take into account the research of Golder and Tellis (1993) we can infer that M&As that failed are in a figure of speech "shorter lived" and, therefore, those instances are more likely to be overlooked when making the assessment. Levinthal and March (1993) also show that people have a tendency to avoid discussing cases when they underperformed or failed thus shrinking the representative case pool. Thus, managers may very possibly overestimate the probabilities for the positive outcome because they have "salient information" about outcomes with positive outcomes and little or ambiguous evidence about the reverse situations. Kahmneman and Lavallo (2004) showed that managers as decision makers have a tendency to view the problems in front of them as unique and thus are prone not to put current decision in framework of potential future opportunities as well as ignore the evidence from the past.

### *2.5. Managers and Overconfidence*

Mangers are particularly prone to being overconfidence. Goel and Tharkov (2002) came up with the model that is supposed to mimic the way leader are established within the organization. Within their theoretical paradigm individuals while competing for the managerial (leadership) position are "forced" to uptake riskier decisions. One can argue that overconfident individual had an upper hand in the competition and the probability of him/her reaching the position of leadership and influence is assumed to be higher by outbeating more rational and less risk prone candidates. Miller and Ross (1975), Nsbett and Ross (1980) showed that people are more prone to take credit for the undertakings that were successful and attribute little responsibility to themselves if the project went down in flames. Gervias and Odean (2001) took this predisposition in the center of the study of successful stock market traders and showed that those grow to be overconfident in their knowledge and instincts. Gervais et al. (2003) applied the same reasoning and argued that managers tend to exaggerate the attribution of success to their own effort impute. Also, due to the selection biases overconfident managers can be preferred to their rational competitors if the overconfidence itself is considered to be a sign of greater potential and ability. Thus, CEO are the individuals to fit in the overconfidence framework.

Weinstein (1980), as stated earlier showed that individuals have tendencies to overstate and overestimate their abilities. March and Shapira (1987) provide evidence that overconfidence on average is higher if individuals deal with tasks of higher difficulty level. Considering the fact that overconfidence also arises when tasks are of rare/non-repetitive nature, it is eligible to say that M&A fits into the framework. Also authors showed that since CEOs on average had the final say in whether to uptake the large scale investment or decide whether to go through with M&A or not they might be "forced" that they are in control of the outcome that leads them downgrade the estimate of failure likelihood. Individuals are also prone to overconfidence if the commitment to the goal/task accomplishments is above average (Weinstein (1980)). CEO whose sufficient part of compensation is tied to stock and stock options grants are tightly committed to the companies' well-being and growth.

Ben-David, Graham and Harvey (2010) showed that financial managers when forecasting stock market returns tend to overestimate their predictive power. Friesen and Weller (2006) state that analysts are prone to be overconfident. Chuang and Lee (2006) showed evidence that investors tend to overestimate the accuracy of the private information. Sieber (1974) provided evidence that managers tend to be more overconfident if the undertaking is of greater importance.

The CEO calibration biases aren't corrected in group decision making environment. Although, Gervais and Goldstein (2003) showed that there can be positive effects of biased of self-perceptions in firms by introducing the framework when a the presence of an agent who overestimates his marginal productivity may make all agents better off, including the biased agent him/herself, but, they also said that the self-perception biases can never be Pareto-improving in case if they affect the team leader. Authors went further and showed that overconfidence can affect the on job tasks like the increase of merger likelihood and its estimated value. Kahneman and Lovallo (1993) provided evidence that there is no guarantee that inflated expectations about the M&A deal will be corrected if the assessment is done in teams or with the external consultant. Influence of CEO's biases on the overall decision making are documented in other studies (e.g. Malmendier and Tate (2005)). Managerial overconfidence influences the speed of firm's expansion, as well as exhibits positive correlation with firm total investment and internal expansion (Jiang F., Zhang M., Chen (2009).

The further suggestion would be that overconfidence pushes managers to uptake riskier projects when they have a biased risk perception. Houghton et all (2000), Weber and Hsee (1998) in their studies discussed the importance of risk assessment of the individual when trying to explain the undertaking of the risky action. Managers pursue the risky undertakings like expansion of production facilities (Nutt (1993)) or innovating (Staw (1991)) since they understate the riskiness of the undertakings, logic introduced in the article of Kahneman and Lovallo (1993). Managers commonly view risk as a challenge to be overcame and are likely to believe that one can mitigate it with managerial experience and experience (Donaldson and Lorsh (1983)). One may, though, argue that underestimating the risk of the decision (undertaking) falls into the calibration definition of overconfidence.

### *2.6. Measuring Overconfidence and Risk Taking*

There are various approaches to how overconfidence and risk taking can be measured. Below, one will find proxies that are constructed and used specifically for this paper and were constructed based on previous research on the topic.

#### *2.6.1. Equity Related Proxies*

2.6.1.1. *Stock Option Exercise:*

Following the recommendations of the financial theory investors are better off to diversify their holdings. Though, investors usually depart in their actions from this rationale (French and Poterba (1991), Huberman (2001)) and are prone to heavily invest in the company of their employment

Merton (1973) shows that since the right to delay purchasing the stock by exercising stock option had above zero value the investor should not exercise the stock option early, but can diversify and hedge by, for example, obtaining short position on the

same stock. Though, since the contraction of the executive stock option compensation is different ( a)on average those are non-tradable; b) legally and due to the signaling hypothesis CEO cannot hedge by short selling), CEOs find themselves highly exposed since the great part of their compensation (Frydman and Jenter (2009)) is equity based and the personal capital they own (knowledge, time etc.) is invested in the company they run thus exposing them towards idiosyncratic risk by linking their careers and the company success (Treynor and Black (1976), Gervais et al. (2003)). Thus, the risk-averse CEO should diversify their holdings by exercising in-the-money stock options. Opposite to this rational approach, some CEOs hold to their stock option position and thus bet on their company's stock performance. Within this paper framework these CEOs are considered to exhibit overconfidence.

Following the previously established logic, the current value of the in-the-money unexercised stock options was divided by the previous year total CEO compensation as reported in SEC filings and multiplied by 100. If the ratio exceeded 100%, 200%, 300%, 400% and 500% the following dummy variables were filled in: CEO100% , CEO200% , CEO300% , CEO400% and CEO500% respectively.

2.6.1.*2. Stock Ownership:*

The argument starts with the notion stated for the option part: rational investors are better off when diversifying their holdings. Though, In contrast towards what theories recommendations are large part of investors hold insufficiently diversified portfolios and on top of them many agents tend to invest in the company they work for, thus, opening their saving to additional risk (worst case scenario - they might end up as the majority of Enron employees). Managers whose career is tightly linked to the company's performance are thus naturally exposed to the idiosyncratic risk of their company (Treynor and Black (1976), Gervais et al. (2003)). Therefore, the notion to diversify their holdings should seem even more appealing and rational to management. Although alternative explanations (e.g. signaling hypothesis, additional and insider information), it is plausible that this behavior at least partially motivated by the cognitive biases.

The findings by Morck, Shleifer, and Vishny (1988) provide evidence towards positive relation between company's performance and managerial ownership, though the relationship holds for the low level of equity ownership (<5%). Different from what the

theory predicts the variables have negative correlation when CEOs own a large fraction of the equity. Bringing the argument further, it is possible that mnay managers when their stake in the company's equity rises tend to experience the previously mentioned illusion of control. By overestimating their influence on company's performance and growth managers might express high level of optimism about company's future, overestimate the retune of their stocks and underestimate the risks they take on both by holding the undiversified portfolio and by implementing their vision of how the company should invest and grow.

Further on, betting on profits that can be extracted by having inside information might bring additional risks. It is often hard to predict market reaction towards certain company's new policies or announcements like M&A or a major investment, especially, if to take into account the information asymmetry notion. Therefore, betting on inside information is presumptuous and can be considered as a sign of overconfidence and overoptimism, especially if the stock performance has been poor.

As mentioned before, signaling hypothesis can be an alternative explanation (Malmendier and Tate (2002). Though, as in the insider information case one would expect this behavior to have episodic character and not to be pursued on day to day basis.

Thus, managerial insufficient portfolio diversification can be considered as a sign of overconfidence and the degree of it will be measured by the percentage of equity managers had one year prior to announcement.

### *2.6.2. Biology Related Proxies*

#### *2.6.2.1. Experience:*

Experts, as shown in some of the studies experienced professionals can exhibit higher level of overconfidence then the inexperienced subjects (Heath and Tversky (1991), Frascara (1999)). This result is backed up by the studies like Glaser et al. (2003), where experienced traders tend to exhibit higher level of overconfidence than students. Similar by logic results were also obtained in the study of Glaser et al. (2004a). Kirchler and Maciejovsky (2002) analyzing asset market arrived to a similar conclusion.

This approach is also consistent with previously discussed studies that deal with the process of managerial selection. In the model of Gervais and Odean (1998) self-serving attribution biases stimulates the rise in the level of overconfidence that individuals exhibit. Within introduced framework investors tend to estimate their abilities from the past success and failures. Due to the natural inclination to forgo failures and attribute success to personal skills and expertise, investors with good track record tend to become overconfident. Also this falls into the following logical framework: overconfidence rises with the amount of achievement subject have tendency to attribute their effort to.

Generally experience is measured with age. There are several studies that relate age with overconfidence. The results though are contradictory at most: while some would state that overconfidence decrease with age (e.g. Graham (1999), Li (2002), Boyson (2003), other come to an opposite conclusion (e.g. Chevalier and Ellison (1999b), Hong et al. (2000), Lamont (2002)). The same refers to managing being risk takers (Prendergast and Stole (1996) vs. Avery and Chevalier (1999)).

One of the possible explanations for the difference in results is that age mirrors several things at a time: experience[1] and some physiological characteristics as testosterone level that might cause younger individuals to exhibit higher level of overconfidence[2]. To avoid this collision, the experience is reasonable to be proxied by the years CEO spent in the company prior to the both as CEO and prior to the appointment before the announcement.

Though, the week spot of this approximation is CEO turnover. According to Booz & Company analysis on average, CEO turnover is around 12-14% for both samples of top 250 and 251-2500 companies by market capitalization. Spencer Stuart report of 2005 showed that top 100 S&P CEOs on average stay with their companies longer than the rest of the sample with median stay within the company of 19 years. The percentage of CEOs that lasted on the job (both as CEO and other) longer than 35 years have a tendency to decrease through the years from 15% in 1999 to 9% in 2004. The average number of years on the CEO job for the total sample is 16.

One of the solutions to the problem would be scaling the total years being in the company prior to the announcement by the age. This will take into account the fact that the

[1] Studies that provide evidence to the notion that overconfidence do decrease with age and obtaining more experience are of e.g. Locke and Mann (2001), Christoffersen and Sarkissian (2002)

[2] See subsection 2.6.2.3. for further discussion about testosterone level and overconfidence

individual might have had prior experience in a different company before landing in the one under consideration.

### *2.6.2.2. Testosterone Level and Gender Overconfidence*

Although both sexes tend to exhibit overconfidence, the degree exhibited by men is on average higher (Lundeberg, Fox, and Puncochaf (1994)). Gender differences in overconfidence are highly dependent on tasks (Lundeberg, Fox, and Puncochaf (1994), Lenney (1977), Beyer and Bowden (1997)) and men seem to exhibit more overconfidence dealing with tasks that are generally perceived as masculine. One might notice that being CEO is more commonly considered to be rather masculine job.

Furthermore, Lenney (1997) provides evidence that gender differences in overconfidence arise though a differences in feedback they receive. In cases when feedback is ambiguous and less frequent (M&A, major investment etc. ) men seem to exhibit higher level of overconfidence and deliver overestimates and inflated prognosis.

Again, Gervais and Odean (1998) within their model show that investors' overconfidence arises from self-serving attribution biases: by taking too much credit for the success and distancing themselves from the failure they undergone, they become overconfident. Several studies showed that men are more prone to self-serving attribution biases (Deaux and Farris (1977), Meehan and Overton (1986), Beyer (1990)). Deaux and Farris (1977) find that the self-serving attribution bias is greater for men than for women. And so men are likely to become more overconfident than women. This notion is also supported in the work of Meehan and Overton (1986) and Beyer (1990).

Berber and Odean (2001) present evidence that in the financial industry men have a tendency to be more overconfident than women trading higher stock volume and through by undertaking excess trading reduce their net returns.

Furthermore, Johnson, McDermott, Barrett, Cowden, Wrangham, McIntyre and Rosen (2006), studying overconfidence in war-games, showed that overconfidence and attacks are more pronounced among males than females.

One of the possible reasons for that is the fact that males have higher levels of testosterone on the system. Level of male testosterone hormone is related towards how

people perceive risk and how overconfident they are. Zak et al. (2009) shows that elevated level of testosterone leads to lower offers in the ultimatum games. Although M&A transaction surely bears some resemblance with ultimatum game, there are also certain differences. M&A transactions, with a fleur of negotiating process, have an option of respond to an offer with a counter offer (Boone and Mulherin (2007)). Levi, Li, Zhang (2008) proxing testosterone level by male find that younger CEOs that assembly have higher level of testosterone are more likely to be initiate acquisition as well as withdraw the offer as bidders and creating tenders as a target.

Since there is little chance to obtain information about CEOs health conditions, the level of the testosterone was projected using averages for the age group as in Vermeulen (1996). The approximation is appropriate for several reasons. The reservation is that testosterone level is more likely to vary with older CEO with health problems and administrating drugs to mitigate them. Though, for example, Ferrini and Barrett-Connor (1998) show that bioavailable testosterone decrease with age is independent of body size, health behavior, and chronic disease.

### *3. Hypothesis and Research Models*

The main research question of this study is:

*What is the impact of manager's overconfidence and risk taking attitudes on the cross industry acquisitions?*

The focus of this study is determining the proper proxies of overconfidence and risk taking behavior of managers and relating these behavioral biases towards the cross-industry M&A transactions where both the bidder and the target are from US.

The general model for the H1-H3 to be empirically tested will be formalized the following way:

$$y_i = \alpha + \sum_i^n \beta_i \cdot O_i + \sum_i^n \gamma_i \cdot X_i + \varepsilon_i, \qquad (1)$$

where $y_i$ is the dependent variable, $O_i$ is the overconfidence measure[3] and $X_i$ represents the bunch of controls like deal characteristics (cash/equity/stock financing; deal value etc.), balance sheet and income statement data (EBITDA, cash flow, book value of equity, ROE, ROA etc) and CEO controls (compensation, dummy variables of if CEO joined or left the company within a year prior or after the acquisition etc) [4].

The baseline hypothesis H1:H3 addresses the relation between cumulative abnormal announcement returns [-1;1]/offer price premia and overconfidence proxies as well as riskiness of the target measured by skewness of the returns and standard deviation of Fama-Frensh model residuals.

