CEO Overconfidence and Dominance in Bank Financial Decisions: The US Evidence

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Report to Examiners on PhD Thesis Revision

I do appreciate Dr. Frankie Chau and Professor Xiaming Liu for their invaluable suggestions as the guiding principle of modifying my PhD thesis with minor corrections. It is my honour to learn from both examiners' professional research attitudes and skills in further improving my PhD thesis. In this report, I list the examiners' suggestions as shown in the Examiners' Joint Report. All page numbers discussed below are based on the modified thesis while the old page numbers with prior contents before the modification are also provided within the bracket. The modified contents are quoted with italic types. Moreover, since examiners' comments are mostly for the second chapter in my thesis, I mainly discuss the minor corrections in that chapter while other essential changes are also presented in this report.

- **1. Further explanation is needed of the extent to which the hypotheses developed have extended our understanding of the topic. Where possible, further development and justification need to be provided.**

Prior studies on CEO overconfidence or dominance effect of corporate takeovers mainly focus on bidder side since they pay the premiums and own the strong position over the acquisition process (Brown and Sarma, 2007; Malmendier and Tate, 2008). However, as mergers are different with acquisitions, researches on CEO overconfidence and dominance effects could not only focus on the bidder side as target side may also own the negotiation power. Therefore, to better our understanding

of the current research topic of managerial cognitive bias effect on terms of mergers since one specific merger deal is a negotiation product between both target and bidder sides while one part's disagreement may lead to the deal under the incomplete situation. Moreover, the purpose of designing empirical hypotheses into these three parts refers to better our investigation in whether the wealth transfer phenomenon could be found in bank mergers. Therefore, the current introduction part of the empirical hypothesis in page 28 [old version: P28] is shown as below:

"In general, mergers, acquisitions or takeovers are usually regarded as similar corporation financial decisions. However, unlike acquisitions or takeovers could also have hostile cases, a merger normally involves the mutual decision of both target and bidder firms as they will be merged as one entity. Therefore, a merger is friendly, full of negotiations with two relatively equal parts (Reed et al., 1995). Roll (1986) indicates a general three-step merger process. First, acquiring firms find suitable target firms. Second, based on expected synergy gains and the present value estimation of specific target firms, acquiring firms bid for target firms. In friendly mergers, this process can be negotiated between management teams from the target and acquiring firms. Third, if the offer is satisfactory to both sides, the merger will be undertaken. Therefore, it is essential to develop empirical predictions that cover the merger procedure as well as perspectives based on bidder, target and combined side, respectively. The core spirit for developing empirical predictions is to detect whether there exists the wealth transfer process from bidders to targets under the situation that CEOs may behave as either overconfident or dominant. Moreover, different with prior study by Malmendier and Tate (2008), target CEOs are also included to investigate cognitive bias effects on determining terms of merger since executive compensation data could be gathered from the EDGAR database. Following prior studies (Malmendier and Tate, 2005, 2008; Brown and Zorn, 2006; Liu and Taffler, 2008; Brown and Sarma, 2007), six main hypotheses are developed based on the target, bidder, and combined sides. "

- **2. Better explain the purpose and importance of having univariate analysis and include a brief discussion on the potential drawbacks/limitations of this preliminary analysis.**

The prior version of the thesis does not provide any introduction to identify the purpose in adopting the univaraite analysis. In fact, as the preliminary analysis of multivariate regressions, univariate analysis is applied to provide a brief statistical discussion of the dependent and independent variables. In my PhD thesis, univariate analysis is especially crucial for comparing different groups of CEOs who are sorted out based on the varied CEO attitudes. In order to enhance the structural analysis of empirical results, I add the purpose and importance of having univariate analysis in page 53-54 [old version: P50]：

"The univariate analysis is a kind of preliminary statistical analysis that contains the measurements applied for the unit analysis based on the specific time window one at a time. The main purpose of adopting univariate analysis is to investigate the average condition where variance and standard deviation figures are gathered.

Comparing with other analysis methods, univariate analysis is predominant in several aspects. First, univariate analysis is more straightforward in interpreting statistical results as multivariate models may usually produce unexpected results that are difficult to be explained. Second, as data used in univariate analysis is assured, results based on the univariate analysis are more reliant in providing accurate predictions than other types of analysis approach in signaling multivariate results. Third, univariate analysis is flexible for researchers to change analysis scenarios as it shows modified results when one variable changes and other factors remain unchanged.

Univariate analysis also owns significant shortcomings and thus should be further

enhanced through multivariate analysis. As multivariate analysis provides statistical estimation results from more than one response variable at a time, univariate analysis is unable to perform such systematic analysis and less comprehensive in the panel data set. Furthermore, univariate analysis fails to display the statistical relationship among different variables since it only considers one variable at a time.

In summary, univariate analysis is a direct statistical approach in discussing simple information for obtained data while it also shows reasonable predictions of multivariate analysis results. However, due to the inherent limitations, univariate analysis results usually acts as the prior-step of the multivariate analysis where results should be further improved through multivariate models (Altman, 1968)."

- **3. Provide fuller information on the reasoning behind the grouping of bank CEOs into three different groups (overconfident, dominating and overconfident-dominating CEOs).**

During the VIVA, Dr. Chau suggests me to add the descriptive statistics for bank CEOs who are none overconfident-dominant. I do agree with this comment since univaraite analysis afterwards provides the comparison analysis between CEOs who have cognitive bias problem and CEOs who are neither overconfident nor dominating the board. Therefore, the following analysis in Table 2.3 may be abrupt without the prior distribution summary of four kinds of CEOs (OV, DOM, OV_DOM and NOV_DOM). Therefore, Table 2.2 is comprehensive through adding the distribution information of none overconfident-dominant target and bidder CEOs. I attach the brief discussion of the new Table 2.2 in Page 50 [old version: P48] and Page 52 [old version: P49] as follow:

"In order to investigate whether CEO attributes are volatile or centralized based on different time periods, a comprehensive descriptive analysis of the CEO attribute,

bidder and target CEOs are sorted out in terms of cognitive bias types like overconfident, dominating, overconfident-dominating and none overconfident-dominating characteristics. As discussed in Brown and Sarma (2007) and Malmendier and Tate (2008), CEO cognitive bias may also be affected by market environment and thus CEO beliefs may behave as centralized or fluctuated over different time periods. Panels A and B of Table 2.2 show the annual distribution of overconfident, dominating, overconfident-dominating and none overconfident-dominating target and acquiring CEOs, respectively. Briefly, overconfident, dominant and overconfident-dominant target CEOs are concentrated from 1997 to 2000 whilst same evidence could not be obtained for those percentages of acquiring CEO attributes."

