DOI: 10.20472/EFC.2016.006.007

PO-HSIN HO

National Taipei University, Taiwan

OVERCONFIDENT CEOS, PRODUCT MARKET COMPETITION, AND CORPORATE INVESTMENT DECISIONS

Abstract:

This study further investigates the corporate investment decisions made by overconfident CEOs. The effect of overconfident CEOs on corporate investment decisions is widely examined in recent literature (Malmendier and Tate, 2005, 2008; Hirshleifer, Low, and Teoh, 2012; Chen, Ho and Ho, 2014; Ferris, Jayaraman, and Sabberwa, 2013; Kolasinski and Li, 2013). The literature indicates that overconfident CEOs overinvest. In a recent article, Kolasinski and Li (2013) find well governed firms could mitigate the overinvestment problem caused by overconfident CEOs. However, the literature ignores the role of product market competition in corporate investment decisions. Giround and Mueller (2010, 2011) find that competitive industries can substitute corporate governance to force managers to work hard. This study thus examines the influence of market competition on managerial overconfidence and reexamines the investment-cash sensitivity and merger activities of overconfident CEOs. We propose two competing hypotheses to study whether the investment behavior of overconfident CEOs differs under different competition structures. Our findings suggest that intense market competition mitigates the overinvestment and merger tendency of overconfident CEOs.

Keywords:

Product market competition; Overconfident CEOs; Investment decision

1. Introduction

The effect of overconfident CEOs on corporate investment decisions is widely examined in the recent literature (Malmendier and Tate, 2005, 2008; Hirshleifer, Low, and Teoh, 2012; Chen, Ho and Ho, 2014; Ferris, Jayaraman, and Sabberwa, 2013; Kolasinski and Li, 2013). The main reason for managerial overconfidence is the "better-than-average" effect in the psychological literature.[1] People tend to overestimate their ability relative to a benchmark. For example, they prefer to attribute positive outcomes to their greater ability or negative outcomes to external factors or luck.

Malmendier and Tate (2005) first propose a theoretical model to investigate the relation between overconfident CEOs and corporate investment behavior and construct two empirical measures to proxy for CEO overconfidence. Their model suggests that overconfident CEOs overestimate future cash flow. Moreover, they believe that external financing may underestimate their firms' value. Both lead CEOs overinvestment, especially when internal funds are sufficient. Malmendier and Tate (2005) show that the sensitivity of investment to cash flows is higher when the CEO is overconfident.

Malmendier and Tate (2008) further examine overconfident CEOs and their merger behavior. They suggest overconfident CEO pursue more merger and acquisition activities than non-overconfident CEOs. The diversified M&A and the merger announcement returns made by overconfident CEOs are significantly more negative than non-overconfident CEOs, which suggests they overpay their target firms or undertake value-destroying M&A projects. Ferris, Jayaraman, and Sabherwal (2013) provide international evidence and observe that CEO overconfidence can help explain merger frequency, the use of cash, and the frequency of diversifying and nondiversifying acquisitions.

Geol and Thakor (2008) use a theoretical model to predict that excessively overconfident managers are more likely to be promoted to CEO because the project payoffs selected by overconfident managers are higher. However, overconfident CEOs are also more likely to be replaced because of their overinvestment behavior. Campbell, Gallmeyer, Johnson, Rutherford, and Stanley (2011) later find consistent evidence with Geol and Thakor's theoretical prediction of CEO turnover. Chen, Ho, and Ho (2014) find the large increase in R&D expense made by overconfident CEOs could not increase the subsequent stock return and operation performance.

Though the research issues of CEO overconfidence and financial decisions are examined in many studies,[2] few studies investigate the relation between CEO

[1] See Larwood and Whittaker (1977), Svenson (1981), and Alicke (1985).

[2] Malmendier, Tate, and Yan (2010) investigate the relationship between the managerial overconfidence and major financial decisions. Liu and Taffler (2008) examine the relations between CEO overconfidence and M&A decision making, while Billett and Qian (2008) explore the connections between overconfidence and M&A frequencies. Hribar

overconfidence and product market competition. In this study, we examine how product market competition affects managerial overconfidence. Kolasinski and Li (2013) indicate that corporate governance can push managers to make better acquisition decisions, while Giround and Mueller (2011) suggest that market competition can substitute for corporate governance and constrain managerial slack. We wonder whether the overinvestment behavior of overconfident CEOs in different competitive environments would change. Our study contributes to the literature by combining the investment decisions of overconfident CEOs and product market competition. To the best of our knowledge, this study is the first to examine the effect of product market competition on CEO overconfidence.

