CEO Overconfidence and Bondholder Wealth Effects: Evidence from Mergers and Acquisitions[*]

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Abstract

This study explores the influence of chief executive officer (CEO) overconfidence on acquirers' bondholder wealth effect during mergers from 1994 to 2014. We find that CEO overconfidence benefits acquirer bondholders. In addition, overconfident acquirers are more likely to merge low return correlation targets rather than relative lower risk ones. We further show that the positive wealth effects are stronger when overconfident acquirers merge targets with lower correlation. Overall, the coinsurance effect of CEO overconfidence on acquirers' bondholder wealth dominates the liquidity effect during mergers.

Key Words: CEO overconfidence, Bondholder wealth effect, Coinsurance effect.

Mergers and acquisitions (M&A) are the consolidation of business organizations and operating units for corporates, having a substantial influence on acquiring firms. M&A helps acquirer to increase its sales or enter another industry instantly. The traditional theory suggests that the merging of two less-than-perfectly correlated firms would decrease systematic risk and default probability for the combined firm after mergers (Lewellen, 1971; Higgins and Schall, 1975; Galai and Masulis, 1976; Scott, 1977). Therefore, acquirer bondholders would experience a positive wealth effect during mergers from merging the target with imperfectly correlated cash flows, which is called the "coinsurance effect." However, the effect of M&A on acquirer bondholder wealth is still a debate. Prior empirical research shows that acquirer bondholder wealth through the merger deals is mixed.[1] These contradictory results raise the question "Why does the existing literature fail to find the result to support the coinsurance effect for acquirer bondholders?" In this paper, we investigate this question by examining an influential factor of acquisition decisions—managerial overconfidence.

Recent research finds that managerial overconfidence has a significant impact on acquisition decisions (e.g., Heaton (2002), Malmendier and Tate (2005, 2008), Billett and Qian (2008), and Kolasinski and Li (2013)). The theory of individual overconfidence is developed from psychological literature.[2] Overconfident chief executive officers (CEOs) believe themselves are better-than-average and overestimate the cash flow (or payoff) generated from the investment projects (Malmendier and Tate, 2005, 2008). They tend to overinvest and undertake high risk projects (Malmendier and Tate, 2005, 2008; Galasso and Simcoe, 2011; Hirshleifer, Low, and Teoh, 2012) to damage firms' performance.[3]

[1] Dennis and McConnell (1986) and Billett et al. (2004) find a negative wealth effect for acquirer bondholders, Eger (1983) and Maquieira et al. (1998) find a positive wealth effect, and Kim and McConnell (1977) and Asquith and Kim (1982) find an insignificant effect.

[2] See, Oskamp (1965), Weinstein (1980), and Svenson (1981).

[3] See, Malmendier and Tate (2005, 2008), Billett and Qian (2008), Goel and Thakor (2008), Hackbarth (2008), Malmendier et al. (2011), Campbell et al. (2011), Gervais et al. (2011), Hirshleifer et al. (2012), Ben-David, Graham, and Harvey (2013), Kolasinski and Li (2013), Deshmukh, Goel, and Howe (2013), and Banerjee et al.

Particularly, Malmendier and Tate (2008) find that overconfident CEOs are more likely to conduct merger acquisitions and do diversifying mergers than cross-industry deals. As a result, the merger announcement returns made by them are negatively significant (Malmendier and Tate, 2008; Billett and Qian, 2008; Kolasinski and Li, 2013; Banerjee, Humphery-Jenner, and Nanda, 2015). However, Roll (1986) argues that CEO overconfidence is not an agency problem and overconfident CEOs dedicate themselves to maximize shareholder wealth. They also induce high commitments and deliver strong belief in firms' future prospect to stakeholders and positively motivate them (Phua, Tham, and Wei, 2018).[4]