Table 2.2 Summary Statistics for Bank Mergers with Overconfident, Dominating, and Overconfident–Dominating CEOs

This table shows the summary statistics for bank mergers with overconfident, dominating, and overconfident-dominating CEOs. Panel A reports the distribution of target CEOs with these three attributes over the period 1996-2006, while the distribution of bidder CEOs with these three attributes is shown in panel B. The variables OV_T, DOM_T, OV_DOM_T and Non_OV_DOM_T are for overconfident, dominating, overconfident-dominating and none overconfident-dominating target CEOs, respectively, while OV_A, DOM_A, OV_DOM_A and Non_OV_DOM_A are for overconfident, dominating, overconfident-dominating and none overconfident-dominating acquiring CEOs, respectively. Firm-related fundamental characteristics are presented in panel C. Size is the logarithmic value of the book value of total assets; ROE is calculated as the net income available divided by the fiscal year end book value of the common equity of shareholders; MB is the market-to-book ratio, computed as the sum of total assets and the market value of equity, minus the book value of equity, divided by total assets; CA is the CA ratio, which equals to the sum of tier 1 and tier 2 capital divided by the risky weighted average assets. Here OP is CEO ownership percentage, calculated as the percentage of the number of shares held by the CEO divided by the company's common shares outstanding × 1,000,000. EBS is the efficient board size, a dummy variable equal to one if the board size is between four and 12 directors, and zero otherwise. The subscripts A and T indicate acquiring banks and target banks, respectively. All variables are measured at the end of the fiscal year prior to the merger announcement date. The p-values are in parentheses below the coefficients. Here *, **, and *** indicate the 10%, 5%, and 1% levels of significance, respectively.

Panel A: Bank mergers with overconfident, dominating, and overconfident-dominating target CEOs by year

Year	OV_T	%	DOM_T	%	OV_DOM_T	%	Non_OV _DOM_T	%
1996	2	3.33	3	5.77	2	5.56	2	8.70
1997	6	10.00	7	13.46	6	16.67	2	8.70
1998	7	11.67	8	15.38	4	11.11	1	4.35
1999	10	16.67	6	11.54	5	13.89	4	17.39
2000	10	16.67	8	15.38	7	19.44	0	0.00
2001	5	8.33	5	9.62	1	2.78	2	8.70
2002	0	0.00	1	1.92	0	0.00	1	4.35
2003	6	10.00	6	11.54	4	11.11	4	17.39
2004	4	6.67	3	5.77	2	5.56	4	17.39
2005	8	13.33	4	7.69	4	11.11	3	13.04

2006	2	3.33	1	1.92	1	2.78	0	0.00
Overall	60	100	52	100	36	100	23	100

Panel B: Bank mergers with overconfident, dominating, and overconfident-dominating acquiring CEOs by year

Year	OV_A	%	DOM_A	%	OV_DOM_A	%	Non_OV _DOM_A	%
1996	4	7.02	4	7.55	4	10.53	1	3.57
1997	6	10.53	5	9.43	4	10.53	2	7.14
1998	5	8.77	7	13.21	3	7.89	4	14.29
1999	11	19.30	8	15.09	5	13.16	1	3.57
2000	8	14.04	5	9.43	5	13.16	3	10.71
2001	5	8.77	5	9.43	3	7.89	4	14.29
2002	2	3.51	1	1.89	1	2.63	0	0.00
2003	5	8.77	5	9.43	4	10.53	6	21.43
2004	5	8.77	6	11.32	4	10.53	2	7.14
2005	5	8.77	6	11.32	4	10.53	4	14.29
2006	1	1.75	1	1.89	1	2.63	1	3.57
Overall	57	100	53	100	38	100	28	100

- **4. While the statistical methods applied seem to be appropriate, a number of the results need to be checked for significance and also the low R-squares must be clearly acknowledged and commented on.**

During the VIVA, Professor Xiaming Liu points out the phenomenon of relatively lower adjusted R-squares for regression results. He mentions that the adjusted R-squares in economic studies should usually around 40% while that value is only around 6% for target CAR regression models and 10% for bidder CAR regression results in my thesis. Hence, although empirical finance regression models normally have low R-squares, if I fail to recognize that problem, the analysis procedure is not precise and comprehensive and thus regression results may not be convinced. Therefore, I discuss the low adjusted R-squares phenomenon through comparing with prior studies in page 76 [old version: P65]:

"To sum up here, estimating findings shown in Tables 2.7，2.8 and 2.9 confirm the phenomenon that overconfident CEOs do affect the terms of mergers in some extents, especially when overconfident CEOs own dominating decision power. This kind of

improvement could also be recognized through the increasing adjusted R^2 (around 20% and 5% for target premiums and target CARs) when comparing with the adjusted R^2 (around 13% and 7%, respectively) in Brown and Zorn (2006). Similarly, the adjusted R^2 of bidder side model is about 9% and 17% for merger premiums and bidder CARs while that number is approximately 12% and 10% in Brown and Zorn (2006) and 8% for acquirer CARs in Malmendier and Tate (2008)."

- **5. Add a correlation coefficient matrix for the dependent and independent variables before the presentation of regression results. More could be usefully said about the potential problems / symptoms of multicollinearity in the main regression analysis.**

Dr. Chau emphasizes the importance of developing a correlation coefficient matrix for regression variables in order to detect whether regression models may have the multicollinearity problem. In the new version of my PhD thesis, I discuss the multicollinearity problem in two steps. Firstly, I analyze the symptoms of multicollinearity and its influence to the precise of estimating results. Secondly, I select two approaches in detecting the multicollinearity problem. One is a correlation coefficient matrix shown in Table 2.5, the other approach that I pay more attention is the variation inflation factors (VIF) analysis shown in Table 2.6. Building upon the investigation of multicollinearity problem, multivariate analysis in the new version is more convincible than the prior version without any diagnose test of multicollinearity. The following part shows the multicollinearity analysis including Table 2.5 and 2.6 which starts from page 61in the modified thesis [old version: P57]:

"Multicollinearity is a statistical problem when at least two explanatory variables in a regression model are highly correlated. A multicollinearity phenomenon could lead to the high P-value while the confidence interval is wide and thus decreases the significance level of main explanatory variables. In order to detect the potential

multicollinearity problem over regression models from 2.4.1 to 2.6.3, three correlation matrices have been developed and results are shown in Table 2.5.