In this study, we propose two competing hypotheses to examine the influence of market competition on CEO overconfidence. Both are drawn from the psychological and organizational literature. One is called the "*difficultly hypothesis*", which means people tend to be more overconfident of their ability on hard than easy tasks (Griffin and Tversky, 1992). Since higher industry competition increases the difficulty of firms outperforming their peers, we expect that the overinvestment and value-destroying merger decisions of overconfident CEOs would be severe in competitive industries. The other hypothesis is the "*underconfidence hypothesis*", which posits that people tend to feel they are "better-than-average" than others on easy tasks, but worse than others on difficult tasks (Moore and Cain, 2007; Hoelzl and Rustichini, 2005; Moore and Kim, 2003; Windschit, Kruger, and Simms, 2003).

Product market competition is an important issue in financial research. In our study, we contend that the investment decision made by overconfident CEOs under different market competition intensities is an important issue for at least three reasons. First, both Gompers, Ishii, and Metrick (2003) and Masulis, Wong, and Xie (2007) find poor governance causes poor performance. Giround and Mueller (2011) further divide their sample into three groups based on industry sales concentration and find that poorly governed firms have lower equity returns and worse value-destroying acquisitions only in noncompetitive industries. We examine whether the investment decisions made by overconfident CEOs under different market competition structures are different.

Second, the bulk of the literature indicates that overconfident CEOs overinvest when making corporate investment decisions.[3] This perspective raises the question of whether overconfident CEOs overinvest irrespective of industry competition structure. Furthermore, Kolasinski and Li (2013) argue that a strong board (median size and independence board) can mitigate the behavior of overconfident CEOs. Giround and Mueller (2011) find that market competition can substitute for governance in competitive industries. Could this effect apply to the investment decisions of overconfident CEOs?

---

and Yang (2010) research whether overconfidence increases the issuance of overly optimistic management earnings forecasts and therefore leads to greater earnings management.

[3] See Malmendier and Tate, 2005, 2008; Hirshleifer, Low, and Teoh, 2012; Chen, Ho and Ho, 2014; Ferris, Jayaraman, and Sabberwa, 2013; Kolasinski and Li, 2013.

Last but not the least, many studies suggest that managerial overconfidence may lead to inefficient investment decisions or have a negative impact on firms.[4] Since our "*underconfidence hypothesis*" proposes that people tend to perform more poorly than others on difficult tasks, we wonder whether competitive industries correct the overestimation of future cashflows of overconfident CEOs, leading to efficient decisions.

We find that overinvestment of overconfident CEOs is mitigated by higher market competition environments because CEOs tend to be overconfident when the task or working environment is easy. Second, we also find that the merger tendency of overconfident CEOs declines in an environment of intense market competition. However, we do not find a clear relationship between CEO overconfidence, market competition, and the merger announcement return.

The remainder of this paper is organized as follows. A detailed description of our overconfidence measure and data used in this study is presented in Section 2, followed in Section 3 by a description of the hypotheses and methodology of this paper. Section 4 presents the empirical results and discussion, and Section 5 concludes this paper.

2. Data

2.1 Measuring Overconfidence

In this study, we adopt the construction criterion of Hirshleifer, Low, and Teoh (2012). Following Malmendier and Tate, we identify a CEO as overconfident when he late exercises the vested options that are at least 67% in-the-money.[5] We assign a binary variable to a CEO that would takes the value of one when the CEO is defined as overconfident, and is zero otherwise. It is worth noting that once a CEO is identified as overconfident under this options-based measure, they are treated as overconfident for the remainder of their tenure. This treatment is consistent with the concept that overconfidence is a persistent feature.

We follow Hirshleifer, Low, and Teoh (2012) to compute the average moneyness of the CEO's option portfolio for each year. The average realizable value per option is calculated by dividing the total realizable value of the options by the number of options held by the CEO for each CEO-year. The exercise price is computed from the fiscal year end price minus the average realizable value. Then we calculate the average moneyness of the options which is measured as the fiscal year end price divided by the estimated exercise price minus 1. Since we judge whether a CEO is overconfident based on their option exercising behavior, we only consider the vested option held by the CEO.

[4] See Malmendier and Tate, 2005, 2008; Goel and Thakor, 2008; Ben-David, Graham, and Harvey, 2010; Chen, Ho, and Ho, 2013.