***H1:***

*The offer price premia is higher in cross-industry acquisitions if the manager is considered to be overconfident or exhibits risk taking aptitudes.*

[3] See section 2.6.2. for the discussion
[4] For further details, please, proceed to the Data section

To restate: managers who exhibit higher degree of overconfidence and risk taking aptitudes might be willing to acquire riskier target for the same price than the otherwise similar business.

To test whether offer price premia is higher for the riskier if the manager is considered to be overconfident or exhibits risk taking aptitudes (H1), the following variation of the model will be used:

$$OPP_i = \alpha + \sum_i^n \beta_i \cdot O_i + \sum_i^n \gamma_i \cdot X_i + \varepsilon_i, \qquad (2)$$

where $OPP_i$ stand for the offer price premium.

***H2:***

*Announcement returns of the bidder are lower in the cross industry acquisition if the manager is considered to be overconfident or exhibits risk taking aptitudes.*

Announcement returns of the bidder will decrease with the CEO's experience that is proxied with age. As mentioned before, the CEO that has been on the job and gaining experience as well as pursuing large scale investing project as well as introducing groundbreaking changes in the company for a longer time through self-attributing biases tend to get more overconfident than their less experienced colleagues (Heath and Tversky (1991), Frascara (1999)).

Announcement returns of the bidder will be lower if manager is male and will decrease with the testosterone level of the CEO. Once again, since there is little chance to obtain information about CEOs health conditions, the level of the testosterone was projected using averages for the age group as in Vermeulen (1996).

If manger tends to avoid exercising options if they are in the money, thus being overconfident, on average the returns for their shareholders are going to be lower. In addition, there has to be negative relation between the managerial stake in the company and the announcement returns.

To test whether announcement returns of the bidder are lower in the cross industry acquisition if the manager is considered to be overconfident or exhibits risk taking aptitudes. (H1), the following variation of the model will be used:

$$ACAR_i = \alpha + \sum_i^n \beta_i \cdot O_i + \sum_i^n \gamma_i \cdot X_i + \varepsilon_i, \quad (3)$$

where $ACAR_i$ stand for the abnormal cumulative return of the bidder.

***H3:***

*Announcement returns of the target are higher in the cross industry acquisition if the manager is considered to be overconfident or exhibits risk taking aptitudes.*

Announcement returns of the target are going to be higher if the bidder's manager is overconfident and prone to risky actions. The logic is similar to the one introduced with synergies: managers who exhibit higher degree of overconfidence and risk taking aptitudes might be willing to acquire riskier target for the same price than the otherwise similar business thus increasing the target's returns.

To test whether announcement returns of the target are higher in the cross industry acquisition if the manager is considered to be overconfident or exhibits risk taking aptitudes (H3), the following variation of the model will be used:

$$TCAR_i = \alpha + \sum_i^n \beta_i \cdot O_i + \sum_i^n \gamma_i \cdot X_i + \varepsilon_i, \quad (4)$$

where $TCAR_i$ stands for the abnormal cumulative return of the target.

***H4:***

*Cross-industry acquisitions are more likely to appear if manager is overconfident.*

Mangers that have more experience, higher testosterone level and are males with high stake in the company are more likely to pursue cross-industry acquisitions. If manger tends to avoid exercising options if they are in the money, thus being overconfident, on average the probability of cross industry acquisition will increase. In addition, there has to be negative relation between the managerial stake in the company and probability of cross-industry acquisition.

To test whether overconfident manager is more likely to engage in more risky cross industry acquisition (H5), the following variation of the model will be used:

$$\Pr\{CI_i = 1 | O_i, X_i\} = G(\alpha + \sum_i^n \beta_i \cdot O_i + \sum_i^n \gamma_i \cdot X_i + \varepsilon_i), \quad (5)$$

where $CI$ is a binary variable that takes 1 if the acquisition is defined as cross-industry and 0 - if it is a within-industry transaction.

## *4. Data*

### *4.1. Dataset Construction*

The initial sample consisted of all M&A transactions that involved both target and acquirer being incorporated in US. The transactions (in total 46960 dating back from 1992, January, till December, 2012) were extracted from Thompson Reuters SDC. One of the pre-requirements was that in the result of the deal acquirer attained the controlling stake of the company, thus the shares owned should amount to no less than 51%. Following the logic of Mork, Schleifer and Vishny (1990) and Malmedier and Tate (2008), the deals that constituted less than 5% of acquirer's market value 30 days prior to the announcement date were excluded from the analysis.

Offer price premium is defined as price paid for the target less market value of the target 30 days prior to the announcement divided by the market value of the target 30 days prior to the announcement. Both target and acquirer cumulative abnormal returns were calculated for a [-1;1] window using market model with [-31;280] estimation window. Past skewness and volatility of the target returns were estimated for the [-30; -760] period. The idiosyncratic volatility of the Fama-French 3 factor model residuals was estimated within same timeframe to match the estimates of skewness and volatility. To control of the target and acquirer are from different industries is to be monitored by the fact if they both have the same or different 2 digit sic code.

Testosterone level was proxied by age group as in Vermeulen (1996)[5]. Age and Gender of the CEO was extracted from ExecComp and noted for the fiscal year of the announcement. Experience variable was constructed by dividing time spent within the company (difference between the date current CEO joined the company and announcement date divided by 365) by the his age during the fiscal year of the announcement. Fraction of the stocks owned by the CEO as reported in SEC feelings was extracted from ExecComp and recorded 1 fiscal year prior to the announcement.

OptionLongholder variable, as noted above, was constructed the following way: the current value of the in-the-money unexercised stock options was divided by the previous year total CEO compensation as reported in SEC filings and multiplied by 100. If the ratio

[5] See appendixes

exceeded 100%, 200%, 300%, 400% and 500% the following dummy variables were filled in: CEO100% , CEO200% , CEO300% , CEO400% and CEO500% respectively.

Additional variables are: book value (total shareholder equity plus deferred taxes and investment tax credit minus redemption value of preferred stock); market to book ratio; return on assets (ROA) that equals net income over total assets; return on equity that equals net income over shareholders equity free of redemption value of preferred stock; and cash, debt due in 2/3/4/5 years, EBITDA as well as cash flow from operations free of preferred and common dividends all standardized by the book value of equity as in Lang et al. (1991). All the variables were calculated for the fiscal year prior to the announcement. The data necessary to construct those variables were extracted from Compustat.

Additional variables to control for deal characteristics were extracted from SDC and those are: whether the deal was financed via cash or borrowings, whether the was more than 1 bidder in the process (tender offer), whether defense techniques were in place as well as percentage of the target acquired and fees paid to the advisors.

The variable to control for the CEO characteristics were extracted from Exec Compustat and those were total salary, bonuses, total compensation, percentage change of total compensation, percentage of shares owned, as well as dummy variable for whether the CEO joined the company within 1 year period before the announcement or left 1 year after, if he worked in the company before being appointed as CEO and if stayed after left the office as well as the reason why he left the office.

### *4.2. Summary Statistics*

The descriptive statistics is captured in Table I and II (see appendixes). Table I captures the descriptive statistics that includes mean, median, standard deviation, maximum and minimum value for the chosen variables as well as number of observation for the sample of cross-industry M&A. Table II provides the same data but for the sample of within-industry M&A for the same period.

The median abnormal returns for the bidder of cross-industry M&A from day -1 to day +1 is 0.014%, and for the target 0.004%. The median offer price premium is 44%. Therefore, cross-industry M&A on average are expected to create value.

For acquirer the median Tobin's Q (market value over book value of equity) is 2.7; EBITDA, R&D expenses, cash and cash equivalent and operating cash flow over book value of equity are respectively 0.24; 0.05; 0,11; 0.12. For the target the values would be 2.07, 0.24; 0.08; 013; 0.15.

Average salary of the bidders CEO is $615 th, while bonus is $744 th. Total average salary would be $1.1 mln and its average change on year-o-year would amount 36%. On average bidders CEO own almost 4% of the company being 54 years old with testosterone level of 0.26. Average salary of the target's CEO is $713 th, while bonus is $860 th. Total average salary would be $1 mln and its average change on year-o-year would amount -3.11%. On average bidders CEO own almost 10% of the company being 54 years old with testosterone level of 0.26.

On average bidders that pursue cross-industry M&A tend to earn higher abnormal returns than bidders who do the within-industry deal (0.024% as opposed to -0.007%). The same concerns targets (0.0004% vs. -0.034%). Offers price premia is higher for the cross-industry deals (93% vs. 71%), though, the deal value is lower on average ($1,058 bl vs. $0,895 bl). On average bidders that go for cross-industry deal have more cash at hand ($298.98 vs. $258), as well as are more profitable (EBTDA of $640 vs. 460) and invest more in R&D ($104 vs. $102). On the other hand, targets of the cross-industry M&A have less cash ($95 vs. 223), lower EBTDA ($177 vs. $280) and R&D expenses (35 vs. 69) and book value of equity ($562 vs. $686), though, higher return on operating assets (-0.02 vs. -0.04) and return on equity (0.21 vs. -0.06) than those form within-industry deals.

Comparing bidders' CEOs, one may notice than those from cross-industry deals tend to have higher salary ($585 vs 615), bonuses ($744 vs. 685) and total salary ($1,14 mln. vs. 1.076 mln.) as well as the higher year-to-year percentage change of the total compensation (36% vs. 20%). Though CEOs that pursue cross- or within-industry M&A own approximately same stakes (4%) in the companies, are around the same age (54 years) with the same testosterone level (0.26).

Comparing CEOs of the targets, it is easy to spot that on average CEO of within-industry M&A tend to have higher salary ($713 vs. 657) but lower bonuses (860 vs. 908) and total salary (1.029 mln vs. $1.267). While target's CEO from within-industry M&A has

on average positive year-to-year change in total compensation (36%), target's CEO from cross industry deal tends to have a negative year-to-year change (-3.11%). Cross-industry deal target's CEO owns higher stake in the company (10% vs. 5.31), is younger (54 vs 55) with higher testosterone level (0.26 vs 0.25).

Comparing acquirers and target from the cross-industry sample one may notice that on average market capitalization of the acquirer is more than twice as the one of the target ($3,9 bln vs. $1,3 bln), but Tobins Q (MV/BV) is higher for the target rather than for the acquirer (2.8 vs 3.5). Acquirers have on average 3 times as much cash as targets ($298 vs 95) and around 2,5 times higher EBITDA and R&D expenses ($640 vs. $177 and $104 vs. $35 respectively). Acquirers have on average higher return on assets and return on equity. CEOs of the acquirers on average tend to have lower salaries, bonuses, total compensation as well as higher level of total pay rise (year-to year percentage change in total compensation) compared to targets' CEOs ($585 vs. 657; 685 vs. 908; 1,3 mln vs. 1,08 mln; 20% vs. 36% respectively). For within-industry M&A sample the same pattern is in place.

Furthermore, Figure 8 and 9 provide additional descriptive statistics on number of deals per year and group sector. There are significant differences with respect to those indicators. For example there are spikes in the number of deals made in late 90s and in the years of 2004-2007. The same trend is valid for both full sample and cross-industry subsample that this paper has most interest in. Another interesting feature is that acquirers from Finance, Insurance and Real Estate Group, as well as from Services and Manufacturing Groups seem to the most acquisitive (this concerns both samples), while Administration and Constriction tend to do less deals. Seeing those differences, one should be urged to control for them in farther analysis.

## *5. Empirical Results*

This section presents the main empirical results. The control variables were chosen following the prior literature and research. Controls were chosen to control for three dimensions: riskiness of the target, acquirer and target overall characteristics as well as deal characteristics. To measure riskiness of the target skewness of returns for the window of [-30;-760] and standard deviation of Fama-French residuals for the same estimation window of [-30;760]. The variables were chosen following Schneider and Spalt (2011). Overall acquirer and target characteristics were chosen primarily based on suggestions of Baker, Pan and Wurgler (2009). Furthermore, also cash, cash flow and R&D ratios were included following the logic of Malmendier and Tate (2008). In addition, deal Characteristics were chosen following Moeller, Schlingemann and Stulz (2004). For the H1-H3 OLS regressions were run in 15 specifications (4 different proxies CEO500%[6], EXPERIENCE, TESTOSTERONE and % OF SHARES OWNED with 3 specifications for each proxy and additional 3 where all 4 proxies included). OLS regressions were run in different specification including year fixed effects as well as acquirer industry (classified by 2-digit SIC code).

### *5.1. Offer Price Premia*

In section 3 the following hypothesis has been established: the offer price premia (OPP) is higher in cross-industry acquisitions if the manager is considered to be overconfident or exhibits risk taking aptitudes. Therefore, positive relation between OPP and proxies is assumed.

In support to the assumption (see Table IV), there is a positive sign before the variable TESTOSTERONE. The relationship is significant for the specification at 10% in specification (6) with t-statistic of 1.67 and when the controls for the acquirer's industry as well as target and acquirer characteristics are introduced. The sign and 10% level

[6] In this paper only CEO500% results are presented. CEO100%, CEO200%, CEO300%, CEO400% were excluded from the paper results since they present similar results as CEO500%..

significance is still in place in specification (10) when OPP is regressed on TESTOSTERONE as well as all 3 other remaining proxies (CEO500%, EXPERIENCE and % OF SHARES OWNED). In all other specifications introduced in this work TESTOSTERONE proxy maintains positive sign, but is not statistically significant.

The results are mixed for CEO500% proxy. In specifications (1) and (9) the coefficients are above zero, while in specifications (2), (10), (11) and (15) they are negative.

Negative coefficients consistently appear before proxies EXPERIENCE and % OF SHARES OWNED. EXPERIENCE has negative and statistically significant (at 5% and 10% level) coefficient in specifications (3), (4), (9), (10) and (12). EXPERIENCE proxy maintains the signs and significance when controlling for target and acquirer as well as deal characteristics, with introduction of industry fixed effects and year fixed effects. It is also significant when OPP is regressed in specifications (9) and (10) with all 4 proxies together. EXPERINCE maintains the sign but loses its significance in specification (15) when OPP is regresses on all 4 proxies and all control as well as when year and industry fixed effects are introduced.

Negative coefficient is also observable before overconfidence proxy of % OF SHARES OWNED. It gains 5% level significance in specifications (8), (9), (10) and (14) with t-statistics of -2.36, -2.25, -2.27 and -1.94 respectively. The significance level is maintained when controlling for deal and target as well acquirer characteristics as well as with year and industry fixed effects.

As for the control variable introduced, one should mention that skewness in statistically significant (5% and 10% level) in almost all specifications (except for (8) and (11)-(15)), though, the sign is a little inconsistent through the results obtained. One may notice that in all specifications but (9) and (10) there is a negative sign before the coefficient. The inconsistency in signs relates to SD of F-F Residuals (negative sign is observable in specifications (3), (4) and (7)-(15)), but the coefficients are not statistically significant.

Bearing in the overall empirical results, one should proceed to interpreting the results within the given framework as well as suggesting possible alternative explanation when results fall out of the predictions made in section 3.