Despite much of literature mainly focuses on the influence of CEO overconfidence on CEOs' behaviors and the consequence of shareholder's wealth, whether the trait of CEO overconfidence would protect or damage the stakeholder's rights is rare. Phua et al. (2018) investigate the influence of overconfident CEOs on stakeholders from the aspects of employees and suppliers, finding overconfident CEOs induce them to exert more efforts to their works and work closely with them. As a key stakeholder of the firm, how do acquirer bondholders respond to the merger announcement made by overconfident CEOs? Do they suffer losses from overinvestment or undertaking high risk projects (Malmendier and Tate, 2005, 2008; Galasso and Simcoe, 2011; Hirshleifer, Low, and Teoh, 2012), or, contrarily, enjoy more coinsurance effect from conducting diversifying deals (Malmendier and Tate, 2008)?[5] This provides strong motivation for this study to exploring whether CEO overconfidence can help to explain the mixed results of acquirer bondholder wealth during the announcement period of mergers. Moreover, we investigate the crucial channels of CEO overconfidence to affect the acquirer's bond return responses.

(2015).

[4] In their study, they investigate the relation between overconfident CEOs and employees and suppliers. They indicate that overconfident CEOs induce stronger supplier and labor commitments which create valuable stakeholder relationships.

[5] Merging a diversifying firm would experience lower cash flow correlation between bidders and targets than merging a within-industry firm.

We argue that managerial overconfidence can influence acquirer's bondholder wealth in several ways. The first is the investing and financing preference of overconfident CEOs. Malmendier and Tate (2005, 2008) and Gervais, Heaton, and Odean (2011) suggest that overconfident CEOs tend to overinvest when internal funds are sufficient, but they may underinvest when they require external financing. Hence, overconfident CEOs' investment behaviors are distorted.[6] They are also more willing to undertake risky investments and underestimate the downside risk of the projects. As a result, the tendency of risk-taking and risk tolerance for them is higher than rational CEOs (Galasso and Simcoe, 2011; Hirshleifer et al., 2012). From the financing perspective, overconfident CEOs have unique preferences. Malmendier, Tate, and Yan (2011) show that overconfident CEOs prefer using internal funds, and then risky debt to equity when they need external financing.[7] They are also more likely to issue short-term debt (Graham, Harvey, and Puri, 2013; Huang, Tan, and Faff, 2016). Combining the above descriptions, given firm with an overconfident CEO, when they pursue investing in high-risk projects during mergers and maintain relative high leverage, we expect intuitively that the negative bondholder wealth effects are stronger.

The second reason is related to the type of target selected by overconfident CEOs. Hann, Ogneva, and Ozbas (2013) and Franco, Urcan, and Vasvari (2015) find that diversified firms with less cross-segment correlations experience a lower cost of capital than stand-alone firms because of reducing systematic risk. Conglomerate deals diversify firm risk more for combined firms than within-industry deals from lower correlation of cash flows between acquirers and targets (Lewellen, 1971; Higgins and Schall, 1975; Galai and Masulis, 1976; Scott, 1977). Since Malmendier and Tate (2008) suggest that overconfident CEOs are more

[6] Overconfident CEOs overestimate their abilities and influence on the odds and returns in investment projects. They believe the future profitability will be higher than the recent and past or recent performance will continue to the future at least (Landier and Thesmar, 2008).

[7] Overconfident CEOs consider the cost of external financing is to be improperly costly because they think that their issued equity and bond are undervalued by outside investors. Moreover, they believe that the degree of undervalued equity is larger than that of risky debt.

likely to do diversifying merger bids when they make an acquisition, we hypothesize they are more likely to select targets with lower correlation with them. Such target selection preference implies that their bondholders are expected to enjoy more coinsurance effect from risk diversification. Hence, we expect that the positive bondholder wealth effects for overconfident acquirers are stronger when they merge a lower correlation target.

Finally, in addition to the coinsurance effect, the alternative effect relating to overconfident CEOs' investment behaviors on acquirer's bondholder wealth is liquidity effect. Liquidity risk which is closely associated with default probability is the risk that firm has solvency problem. Our research focuses on two overconfident CEOs' behaviors. First, Malmendier and Tate (2008) and Harford, Humphery-Jenner, and Powell (2012) find that overconfident acquirers tend to overbid in mergers. It causes acquirers to bear greater acquisition cost which may raise probability for them to suffer financial deficit. The other is the method of payment. Overconfident acquirers prefer use cash-bid than stock-bid or mix (Malmendier and Tate, 2008).[8] For cash bids can be financed by internal cash or debt, payment by cash may reduce cash available to meet the debt obligations and financing by debt may damage the creditor's rights. Both overbidding and paying by cash reduce cash available to repay loans, decline debt-paying ability, and decrease firm's liquidity capability. Consequently, we expect that the negative bondholder wealth effects for overconfident acquirers are stronger when they overbid and pay by cash in mergers.