[5] Malmendier and Tate (2005) and Campbell, Gallmeyer, Johnson, Rutherford, and Stanley (2011) further require that a CEO must exhibit the late exercise behavior twice during his/her tenure, which would lead to using forward-looking information.

2.2 Sample Construction

In this study, the options-based overconfident CEO measure is obtained from the Standard and Poor's ExecuComp database which contains S&P 1,500 firms after 1,994. The stock transaction data for our sample are obtained from the Center for Research on Security Prices (CRSP). We only include ordinary common equities with securities whose CRSP share type codes are "10" or "11". The accounting data used for the computation of market competition and firm characteristics is retrieved from the Compustat database. Our sample excludes financial firms (SIC from 6000 to 6999) and utilities (SIC from 4900 to 4999). In order to control the effect of corporate governance on managerial overconfidence, we obtain data from the RiskMetrics database to measure the board characteristics. Because RiskMetrics begins in 1996, our research period runs from 1996 to 2012.

Furthermore, we retrieve merger data from the Security Data Company (SDC). Consistent with Malmendier and Tate (2008), we only include complete and control bid M&A deals. In addition, we only focus on relatively important merger deals which means that the transaction value must exceed 5% of the acquirer's assets.

For the measure of product market competition, we follow the definition in Giround and Mueller (2011). They use the Herfindahl-Hirschman index (HHI) as the proxy for market competition. The HHI is calculated as the sum of squared market shares:

$$HHI_{jt} = \sum_{i=1}^{N_j} s_{ijt}^2, \tag{1}$$

where s_{ijt} is the market share of firm i in industry j of year t. Excluding negative or missing data, market share is measured using a firm's total sales. As discussed in Tirole (1988), HHI is commonly used in empirical studies. Consistent with Giround and Mueller (2011), we use the Fama-French 48 industry classifications to classify industry.[6] Therefore, following Giround and Mueller (2011), we can divide our sample into three groups, based on a sample firm's HHI, to implement our analysis.

3. Hypotheses and Methodology

3.1 Hypothesis development

In this section, we propose two competing hypothesis to examine the relation between CEO overconfidence and market competition. Many economists believe that being in a competitive industry reduces managerial slack and maximizes profits. By contrast, firms in noncompetitive industries lack competitive pressure and managers are not disciplined. Hence, competitive industries not only help investors to monitor managers, but also induce managers to work hard. Giround and Mueller (2011) provide evidence that in noncompetitive industries, weak governance firms have lower equity returns,

[6] Giround and Mueller (2012) also directly use four-digit SIC codes as industry classification. The results are qualitatively similar.

poorer operating performance, and lower firm value. They also suggest that lacking competitive pressure from product markets, weak governance raises the agency costs of wasting firm resources. Since overconfidence stems from the “better-than-average” effect in the psychological literature, we also explore how the competitive situation affects overconfidence.

Overconfidence makes executives overestimate cashflow and the probability of success. Moreover, people tend to be more overconfident about their ability to perform hard than easy tasks (Griffin and Tversky, 1992). People in competitive environments often face tasks more difficult than in noncompetitive environments. Hence, we propose the “*difficulty hypothesis*” which means overconfident CEOs in competitive industries reinforce their tendency to overestimate future cashflow.

In contrast with Griffin and Tversky’s argument, we also find another explanation related to overconfidence and competition. Moore and Cain (2007) show that the “better-than-average” effect is not universal. Their study presents evidence that people believe they are below average on skill-based tasks that are difficult. Being a CEO requires diverse managerial skills. Therefore, we propose the “*underconfidence hypothesis*” which means overconfident CEOs in competitive industries tend not to feel they are “better-than-average” and may not overestimate future cash flow, unlike their peers in noncompetitive industries.

Based on the above discussion, we reexamine the investment-cash sensitivity in Malmendier and Tate (2005) which argues that overconfident CEOs overestimate the return to their investment projects. If they have sufficient internal funds for investment, they overinvest. If they do not have sufficient internal funds, they may be reluctant to issue new equity because they perceive the stock of their company to be undervalued by the market. Consequently, they stop their investment. Thus, based on the “*difficulty hypothesis*”, we propose Hypothesis 1a, while based on the “*underconfidence hypothesis*”, we propose Hypothesis 1b.

Hypothesis 1a: Only in competitive industries, the investment-cash sensitivity of firms with overconfident CEOs is higher than firms without overconfident CEOs.

Hypothesis 1b: Only in noncompetitive industry, the investment-cash sensitivity of firms with overconfident CEOs is higher than firms without overconfident CEOs.