Considering OPP the results are mostly contradictory to the hypothesis made: the higher the level of the overconfidence of bidder's CEO the higher would be OPP. The

underline hypothesis came from the assumption that overconfident CEO is willing to pay more for the target he/she set his/her mind to since he/she overestimates synergies that might be in place, the degree of positive changes that can be introduced, underestimates the target's executives and their business aptitudes etc. With this mindset the target still comes cheap.

Though, alternative explanation might be that overconfident CEOs might be tougher/better negotiators. According to dual concern model of Pruitt (1981) the outcome of negotiations is dependent upon the concern placed on achieving personal outcome as well as concern placed upon the other party achieving its outcome in a given negotiation. Within this theoretical framework, if concern for achieving personal outcome outweighs concern for the others' outcome, the negotiator will go for the "contending strategy", pressuring other parties involved in order his/hers demands to be satisfied. According to Lim (1997) overconfidence may not impair the performance and success of negotiator in all situations, but can come handy in some settings leading to beneficial outcome for the bargainer. Also in the setting of the experiment was shown that overconfident negotiator perform no worse than rational ones regardless of the complexity of their aspirations[7] and the level of overconfidence exhibited by the other party involved into the process. Therefore, there might be a reason to suggest that there is a possibility for the positive relation between OPP and CEOs overconfidence.

Continuing OPP discussion, one should bring up the fact that the consistent negative relation between OPP was noted for two proxies: EXPERIENCE and % OF SHARES OWNED. TESTOSTERONE proxy, on the other hand, had a positive coefficient in all settings. While TESTOSTERONE might capture the overconfidence due to young age and behavioral biases that are associated with higher than average level of aggression, strive for dominance and win in competitive situation regardless, so to say, of consequences; EXPERIENCE and % OF SHARES OWNED might capture besides overconfidence due to calibration biases and self-serving aptitudes also capture the de facto experience of negotiation[8]. If this is the case,

[7] The definition of "aspiration" is "the particular target level of benefit a negotiator strives to achieve at any given time" (Ma (2008), p. 4)

[8] Note that these double effect capturing should bear little implication for further discussion since negotiating the price of the deal is more frequent event setting than the M&A process itself thus enabling the CEO to distanciate him/herself from the calibration when negotiation the price of the deal. This does not, however, imply that the de-facto experience will be substantial for the CEO to overcome calibration biases deciding to pursue the M&A deal itself, since M&A, as a major investment decision, setting are in fact less frequent settings to come across in the lifetime of the CEO. Thus, by intuition, M&A appears as less repetitive event with lack of clear and straightforward feedback than negotiating the price of the deal.

then the relation between those proxies and OPP is up to a discussion since it is hard to predict which effect outweighs. If the overconfidence effect, than according to the logic introduced in Section 2, the sign should be positive. Though, if it is experience that dominates, then the relation should be negative. In numerous studies (e.g. Kelley (1966); Neale and Northcraft (1989)) was shown that negotiators who previously had experience negotiating in similar settings should be better off and are more likely to achieve an desirable outcome. Phelps and Shanteau (1978) argued that experience is beneficial for the negotiation and can improve judgment and, therefore, the outcome of negotiations significantly.

Coefficients of EXPERIENCE and TESTOSTERONE are highly economically significant. A one standard deviation change in EXPERIENCE decreases OPP by 88%[9]. A one standard deviation change in TESTOSTERONE increases OPP by 153%. The effect of % OF SHARES OWNED is significantly smaller and equals decrease in OPP by 6.03% in case of one standard deviation in the variable.

### *5.2. Acquirer Cumulative Abnormal Returns*

In section 3 the following hypothesis has been established: announcement returns of the bidder are lower in the cross industry acquisition if the manager is considered to be overconfident or exhibits risk taking aptitudes. Therefore, negative relation between Acquirer Cumulative Abnormal Returns (ACAR) and proxies is assumed.

In support of the hypothesis the negative relation between proxies and depended variable (ACAR) is observed. CEO500% is negatively (only in specifications (10) and (11) positive sign is observable) related to ACAR. Though, the variable is not statistically significant in any of the specification from (1) to (15) with t-statistics below 1.

EXPERIENCE is negatively related to ACAR with no variations in signs whatsoever. EXPERIENCE gains statistical significance if the control for industry fixed effects or both

9 Calculated for the single setting models the following way: explanatory variable coefficient multiplied by its standard deviation (from the sample) and divided by mean of the dependent variable.

industry and year fixed effects are introduced. In these cases statistical significance reaches the level of 1% (t-statistics is above 3 in specifications (4), (10), (12) and (15).

TESTOSTERONE is consistently in line with the underline hypothesis related towards ACAR. The proxy is statistically significant in specification (5) at 10% level with t-statistics of -1.79. Though, when additional controls are introduced (acquirer/target and deal characteristics as well as year and industry fixed effects) the t-statistics of the underline coefficient drops to below 1 values.

Similar situation is persistent with the next proxy - % OF SHARES OWNED. The coefficient is steadily negative through specification where variable is included, but it is significant at 10% level (with t-statistics of -1.94) in specification (7) where only controls for target riskiness is introduced. When additional controls are added the coefficient keeps the negative sign, but t-statistics drops below 1.

As for the controls for the target riskiness - Skewness of Returns and SD of F-F Residuals – the results are mixed. Signs are both positive and negative. Though, negative relation is observed mostly in specification without controls for deal characteristics as well as well as year fixed effects. In specifications where the relation is statistically significant (for Skewness of Returns specifications (7), (8) and (14); and for SD of F-F Residuals specifications (7), (8), (11) and (14)) the relation is persistently negative.

As for the ACAR and the proxies of overconfidence, the results are steadily in line with underline hypothesis. This means that the higher the level of overconfidence exhibited by the CEO the lower would be bidder's cumulative abnormal returns. The economic effect that one standard deviation in explanatory variable brings to ACAR is still substantial. The greatest impact is on average due to increase in managerial ownership stake: I standard deviation change in % of SHARES OWNED decreases ACAR by almost 0.12% that relative to the mean of the dependent variable mean constitutes 46% of ACAR. As for the EXPERIENCE – 1 standard deviation change in the underline variable decreases ACAR by 0.09% that relative to the mean of ACAR equals 3% drop. Furthermore, 1 standard deviation change in TESTOSTERONE variable forces the drop in ACAR of 0.13% that is 4% decrease if to take it relative to ACAR's median.

### *5.3. Target Cumulative Abnormal Returns*

In section 3 the following hypothesis has been established: announcement returns of the target are higher in the cross industry acquisition if the manager is considered to be overconfident or exhibits risk taking aptitudes. Therefore, positive relation between Target Cumulative Abnormal Returns (TCAR) and proxies is assumed.

In contrast to the hypothesis in single proxy settings regressions ((1)-(8) and (11)-(13)) one can find that all proxies maintain negative sign. CEO500%, as mentioned before maintains negative sign, though the coefficient is not statistically significant. Though, in specifications (9), (10) and (15), where TCAR is regressed on all 4 overconfidence proxies, CEO500% appears to have positive coefficient (in line with the hypothesis) with t-statistics above 1, but less than 1.64 that precludes us from stating its significance.

In contrast to the hypothesis EXPERIENCE proxy has consistent negative sign in all specifications and gains statistical significance (5% level) in single setting model with acquirer/target and deal characteristics controls introduced as well as firm industry and years fixed effects (t-statistics equals -2.17).

The signs of TESTOSTERONE proxy, on the other hand, are more in line with what stated in the H3 and are positive through all settings, except for specification (5) where one controls only for the targets riskiness. In all settings, though, the coefficients appear to be insignificant.

The coefficients of the % OF SHARES OWNED appear to be of the negative sign in single setting specification models (7) and (8) and are statistically significant at 10 % and 5% level (t-statistics -1.71 and -2.25) respectively. In settings (9), (10) and (15) where all 4 proxies included the sign is positive as expected in the hypothesis. Though, the coefficients appear to be statistically insignificant.

Skewness of Returns and SD of F-F Residuals are of mixed signs and there is hardly a pattern to bring up to the attention. Though when the coefficients in front of the controls of targets riskiness are significant (e.g. specifications (7) or (8)) they are of the negative signs.

Considering the OPP discussion above, the results for TCAR regression are now less “unexpected”. As in OPP case EXPERIECE and % of SHARES OWNED are associated with lower TCAR that is different form the underline hypothesis H3. TESTOSTERONE proxy on the other hand is positively related to TCAR. As for the economic significance, 1 standard deviation change in EXPERIENCE, TESTOSTERONE or % OF SHARES OWNED will induce change in TCAR by 0.56, 0.09 and 0.07 respectively. This constitutes relative to the mean of the underlying dependent variable a change of 19%, 2% and 28% respectively.

### *5.4. Cross-Industry M&A Probability*

In section 3 the following hypothesis has been established: cross-industry acquisitions are more likely to appear if manager is overconfident. Therefore, positive relation between Cross-Industry M&A probability (CIP) and proxies is assumed.

In line with the hypothesis EXPERIENCE and TESTOSTERONE exhibit consistent positive coefficients, while CEO500% and % OF SHARES OWNED have mixed signs in coefficients.

CEO500% as noted earlier exhibits little consistency in sign. Only in specification (9) does it have positive sign, while in settings (1), (2), (10), (11) and (15) it is negative in contrast to what was hypostasized in part 3. The coefficients appear to be statistically insignificant with t-statistics relatively far below 1.64.

EXPERIEMCE and TESTOSTERONE appear to bear positive signs in line with made predictions. Furthermore, in all specifications where either one or both of the proxies are present (single-setting model or all proxies included settings) the coefficients appear to be significant. EXPERIENCE is significant even at 1% level in specification (4) with t-statistics of 3.69. TESTOSTERONE maintains significance level of 10% to 5%.

Similar to the CEO500% proxy, % OF SHARES OWNED has mixed signs. Though, there is a clear pattern to that. In single-setting model, the coefficient bears positive sign, though exhibits no statistical significance whatsoever. Though, when the specification includes 3 other overconfidence proxies, the sing appears to be negative still with no statistical significance to note.

Controls for target's riskiness (SD of F-F Residuals and Skewness of Returns) appear to have more or less consistent positive sign. In addition to that in specifications (1), (6), (7) and (13) those are statistically significant sat 10% level.

## *6. Conclusions*

The paper was devoted to the analysis of managerial overconfidence and risk taking behavior and cross-industry M&A. Overconfidence as it is does not necessarily predicts more acquisitions – this very much is a function of how CEO perceives the valuation of their company (over or undervalued) as well as their estimate of the future synergies and thus returns from the deal, but it does seem to associate with lower quality of M&A.

The overconfidence has been measured in 4 separate ways. First one was related to stock option exercise: if the value CEO stock options that are at the money exceeded the previous year total compensation by the number of 5, the corresponding CEO as overconfident. Second proxy was the ratio of years the CEO spent in the company (regardless of the position) to the age in the year of the deal announcement. Third proxy was related to usual gender and age approaches, and proxied testosterone level in man by age groups. And finally the % of company shares owned by the CEO was assumed to be a proxy for the overconfidence.

The results of the paper, though, somewhere inconclusive are consistent with the previous research done and poofs that overconfidence is value destroying for a bidder. In line with the Malmendier and Tate (2008) study it was found that CEO's overconfidence is associated with a higher probability of cross-industry acquisition. In turn, cross-industry M&A activity on average bring acquirer lower returns. Consistent with Stulz and Spalt (2011) the aptitude for risk taking (acquiring riskier targets) has substantial effect both offer price premium as well as destroys value for the bidder's shareholders. The control variables results are mostly consistent with those presented in other studies like Baker, Pan and Wurgler (2009). The paper shows evidence that offer price premia is higher in tender offers and in deals with multiple bidders. On the other hand, it also opens the door to discussion if overconfidence can be beneficial for the acquirer shareholders in terms of "tougher negotiator".

The question though remains what other effects are in place that drive pursuit of cross-industry M&A. The explanatory power of the models presented here are at best 30%. Therefore, it is valid to say that there are additional factors that encourage/force companies to go for the risky transactions.

There are some alternative hypotheses, besides overconfidence to consider for the further research and their interaction with overconfidence hypothesis. There is hard-to-value hypothesis, according to which sometimes targets value is hard to access and the same concerns the promising synergies – the holy grail of M&A. This leads to higher offer price premia and lower returns for bidders – market possessing little information about the accuracy of the prediction tends to average  both peaches and pears deals. Another alternative explanation that deviates from overconfidence hypothesis lies also in the valuation area: real-option hypothesis. According to it targets that have higher upside potential are rationally valued higher thus increasing offer price premiums and on average decreasing bidders returns. In addition to that there is a well know and discussed above managerial entrenchment hypothesis that says that pursuing their own benefits of pay and recognition etc. mangers may involve their firms to go for riskier and value destroying investments.

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## *Definition of constructs*

| VARIABLE NAME | Explanation | SOURCE |
|---|---|---|
| ACAR | Cumulative abnormal returns of the acquirer calculated for a [-1;1] window using market model with [-31;280] estimation window. | SDC |
| TCAR | Cumulative abnormal returns of the target calculated for a [-1;1] window using market model with [-31;280] estimation window | SDC |
| SKEWNESS OF RETURNS | Past skewness and volatility of the target returns were estimated for the [-30; -760] period. | SDC, F-F website |
| SD OF OF RETURNS | Standard deviation of the Fama-French 3 factor model residuals estimated for the [-30; -760] period. | SDC, F-F website |
| SD OF F-F RESIDUALS | Idiosyncratic volatility of the Fama-French 3 factor model residuals estimated for the [-30; -760] period. | SDC, F-F website |
| OFFER PRICE PREMIUM | Price paid for the target less market value of the target 30 days prior to the announcement divided by the market value of the target 30 days prior to the announcement | SDC |
| DEAL VALUE | Transaction value of the takeover (including assumed liabilities). | SDC |
| % OWNED BEFORE ACQUISIIOTN | Percentage of share owned before the announcement | SDC |
| % AFTER ACQUIRED | Equity percentage acquired through transaction and percentage owned prior the acquisition | SDC |
| % ACQUIRED | Equity percentage acquired through acquisition | SDC |
| BOROWING | Dummy variable, 1 if transaction was finance through debt financing | SDC |
| EQUITY | Dummy variable, 1 if transaction was finance through equity financing | SDC |
| CASH | Dummy variable, 1 if transaction was finance through casg financing | SDC |
| TENDER | Dummy variable, 1 if tender took place | SDC |
| NUMBER OF BIDDERS | Number of bidders for each transaction | SDC |
| DEFENSE | Dummy variable, 1 if defense tactics (e.g. white knight) were employed took place | SDC |
| CASH | Cash or cash equivalents. Source: compustat | Compustat |
| EBITDA | Earnings before interest, taxes, depreciation and amortization taken 1 fiscal year prior to the announcement | Compustat |
| R&D | Research and development expenses taken 1 fiscal year prior to the announcement | Compustat |
| BV | Total shareholder equity plus deferred taxes and investment tax credit minus redemption value of preferred stock | Compustat |

| | | |
|---|---|---|
| ROA | Net income over total assets | Compustat |
| ROE | Net income over shareholders equity free of redemption value of preferred stock | Compustat |
| TOBIN'S Q | Sum of acquirer market value of equity and book value of debt divided over sum of book value of equity and book value of debt. | SDC, Compustat |
| SALARY | Executive salary as stated in sec fillings | ExecComp |
| BONUS | Executive bonus as stated in sec fillings | ExecComp |
| TOTAL SALARY | Total compensation equals sum of salary, bonus, other annual, restricted stock grants and LTI | ExecComp |
| SALARY % CHAG. (Y-O-Y) | Salary percent change year-to-year (%) | ExecComp |
| % OF SHARES OWNED | Percentage of total shares owned as reported in sec fillings | ExecComp |
| AGE | Age of the executive in the fiscal year of the announcement | ExecComp |
| TESTOSTERONE LEVEL | Testosterone level of male executives proxied by age group following Vermeulen (1996). | ExecComp, Vermeulen (1996). |
| CEO100% | Dummy variable, 1 if ratio of current value of the in-the-money unexercised stock options to the previous year total CEO compensation as reported in sec filings and multiplied by 100 exceeds 100% | ExecComp |
| CEO200% | Dummy variable, 1 if ratio of current value of the in-the-money unexercised stock options to the previous year total CEO compensation as reported in sec filings and multiplied by 100 exceeds 200% | ExecComp |
| CEO300% | Dummy variable, 1 if ratio of current value of the in-the-money unexercised stock options to the previous year total CEO compensation as reported in sec filings and multiplied by 100 exceeds 300% | ExecComp |
| CEO400% | Dummy variable, 1 if ratio of current value of the in-the-money unexercised stock options to the previous year total CEO compensation as reported in sec filings and multiplied by 100 exceeds 400% | ExecComp |
| CEO500% | Dummy variable, 1 if ratio of current value of the in-the-money unexercised stock options to the previous year total CEO compensation as reported in sec filings and multiplied by 100 exceeds 500% | ExecComp |
| EXPERIENCE | Number of years in the bidder's company prior to the announcement divided by the age in the year of the announcement | ExecComp |