Our final sample consists of 365 announcements of mergers from 1994 to 2014. We use a stock options-based measure to proxy for managerial overconfidence.[9] Following Bessembinder, Kahle, Maxwell, and Xu (2009), we calculate daily abnormal bond returns to investigate all our examinations from Trade Reporting and Compliance Engine (TRACE)

[8] Overconfident CEOs believe the market would undervalue their firms' stock price.

[9] Stock options-based measure is widely used in recent financial literature. See Campbell et al. (2011), Hirshleifer et al. (2012), Banerjee et al. (2015), and Ho et al. (2016).

database. The overall wealth effect for acquirer bondholders is significantly negative.[10]

For the CEO overconfidence effect, we find a significantly positive wealth effect for overconfident acquirers, while a significantly negative wealth effect for non-overconfident acquirers. The results are also significant in regression analyses after controlling merger, acquirer, and CEO characteristics. The empirical results are robust after conducting two additional methodologies to eliminate the endogenous concerns.[11] We suggest that, for bidders, the characteristic of CEO overconfidence is a significant determinant to bring a bright-side point to their bondholders during mergers.

To verify the reasons of positive wealth effect for overconfident acquirer bondholders, given the nature of coinsurance effect, we investigate their target selection preference ex ante. We consider the pre-merger target selection model following the methodology of Albuquerque, De Franco, and Verdi (2013) in spirit. For each merger event, we construct a pool of potential target candidates including firms are in the same industry as the target. The coinsurance effect can be contributed through two ways, acquiring a lower correlated target with acquirer (Lewellen, 1971; Higgins and Schall, 1975; Galai and Masulis, 1976; Scott, 1977) or a relative lower risk target than acquirer (Shastri, 1990; Billett, King, and Mauer, 2004).[12] We find that overconfident acquirers are more likely to select targets with low stock return correlation with them rather than targets with lower risk than them.[13] Consistent with the implication of Malmendier and Tate (2008), diversifying merger deals are more likely

[10] The results are consistent with Bessembinder et al. (2009) and Deng et al. (2013) using TRACE database to evaluate bond returns.

[11] Although Deng et al., (2013) suggest that mergers are largely unanticipated investment events and this concern can be partially mitigated using announcement returns, we still use propensity score-matching and difference-in-difference estimation approaches to deal with this issue.

[12] Besides risk diversification from two uncorrelated firms merged, the risk decrease from pre-merger (the acquirer) to post-merger (the combined firm) also strengthen the coinsurance effect. Shastri (1990) argues that the influences on the value of acquirer bonds should be attributed to the relative pre-merger risk by comparing the risk of acquirers with targets, including risk, leverage, and debt maturity, which results in the coinsurance effect or expropriation effect. Billett et al. (2004) indicate different findings that the wealth effects in relative pre-merger risk measures are only significant for target bondholders, but do not appear for acquirer bondholders.

[13] These findings are robust to conduct traditional post-merger target selection model. The results are shown in Section 4.1.

been done by overconfident CEOs. The results imply the positive bondholder wealth effect for overconfident acquirers comes from risk diversification by merging low correlation targets, but not from risk reduction by selecting lower risk targets than themselves.