Next, we examine acquisition decisions. Malmendier and Tate (2008) argue that overconfident CEOs may overpay their targets and undertake value-destroying decisions because they overestimate their ability to generate returns or create synergy. Thus, based on the “*difficulty hypothesis*”, we propose Hypothesis 2a, while based on the “*underconfidence hypothesis*”, we propose Hypothesis 2b.

Hypothesis 2a: Only in competitive industries, for firms with sufficient internal funds, overconfident CEOs are more likely to conduct merger and acquisition activities than firms without overconfident CEOs.

Hypothesis 2b: Only in noncompetitive industries, for firms with sufficient internal funds, overconfident CEOs are more likely to conduct merger and acquisition activities than firms without overconfident CEOs.

Malmendier and Tate (2008) also indicate that the market reaction at the merger announcement is significantly more negative than for non-overconfident CEOs. Thus, based on the "*difficulty hypothesis*", we propose Hypothesis 3a, while based on the "*underconfidence hypothesis*", we propose Hypothesis 3b.

Hypothesis 3a: Only in competitive industries, the merger announcement returns made by overconfident CEOs are lower than for firms without overconfident CEOs.

Hypothesis 3b: Only in noncompetitive industries, the merger announcement returns made by overconfident CEOs are lower than for firms without overconfident CEOs.

3.2 Methodology

In this section, we present the methodology used in this study. To test our Hypothesis 1, we estimate the following regression:

$$I_{it} = \beta_0 + \beta_1 OC_{it} + \beta_2 OC_{it} \times Cashflow_{it} + \beta_3 OC_{it} \times Cashflow_{it} \times HHI_{it} + \beta_4 HHI_{it} + \beta x_{it-1} + \varepsilon_{it}, \quad (2)$$

where I_{it+1} refers to the investment of firm i in year t+1, defined as firm's capital expenditure of year t+1 divided by the total assets of year t. OC_{it} is the overconfidence measure of firm i which the CEO belongs to in year t. $Cashflow_{it}$ is the cashflow of firm i in year t. HHI_{it} refers to the industry HHI measure of firm i in year t. x_{it-1} refers to the control variables. The standard errors are clustered at firm level and adjusted for heteroscedasticity. The null hypothesis of Hypothesis 1 is that β_3, the coefficient on the interaction among overconfidence, cashflow, and industry competition, is equal to zero.

To test our Hypothesis 2, we estimate the following probit regression:

$$\Pr(MA_{it} = 1 \mid OC_{it}, HHI_{it}, x_{it-1}) = L(\beta_0 + \beta_1 OC_{it} + \beta_2 OC_{it} \times HHI_{it} + \beta x_{it-1} + \varepsilon_{it}), \quad (3)$$

where L is the logistic function. MA_{it} refers to the binary variable of firm i in year t that takes the value of one if the CEO made at least one successful merger bid in year t. OC_{it} is the overconfidence measure of firm i which the CEO belongs to in year t. HHI_{it} refers to the industry HHI measure of firm i in year t. x_{it-1} refers to the control variables. The standard errors are clustered at firm level and adjusted for heteroscedasticity. The null hypothesis of Hypothesis 2 is that β_2, the coefficient on the interaction of overconfidence and industry competition, is equal to zero.

To test our Hypothesis 3, we estimate the following regression:

$$CAR_{it} = \beta_0 + \beta_1 OC_{it} + \beta_2 OC_{it} \times HHI_{it} + \beta x_{it-1} + \varepsilon_{it}, \quad (4)$$

where CAR_{it} refers to (-1, 1) abnormal return of merger announcement of firm i in year t. OC_{it} is the overconfidence measure of firm i which the CEO belongs to in year t. HHI_{it}

refers to the industry HHI measure of firm *i* in year *t*. x_{it-1} refers to the control variables. The standard errors are clustered at firm level and adjusted for heteroscedasticity. The null hypothesis of Hypothesis 3 is that β_2, the coefficient on the interaction of overconfidence and industry competition, is equal to zero.

4. Empirical Results

4.1 Summary Statistics

The average firm-year observations of overconfident CEOs are 65.4%, consistent with Hirshleifer, Low, and Teoh (2012), in whose sample 61% of CEOS are identified as overconfident. To control for the effect of a strong board demonstrated in Kolasinski and Li (2013), we also construct the same proxy for strong and independent board. Over 80% of our sample is classified as having a strong board. The average tenure of CEOs is 8.14 years with a standard deviation of 7.07 years. The average age of CEOs is 55.34 years old with a standard deviation of 7.20 years.[7] The definitions of firm characteristics are given in Appendix 1.