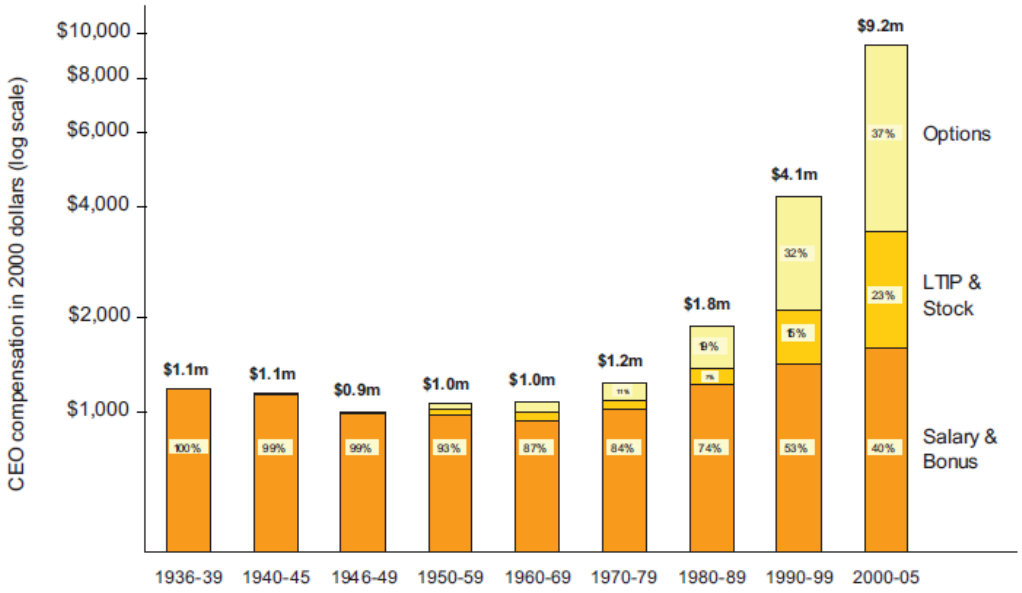



Figure 1: Evolution of CEO Compensation. Median CEO compensation at 50 largest US firms.
Source: Frydman and Jenter (2009)

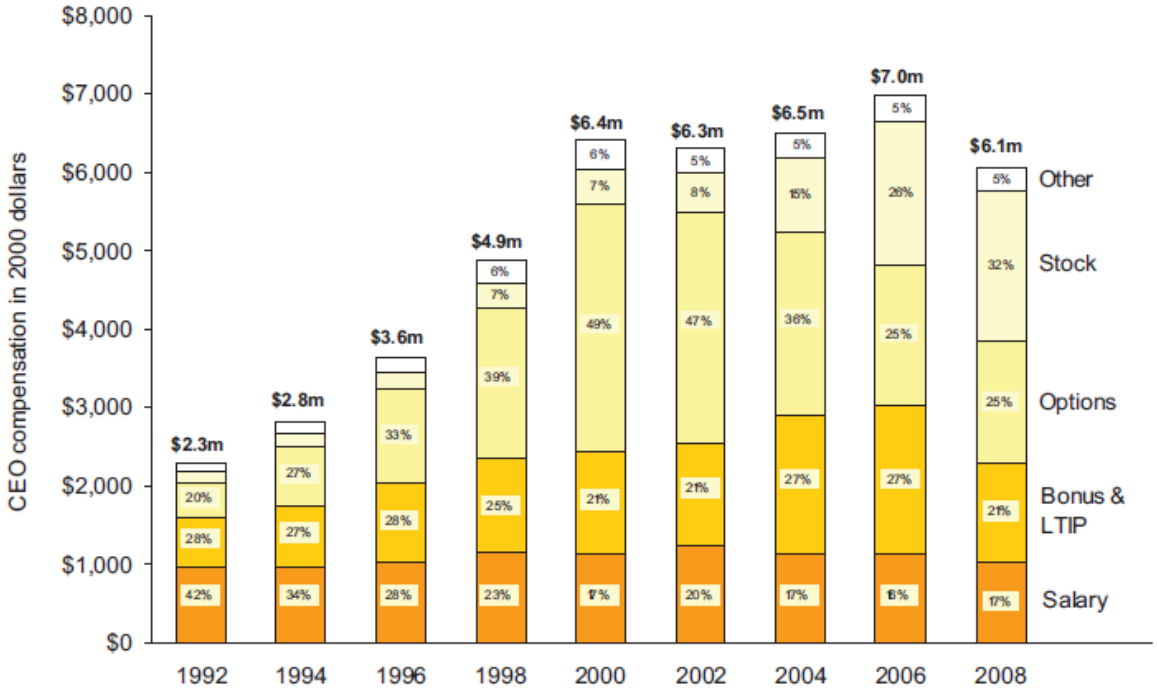



Figure 2: Median CEO Pay in S&P500 Firms.
Percentages calculated by using averages per each category.
Source: Frydman and Jenter (2009)

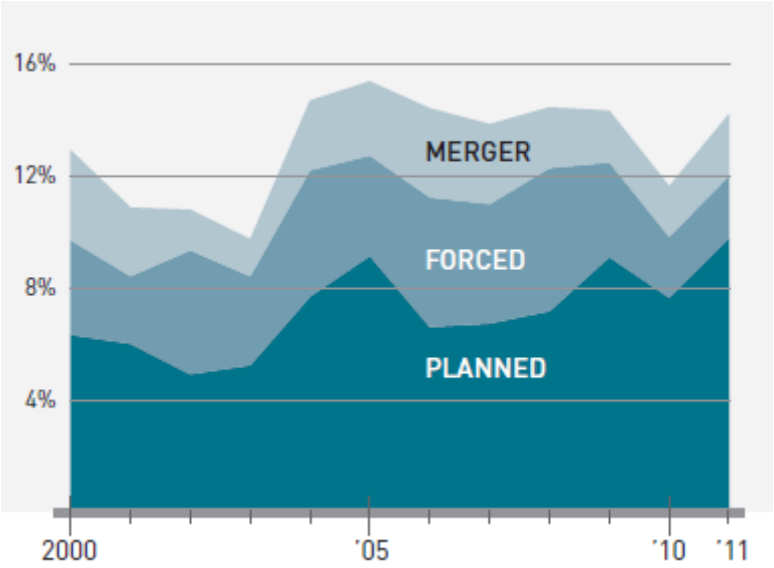



Figure 2: Global CEO Turnover, 2000–11 sample
Source: Booz & Company analysis

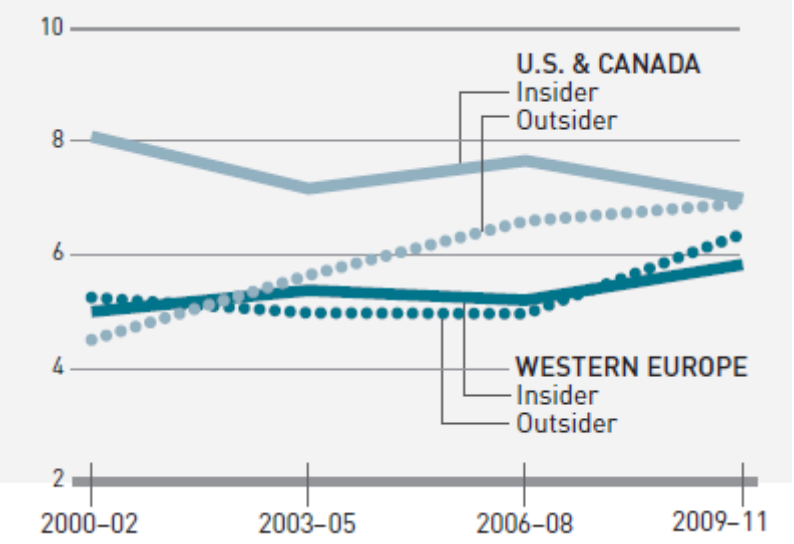



Figure 3: Median Tenure of Outgoing CEO by Region, Insider vs. Outsider
Source: Booz & Company analysis

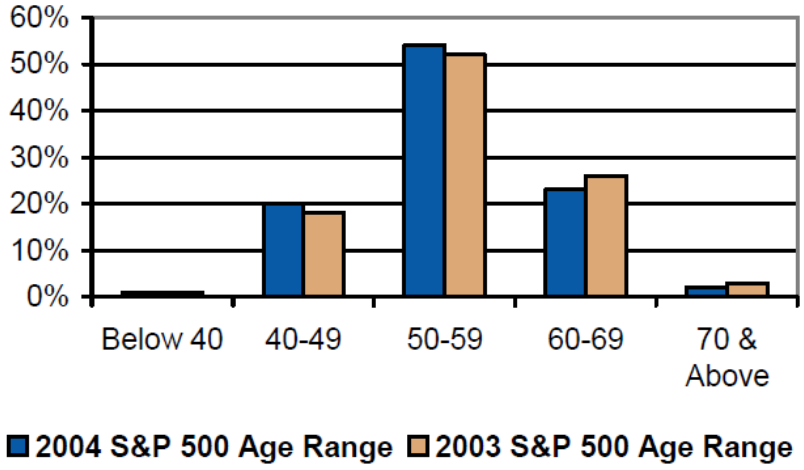



Figure 4: Age ranges
Source: Spencer Stuart (2005)

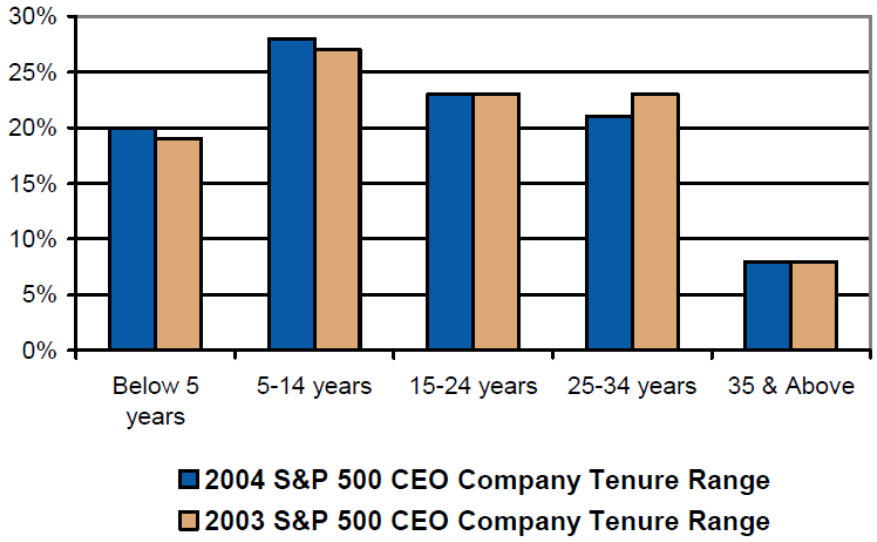



Figure 5: CEO Company Tenure Ranges
Source: Spencer Stuart (2005)

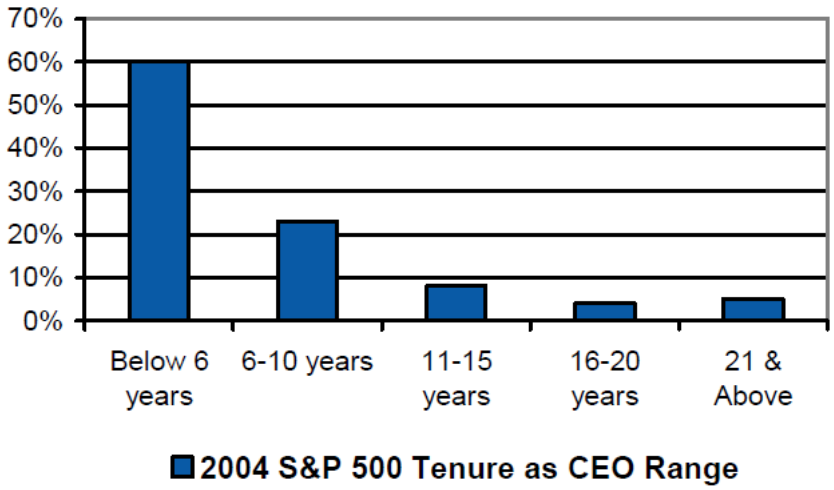


Figure 6: Tenure as CEO Ranges
Source: Spencer Stuart (2005)

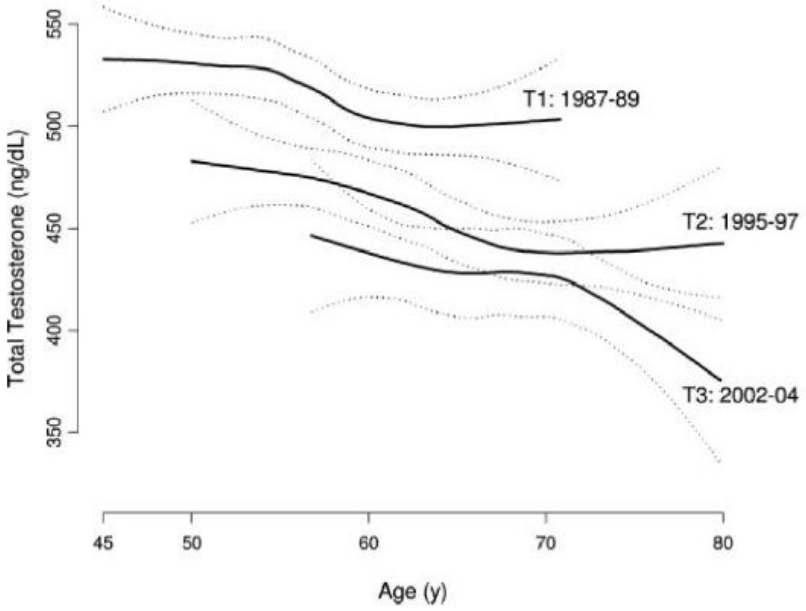



Figure 7: Secular Decline in Total Testosterone.