Panels A, B and C of Table 2.5 indicate the correlation results of regression models for target, bidder and combined side, respectively. In general, the correlation coefficients of main independent variables, such as overconfidence, dominance and overconfidence-dominance, do not show the extreme correlation with each other while there is also no evidence that main explanatory variables are highly correlated with other control variables."

Table 2.5 Correlation Matrices of Explanatory Variables

Table 2.5 shows the preliminary correlation analysis for explanatory variables of regression models 2.4.1 to 2.6.3. Panels A, B and C display the correlation matrix of estimation models for target, bidder and combined side, respectively. Premium is the one-week offer price prior to the merger announcement date from Thomson One Banker. $TCAR$ and $BCAR$ refer to market responses for target and acquiring firms, which is the three-day CARs computed by the market model with the CRSP value-weighted portfolio over the period (-250, -21) (the merger announcement day is denoted as day 0).The variables OV_T, DOM_T and OV_DOM_T are for overconfident, dominating and overconfident-dominating target CEOs, respectively, while OV_A, DOM_A and OV_DOM_A are for overconfident, dominating and overconfident-dominating acquiring CEOs, respectively. The payment method (PM) involves a dummy variable that equals one if a deal is financed with more than 50% cash, and zero otherwise; GEO_DIV and ACT_DIV refer to geography diversifying and activity diversifying mergers; Relative size (RS) is defined as the fiscal year end book value of total assets in target banks divided by the book value of total assets in bidder banks before the announcement date. Size is the logarithmic value of the book value of total assets; ROE is calculated as the net income available divided by the fiscal year end book value of the common equity of shareholders; MB is the market-to-book ratio, computed as the sum of total assets and the market value of equity, minus the book value of equity, divided by total assets; CA is the CA ratio, which equals to the sum of tier 1 and tier 2 capital divided by the risky weighted average assets; OP is CEO ownership percentage, calculated as the percentage of the number of shares held by the CEO divided by the company's common shares outstanding × 1,000,000; EBS is the efficient board size, a dummy variable equal to one if the board size is between four and 12 directors, and zero otherwise. The subscripts A and T indicate acquiring banks and target banks, respectively. All variables are measured at the end of the fiscal year prior to the merger announcement date.

Panel A. Correlation results of regression models for target side

	PREMIUM	TCAR (-1,1)	OV _T	DOM _T	OV_ DOM_T	PM	GEO _DIV	ACT _DIV	SIEZ _T	ROE _T	MB _T	CA _T	OP _T	EBS _T
PREMIUM	1	0.57	-0.01	0.19	0.2	-0.03	0.02	0.14	-0.13	-0.06	-0.23	-0.02	-0.14	0.08
TCAR(-1,1)	0.57	1	-0.02	0.13	0.1	0.13	-0.21	-0.06	-0.23	-0.19	-0.27	0.06	-0.09	0.1
OV_T	-0.01	-0.02	1	0.16	0.4	-0.07	0.06	0.02	0.13	0.28	0.38	-0.11	-0.08	-0.24
DOM_T	0.19	0.13	0.16	1	0.42	-0.15	0.16	-0.02	0.23	0.01	0.06	-0.05	0.17	-0.14
OV_DOM_T	0.2	0.1	0.4	0.42	1	-0.18	0.14	0.06	0.19	0.17	0.22	-0.12	0	-0.17
PM	-0.03	0.13	-0.07	-0.15	-0.18	1	-0.04	-0.19	-0.23	-0.2	-0.25	0.31	0.07	0.17
GEO_DIV	0.02	-0.21	0.06	0.16	0.14	-0.04	1	-0.14	0.55	0.23	0.29	-0.1	0.05	-0.35
ACT_DIV	0.14	-0.06	0.02	-0.02	0.06	-0.19	-0.14	1	-0.27	0.14	-0.11	0.02	0.06	0.28
SIEZ_T	-0.13	-0.23	0.13	0.23	0.19	-0.23	0.55	-0.27	1	0.32	0.47	-0.27	-0.28	-0.6
ROE_T	-0.06	-0.19	0.28	0.01	0.17	-0.2	0.23	0.14	0.32	1	0.48	-0.22	-0.17	-0.21
MB_T	-0.23	-0.27	0.38	0.06	0.22	-0.25	0.29	-0.11	0.47	0.48	1	-0.22	-0.31	-0.43
CA_T	-0.02	0.06	-0.11	-0.05	-0.12	0.31	-0.1	0.02	-0.27	-0.22	-0.22	1	0.17	0.21
OP_T	-0.14	-0.09	-0.08	0.17	0	0.07	0.05	0.06	-0.28	-0.17	-0.31	0.17	1	0.28
EBS_T	0.08	0.1	-0.24	-0.14	-0.17	0.17	-0.35	0.28	-0.6	-0.21	-0.43	0.21	0.28	1