4.2 CEO overconfidence, Market Competition, and Investment Decisions

First we examine the relation between CEO overconfidence, market competition, and the level of capital expenditure. We use an ordinal least square regression model to examine this relation. Table 1 shows the regression results. The dependent variable is the capital expenditure of year *t*+1 over the total assets of year *t* for firm *i*. The independent variables are defined in Appendix 1. Models (1) to (3) show different model specifications. The coefficient of *OC* is positively significant no matter what model we use, suggesting that overconfident CEOs are more likely to invest more on capital expenditure. However, the coefficient of *HHI* is negatively significant no matter what model we use, suggesting that firms with higher market competition are more likely to invest more on capital expenditure.

However, when we add an interaction term to examine the joint effect of managerial overconfidence and market competition on capital expenditure, the coefficient *OC*×*HHI* is negative and not significant. This indicates that market competition has no additional influence on the relation between CEO overconfidence and capital expenditure.

Table 1 CEO overconfidence, Market Competition, and Investment

This table shows the regression results of CEO overconfidence and market competition on corporate investment. The dependent variable is the capital expenditure of year *t*+1 over the total assets of year *t*. The independent variables are defined in Appendix 1. Parentheses are *t*-value. The standard errors are clustered at firm level and adjusted for heteroscedasticity.

[7] To save space, we do not report the table of summary statistics. These data are available upon request.

Variable	(1)	(2)	(3)
Intercept	1.3235***	10.1032***	9.9653***
	(2.82)	(3.51)	(3.57)
OC	0.7492***	0.7411***	0.4500*
	(2.91)	(2.73)	(1.66)
OC×HHI	-0.1765	-0.1739	0.0874
	(-0.30)	(-0.30)	(0.15)
HHI	-1.3413***	-1.1975***	-1.0584**
	(-2.92)	(-2.66)	(-2.35)
OCF	10.4737***	10.7403***	9.2984***
	(5.01)	(5.09)	(4.23)
Strong Board	0.3468*	0.3580**	0.0752
	(1.92)	(1.99)	(0.44)
CEO Controls	No	Yes	Yes
Firm Controls	No	No	Yes
2-digit SIC fixed effect	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes
Observations	6,532	6,532	6,532
Adjusted R^2	0.4316	0.4349	0.4714

Although Table 1 provides evidence that market competition has no margin effect on the relation between CEO overconfidence and capital expenditure, we need to further examine the impact of market competition on relation between CEO overconfidence and the sensitivity of investment to cash flow. Table 2 shows the regression results of CEO overconfidence, market competition, and the sensitivity of investment to cash flow. The dependent variable is the capital expenditure of year *t*+1 over the total assets of year *t* for firm *i*. In Table 2, we first interact *OCF* with *OC* to examine the overinvestment behavior of overconfident CEOs. Models (1) to (4) show different model specifications. Except for Model (4), the coefficient of *OC*×*OCF* is positively significant, suggesting that overconfident CEOs tend to overinvest when firms have sufficient internal funds, consistent with Malmendier and Tate (2005).

Table 2 CEO overconfidence, Market Competition, and Sensitivity of Investment to Cash Flows

This table shows the regression results of CEO overconfidence and market competition on the sensitivity of investment to cash flows. The dependent variable is the capital expenditure of year *t*+1 over the total assets of year *t*. The independent variables are defined in Appendix 1. Parentheses are *t*-value. The standard errors are clustered at firm level and adjusted for heteroscedasticity.

Variable	(1)	(2)	(3)	(4)
Intercept	1.8271***	10.7458***	10.3327***	10.3678***
	(3.74)	(3.80)	(3.73)	(3.74)
OC	0.0296	0.0099	-0.0533	0.3580
	(0.10)	(0.03)	(-0.20)	(0.96)
OC×OCF	6.1589**	6.2321**	4.9744**	1.6587
	(2.41)	(2.44)	(2.22)	(0.55)
OC×HHI				-1.8475*
				(-1.80)
OC×OCF×HHI				14.9754*
				(1.74)
OCF	6.5224**	6.7453**	6.2071**	6.2063**
	(2.40)	(2.49)	(2.45)	(2.42)
HHI	-1.4436***	-1.2950***	-1.0030***	-1.0015**
	(-3.84)	(-3.52)	(-2.69)	(-2.21)
Strong Board	0.3623**	0.3731**	0.0886	0.0857
	(2.00)	(2.07)	(0.51)	(0.50)
CEO Controls	No	Yes	Yes	Yes
Firm Controls	No	No	Yes	Yes
2-digit SIC fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Observations	6532	6532	6532	6532
Adjusted R^2	0.4342	0.4376	0.4731	0.4742