**Source:** Thomas G. Travison, Andre B. Araujo, Amy B. O'Donnell, Varant Kupelain and John. B. McKinlay, "A Population-Level Decline in Serum Testosterone Levels in American Men", *The Journal of Clinical Endocrinology and Metabolism*, Vol. 92, No. 1, 2007, pp. 196 – 202.

Table I
Average Testosterone Levels by Age in Men

| Age | # of Subjects | Total Test | SD | Free test | Sd | SHBG | SD |
|---|---|---|---|---|---|---|---|
| 25-34 | 45.00 | 21.38 | 5.9 | 0.43 | 0.10 | 35.5 | 8.80 |
| 35-44 | 22.00 | 23.14 | 7.36 | 0.36 | 0.04 | 40.1 | 7.90 |
| 45-54 | 23.00 | 21.02 | 7.37 | 0.31 | 0.08 | 44.6 | 8.20 |
| 55-64 | 43.00 | 19.49 | 6.75 | 0.29 | 0.07 | 45.5 | 8.80 |
| 65-74 | 47.00 | 18.15 | 6.83 | 0.24 | 0.08 | 48.7 | 14.20 |
| 75-84 | 48.00 | 16.32 | 5.85 | 0.21 | 0.08 | 51 | 22.70 |
| 85-100 | 21.00 | 13.05 | 4.63 | 0.19 | 0.08 | 65.9 | 22.80 |

Measurements in SI Units (nmol/L)
Source: Vermeulen, A. (1996). *Declining Androgens with Age: An Overview*. In Vermeulen, A. & Oddens, & B. J. (Eds.), Androgens and the Aging Male (pp. 3-14). New York: Parthenon Publishing.

Table II
Summary Statistics: Cross-Industry Sample

**Deal Characteristic**

| Variable Name | Mean | Median | SD | Min | Max |
|---|---|---|---|---|---|
| ACAR | 0.024 | 0.014 | 0.057 | -0.116 | 0.136 |
| TCAR | 0.004 | 0.035 | 0.009 | -0.054 | 0.063 |
| Skewness of Returns | -0.25 | -0.16 | 0.34 | -1.30 | 0.39 |
| SD of of Returns | 0.01 | 0.01 | 0.00 | 0.01 | 0.02 |
| SD of F-F REsiduals | 0.01 | 0.01 | 0.00 | 0.01 | 0.02 |
| Offer Price Premium | 0.93 | 0.44 | 4.99 | -0.96 | 101.36 |
| Deal Value | 895.26 | 90 | 4819.91 | 1 | 164747 |
| % Owned Before Acq. | 98.95 | 100 | 5.86 | 51 | 100 |
| % after Acquired | 96.39 | 100 | 13.65 | 3 | 100 |
| % Acquired | 96.37 | 100 | 13.82 | 3 | 100 |
| Borowing | 0.09 | 0 | 0.29 | 0 | 1 |
| Equity | 0.02 | 0 | 0.13 | 0 | 1 |
| Cash | 0.10 | 0 | 0.30 | 0 | 1 |
| Tender | 0.10 | 0 | 0.29 | 0 | 1 |
| Number of Bidders | 1.03 | 1 | 0.17 | 1 | 4 |
| Defense | 0.04 | 0 | 0.19 | 0 | 1 |

**BS and IS Data**

**ACQUIRER**

| Variable Name | Mean | Median | SD | Min | Max |
|---|---|---|---|---|---|
| Cash | 298.98 | 31.05 | 1409.98 | 0.01 | 21406.00 |
| EBITDA | 640.96 | 75.47 | 3144.82 | -346.18 | 69687.00 |
| R&D | 104.67 | 10.38 | 455.97 | 0.00 | 5720.00 |
| BV | 1427.46 | 270.09 | 7303.02 | -5201.13 | 191014.00 |
| ROA | 0.00 | 0.04 | 0.28 | -6.68 | 0.34 |
| ROE | 0.07 | 0.10 | 1.46 | -7.63 | 41.72 |
| MV/BV | 2.8 | 2.07 | 7.19 | -126.58 | 91.12 |
| EBITDA/BV | 0.22 | 0.24 | 0.71 | -9.18 | 6.26 |
| R&D/BV | 0.09 | 0.05 | 0.21 | -2.95 | 1.42 |
| Cash/BV | 0.17 | 0.11 | 0.52 | -12.66 | 3.49 |
| OCF/BV | 0.11 | 0.12 | 1.49 | -16.91 | 36.5 |

**TARGET**

| Variable Name | Mean | Median | SD | Min | Max |
|---|---|---|---|---|---|
| Cash | 95.34 | 25.46 | 283.03 | 0.01 | 4265.00 |
| EBITDA | 177.55 | 42.10 | 571.72 | -1353.10 | 6821.40 |
| R&D | 35.33 | 14.92 | 71.68 | 0.21 | 668.00 |
| BV | 562.91 | 159.60 | 1978.85 | -420.30 | 32485.00 |
| ROA | -0.02 | 0.03 | 0.29 | -3.13 | 3.06 |
| ROE | 0.21 | 0.08 | 5.00 | -22.74 | 108.39 |
| MV/BV | 3.5 | 2.27 | 11.04 | -69.06 | 248.16 |
| EBITDA/BV | 0.29 | 0.22 | 3.17 | -20.25 | 75.61 |
| R&D/BV | 0.09 | 0.08 | 2.44 | -45.45 | 14.59 |
| Cash/BV | 0.22 | 0.15 | 1.05 | -20.87 | 12.65 |
| OCF/BV | 0.12 | 0.14 | 0.42 | -3.31 | 1.7 |

Table II (Continued)
Summary Statistics: Cross-Industry Sample

**Executive Data**

**ACQUIRER**

| Variable Name | Mean | Median | SD | Min | Max |
|---|---|---|---|---|---|
| Salary | 615.49 | 543.39 | 453.86 | 0.00 | 8100.00 |
| Bonus | 744.51 | 439.94 | 1012.26 | 0.50 | 8608.81 |
| Total Salary | 1149.91 | 837.96 | 1123.33 | 0.00 | 9533.81 |
| Salary % Change (y-o-y) | 36.05 | 7.97 | 192.86 | -98.56 | 2849.64 |
| % of shares owned | 3.98 | 2.10 | 5.61 | 0.16 | 25.65 |
| Age | 54.59 | 54.50 | 7.10 | 36.00 | 84.00 |
| Testosterone level | 0.26 | 0.31 | 0.06 | 0.19 | 0.36 |
| Experience | 0.33 | 0.32 | 0.19 | 0.02 | 0.71 |

**TARGET**

| Variable Name | Mean | Median | SD | Min | Max |
|---|---|---|---|---|---|
| Salary | 713.15 | 637.50 | 357.08 | 130.00 | 1500.00 |
| Bonus | 860.52 | 214.00 | 1584.81 | 16.99 | 6037.03 |
| Total Salary | 1029.62 | 750.00 | 1256.23 | 0.00 | 7347.03 |
| Salary % Change (y-o-y) | -3.11 | 0.00 | 33.27 | -78.60 | 71.01 |
| % of shares owned | 9.77 | 2.25 | 20.30 | 0.66 | 59.71 |
| Age | 54.68 | 55.00 | 6.92 | 37.00 | 76.00 |
| Testosterone level | 0.263 | 0.261 | 0.059 | 0.186 | 0.356 |

Table III
Summary Statistics: Within-Industry Sample

**Deal Characteristic**

| Variable Name | Mean | Median | SD | Min | Max |
|---|---|---|---|---|---|
| ACAR | -0.007 | -0.004 | 0.009 | -0.080 | 0.136% |
| TCAR | -0.034 | -0.035 | 0.010 | -0.084 | 0.081 |
| Skewness of Returns | -0.288 | -0.271 | 0.364 | -1.413 | 0.392 |
| SD of of Returns | 0.01 | 0.01 | 0.00 | 0.01 | 0.02 |
| SD of F-F REsiduals | 0.01 | 0.01 | 0.00 | 0.01 | 0.02 |
| Offer Price Premium | 0.71 | 0.47 | 1.21 | -0.91 | 20.15 |
| Deal Value | 1058.98 | 108 | 4487.69 | 1 | 89168 |
| | | | | | |
| % Owned Before Acquisiiotn | 97.46 | 100 | 12.14 | 5 | 100 |
| % after Acquired | 99.55 | 100 | 3.73 | 51 | 100 |
| % Acquired | 97.40 | 100 | 12.38 | 5 | 100 |
| Borowing | 0.08 | 0 | 0.27 | 0 | 1 |
| Equity | 0.02 | 0 | 0.14 | 0 | 1 |
| Cash | 0.09 | 0 | 0.28 | 0 | 1 |
| Tender | 0.08 | 0 | 0.26 | 0 | 1 |
| Number of Bidders | 1.03 | 1 | 0.22 | 1 | 5 |
| Defense | 0.07515 | 0 | 0.2636748 | 0 | 1 |

**BS and IS Data**

**ACQUIRER**

| Variable Name | Mean | Median | SD | Min | Max |
|---|---|---|---|---|---|
| Cash | 258.79 | 37.09 | 1215.53 | 0.00 | 36999.00 |
| EBITDA | 460.76 | 82.72 | 1796.20 | -2671.00 | 34320.00 |
| R&D | 102.98 | 15.76 | 497.58 | 0.00 | 9112.00 |
| BV | 1584.74 | 282.35 | 5837.41 | -2994.30 | 101742.00 |
| ROA | 0.00 | 0.03 | 0.19 | -2.65 | 0.43 |
| ROE | 0.02 | 0.10 | 1.83 | -16.94 | 61.23 |
| MV/BV | 4.14 | 2.09 | 41.08 | -143.42 | 145.39 |
| EBITDA/BV | 0.18 | 0.24 | 1.34 | -37.07 | 9.42 |
| R&D/BV | 0.29 | 0.08 | 3.20 | -5.58 | 86.06 |
| Cash/BV | 0.31 | 0.12 | 4.50 | -24.71 | 158.96 |

**TARGET**

| Variable Name | Mean | Median | SD | Min | Max |
|---|---|---|---|---|---|
| Cash | 223.98 | 27.79 | 1112.26 | 0.00 | 17089.00 |
| EBITDA | 280.00 | 45.63 | 999.03 | -2606.61 | 14400.00 |
| R&D | 69.82 | 20.06 | 268.96 | 0.07 | 3529.00 |
| BV | 686.47 | 171.62 | 1872.65 | -1134.00 | 22331.00 |
| ROA | -0.04 | 0.02 | 0.32 | -7.58 | 0.42 |
| ROE | -0.06 | 0.09 | 1.11 | -15.68 | 10.86 |
| MV/BV | 4.72 | 2.33 | 32.59 | -143.42 | 157.39 |
| EBITDA/BV | 0.34 | 0.23 | 4.97 | -21.23 | 135.32 |
| R&D/BV | 0.14 | 0.12 | 1.28 | -25.06 | 10.13 |
| Cash/BV | 0.1808428 | 0.1164288 | 1.476056 | -35.78423 | 13.07801 |

Table III (Continued)
Summary Statistics: Within-Industry Sample

**Executive Data**

**ACQUIRER**

| Variable Name | Mean | Median | SD | Min | Max |
|---|---|---|---|---|---|
| Salary | 585.06 | 527.22 | 298.15 | 6.54 | 2851.50 |
| Bonus | 685.40 | 400.00 | 1005.51 | 0.20 | 11475.03 |
| Total Salary | 1076.50 | 812.38 | 1047.09 | 6.54 | 12475.03 |
| Salary % Change (y-o-y) | 20.11 | 9.75 | 78.21 | -93.61 | 1524.99 |
| % of shares owned | 3.83 | 1.91 | 6.34 | 0.04 | 51.90 |
| Age | 53.68 | 54.00 | 7.38 | 33.00 | 94.00 |
| Testosterone level | 0.27 | 0.31 | 0.06 | 0.19 | 0.43 |

**TARGET**

| Variable Name | Mean | Median | SD | Min | Max |
|---|---|---|---|---|---|
| Salary | 657.82 | 647.83 | 315.30 | 0.00 | 1600.00 |
| Bonus | 908.02 | 575.18 | 1133.13 | 23.60 | 6000.00 |
| Total Salary | 1267.00 | 842.57 | 1180.26 | 0.00 | 6992.20 |
| Salary % Change (y-o-y) | 36.94 | 7.86 | 135.66 | -68.26 | 893.07 |
| % of shares owned | 5.31 | 1.07 | 10.08 | 0.04 | 31.50 |
| Age | 55.71 | 56.00 | 6.44 | 35.00 | 70.00 |
| Testosterone level | 0.250 | 0.207 | 0.057 | 0.186 | 0.356 |