Panel B. Correlation results of regression models for bidder side

	PREMIUM	BCAR (-1,1)	OV _A	DOM _A	OV_ DOM_A	PM	GEO _DIV	ACT _DIV	SIZE _A	ROE _A	MB _A	CA _A	OP _A	EBS _A
PREMIUM	1	-0.37	0.02	0.11	0.03	-0.03	0.02	0.14	-0.15	-0.01	-0.02	0.1	-0.05	-0.03
BCAR(-1,1)	-0.37	1	-0.41	-0.36	-0.34	0.19	-0.33	-0.25	-0.23	-0.23	-0.14	0.05	0.03	0.15
OV_A	0.02	-0.41	1	0.25	0.45	-0.18	0.27	0.29	0.29	0.46	0.13	-0.1	0.16	0.03
DOM_A	0.11	-0.36	0.25	1	0.48	-0.22	0.43	0.12	0.37	0.16	-0.1	0	0.16	-0.18
OV_DOM_A	0.03	-0.34	0.45	0.48	1	-0.12	0.39	0.22	0.37	0.31	-0.1	-0.12	0.23	-0.02
PM	-0.03	0.19	-0.18	-0.22	-0.12	1	-0.04	-0.19	-0.15	-0.14	-0.24	0.04	-0.02	0.23
GEO_DIV	0.02	-0.33	0.27	0.43	0.39	-0.04	1	-0.14	0.57	0.2	0.13	-0.01	-0.07	-0.37
ACT_DIV	0.14	-0.25	0.29	0.12	0.22	-0.19	-0.14	1	-0.24	0.11	-0.05	-0.01	0.09	0.3
SIZE_A	-0.15	-0.23	0.29	0.37	0.37	-0.15	0.57	-0.24	1	0.33	0.13	-0.19	-0.22	-0.41
ROE_A	-0.01	-0.23	0.46	0.16	0.31	-0.14	0.2	0.11	0.33	1	0.48	-0.16	0.06	-0.02
MB_A	-0.02	-0.14	0.13	-0.1	-0.1	-0.24	0.13	-0.05	0.13	0.48	1	0.11	-0.02	-0.05
CA_A	0.1	0.05	-0.1	0	-0.12	0.04	-0.01	-0.01	-0.19	-0.16	0.11	1	0.04	0.08
OP_A	-0.05	0.03	0.16	0.16	0.23	-0.02	-0.07	0.09	-0.22	0.06	-0.02	0.04	1	0.18
EBS_A	-0.03	0.15	0.03	-0.18	-0.02	0.23	-0.37	0.3	-0.41	-0.02	-0.05	0.08	0.18	1

Panel C. Correlation results of regression models for combined side

	CCAR (-1,1)	OV _T	DOM _T	OV_ DOM_T	OV _A	DOM _A	OV_ DOM_A	RS	PM	GEO _DIV	ACT _DIV	ROE _T	ROE _A	MB _T	MB _A	CA _T	CA _A	OP _T	OP _A	EBS _T	EBS _A
CCAR(-1,1)	1	-0.09	-0.11	-0.12	-0.54	-0.44	-0.47	0.3	0.23	-0.37	-0.31	-0.22	-0.3	-0.09	-0.1	0.07	0.1	-0.07	-0.05	0.11	0.06
OV_T	-0.09	1	0.16	0.4	0.16	0.05	0.09	0	-0.07	0.06	0.02	0.28	0.07	0.38	0.2	-0.11	-0.07	-0.08	0.04	-0.24	0.02
DOM_T	-0.11	0.16	1	0.42	-0.03	0.26	0.09	0.02	-0.15	0.16	-0.02	0.01	-0.18	0.06	-0.14	-0.05	0.09	0.17	-0.09	-0.14	-0.24
OV_DOM_T	-0.12	0.4	0.42	1	0.1	0.21	0.1	0.02	-0.18	0.14	0.06	0.17	-0.04	0.22	-0.02	-0.12	0.05	0	-0.1	-0.17	-0.11
OV_A	-0.54	0.16	-0.03	0.1	1	0.32	0.45	-0.21	-0.18	0.27	0.29	0.18	0.46	0.05	0.13	-0.09	-0.1	0.03	0.16	-0.11	0.03
DOM_A	-0.44	0.05	0.26	0.21	0.32	1	0.48	-0.04	-0.22	0.43	0.12	0.14	0.16	0.02	-0.1	-0.14	0	0.09	0.16	-0.13	-0.18

OV_DOM_A	-0.47	0.09	0.09	0.1	0.45	0.48	1	-0.16	-0.12	0.39	0.22	0.18	0.31	0.04	-0.1	-0.06	-0.12	0.06	0.23	-0.09	-0.02
RS	0.3	0	0.02	0.02	-0.21	-0.04	-0.16	1	-0.14	0.07	-0.21	-0.05	-0.14	0.2	0.15	-0.09	0.19	-0.12	-0.06	-0.18	-0.03
PM	0.23	-0.07	-0.15	-0.18	-0.18	-0.22	-0.12	-0.14	1	-0.04	-0.19	-0.2	-0.14	-0.25	-0.24	0.31	0.04	0.07	-0.02	0.17	0.23
GEO_DIV	-0.37	0.06	0.16	0.14	0.27	0.43	0.39	0.07	-0.04	1	-0.14	0.23	0.2	0.29	0.13	-0.1	-0.01	0.05	-0.07	-0.35	-0.37
ACT_DIV	-0.31	0.02	-0.02	0.06	0.29	0.12	0.22	-0.21	-0.19	-0.14	1	0.14	0.11	-0.11	-0.05	0.02	-0.01	0.06	0.09	0.28	0.3
ROE_T	-0.22	0.28	0.01	0.17	0.18	0.14	0.18	-0.05	-0.2	0.23	0.14	1	0.41	0.48	0.29	-0.22	-0.02	-0.17	-0.14	-0.21	-0.24
ROE_A	-0.3	0.07	-0.18	-0.04	0.46	0.16	0.31	-0.14	-0.14	0.2	0.11	0.41	1	0.27	0.48	-0.02	-0.16	-0.14	0.06	-0.15	-0.02
MB_T	-0.09	0.38	0.06	0.22	0.05	0.02	0.04	0.2	-0.25	0.29	-0.11	0.48	0.27	1	0.59	-0.22	-0.07	-0.31	-0.15	-0.43	-0.21
MB_A	-0.1	0.2	-0.14	-0.02	0.13	-0.1	-0.1	0.15	-0.24	0.13	-0.05	0.29	0.48	0.59	1	-0.04	0.11	-0.25	-0.02	-0.16	-0.05
CA_T	0.07	-0.11	-0.05	-0.12	-0.09	-0.14	-0.06	-0.09	0.31	-0.1	0.02	-0.22	-0.02	-0.22	-0.04	1	0.18	0.17	0.07	0.21	0.15
CA_A	0.1	-0.07	0.09	0.05	-0.1	0	-0.12	0.19	0.04	-0.01	-0.01	-0.02	-0.16	-0.07	0.11	0.18	1	-0.04	0.04	0.07	0.08
OP_T	-0.07	-0.08	0.17	0	0.03	0.09	0.06	-0.12	0.07	0.05	0.06	-0.17	-0.14	-0.31	-0.25	0.17	-0.04	1	0.24	0.28	0.01
OP_A	-0.05	0.04	-0.09	-0.1	0.16	0.16	0.23	-0.06	-0.02	-0.07	0.09	-0.14	0.06	-0.15	-0.02	0.07	0.04	0.24	1	0.17	0.18
EBS_T	0.11	-0.24	-0.14	-0.17	-0.11	-0.13	-0.09	-0.18	0.17	-0.35	0.28	-0.21	-0.15	-0.43	-0.16	0.21	0.07	0.28	0.17	1	0.41
EBS_A	0.06	0.02	-0.24	-0.11	0.03	-0.18	-0.02	-0.03	0.23	-0.37	0.3	-0.24	-0.02	-0.21	-0.05	0.15	0.08	0.01	0.18	0.41	1