Based on above results, we find that when they merge lower stock return correlation targets, a significantly positive wealth effect is stronger for their bondholders, consistent with our coinsurance hypothesis. We further investigate the alternative explanation on the acquirer's bond returns associated with characteristics of overconfident CEOs, liquidity effect. We find that when they overbid and use cash-bids to decrease the firm's liquidity, their bondholders experience a stronger negative wealth effect. The liquidity effect becomes insignificant after controlling for coinsurance effect. To eliminate the concern of sample selection bias arisen from corporate bond issuing firms' characteristics, we conduct the Heckman's two-step selection model (Chen, 2012). The result of coinsurance effect is still robust and the liquidity effect becomes weaker. They are also robust to alternative measures of abnormal bond returns for another merger announcement window and CEO overconfidence. These further examinations ensure our empirical findings are solid. Therefore, we conclude that the coinsurance effect dominates the liquidity effect to lead to benefit bondholders for overconfident acquirers during mergers.

This research contributes to the literature in four ways. First, CEO overconfidence, one of the managerial character traits, is an increasingly vital issue. Previous literature concentrates on examining their behaviors in investing, financing, and dividend policies, and discusses these actions to influence on the firm performance and stockholder's wealth.[14] However, few studies investigate whether CEO overconfidence would affect the bondholder's wealth. This is the first paper filling the gaps by illustrating the association between CEO

[14] For investment policy, see Malmendier and Tate (2005, 2008), Billett and Qian (2008), Galasso and Simcoe (2011), Hirshleifer et al. (2012), Ferris et al. (2013), Kolasinski and Li (2013), and Banerjee et al. (2015). For financing policy, see Malmendier et al. (2011), Huang, Tan, and Faff (2016), and Ho et al. (2016). For dividend policy, see Deshmukh et al. (2013).

overconfidence and bondholder wealth effect during the announcement period of mergers.

Second, although prior literature finds overconfident acquirers are associated with a more negative stock performance during mergers, we contribute to the literature by presenting the evidence that bondholders with them enjoy premium.[15] They are more likely to choose a low stock return correlation target with them to strengthen the coinsurance effect. As a result, the stronger coinsurance effect for overconfident acquirers provides reasonable explanations for why their bondholders respond a positive valuation. It drives the implication that the acquirer bondholder wealth is improved by CEO overconfidence during mergers.

Third, Galasso and Simcoe (2011) and Hirshleifer et al. (2012) show that overconfident CEOs are more likely to take high-risk investment projects. However, our results demonstrate that overconfident acquirers tend to select a target with lower return correlation when they make an acquisition. It provides a viewpoint that although overconfident CEOs are known as a risk-lover, they still place a high value on risk diversification to mitigate their degree of over-risk-taking in merger decisions.

Lastly, this study complements the influence of managerial overconfidence on their stakeholders. Phua et al. (2018) find overconfident CEOs maintain well relation with employees and suppliers. We suggest another bright side for them to benefit their stakeholders. Our result contributes to the literature by exploring how overconfident CEOs increase bondholder wealth through announcing merger deals.

The remainder of the paper is organized as follows. Section 1 details the databases, data collection processes, and measures of CEO overconfidence and bond returns. Sections 2 and 3 present the analysis of empirical results. Sections 4 show the robustness checks. Finally, we conclude in Section 5.

1. Data

[15] Malmendier and Tate (2008), Billett and Qian (2008), Kolasinski and Li (2013), and Banerjee et al. (2015) show a more negative abnormal stock returns for overconfident acquirers during mergers.

1.1 Data Source and Sample Construction

Our data of empirical investigation are retrieved from several databases. We collect merger and acquisition data from Thomson Financial Securities Data Corporation (SDC) Mergers and Acquisitions Database with complete deals from 1994 to 2014. Both acquirers and targets are US firms and public traded with non-missing stock returns during announcement period. The stock transaction data is obtained from Center for Research in Security Prices (CRSP) and we restrict sample to ordinary common equities of US firms by securities with share code 10 or 11. We drop deals of recapitalization, simple acquisitions of assets, and repurchases, because they are not the merger in which the acquirer and the target merge to be a new combined firm (Billett et al., 2004). We also drop the deal value of transaction is less than $1 million (Harford et al., 2012; Deng, Kang, and Low, 2013).