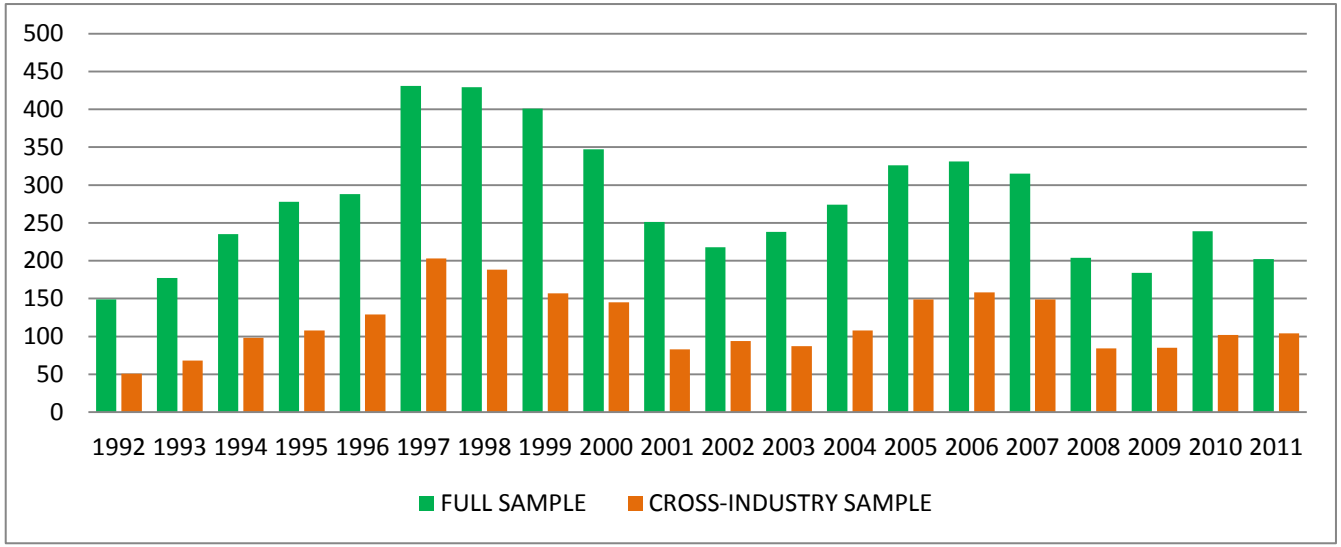



Figure 8: M&A Frequency

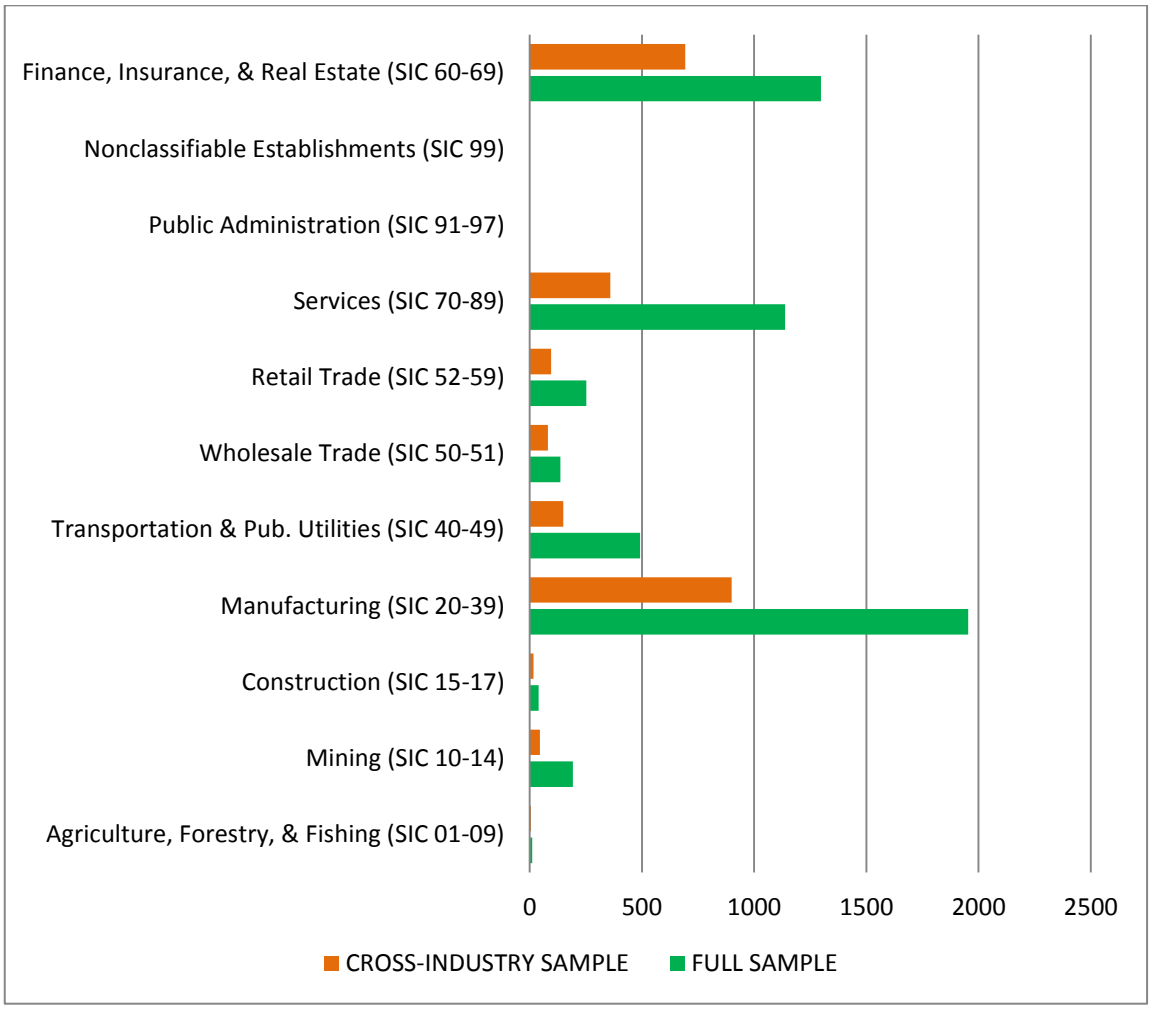



Figure 9: Number of M&A Deals by Sector Groups

Table IV
Offer Price Premium

The Table presents results of OLS regressions where the dependent variable is Offer Price Premia (OPP). OPP is defined as price paid for the target less market value of the target 30 days prior to the announcement divided by the market value of the target 30 days prior to the announcement. Main explanatory variables are CEO500% (dummy variable, 1 if ratio of current value of the in-the-money unexercised stock options to the previous year total CEO compensation as reported in sec filings and multiplied by 100 exceeds 500%), EXPERIECNE (number of years in the bidder's company prior to the announcement divided by the age in the year of the announcement), TESTOSTERONE (Testosterone level of male executives proxied by age group following Vermeulen (1996)) and % OF SHARES OWNED (percentage of total shares owned as reported in sec filings). For the details on how the additional control variables are constructed see Appendix "Definition of constructs". T-statistics is reported in brackets beneath the respective coefficient.

| Dependent VAR: | Offer Price Premium | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Constanta | -51.77 | 2.70 | 23.27 | 26.83 | 15.79 | 10.77 | -10.39 | -8.76 | -12.15 | -13.91 |
| | (-1.29) | (0.07) | (0.18) | (0.19) | (0.20) | (0.79) | (-0.59) | (-0.29) | (-1.94) | (-1.99) |
| CEO500% | 0.42 | -0.23 | | | | | | | 0.38 | -0.27 |
| | (0.01) | (-0.67) | | | | | | | (-0.03) | (-0.71) |
| EXPERIENCE | | | -13.11 | -11.47 | | | | | -1.99 | -8.39 |
| | | | (-2.02) | (-1.78) | | | | | (-1.69) | (-1.64) |
| TESTOSTERONE | | | | | 23.72 | 31.87 | | | 1.16 | 8.73 |
| | | | | | (-1.06) | (-1.67) | | | (1.27) | (1.96) |
| % Of SHARES OWNED | | | | | | | -0.01 | -0.01 | -0.49 | -0.59 |
| | | | | | | | (-1.50) | (-2.36) | (-2.25) | (-2.47) |
| Skewness Of Returns | -65.39 | -70.28 | -19.54 | -21.94 | -65.16 | -66.98 | 80.61 | 11.72 | -17.09 | -21.41 |
| | (-1.82) | (-1.85) | (-2.34) | (-2.25) | (-1.79) | (-1.73) | (1.63) | (0.97) | (-1.96) | (-1.63) |
| SD Of F-F Residuals | 96.61 | 96.06 | -31.03 | -74.96 | 48.61 | 46.06 | -51.19 | -58.78 | -1.72 | -2.91 |
| | (0.33) | (0.32) | (-0.33) | (-0.62) | (0.14) | (0.13) | (-0.54) | (-0.36) | (-1.24) | (-1.96) |
| Acquirer Tobin's Q | | -4.26 | | -70.68 | | -16.19 | | 41.67 | | 6.97 |
| | | (-0.30) | | (-0.80) | | (-0.87) | | (-0.64) | | (0.33) |
| Acquirer R&D Ratio | | -63.07 | | -2.87 | | 46.77 | | -14.37 | | -8.12 |
| | | (-0.22) | | (-0.04) | | (0.13) | | (-0.06) | | (-0.27) |
| Acquirer Cash Ratio | | -30.36 | | -93.79 | | -50.52 | | -18.04 | | 45.75 |
| | | (-0.28) | | (-1.04) | | (-0.36) | | (0.06) | | (0.58) |
| Acquirer OCF Ratio | | 47.16 | | 42.39 | | 41.41 | | 60.18 | | 26.43 |
| | | (0.43) | | (0.39) | | (0.24) | | (0.41) | | (0.24) |
| Acquirer ROA | | 34.84 | | 41.15 | | -19.72 | | -86.12 | | 8.17 |
| | | (2.71) | | (1.15) | | (1.52) | | (0.07) | | (0.46) |
| Target Tobin's Q | | 5.34 | | -7.53 | | 47.21 | | 57.60 | | 14.63 |
| | | (0.05) | | (-0.52) | | (0.30) | | (0.70) | | (0.56) |
| Target ROA | | 3.36 | | -2.00 | | 89.64 | | 54.02 | | 6.32 |
| | | (1.35) | | (1.54) | | (0.02) | | (0.98) | | (0.85) |
| Year Fixed Effects | No | No | No | No | No | No | No | No | No | No |
| Industry Fixed Effects | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Adjusted R2 | 9.89% | 6.63% | 22.61% | 24.53% | 13.98% | 14.50% | 22.00% | 33.81% | 18.37% | 19.74% |
| Number Of Observations | 2346 | 2339 | 2350 | 2350 | 2314 | 2314 | 2217 | 2217 | 2217 | 2217 |

Table IV (Continued)
Offer Price Premium

The Table presents results of OLS regressions where the dependent variable is Offer Price Premia (OPP). OPP is defined as price paid for the target less market value of the target 30 days prior to the announcement divided by the market value of the target 30 days prior to the announcement. Main explanatory variables are CEO500% (dummy variable, 1 if ratio of current value of the in-the-money unexercised stock options to the previous year total CEO compensation as reported in sec filings and multiplied by 100 exceeds 500%), EXPERIECNE (number of years in the bidder's company prior to the announcement divided by the age in the year of the announcement), TESTOSTERONE (Testosterone level of male executives proxied by age group following Vermeulen (1996)) and % OF SHARES OWNED (percentage of total shares owned as reported in sec filings). For the details on how the additional control variables are constructed see Appendix "Definition of constructs". T-statistics is reported in brackets beneath the respective coefficient.

| Dependent VAR: | Offer Price Premium | | | | |
|---|---|---|---|---|---|
| | (11) | (12) | (13) | (14) | (15) |
| Constanta | 35.43 | 52.57 | 39.03 | 19.87 | 16.60 |
| | (8.71) | (5.53) | (7.36) | (0.68) | (0.81) |
| CEO500% | -0.81 | | | | -0.85 |
| | (-0.51) | | | | (-0.55) |
| EXPERIENCE | | -12.11 | | | -16.79 |
| | | (-1.83) | | | (-1.11) |
| TESTOSTERONE | | | 13.48 | | 3.57 |
| | | | (1.13) | | (1.48) |
| % of SHARES OWNED | | | | -0.06 | -1.77 |
| | | | | (-1.94) | (-1.24) |
| Skewness Of Returns | -92.34 | -66.70 | -88.45 | -82.85 | -68.85 |
| | (-1.23) | (-1.00) | (-1.27) | (-1.34) | (-1.34) |
| SD Of F-F Residuals | -33.16 | -46.82 | -21.99 | -1.57 | -1.57 |
| | (-0.06) | (-0.01) | (-0.12) | (-0.27) | (-0.27) |
| Acquirer Tobin's Q | -3.97 | -92.77 | -10.35 | -9.24 | -9.24 |
| | (-0.28) | (-0.18) | (-0.53) | (-0.56) | (-0.56) |
| Acquirer R&D Ratio | -14.12 | -1.68 | 20.19 | 20.42 | 2.42 |
| | (-0.05) | (-0.02) | (0.06) | (0.06) | (0.06) |
| Acquirer Cash Ratio | 39.81 | -41.99 | 24.27 | 52.93 | 52.93 |
| | (0.34) | (-0.41) | (0.16) | (0.48) | (0.48) |
| Acquirer OCF Ratio | 6.15 | -25.63 | -18.25 | 31.68 | 31.68 |
| | (0.05) | (-0.10) | (-0.09) | (0.32) | (0.32) |
| Acquirer ROA | 5.02 | 2.38 | -7.22 | 7.54 | 9.87 |
| | (2.68) | (1.30) | (1.71) | (1.08) | (1.07) |
| Target Tobin's Q | -19.08 | -81.72 | -27.92 | -5.71 | -5.71 |
| | (-0.18) | (-1.23) | (-0.17) | (-0.04) | (-0.04) |
| Target ROA | 12.24 | 2.06 | 85.16 | -81.57 | -4.06 |
| | (1.11) | (1.89) | (2.04) | (1.50) | (1.37) |
| %Acquired | -3.70 | -4.66 | -3.63 | -2.73 | -4.11 |
| | (-1.12) | (-2.11) | (-2.63) | (-1.69) | (-1.22) |
| DV Relative Size | 0.00 | -0.09 | 0.00 | -0.03 | -0.07 |
| | (-0.55) | (-2.94) | (-1.13) | (-1.20) | (-1.99) |
| Borrowings | -9.60 | 13.90 | -8.98 | 60.27 | 1.15 |
| | (-0.62) | (1.58) | (-0.50) | (0.53) | (1.48) |
| Equity | 14.13 | -22.91 | 4.51 | -3.13 | -5.51 |
| | (0.36) | (-0.29) | (0.06) | (-0.02) | (-0.14) |
| Cash | -9.93 | -43.79 | -10.94 | -1.97 | -3.76 |
| | (-0.61) | (-2.26) | (-0.63) | (-0.99) | (-1.65) |
| Tender | -9.37 | 45.67 | -13.16 | 1.61 | 3.80 |
| | (-0.64) | (2.20) | (-0.80) | (0.62) | (1.26) |
| # Bidders | 4.78 | -4.90 | 1.57 | -1.44 | -0.88 |
| | (0.31) | (-0.85) | (0.10) | (-0.29) | (-0.78) |
| Defense | -2.99 | 13.91 | -10.92 | 2.47 | 0.38 |
| | (-0.19) | (0.35) | (-0.63) | (0.04) | (0.01) |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes |
| Industry Fixed Effects | Yes | Yes | Yes | Yes | Yes |
| Adjusted R2 | 28.23% | 24.28% | 20.17% | 25.78% | 26.33% |
| Number Of Observations | 2339 | 2350 | 2314 | 2217 | 2217 |