"However, Baum (2006) points out that the preliminary correlation matrix may not show strong evidence in detecting the multicollinearity problem. In order to undertake an efficient statistical diagnosis, many empirical studies adopt the variation inflation factors (VIF) to identify the multicollinearity phenomenon (Lin, 2008; Alheety and Gore, 2009; Redmayne et al., 2011).The main aim of VIF analysis is to test the increasing level of each regressor's variance because of the multicollinearity problem. The traditional VIF analysis contains two steps. The first step is to run an OLS regression with one specific explanatory variable as the dependent variable and other explanatory elements as independent variables. The second step is to calculate the VIF with the coefficient determination (R_i^2) derived from the first step, which is shown in equation 2.9:

$$VIF = \frac{1}{1-R_i^2} \qquad (2.9)$$

Following Baum (2006), the average VIF value is generated based on the OLS regression models where year dummy variables are also included. The multicollinearity problem can be detected if the largest VIF value is greater than 10. Table 2.6 shows VIF results with the descending order of regression models for target, bidder and combined side through equations 2.4.1 to 2.6.3. As mean value of each model presented in all three panels of Table 2.6 is smaller than 4 while the largest VIF value of each model is also smaller than 10, it is thus comfortable to suggest that the multicollinearity problem does not affect the precise of estimating results through regression models 2.4.1 to 2.6.3."

Table 2.6 Variance Inflation Factor (VIF) Analysis of Multicollinearity

Table 2.6 shows the VIF analysis for explanatory variables of OLS regression models 2.4.1 to 2.6.3 where year dummy variables are also included. Panels A, B and C display the VIF results for target, bidder and combined side, respectively. The variables OV_T, DOM_T and OV_DOM_T are for overconfident, dominating and overconfident-dominating target CEOs, respectively, while OV_A, DOM_A and OV_DOM_A are for overconfident, dominating and overconfident-dominating acquiring CEOs, respectively. The payment method (PM) involves a dummy variable that equals one if a deal is financed with more than 50% cash, and zero otherwise; GEO_DIV and ACT_DIV refer to geography diversifying and activity diversifying mergers; Relative size (RS) is defined as the fiscal year end book value of total assets in target banks divided by the book value of total assets in bidder banks before the announcement date. Size is the logarithmic value of the book value of total assets; ROE is calculated as the net income available divided by the fiscal year end book value of the common equity of shareholders; MB is the market-to-book ratio, computed as the sum of total assets and the market value of equity, minus the book value of equity, divided by total assets; CA is the CA ratio, which equals to the sum of tier 1 and tier 2 capital divided by the risky weighted average assets; OP is CEO ownership percentage, calculated as the percentage of the number of shares held by the CEO divided by the company's common shares outstanding × 1,000,000; EBS is the efficient board size, a dummy variable equal to one if the board size is between four and 12 directors, and zero otherwise. Variables Y1 to Y10 refer to year dummy variables which indicate year 1996 to year 2005. The subscripts A and T indicate acquiring banks and target banks, respectively. All variables are measured at the end of the fiscal year prior to the merger announcement date.

Panel A. Variance inflation factor (VIF) analysis for target side

Target CEO Overconfidence			Target CEO Dominance			Target CEO Overconfidence-Dominance		
Variable	VIF	1/VIF	Variable	VIF	1/VIF	Variable	VIF	1/VIF
Y4	7.75	0.13	Y4	7.69	0.13	Y4	7.70	0.13
Y3	7.51	0.13	Y3	7.21	0.14	Y3	7.24	0.14
Y8	6.70	0.15	Y8	6.56	0.15	Y8	6.56	0.15
Y6	6.58	0.15	Y6	6.48	0.15	Y6	6.54	0.15
Y5	6.48	0.15	Y5	6.46	0.15	Y5	6.45	0.16
Y10	6.09	0.16	Y10	6.07	0.16	Y10	6.06	0.17
Y2	5.70	0.18	Y2	5.66	0.18	Y2	5.63	0.18
Y9	5.42	0.18	Y9	5.24	0.19	Y9	5.25	0.19
Y1	3.86	0.26	Y1	3.80	0.26	Y1	3.79	0.26
MB_T	2.75	0.36	SIZE_T	2.85	0.35	SIZE_T	2.72	0.37
SIZE_T	2.71	0.37	MB_T	2.58	0.39	MB_T	2.62	0.38
Y7	2.33	0.43	Y7	2.26	0.44	Y7	2.28	0.44
EBS_T	2.11	0.47	EBS_T	2.04	0.49	EBS_T	2.03	0.49
GEO_DIV	1.99	0.50	GEO_DIV	1.97	0.51	GEO_DIV	1.96	0.51
ROE_T	1.92	0.52	ROE_T	1.91	0.52	ROE_T	1.88	0.53
PM	1.61	0.62	PM	1.61	0.62	PM	1.61	0.62
OV_T	1.44	0.69	OP_T	1.48	0.67	CA_T	1.43	0.70
CA_T	1.43	0.70	CA_T	1.43	0.70	ACT_DIV	1.42	0.70
ACT_DIV	1.42	0.71	ACT_DIV	1.41	0.71	OP_T	1.40	0.71
OP_T	1.39	0.72	DOM_T	1.27	0.79	OV_DOM_T	1.24	0.81
Mean VIF	3.86		Mean VIF	3.80		Mean VIF	3.79	

Panel B. Variance inflation factor (VIF) analysis for bidder side

Acquiring CEO Overconfidence			Acquiring CEO Dominance			Acquiring CEO Overconfidence-Dominance		
Variable	VIF	1/VIF	Variable	VIF	1/VIF	Variable	VIF	1/VIF
Y4	8.25	0.12	Y4	8.31	0.12	Y4	8.41	0.12
Y3	7.42	0.13	Y3	7.37	0.14	Y3	7.48	0.13
Y8	7.20	0.14	Y8	7.24	0.14	Y8	7.25	0.14