In Model (4), we also input HHI into the interaction *OC*×*OCF*. The coefficient of *OC*×*OCF*×*HHI* is positively significant, suggesting that the overinvestment behavior of overconfident CEOs with abundant internal funds mitigates in the effect of a higher market competition environment. These results support Hypothesis 1b, confirming that overconfident CEOs are more likely to overinvest under a non-competitive market structure. Concluding this subsection, market competition has a significant impact on the relation between CEO overconfidence and investment decisions.

4.3 CEO overconfidence, Market Competition, and M&A Decisions

In this section, we investigate the relation between CEO overconfidence, market competition, and the merger decisions. The summary statistics of our M&A sample shows that the proportion of overconfident CEOs in the M&A sample is 68.2%. The (-1,+1) cumulative abnormal merger announcement is 0.4%. The average deal value is 983.66 million. The proportion of pure cash bid is 42.4% and the proportion of tender offer is 98.2%. The proportion of public target is 30.9%.[8] The definitions of other variables are defined in Appendix 1.

We use a logistic regression model to examine this relation. Table 3 shows the regression results. The dependent variable is a binary variable which takes the value of one if firm *i* makes at least one successful M&A deal in year *t*, and zero otherwise.

[8] To save space, we do not report the table of summary statistics of M&A sample. These data are available upon request.

Table 3 CEO overconfidence, Market Competition, and the Tendency of M&A

This table shows the regression results of CEO overconfidence and market competition on the tendency of corporate merger decision. The dependent variable is firm *i* at least proceeding one successful merger of year *t*+1. The independent variables are defined in Appendix 1. Parentheses are *t*-value. The standard errors are clustered at firm level and adjusted for heteroscedasticity.

Variable	(1)	(2)	(3)
Intercept	-4.2056***	-0.6822	-0.2730
	(414.81)	(0.26)	(0.04)
OC	-0.0785	-0.0442	-0.0989
	(0.25)	(0.07)	(0.35)
OC×HHI	0.6887*	0.6967*	0.7103*
	(2.78)	(2.87)	(2.91)
HHI	-0.3849	-0.3572	-0.4368
	(1.14)	(0.99)	(1.42)
OCF	-1.3289***	-1.2872***	-2.0242***
	(16.43)	(15.14)	(22.59)
Strong Board	0.4009***	0.3802***	0.3601***
	(8.79)	(7.83)	(6.64)
CEO Controls	No	Yes	Yes
Firm Controls	No	No	Yes
2-digit SIC fixed effect	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes
Observations	0.0282	0.0296	0.0381
Pseudo R^2	6515	6515	6515

Models (1) to (3) show different model specifications. As shown in Table 1, we focus on the interaction term between *OC* and *HHI*. The coefficient of *OC*×*HHI* is positively significant, suggesting that the effect of overconfident CEOs on making more merger deals mitigates under a higher market competition environment. These results support Hypothesis 2b, confirming that overconfident CEOs are more likely to engage in more mergers in a non-competitive market structure.

Last, we examine the relation between CEO overconfidence, market competition, and the merger announcement return. We use an ordinal least square regression model to examine this relation. Table 4 shows the regression results. The dependent variable is the (-1,+1) cumulative market-adjusted abnormal return of firm *i*. Models (1) to (4) show different model specifications.

Table 4 CEO overconfidence, Market Competition, and Merger Announcement Return

This table shows the regression results of CEO overconfidence and market competition on the tendency of corporate merger decision. The dependent variable is firm *i* at least proceeding one successful merger of year *t*+1. The independent variables are defined in Appendix 1. Parentheses are *t*-value. The standard errors are clustered

at firm level and adjusted for heteroscedasticity.