Table V

Cumulative Announcement Returns: Acquirer

The Table presents results of OLS regressions where the dependent variable is Cumulative Abnormal Announcement Returns of the Acquirer (ACAR). ACAR is defined as cumulative abnormal returns of the acquirer calculated for a [-1;1] window using market model with [-31;280] estimation window. Main explanatory variables are CEO500% (dummy variable, 1 if ratio of current value of the in-the-money unexercised stock options to the previous year total CEO compensation as reported in sec filings and multiplied by 100 exceeds 500%), EXPERIECNE (number of years in the bidder's company prior to the announcement divided by the age in the year of the announcement), TESTOSTERONE (Testosterone level of male executives proxied by age group following Vermeulen (1996)) and % OF SHARES OWNED (percentage of total shares owned as reported in sec filings). For the details on how the additional control variables are constructed see Appendix "Definition of constructs". T-statistics is reported in brackets beneath the respective coefficient.

| Dependent VAR: | ACAR [-1;1] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Constanta | -0.0000446 | 0.00000426 | 0.0000625 | 0.0000455 | -0.0001571 | 0.00000859 | 0.0002328 | 0.000028 | -0.0002438 | -0.0001976 |
| | (-0.80) | (0.49) | (0.63) | (1.94) | (-1.61) | (0.27) | (1.78) | 0.62 | (-0.39) | (-0.82) |
| CEO500% | -0.0000126 | 0.0000103 | | | | | | | -0.0002438 | 0.0001046 |
| | (-0.21) | (0.49) | | | | | | | (-0.39) | (1.45) |
| EXPERIENCE | | | -0.0001168 | -0.0002144 | | | | | -0.0001769 | -0.000223 |
| | | | (-1.17) | (-3.74) | | | | | (-1.38) | (-3.78) |
| TESTOSTERONE | | | | | -0.0005043 | -0.00000369 | | | -0.0006384 | -0.0002983 |
| | | | | | (-1.79) | (-0.03) | | | (-0.76) | (-0.92) |
| % Of SHARES OWNED | | | | | | | -0.00000496 | -0.000000019 | 0.00000267 | 0.00000304 |
| | | | | | | | (-1.94) | (-0.27) | (0.32) | (1.02) |
| Skewness Of Returns | 0.00000466 | -0.00000336 | -0.0000913 | -0.0000229 | -0.00000777 | -0.00000777 | -0.0007211 | -0.0008209 | -0.0000302 | -0.0000223 |
| | (0.09) | (-0.06) | (-0.14) | (-0.36) | (-0.17) | (-0.17) | (-7.48) | (-9.46) | (-0.40) | (-0.27) |
| SD Of F-F Residuals | 0.0053656 | 0.0054273 | -0.0022372 | -0.0081791 | 0.0022968 | 0.0022968 | -0.0033635 | -0.0034823 | -0.0009049 | -0.0081148 |
| | (1.32) | (1.31) | (-0.30) | (-1.01) | (0.55) | (0.55) | (-1.81) | (-2.65) | (-0.10) | (-0.72) |
| Acquirer Tobin's Q | | 0.0000064 | | -0.00000354 | | -0.00000161 | | -0.0000517 | | -0.00000332 |
| | | (0.00) | | (-1.57) | | (-0.15) | | (-2.69) | | (-1.35) |
| Acquirer R&D Ratio | | -0.0000338 | | 0.0000455 | | -0.0000245 | | -0.0000511 | | 0.00005 |
| | | (-0.73) | | (0.65) | | (-0.47) | | (-0.20) | | (0.70) |
| Acquirer Cash Ratio | | 0.0000201 | | 0.000023 | | 0.0000221 | | 0.0001787 | | 0.0000185 |
| | | (0.66) | | (0.43) | | (0.59) | | (0.96) | | (0.33) |
| Acquirer OCF Ratio | | -0.0000194 | | -0.0000667 | | -0.0000276 | | 0.0001444 | | 0.0000842 |
| | | (-0.76) | | (-0.86) | | (-1.00) | | (1.08) | | (0.54) |
| Acquirer ROA | | 0.0000148 | | 0.0003028 | | 0.0000175 | | 0.0003985 | | 0.0003178 |
| | | (0.22) | | (2.05) | | (0.24) | | (0.90) | | (2.09) |
| Target Tobin's Q | | 0.00000791 | | 0.0001066 | | 0.0000029 | | 0.0002004 | | -0.0000693 |
| | | (0.73) | | (1.62) | | (0.21) | | (1.72) | | (-0.96) |
| Target ROA | | 0.0000145 | | -0.0000628 | | 0.0000137 | | 0.000091 | | -0.0000715 |
| | | (0.87) | | (-0.86) | | (0.77) | | (1.44) | | (-0.95) |
| Year Fixed Effects | No | No | No | No | No | No | No | No | No | No |
| Industry Fixed Effects | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Adjusted R2 | 6.19% | 50.74% | 13.30% | 40.65% | 12.35% | 21.87% | 20.65% | 25.17% | 21.81% | 42.64% |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Number Of Observations | 2190 | 2190 | 2260 | 2259 | 2250 | 2243 | 1904 | 1903 | 1901 | 1901 |

Table V (Continued)
Cumulative Announcement Returns: Acquirer

The Table presents results of OLS regressions where the dependent variable is Cumulative Abnormal Announcement Returns of the Acquirer (ACAR). ACAR is defined as cumulative abnormal returns of the acquirer calculated for a [-1;1] window using market model with [-31;280] estimation window. Main explanatory variables are CEO500% (dummy variable, 1 if ratio of current value of the in-the-money unexercised stock options to the previous year total CEO compensation as reported in sec filings and multiplied by 100 exceeds 500%), EXPERIECNE (number of years in the bidder's company prior to the announcement divided by the age in the year of the announcement), TESTOSTERONE (Testosterone level of male executives proxied by age group following Vermeulen (1996)) and % OF SHARES OWNED (percentage of total shares owned as reported in sec filings). For the details on how the additional control variables are constructed see Appendix "Definition of constructs". T-statistics is reported in brackets beneath the respective coefficient.

| Dependent VAR: | ACAR [-1;1] | | | | |
|---|---|---|---|---|---|
| | (11) | (12) | (13) | (14) | (15) |
| Constanta | 0.0000124 | 0.0001145 | 0.0000111 | 0.0001253 | 0.0002083 |
| | (0.24) | (1.35) | (0.17) | (0.23) | (1.01) |
| CEO500% | 0.0000088 | | | | -7.10204E-05 |
| | (0.58) | | | | (0.54) |
| EXPERIENCE | | -0.0001393 | | | -0.0001367 |
| | | (-3.55) | | | (-3.41) |
| TESTOSTERONE | | | -0.000053 | | -0.0001175 |
| | | | (-0.60) | | (-0.45) |
| % of SHARES OWNED | | | | -0.0000000046 | -0.00000118 |
| | | | | (-0.93) | (-0.52) |
| Skewness Of Returns | 0.0000239 | 5.87248E-06 | -0.0000113 | -0.000723944 | -2.67857E-05 |
| | (0.39) | (0.09) | (-0.20) | (-7.95) | (-0.34) |
| SD Of F-F Residuals | 0.0089602 | 0.006876957 | 0.005795 | -0.003213991 | -0.004601888 |
| | (1.83) | (1.30) | (0.96) | (-2.09) | (-0.42) |
| Acquirer Tobin's Q | -0.0000391 | -2.62397E-05 | -0.0000172 | -0.0000338 | -3.00619E-05 |
| | (-3.47) | (-2.13) | (-1.10) | (-2.67) | (-2.42) |
| Acquirer R&D Ratio | 0.000201 | -0.000000007 | -0.0002099 | 0.0001143 | 2.61633E-05 |
| | (0.86) | (0.06) | (-0.73) | (0.45) | (0.17) |
| Acquirer Cash Ratio | 0.0001036 | 0.000140707 | 0.0001983 | 0.0001499 | 0.000153102 |
| | (1.08) | (1.26) | (1.62) | (1.40) | (1.38) |
| Acquirer OCF Ratio | 0.0000672 | 0.000102675 | 0.0001531 | 0.0001461 | 0.000121208 |
| | (0.89) | (0.78) | (0.78) | (1.27) | (0.96) |
| Acquirer ROA | 0.0000124 | 0.000187314 | 0.0003895 | 0.0002249 | 0.000210365 |
| | (0.24) | (0.63) | (1.11) | (0.87) | (0.74) |
| Target Tobin's Q | 0.0002418 | 0.000178412 | 0.000141 | 0.0002609 | -0.0000836 |
| | (2.84) | (1.81) | (1.05) | (2.68) | (-1.07) |
| Target ROA | -0.0000239 | -0.000000859 | -0.0001606 | -0.0001675 | -0.000113176 |
| | (-0.73) | (-0.67) | (-0.70) | (-1.06) | (-0.82) |
| %Acquired | -0.000000125 | -0.000054 | -0.0000267 | -0.00000116 | 0.000000591 |
| | (-0.32) | (-0.15) | (-0.13) | (-0.21) | (0.16) |
| DV Relative Size | 4.3E-09 | 0.0000686 | 0.0000348 | 0.0000000 | 0.0000000 |
| | (1.12) | (0.52) | (0.28) | (1.09) | (1.24) |
| Borrowings | 0.0000145 | 0.0000068 | -0.0000051 | 0.0000313 | 0.0000300 |
| | (0.73) | (0.34) | (0.37) | (0.34) | (0.94) |
| Equity | -0.0000314 | -0.0000146 | 0.0000720 | -0.0001878 | -0.0000930 |
| | (-0.60) | (-0.28) | (0.03) | (-0.93) | (-0.94) |
| Cash | 0.0000504 | 0.0000235 | -0.0000018 | 0.0000775 | 0.0000559 |
| | (2.79) | (1.30) | (1.52) | (1.09) | (1.84) |
| Tender | -0.0000147 | -0.0000009 | -0.0000117 | 0.0000074 | 0.0000244 |
| | (-0.65) | (-0.30) | (-0.52) | (0.07) | (0.80) |
| # Bidders | -0.00000144 | -0.0000002 | -0.0000343 | 0.0000659 | 0.0000022 |
| | (-0.04) | (-0.02) | (-0.38) | (0.69) | (0.04) |
| Defense | -0.0000479 | -0.0000492 | 0.0000525 | -0.0002005 | -0.0000324 |
| | (-0.65) | (-0.70) | (-0.25) | (-0.85) | (-1.08) |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes |
| Industry Fixed Effects | Yes | Yes | Yes | Yes | Yes |
| Adjusted R2 | 2.65% | 23.84% | 3.26% | 8.55% | 24.19% |

| | | | | | |
|---|---|---|---|---|---|
| Number Of Observations | 2190 | 2269 | 2239 | 1904 | 1861 |

Table VI

Cumulative Announcement Returns: Target

The Table presents results of OLS regressions where the dependent variable is Cumulative Abnormal Announcement Returns of the Target (TCAR). TCAR is defined as cumulative abnormal returns of the target calculated for a [-1;1] window using market model with [-31;280] estimation window. Main explanatory variables are CEO500% (dummy variable, 1 if ratio of current value of the in-the-money unexercised stock options to the previous year total CEO compensation as reported in sec filings and multiplied by 100 exceeds 500%), EXPERIECNE (number of years in the bidder's company prior to the announcement divided by the age in the year of the announcement), TESTOSTERONE (Testosterone level of male executives proxied by age group following Vermeulen (1996)) and % OF SHARES OWNED (percentage of total shares owned as reported in sec filings). For the details on how the additional control variables are constructed see Appendix "Definition of constructs". T-statistics is reported in brackets beneath the respective coefficient.

| Dependent VAR: | TCAR [-1;1] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Constanta | -0.0000453 | -0.0000237 | 0.0000657 | 0.000069 | 0.0000338 | -0.0001194 | 0.0002326 | 0.0002195 | -0.0002696 | -0.0000712 |
| | (-0.81) | (-0.60) | (0.68) | (0.72) | (0.35) | (-1.24) | (6.83) | (9.34) | (-0.45) | (-0.99) |
| CEO500% | -0.0000125 | -0.0000226 | | | | | | | 0.0005394 | 0.0005216 |
| | (-0.21) | (-0.35) | | | | | | | (1.50) | (1.37) |
| EXPERIENCE | | | -0.0001188 | -0.0000958 | | | | | -0.0001821 | -0.0000478 |
| | | | (-1.20) | (-0.97) | | | | | (-1.46) | (-0.68) |
| TESTOSTERONE | | | | | -0.0000197 | 0.000454 | | | 0.0006821 | 0.0005394 |
| | | | | | (-0.06) | (1.26) | | | (0.83) | (1.50) |
| % of SHARES OWNED | | | | | | | -0.000000496 | -0.00000048 | 0.00000302 | 0.0000473 |
| | | | | | | | (-1.71) | (-2.25) | (0.37) | (0.64) |
| Skewness Of Returns | 0.00000448 | -<br>0.00000329 | -<br>0.00000898 | -0.0000225 | 0.0000142 | -0.00000763 | -0.0007225 | -0.000819 | -0.0000306 | 0.0000226 |
| | (0.09) | (-0.06) | (-0.14) | (-0.35) | (0.25) | (-0.17) | (-2.56) | (-1.88) | (-0.41) | (0.37) |
| SD Of F-F Residuals | 0.0053989 | 0.00546 | -0.0025866 | -0.0082808 | -0.0018226 | 0.0022853 | -0.0033259 | -0.0034656 | -0.0012759 | 0.0090295 |
| | (1.32) | (1.32) | (-0.36) | (-1.03) | (-0.32) | (0.55) | (-1.81) | (-2.76) | (-0.15) | (1.84) |
| Acquirer Tobin's Q | | -0.0000345 | | -0.000123 | | -0.0000131 | | -0.0000274 | | -0.0000397 |
| | | (-2.57) | | (0.00) | | (-0.93) | | (-2.20) | | (-3.53) |
| Acquirer R&D Ratio | | 0.0001536 | | -0.000123 | | -0.000252 | | -0.0000485 | | 0.0002003 |
| | | (0.57) | | (0.00) | | (-0.92) | | (0.22) | | (0.86) |
| Acquirer Cash Ratio | | 0.0002143 | | -0.000123 | | 0.0002436 | | 0.00016228 | | 0.0001076 |
| | | (2.05) | | (0.00) | | (2.31) | | (1.56) | | (1.12) |
| Acquirer OCF Ratio | | 0.0001906 | | -0.000123 | | 0.0000817 | | 0.00010991 | | 0.0000675 |
| | | (1.84) | | (0.00) | | (0.61) | | (1.05) | | (0.90) |
| Acquirer ROA | | 0.0002757 | | 0.000646 | | 0.0004865 | | 0.0006742 | | 0.000268266 |
| | | (1.02) | | (1.51) | | (1.54) | | (2.32) | | (1.08) |
| Target Tobin's Q | | 0.0002567 | | -0.000123 | | 0.0001174 | | 0.000200113 | | 0.0002459 |
| | | (2.52) | | (0.00) | | (0.97) | | (2.06) | | (2.90) |
| Target ROA | | -0.0002118 | | -0.00000366 | | -0.0002338 | | -0.0002649 | | 0.001839397 |
| | | (-1.30) | | (-0.38) | | (-1.14) | | (-1.92) | | (-0.39) |
| Year Fixed Effects | No | No | No | No | No | No | No | No | No | No |
| Industry Fixed Effects | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Adjusted R2 | 6.22% | 42.42% | 14.00% | 35.38% | 1.93% | 49.70% | 99.20% | 99.88% | 23.63% | 51.34% |
| Number Of Observations | 1939 | 1939 | 1927 | 1926 | 1883 | 1880 | 2103 | 2103 | 1725 | 1725 |