Y6	6.66	0.15	Y6	6.70	0.15	Y6	6.76	0.15
Y5	6.41	0.16	Y5	6.54	0.15	Y5	6.48	0.15
Y10	6.03	0.17	Y10	6.03	0.17	Y10	6.07	0.16
Y2	5.85	0.17	Y2	5.98	0.17	Y2	5.97	0.17
Y9	5.48	0.18	Y9	5.48	0.18	Y9	5.50	0.18
Y1	3.94	0.25	Y1	3.95	0.25	Y1	3.94	0.25
SIZE_A	2.51	0.40	SIZE_A	2.58	0.39	SIZE_A	2.58	0.39
ROE_A	2.32	0.43	MB_A	2.29	0.44	ROE_A	2.24	0.45
MB_A	2.10	0.48	ROE_A	2.17	0.46	MB_A	2.22	0.45
Y7	2.07	0.48	GEO_DIV	2.12	0.47	GEO_DIV	2.13	0.47
GEO_DIV	1.96	0.51	Y7	2.06	0.49	Y7	2.06	0.48
EBS_A	1.83	0.55	EBS_A	1.82	0.55	OV_DOM_A	1.96	0.51
OV_A	1.76	0.57	DOM_A	1.76	0.57	EBS_A	1.83	0.55
PM	1.54	0.65	PM	1.59	0.63	PM	1.55	0.65
ACT_DIV	1.53	0.65	CA_A	1.46	0.68	ACT_DIV	1.54	0.65
CA_A	1.41	0.71	ACT_DIV	1.46	0.68	CA_A	1.41	0.71
OP_A	1.20	0.83	OP_A	1.25	0.80	OP_A	1.30	0.77
Mean VIF	3.87		Mean VIF	3.91		Mean VIF	3.93	

Panel C. Variance inflation factor (VIF) analysis for combined side

CEO Overconfidence			CEO Dominance			CEO Overconfidence-Dominance		
Variable	VIF	1/VIF	Variable	VIF	1/VIF	Variable	VIF	1/VIF
Y4	8.35	0.12	Y4	8.44	0.12	Y4	8.56	0.12
Y3	8.20	0.12	Y3	7.94	0.13	Y3	8.11	0.12
Y8	7.53	0.13	Y8	7.55	0.13	Y8	7.53	0.13
Y6	7.20	0.14	Y6	7.25	0.14	Y6	7.30	0.14
Y5	6.78	0.15	Y5	6.98	0.14	Y5	6.87	0.15
Y2	6.29	0.16	Y2	6.53	0.15	Y2	6.44	0.16
Y10	6.15	0.16	Y10	6.16	0.16	Y10	6.20	0.16
Y9	5.71	0.18	Y9	5.57	0.18	Y9	5.61	0.18
Y1	4.09	0.24	Y1	4.11	0.24	Y1	4.06	0.25
MB_T	3.35	0.30	MB_T	3.30	0.30	MB_T	3.29	0.30
MB_A	2.64	0.38	MB_A	2.78	0.36	MB_A	2.79	0.36
ROE_A	2.55	0.39	ROE_A	2.42	0.41	ROE_A	2.44	0.41
Y7	2.42	0.41	Y7	2.36	0.42	Y7	2.37	0.42
ROE_T	2.16	0.46	EBS_A	2.09	0.48	ROE_T	2.07	0.48
EBS_T	2.12	0.47	ROE_T	2.09	0.48	EBS_A	2.05	0.49
EBS_A	2.09	0.48	EBS_T	2.01	0.50	EBS_T	2.00	0.50
ACT_DIV	1.85	0.54	GEO_DIV	1.96	0.51	GEO_DIV	1.96	0.51
PM	1.85	0.54	PM	1.90	0.53	OV_DOM_A	1.88	0.53
OV_A	1.81	0.55	DOM_A	1.83	0.54	PM	1.88	0.53
GEO_DIV	1.71	0.59	ACT_DIV	1.75	0.57	ACT_DIV	1.83	0.55
CA_T	1.53	0.66	CA_A	1.54	0.65	RS	1.51	0.66
OV_T	1.52	0.66	RS	1.53	0.66	CA_T	1.51	0.66
RS	1.51	0.66	CA_T	1.52	0.66	CA_A	1.50	0.67

CA_A	1.51	0.66	OP_T	1.48	0.67	OP_T	1.45	0.69
OP_T	1.44	0.70	DOM_T	1.48	0.68	OP_A	1.33	0.75
OP_A	1.25	0.80	OP_A	1.29	0.78	OV_DOM_T	1.29	0.78
Mean VIF	3.60		Mean VIF	3.61		Mean VIF	3.61	

- **6. Give more details and justify the use of Huber-White estimator of variance.**

Although the Huber-White estimator of variance could be selected as the robust approach for estimating empirical models in STATA software, it is still essential to show the reason in explaining the adoption of that model rather than just mention it in the table description part. Therefore, I add the paragraph of Huber-White estimator of variance as the part of regression methods in page 45 and 46 [old version: P44]:

"All regression models are robust to Huber-White estimator of variance. Although the traditional OLS regression produces the most efficient and consistent estimating results among other estimators from the parameterization model under the assumption of Gauss-Markov theorem, the OLS estimator becomes inefficient when regression errors are not independent identically distributed (i.i.d). In fact, Baum (2006) indicates two methods, the robustness and efficiency approach in dealing with the conditional heteroskedasticity problem over model regression procedures. Comparing with the efficiency approach, the author suggests that the robustness approach relaxes more restrictions on the estimator since the rational of the approach is to correct the variance-covariance estimator (VCE) of the regressor when the consistency of the estimator is sufficiently good. Although the efficiency approach may provide a more efficient estimator than the robustness approach, the procedure is more complicated and uncertain as it requires integrating "an explicit specification" of the non-i.i.d distribution of error terms to the regression models.

The Huber-White (also known as Huber-White-Sandwich) estimator of variance is a general type of the robustness approach which is introduced by Huber (1967) and White (1982). The Huber-White method produces consistent covariance matrix regardless the distributional assumptions of error terms and the incorrect coefficient estimators. Therefore, because of these unique advantages, the Huber-White estimator of variance is widely adopted in empirical panel data regression models, such as generalized regression models and multivariate regression models (Crowder, 2001). Therefore, as suggested in Carroll et al., (1998) that Huber-White estimator is favored since it only estimates one variable's consistent variance under the asymptotic normal distribution and needs no precise estimation of the covariance matrix."