Variable	(1)	(2)	(3)	(4)
Intercept	0.0258	0.0713*	-0.0759	-0.0051
	(1.01)	(1.88)	(-0.75)	(-0.05)
OC	0.0108	0.0105	0.0079	0.0082
	(0.87)	(0.89)	(0.66)	(0.66)
OC×HHI	-0.0022	-0.0052	-0.0053	-0.0049
	(-0.07)	(-0.16)	(-0.17)	(-0.16)
HHI	0.0096	0.0141	0.0131	0.0104
	(0.30)	(0.48)	(0.45)	(0.36)
OCF	0.0079	0.0078	-0.0033	-0.0440
	(0.17)	(0.17)	(-0.07)	(-0.87)
Strong Board	-0.0127	-0.0142	-0.0118	-0.0134
	(-1.23)	(-1.44)	(-1.22)	(-1.39)
Bid Characteristics	No	Yes	Yes	Yes
CEO Controls	No	No	Yes	Yes
Firm Controls	No	No	No	Yes
2-digit SIC fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Observations	762	762	762	762
Adjusted R^2	0.0055	0.0894	0.0943	0.0974

We focus on the interaction between *OC* and *HHI*. The coefficient of *OC*×*HHI* is negative and not significant no matter what model we choose. As a result, our Hypothesis 3 cannot be supported. This result suggests that market competition has no impact on the relation between CEO overconfidence and merger announcement return. Concluding this subsection, market competition has a significant impact on the relation between CEO overconfidence and the tendency to engage in mergers. However, it has no significant impact on the relation between CEO overconfidence and the merger announcement return.

5. Conclusions

In this study we investigate the influence of market competition on overconfident CEOs from the aspect of investment and merger decisions. We propose two competing hypotheses to explain the different effect of market competition on managerial overconfidence. The first is the "*difficultly hypothesis*", which states that people are more likely to be overconfident about their ability on hard than easy tasks (Griffin and Tversky, 1992). The second hypothesis is the "*underconfidence hypothesis*", which states that people are more likely to feel they are "better-than-average" than others on easy tasks, but worse than others on difficult tasks (Moore and Cain, 2007; Hoelzl and Rustichini, 2005; Moore and Kim, 2003; Windschit, Kruger, and Simms, 2003).

This paper has three findings. First, we document that the overinvestment of overconfident CEOs is mitigated by higher market competition environment because CEOs are more likely to be overconfident when the task or working environment is easy, and higher market competition pushes CEOs work harder and reduces their

overconfidence.

Second, we also find that the merger tendency of overconfident CEOs falls when the market environment is competitive. Last, we do not find a significant relation between CEO overconfidence, market competition, and the merger announcement return. Concluding this paper, we argue that market competition is a vital mechanism that can restrain overconfident CEOs.

Appendix 1

Variable	Definition
Overconfidence variable	
OC	Dummy variable that takes the value of one if a CEO denies to exercise 67% in-the-money exercisable options, and zeroing otherwise
Market competition	
HHI	The sum of squared market shares
Governance variable	
Strong Board	Dummy variable that takes the value of one if the has an independent director dominated board and boardsize is between 4 to 12 people, and zero otherwise
CEO Characteristics	
Tenure	The year that CEO has been the CEO of the company
CEO Age	The age of CEO
CEO Holdings	CEO's ownership over firm's total shares
Firm Characteristics	
Assets	Book value of total assets
Leverage	The book value of total debt over total assets
OCF	The sum of earnings of interest and taxes and deprecation minus taxes divided by total assets
CAPX/Assets	Capital expenditure divided by total assets
R&D/Assets	R&D expenditure divided by total assets
Intangible/Assets	Intangible assets divided by total assets
Tobin Q	Market of total assets over book value of assets. Market value of assets equals assets minus book value of equity plus market value of equity. Market value of equity equals fiscal year end price multiple by shares outstanding.
Prior 1 Year Return	Cumulative previous one year daily stock return
Return Volatility	The stand deviation of previous one year daily stock return
Institutional Holdings	The ownership of institutional investors divided by firm's total shares
Acquisition Characteristics	
CAR (-1,+1)	The acquirer's cumulative abnormal return from one day prior to the merger announcement to one day after the announcement. The abnormal return is market-adjusted. The benchmark market return is S&P 500 index.
Deal Value	The transaction value of the deal.
Cash Bid	Dummy variable that takes the value of one if the deal is transaction by pure cash, and zero otherwise.
Tender Offer	Dummy variable that takes the value of one if the attitude of the deal if friendly, and zero otherwise.
Public Target	Dummy variable that takes the value of one if the target of the deal is a public firm.

Reference

Alicke, M., 1985, Global self-evaluation as determined by the desirability and controllability of trait adjectives, *Journal of Personality and Social Psychology* 49, 1621-1630.

Ben-David, I., J. Graham, and C. Harvey, 2010, Managerial miscalibration, Working Paper, Duke University.