Table VI (Continued)
Cumulative Announcement Returns: Target

The Table presents results of OLS regressions where the dependent variable is Cumulative Abnormal Announcement Returns of the Target (TCAR). TCAR is defined as cumulative abnormal returns of the target calculated for a [-1;1] window using market model with [-31;280] estimation window. Main explanatory variables are CEO500% (dummy variable, 1 if ratio of current value of the in-the-money unexercised stock options to the previous year total CEO compensation as reported in sec filings and multiplied by 100 exceeds 500%), EXPERIECNE (number of years in the bidder's company prior to the announcement divided by the age in the year of the announcement), TESTOSTERONE (Testosterone level of male executives proxied by age group following Vermeulen (1996)) and % OF SHARES OWNED (percentage of total shares owned as reported in sec filings). For the details on how the additional control variables are constructed see Appendix "Definition of constructs". T-statistics is reported in brackets beneath the respective coefficient.

| Dependent VAR: | TCAR | | | | |
|---|---|---|---|---|---|
| | (11) | (12) | (13) | (14) | (15) |
| Constanta | -0.0000296 | 0.0002126 | -0.0001276 | 0.0005394 | -0.0001793 |
| | (-0.29) | (0.72) | (-1.09) | (1.50) | (-0.25) |
| CEO500% | -0.0000582 | | | | 0.000505238 |
| | (-0.93) | | | | (1.37) |
| EXPERIENCE | | -0.0002176 | | | -0.0001249 |
| | | (-2.17) | | | (-0.85) |
| TESTOSTERONE | | | 0.0003404 | | 0.0003642 |
| | | | (.15) | | (0.37) |
| % of SHARES OWNED | | | | -0.0001768 | 0.00000299 |
| | | | | (-1.48) | (0.31) |
| Skewness Of Returns | 0.00003 | 0.0000226 | -0.0000117 | 0.0074863 | -0.0000236 |
| | (0.44) | (0.37) | (-0.21) | (1.39) | (-0.28) |
| SD Of F-F Residuals | 0.0079425 | 0.0090295 | 0.0059028 | 0.0001608 | -0.0079017 |
| | (1.51) | (1.84) | (0.99) | (1.42) | (-0.71) |
| Acquirer Tobin's Q | -0.0000345 | -0.0000397 | -0.0000179 | -0.0002023 | 0.0074863 |
| | (-2.73) | (-3.53) | (-1.16) | (-0.73) | (1.39) |
| Acquirer R&D Ratio | 0.0001138 | 0.0002003 | -0.0002177 | 0.0001463 | 0.0001608 |
| | (0.45) | (0.86) | (-0.76) | (1.61) | (1.42) |
| Acquirer Cash Ratio | 0.0001534 | 0.0001076 | 0.000198 | -0.0000131 | -0.0000255 |
| | (1.44) | (1.12) | (1.63) | (-0.16) | (-1.90) |
| Acquirer OCF Ratio | 0.0001471 | 0.0000675 | 0.0000386 | -0.00000472 | -0.0002023 |
| | (1.28) | (0.90) | (0.25) | (-0.09) | (-0.73) |
| Acquirer ROA | 0.0002134 | -0.000123 | 0.0003648 | 0.00003 | 0.0005927 |
| | (0.83) | (0.00) | (1.04) | (0.44) | (1.03) |
| Target Tobin's Q | 0.0002665 | 0.0002459 | 0.0001432 | -0.0000255 | -0.00000472 |
| | (2.74) | (2.90) | (1.08) | (-1.90) | (-0.09) |
| Target ROA | -0.0001661 | -0.000123 | -0.000149 | 0.0079425 | -0.00000202 |
| | (-1.06) | (0.00) | (-0.65) | (1.51) | (-0.16) |
| %Acquired | 0.00000121 | 4.67E-08 | 0.000000836 | 0.0002665 | 0.0001463 |
| | (1.23) | (0.07) | (0.95) | (2.74) | (1.61) |
| DV Relative Size | 3.18E-09 | -0.000000069 | 4.01E-09 | -0.0000345 | -0.0000131 |
| | (0.67) | (-2.17) | (0.92) | (-2.73) | (-0.16) |
| Borrowings | 0.0000204 | 0.0002217 | 0.0000127 | 0.0001138 | -0.0001768 |
| | (0.49) | 2.41 | (0.31) | (0.45) | (-1.48) |
| Equity | 0.0000304 | 0.0000228 | -0.0004632 | 0.0001534 | -0.000124783 |
| | (0.28) | (0.27) | (-0.30) | (1.44) | (0.61) |
| Cash | -0.0000132 | -0.0002959 | -0.00000155 | 0.0001471 | -6.53696E-05 |
| | (-0.30) | (-1.40) | (-0.04) | (1.28) | (-0.07) |
| Tender | -0.0000302 | 0.0003208 | -0.000000273 | 0.0002134 | 0.000232142 |
| | (-0.76) | (1.43) | (-0.01) | (0.83) | (0.98) |
| # Bidders | -0.0000472 | -0.0000667 | -0.0000233 | -0.0001661 | -0.000111348 |
| | (-1.15) | (-1.12) | (-0.63) | (-1.06) | (-1.22) |
| Defense | -0.0000767 | -0.0000478 | -0.0000666 | -0.0001385 | -0.000109957 |
| | (-1.84) | (-1.09) | (-1.65) | (-1.04) | (-1.64) |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes |
| Industry Fixed Effects | Yes | Yes | Yes | Yes | Yes |
| Adjusted R2 | 14.83% | 81.52% | 18.88% | 20.75 | 37.16% |

| | | | | | |
|---|---|---|---|---|---|
| # Of Observations | 1938 | 1924 | 1833 | 2103 | 1725 |

Table VII
Logit: Cross-Industry M&A

The Table presents results of OLS regressions where the dependent variable is binary variable Cross-Industry M&A and equals 1 if target and acquirer are from different industries, other words, have different SIC code. Main explanatory variables are CEO500% (dummy variable, 1 if ratio of current value of the in-the-money unexercised stock options to the previous year total CEO compensation as reported in sec filings and multiplied by 100 exceeds 500%), EXPERIECNE (number of years in the bidder's company prior to the announcement divided by the age in the year of the announcement), TESTOSTERONE (Testosterone level of male executives proxied by age group following Vermeulen (1996)) and % OF SHARES OWNED (percentage of total shares owned as reported in sec filings). For the details on how the additional control variables are constructed see Appendix "Definition of constructs". T-statistics is reported in brackets beneath the respective coefficient.

| Dependent VAR: | CROSS-INDUSTRY M&A | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| CEO500% | -0.82 | -1.15 | | | | | | | 2.53 | -0.48 |
| | (-1.21) | (-1.22) | | | | | | | (1.01) | (-0.28) |
| EXPERIENCE | | | 0.53 | 2.28 | | | | | 2.26 | 0.22 |
| | | | (1.71) | (3.69) | | | | | (0.98) | (2.18) |
| TESTOSTERONE | | | | | 5.65 | 7.68 | | | 1.90 | 9.97 |
| | | | | | (2.48) | (1.83) | | | (1.69) | (1.71) |
| % of SHARES OWNED | | | | | | | 0.00 | 0.00 | -0.61 | -0.48 |
| | | | | | | | (-0.20) | (0.21) | (-0.31) | (-0.28) |
| Skewness Of Returns | 1.24 | 1.10 | 0.10 | -2.93 | 0.46 | -0.02 | 1.14 | 0.96 | -0.22 | 0.73 |
| | (2.63) | (1.33) | (0.07) | (-1.05) | (0.82) | (-0.02) | (1.91) | (1.04) | (-0.18) | (0.65) |
| SD Of F-F Residuals | 4.71 | 1.39 | -6.19 | -1.23 | 5.09 | 10.16 | -7.43 | 3.99 | -1.29 | 11.29 |
| | (2.24) | (0.36) | (-0.04) | (-0.64) | (1.26) | (1.85) | (-0.75) | (0.38) | (-0.79) | (1.33) |
| Acquirer Tobin's Q | | -0.12 | | -0.28 | | -0.20 | | -0.22 | | -0.26 |
| | | (-0.71) | | (-1.21) | | (-0.95) | | (-1.09) | | (-1.00) |
| Acquirer R&D Ratio | | -2.99 | | -3.79 | | -0.57 | | -3.16 | | 0.80 |
| | | (-0.84) | | (-0.85) | | (-0.13) | | (-0.79) | | (0.17) |
| Acquirer Cash Ratio | | 2.48 | | 3.78 | | 3.15 | | 2.24 | | 3.37 |
| | | (1.18) | | (1.41) | | (1.31) | | (0.99) | | (1.23) |
| Acquirer OCF Ratio | | 0.00 | | -2.46 | | 2.18 | | -1.02 | | -1.20 |
| | | (0.00) | | (-0.96) | | (0.58) | | (-0.49) | | (-0.51) |
| Acquirer ROA | | -23.15 | | -29.58 | | -2.10 | | -2.40 | | -2.06 |
| | | (-2.46) | | (-2.37) | | (-1.98) | | (-2.23) | | (-1.50) |
| Target Tobin's Q | | 0.63 | | 2.08 | | 1.32 | | 0.87 | | 0.99 |
| | | (0.36) | | (0.78) | | (0.65) | | (0.42) | | (0.42) |
| Target ROA | | 10.20 | | 13.98 | | 8.90 | | 9.80 | | 8.07 |
| | | (2.05) | | (2.19) | | (1.65) | | (1.78) | | (1.16) |
| # of Observations | 5621 | 5621 | 5127 | 5127 | 5024 | 5024 | 5311 | 5297 | 5019 | 5019 |

Table VII (Continued)
Logit: Cross-Industry M&A

The Table presents results of OLS regressions where the dependent variable is binary variable Cross-Industry M&A and equals 1 if target and acquirer are from different industries, other words, have different SIC code. Main explanatory variables are CEO500% (dummy variable, 1 if ratio of current value of the in-the-money unexercised stock options to the previous year total CEO compensation as reported in sec filings and multiplied by 100 exceeds 500%), EXPERIECNE (number of years in the bidder's company prior to the announcement divided by the age in the year of the announcement), TESTOSTERONE (Testosterone level of male executives proxied by age group following Vermeulen (1996)) and % OF SHARES OWNED (percentage of total shares owned as reported in sec filings). For the details on how the additional control variables are constructed see Appendix "Definition of constructs". T-statistics is reported in brackets beneath the respective coefficient.

| Dependent VAR: | CROSS-INDUSTRY M&A | | | | |
|---|---|---|---|---|---|
| | (11) | (12) | (13) | (14) | (15) |
| CEO500% | -0.23 | | | | -0.22 |
| | (-0.20) | | | | (-0.18) |
| EXPERIENCE | | 2.73 | | | 1.29 |
| | | (1.93) | | | (1.79) |
| TESTOSTERONE | | | 7.68 | | 1.00 |
| | | | (1.83) | | (1.37) |
| % of SHARES OWNED | | | | 0.03 | -1.32 |
| | | | | (0.80) | (-0.70) |
| Skewness Of Returns | 1.20 | -7.38 | -0.02 | 2.18 | -0.22 |
| | (1.10) | (-1.02) | (-0.02) | (1.87) | (-0.18) |
| SD Of F-F Residuals | 18.31 | -1.41 | 10.16 | -6.33 | -1.29 |
| | (1.31) | (-1.01) | (1.85) | (-0.07) | (-0.79) |
| Acquirer Tobin's Q | -0.24 | -0.97 | -0.20 | -0.34 | -1.32 |
| | (-1.10) | (-1.97) | (-0.95) | (-1.41) | (-0.70) |
| Acquirer R&D Ratio | -0.27 | -14.03 | -0.57 | -3.99 | -0.92 |
| | (-0.06) | (-1.46) | (-0.13) | (-0.89) | (-0.49) |
| Acquirer Cash Ratio | 2.73 | 12.05 | 3.15 | 1.86 | -0.73 |
| | (1.19) | (2.09) | (1.31) | (0.72) | (-0.34) |
| Acquirer OCF Ratio | 0.63 | -6.24 | 2.18 | -0.63 | -0.22 |
| | (0.28) | (-1.35) | (0.58) | (-0.27) | (-0.18) |
| Acquirer ROA | -21.27 | -50.29 | -2.10 | -2.94 | -1.29 |
| | (-1.79) | (-2.26) | (-1.98) | (-1.61) | (-0.79) |
| Target Tobin's Q | 1.72 | 4.72 | 1.32 | 1.21 | -1.00 |
| | (0.86) | (0.96) | (0.65) | (0.53) | (-0.70) |
| Target ROA | 8.25 | 22.76 | 8.90 | 7.71 | -9.00 |
| | (1.36) | (1.93) | (1.65) | (1.10) | (-0.70) |
| %Acquired | -0.02 | -0.07 | 2.42 | -1.32 | -1.00 |
| | (-1.16) | (-1.45) | (0.62) | (-0.70) | (-1.33) |
| DV Relative Size | 0.00 | 0.00 | 0.00 | 0.00 | -0.74 |
| | (-0.98) | (-1.83) | (-0.58) | (-0.71) | (-0.70) |
| Borrowings | 1.26 | 5.21 | 0.50 | -0.09 | -0.73 |
| | (1.16) | (2.17) | (0.45) | (-0.08) | (2.53) |
| Equity | -2.17 | 6.11 | 2.26 | -0.61 | 1.01 |
| | (-0.87) | (1.47) | (0.98) | (-0.31) | (-0.30) |
| Cash | -0.60 | 3.04 | 0.04 | -0.52 | 2.16 |
| | (-0.69) | (1.75) | (0.05) | (-0.56) | (0.72) |
| Tender | 0.84 | 1.48 | 0.50 | 0.90 | 6.11 |
| | (0.99) | (0.92) | (0.53) | (0.99) | (1.47) |
| # Bidders | 0.29 | 0.27 | 0.84 | -0.37 | -0.70 |
| | (0.49) | (0.29) | (0.91) | (-0.41) | (-1.32) |
| Defense | 2.55 | 4.82 | 2.01 | 1.96 | -0.34 |
| | (2.14) | (1.82) | (1.47) | (1.43) | (-0.71) |
| # Of Observations | 5616 | 5127 | 5011 | 5304 | 5019 |