- **7. While some interesting comments were made to the main findings, the discussion of the empirical results could show a more critical grasp by providing a fuller / in-depth explanations and economic interpretations; and be compared to that of prior studies.**

During the VIVA procedure, Professor Xiaming Liu points out that the discussion of main results should be compared with previous studies. I think this comment is for the whole thesisTherefore, I add some comparison analysis with prior studies. For example, I discuss the reason why study by Malmendier and Tate (2008) fails to consider the target side as they do not have access to the target side data in the last paragraph in page 28. Moreover, I also provide the detail information of the sample selection which shows a more trustable procedure of sample establishment in page 32. Link with the comment four, the adjusted R-squares comparison with previous studies and multicollinearity analyses also better the explanation of economic interpretations.

- **8. Need to provide clearer notations and equations, e.g., eqt 2.4 and 2.5.**

Estimation equations in prior version combine both target and bidder side which may lead to the misunderstanding of empirical predictions. In the new version of the thesis, I separate regression models for target side and bidder side, respectively. The new content starts from page 41 displays the clearer notations of prior equation 2.4 and 2.5 in page 41 of the old version:

"In line with Gaspar et al. (2005), for the first and second hypotheses the target firm characteristics are controlled in the regression model, while when testing the third, fourth and fifth hypotheses the bidder firm characteristics are controlled. Finally, when testing the merger synergistic value, which is the sixth hypothesis, both target and bidder firm characteristics, such as relative size, are controlled. Equations 2.4.1 to 2.4.6 show the regression model testing whether overconfident, dominating and overconfident-dominating target CEOs negotiate higher merger premiums and thus significantly generates higher merger premiums from acquiring firms during the merger negotiation process:

$$Premium = \alpha_0 + \alpha_1 OV_{T_{i,t}} + \alpha_2 PM + \alpha_3 GEO\_D + \alpha_4 ACT\_D + \alpha_5 SIZE_{T_{i,t}} + \alpha_6 ROE_{T_{i,t}} + \alpha_7 MB_{T_{i,t}} + \alpha_8 CA_{T_{i,t}} + \alpha_9 OP_{T_{i,t}} + \alpha_{10} EBS_{T_{i,t}} + \varepsilon_{i,t} \quad (2.4.1)$$

$$Premium = \lambda_0 + \lambda_1 DOM_{T_{i,t}} + \lambda_2 PM + \lambda_3 GEO\_D + \lambda_4 ACT\_D + \lambda_5 SIZE_{T_{i,t}} + \lambda_6 ROE_{T_{i,t}} + \lambda_7 MB_{T_{i,t}} + \lambda_8 CA_{T_{i,t}} + \lambda_9 OP_{T_{i,t}} + \lambda_{10} EBS_{T_{i,t}} + \varepsilon_{i,t} \quad (2.4.2)$$

$$Premium = \varphi_0 + \varphi_1 OV\_DOM_{T_{i,t}} + \varphi_2 PM + \varphi_3 GEO\_D + \varphi_4 ACT\_D + \varphi_5 SIZE_{T_{i,t}} + \varphi_6 ROE_{T_{i,t}} + \varphi_7 MB_{T_{i,t}} + \varphi_8 CA_{T_{i,t}} + \varphi_9 OP_{T_{i,t}} + \varphi_{10} EBS_{T_{i,t}} + \varepsilon_{i,t} \quad (2.4.3)$$

$$TCAR = \alpha_0 + \alpha_1 OV_{T_{i,t}} + \alpha_2 PM + \alpha_3 GEO\_D + \alpha_4 ACT\_D + \alpha_5 SIZE_{T_{i,t}} + \alpha_6 ROE_{T_{i,t}} + \alpha_7 MB_{T_{i,t}} + \alpha_8 CA_{T_{i,t}} + \alpha_9 OP_{T_{i,t}} + \alpha_{10} EBS_{T_{i,t}} + \varepsilon_{i,t} \quad (2.4.4)$$

$$TCAR = \lambda_0 + \lambda_1 DOM_{T_{i,t}} + \lambda_2 PM + \lambda_3 GEO\_D + \lambda_4 ACT\_D + \lambda_5 SIZE_{T_{i,t}} + \lambda_6 ROE_{T_{i,t}} + \lambda_7 MB_{T_{i,t}} + \lambda_8 CA_{T_{i,t}} + \lambda_9 OP_{T_{i,t}} + \lambda_{10} EBS_{T_{i,t}} + \varepsilon_{i,t} \quad (2.4.5)$$

$$TCAR = \varphi_0 + \varphi_1 OV\_DOM_{T_{i,t}} + \varphi_2 PM + \varphi_3 GEO\_D + \varphi_4 ACT\_D + \varphi_5 SIZE_{T_{i,t}} + \varphi_6 ROE_{T_{i,t}} + \varphi_7 MB_{T_{i,t}} + \varphi_8 CA_{T_{i,t}} + \varphi_9 OP_{T_{i,t}} + \varphi_{10} EBS_{T_{i,t}} + \varepsilon_{i,t} \quad (2.4.6)$$

where the merger premium is the one-week offer price prior to the merger announcement date from Thomson One Banker. $TCAR$ *is three-day CARs computed by the market model. Following Gupta and Misra (2007), the market model coefficients are estimated with the CRSP value-weighted portfolio over the period (-250, -21) (the merger announcement day is denoted as day 0).* $OV_{T_{i,t}}$, $DOM_{T_{i,t}}$ *and* $OV\_DOM_{T_{i,t}}$ *refer to overconfident, dominating, and overconfident-dominating target CEOs for bank i in fiscal year t, respectively. These variables will be examined separately and are expected to have a positive effect on merger premiums. All target firm-related variables are included in the model, such as* $SIZE_{T_{i,t}}$, $ROE_{T_{i,t}}$, $MB_{T_{i,t}}$, $CA_{T_{i,t}}$, $OP_{T_{i,t}}$, *and* $EBS_{T_{i,t}}$ *while merger-related variables,* PM, GEO_D *and* ACT_D *are included in all regression estimations.*