Billett, M. and Y. Qian, 2008, Are Overconfident CEOs Born or Made? Evidence of Self-Attribution Bias from Frequent Acquirers, *Management Science* 54, 1037-1051.

Campbell, T.C., M. Gallmeyer, S. Johnson, J. Rutherford, and B. Stanley, 2011, CEO confidence and forced turnover, *Journal of Financial Economics* 101, 695-712.

Chen, S.-S., K.-Y. Ho, and P.-H. Ho, 2014, CEO Overconfidence and the Long-Term Performance Following R&D Increases, *Financial Management* 42, 245 -269 .

Core, J. and W. Guay, 2002, Estimating the Value of Employee Stock Option Portfolios and their Sensitivities to Price and Volatility, *Journal of Accounting research* 40, 613-630.

Ferris, S., N. Jayaraman, and S. Sabberwa, 2013, CEO Overconfidence and International Merger and Acquisition Activity, *Journal of Financial and Quantitative Analysis* 48, 137-164.

Giround, X. and H. Mueller, 2010, Does corporate governance matter in competitive industries? *Journal of Financial Economics* 95, 612-331

Giround, X. and H. Mueller, 2011, Corporate Governance, Product Market Competition, and Equity Prices, *Journal of Finance* 66, 563-600.

Goel, A. and A. Thakor, 2008, Overconfidence, CEO selection, and corporate governance, *Journal of Finance* 63, 2737-2784.

Gompers, A, J. Ishii, and A. Metrick, 2003, Corporate governance and equity prices, *Quarterly Journal of Economics 118*, 107-155.

Griffin, D., and A. Tversky, 1992, The Weighing of Evidence and the Determinants of Confidence,"*Cognitive Psychology* 24, 411–435.

Hall, B. and K. Murphy, 2002, Stock options for undiversified executives. *Journal of Accounting and Economics* 33, 3–42.

Hirshleifer, D., A. Low, and S. Teoh, 2012, Are overcongident CEOs better innovators? *Journal of Finance* 67, 1457-1498.

Hoelzl, E.and A. Rustichini, 2005, Overconfident: Do you put your money on it? *Economic Journal* 115, 305-318.

Hribar, P. and H. Yang, 2010, Does CEO overconfidence affect management forecasting and subsequent earnings management? Working Paper, University of Iowa.

Kolasinski, A. and X. Li, 2013, Can strong boards and trading their own firm's stock help CEOs make better decisions? Evidence from acquisitions by overconfident CEOs, *Journal of Financial and Quantitative Analysis,* forthcoming.

Lambert, R., D. Larcker, and R. Verrecchia, 1991, Portfolio Considerations in Valuing Executive Compensation, *Journal of Accounting Research* 29, 129–149.

Larwood, L. and W. Whittaker, 1977, Managerial myopia: Self-serving biases in organizational planning, *Journal of Applied Psychology* 62, 94-198.

Liu, Y. and R. Taffler, 2008, CEO overconfidence in M&A decision making and its impact on firm performance, Working Paper, University of Edinburgh.

Malmendier, U. and G. Tate, 2005, CEO overconfidence and corporate investment, *Journal of Finance* 60, 2661-2700.

Malmendier, U. and G. Tate, 2008, Who makes acquisitions? CEO overconfidence and the market's reaction, *Journal of Financial Economics* 89, 20-43.

Malmendier, U., G. Tate, and J. Yan, 2010, Overconfidence and early-life experience: The impact of managerial traits on corporate financial policies, *Journal of Finance 66*, 1687-1733.

Masulis, R., C. Wong, F. Xie, 2007,Corporate governance and acquirer returns, *Journal of Finance* 62, 1851-1889.

Moore, A. and T. Kim, 2003, Myopic social prediction and the solo comparison effect, *Journal of Personality and Social Psychology* 85, 1121-1135.

Moore, D. and D. Cain, 2007, Overconfidence and underconfidence: When and why people underestimate (and overestimate) the competition, *Organizational Behavior and Human Decision Processes* 103, 197-203.

Svenson, O., 1981, Are we all less risky and more skillful than our fellow drivers?, *Acta Psychologica* 47, 143-148.

Tirole, J., 1988, The theory of industrial organization, NIT Press, Cambridge, MA.

Windschit, D., J. Kruger, and E. Simms, 2003, The influence of egocentrism and focalism on people's optimism in competitions: When what affects us equally affects me more, *Journal of Personality and Social Psychology* 85, 389-4085.