A similar regression model is adopted to estimate the merger premiums and stock market responses to deals undertaken by overconfident, dominating, and overconfident-dominating acquiring CEOs:

$$Premium = \beta_0 + \beta_1 OV_{A_{i,t}} + \beta_2 PM + \beta_3 GEO\_D + \beta_4 ACT\_D + \beta_5 SIZE_{A_{i,t}} + \beta_6 ROE_{A_{i,t}} + \beta_7 MB_{A_{i,t}} + \beta_8 CA_{A_{i,t}} + \beta_9 OP_{A_{i,t}} + \beta_{10} EBS_{A_{i,t}} + \varepsilon_{i,t}$$

(2.5.1)

$$Premium = \gamma_0 + \gamma_1 DOM_{A_{i,t}} + \gamma_2 PM + \gamma_3 GEO\_D + \gamma_4 ACT\_D + \gamma_5 SIZE_{A_{i,t}} + \gamma_6 ROE_{A_{i,t}} + \gamma_7 MB_{A_{i,t}} + \gamma_8 CA_{A_{i,t}} + \gamma_9 OP_{A_{i,t}} + \gamma_{10} EBS_{A_{i,t}} + \varepsilon_{i,t}$$

(2.5.2)

$$Premium = \phi_0 + \phi_1 OV\_DOM_{A_{i,t}} + \phi_2 PM + \phi_3 GEO\_D + \phi_4 ACT\_D + \phi_5 SIZE_{A_{i,t}} + \phi_6 ROE_{A_{i,t}} + \phi_7 MB_{A_{i,t}} + \phi_8 CA_{A_{i,t}} + \phi_9 OP_{A_{i,t}} + \phi_{10} EBS_{A_{i,t}} + \varepsilon_{i,t}$$

(2.5.3)

$$BCAR = \beta_0 + \beta_1 OV_{A_{i,t}} + \beta_2 PM + \beta_3 GEO\_D + \beta_4 ACT\_D + \beta_5 SIZE_{A_{i,t}} + \beta_6 ROE_{A_{i,t}} + \beta_7 MB_{A_{i,t}} + \beta_8 CA_{A_{i,t}} + \beta_9 OP_{A_{i,t}} + \beta_{10} EBS_{A_{i,t}} + \varepsilon_{i,t}$$

(2.5.4)

$$BCAR = \gamma_0 + \gamma_1 DOM_{A_{i,t}} + \gamma_2 PM + \gamma_3 GEO\_D + \gamma_4 ACT\_D + \gamma_5 SIZE_{A_{i,t}} + \gamma_6 ROE_{A_{i,t}} + \gamma_7 MB_{A_{i,t}} + \gamma_8 CA_{A_{i,t}} + \gamma_9 OP_{A_{i,t}} + \gamma_{10} EBS_{A_{i,t}} + \varepsilon_{i,t}$$

(2.5.5)

$$BCAR = \phi_0 + \phi_1 OV\_DOM_{A_{i,t}} + \phi_2 PM + \phi_3 GEO\_D + \phi_4 ACT\_D + \phi_5 SIZE_{A_{i,t}} + \phi_6 ROE_{A_{i,t}} + \phi_7 MB_{A_{i,t}} + \phi_8 CA_{A_{i,t}} + \phi_9 OP_{A_{i,t}} + \phi_{10} EBS_{A_{i,t}} + \varepsilon_{i,t}$$

(2.5.6)

All regression variables hold the same definition in prior regression models (2.4.1) to (2.4.6) since equations (2.5.1) to (2.5.6) consider the situation of bidder side. Coefficients of $OV_{A_{i,t}}$, $DOM_{A_{i,t}}$ *and* $OV\_DOM_{A_{i,t}}$ *are expected to be significant positively related with merger premium and negatively related with the market response to acquiring firms."*

- **9. Pay careful attention to the choice of wording (e.g., 'hand-collected' data, 'empirical' hypothesis, 'common' financial decisions, and power vs. dominance, etc.)**

The following table shows the change of wording in the thesis:

Original Wording	Current Wording	Page Number (Old Version)	Page Number (New Version)
hand-collected	manually collected	P8	P8
hand-collected	manually-collected	P135	P146
hand-collected	manually collected	P153	P164
hand-collected	manually collected	P154	P165
common financial decisions	those financial decisions	P3	P3
common financial decisions	financial decisions	P3	P3
common financial decisions	bank financial decisions	P7	P7
power vs. dominance	Please check the 4th footnote in page 18 which is displayed in the new version of my PhD thesis.		

- **10. The overall presentation could be further improved with minor editing and proofreading.**

According to the suggestion from the VIVA, I repeat the proofreading for my modified thesis while the following table shows the editing results:

Original Wording	Current Wording	Page Number/Part (Old Version)	Page Number/Part (New Version)
CEO Overconfidence and Power in Bank Financial Decisions: The US Evidence	CEO Overconfidence and Dominance in Bank Financial Decisions: The US Evidence	Thesis Title	Thesis Title
effects	impact	Abstract(9th line)	Abstract(9th line)
D.Phil (Economics)	D.Phil (Finance)	Abstract	Abstract
Robustness tests	Robustness and additional tests	Content	Content

Bibliography	References	Content	Content
the 8th line from the top: "geographically diversifying "	"pure geographically diversifying "	P9	P9
The 2nd line from the bottom: "geography-diversifying mergers"	"geography-activity diversifying mergers"	P55	P59
The 3rd line from the top: "both geography and activity"	"either geography or activity"	P68	P79
The 4th line from the bottom:"conflicting empirical results"	"conflicted empirical results"	P87	P98
The 13th line from the top:"information asymmetry with higher growth opportunities"	"information asymmetry and with higher growth opportunities"	P88	P99
The 4th line from the top"firm0specific"	"firm specific"	P98	P109
The 10th line from the top"691 banks and bank holding companies"	"692 banks and bank holding companies"	P104	P115
The 2nd line from the bottom: "fail at least twice"	"reluctant"	P105	P116
The 4th line from the bottom:"CDO underwriting.'"	"CDO underwriting"	P138	P149
The 7th line from the top:"value derived from equation (2)"	"value derived from equation (4.2)"	P156	P167
The 4th line from the top:"White estimator of variance"	"Huber-White estimator of variance"	P161	P172
The 6th line from the top:"we follow Laeven and Levine (2009)"	"following Laeven and Levine (2009)"	P162	P173