We use the TRACE database introduced by the Financial Industry Regulatory Authority (FINRA) to collect daily bond price data, rather than the Lehman Brothers Bond Database (LBBD) database which previous studies usually used.[16] Both databases have advantages and disadvantages respectively. The LBBD database covers early sample monthly data from January 1973 but only to March 1998. Although most prices are dealer quotes, some are matrix price.[17] The TRACE database provides intraday individual bond transactions which are more precise to analyze market reactions during the day of events. It provides investors more comprehensive and transparent in corporate bond market information. Using daily bond returns is more precise and instant to observe the bondholder wealth effect of merger announcements. However, the available period of TRACE database begins from July 2002

[16] LBBD database is widely used by previous studies for collecting bond price, for example, Maxwell and Stephens (2003), Maxwell and Rao (2003), Billett et al. (2004), and Cremers et al. (2007). However, LBBD is not available for recent research period and only provide monthly bond price. Moreover, LBBD provide matrix price which is matching from the quote price of similar bond characteristics if the quote price of bond is not available.

[17] The results of monthly acquirer abnormal bond returns are mixed during mergers. A negative wealth effect is shown in Dennis and McConnell (1986) and Billett et al. (2004), a positive wealth effect is shown in Eger (1983) and Maquieira et al. (1998), and an insignificant effect is shown in Kim and McConnell (1977) and Asquith and Kim (1982).

and covers all publicly traded corporate bonds after February 2005. Since the bond price data in TRACE prior February 2005 is not complete, following Lin, Wang, and Wu (2011), Jostova, Nikolova, Philipov, and Stahel (2013), and De Franco, Vasvari, Vyas, and Wittenberg-Moerman (2013), we complement the bond transactions data by National Association of Insurance Commissioners (NAIC) database from 1994. Static bond characteristics and bond ratings are obtained from Mergent Fixed Income Securities Database (FISD). Following Bessembinder et al. (2009), we eliminate puttable bonds because bondholders have the right to repay the principle before the maturity date. We also exclude zero-coupon bonds which are particularly sensitive to changes in interest rate and act more like stocks.

The measure of options-based CEO overconfidence and CEO characteristics data are retrieved from Standard and Poor's Executive Compensation Database (Execucomp). Corporate governance data are from Institutional Shareholder Services (ISS) database. To expand the available bond return observations, we fill the missing CEO's option exercise and governance information by hand-collect.[18] All accounting data is collected from Compustat database.

1.2 Measuring Abnormal Bond Returns

We follow Bessembinder et al. (2009)'s method to construct daily bond returns. The daily bond return is the combination of capital gain, the change in market value of the bond, and coupon payment. The bond price quoted on TRACE is clean price which separate out the effect of coupon payments. The clean price must be added accrued interest to be the dirty price which reflect the real price paid when settlement. We drop cancelled, corrected, and commission trades in order to make sure not existing any problematic trades. We also delete all trades under $100,000 because they have a strong probability for not trading by

[18] We collect the data from firm's proxy statement (form DEF 14A) on Securities and Exchange Commission (SEC)'s Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system.

institutional firms. Daily prices are calculated by weighting each intraday transaction by its trading volume. The formula is as follows:

$$Ret_{t-1,t} = \frac{P_t + AI_t + Coupon_t}{P_{t-1} + AI_{t-1}} - 1, \quad (1)$$

where $Ret_{t-1,t}$ is daily bond return from day $t-1$ to day t, P_t is clean price on the valuation day t, AI_t is accrued interest on the valuation day t, and $Coupon_t$ is coupon payment on the valuation day t. Following Bessembinder et al. (2009), we eliminate the absolute bond return is greater than 20% because of extreme trades.

We calculate abnormal bond returns using the matching portfolio model. We formed the value-weighted index portfolios which can be regarded as the expected daily bond returns. They are developed by matching eight major categories of Moody's rating (Aaa, Aa, A, Baa, Ba, B, CCC, and C) to control default risk and weighted by their bond sizes for each date. Because the index return should be formed by most liquid bonds, we retrieve the price data on two continuous trading days (Bessembinder et al., 2009). The daily abnormal bond return adjusted by risk, then, is estimated as follows:

$$AR_i = Ret_i - E(Ret_i), \quad (2)$$

where AR_i is daily abnormal bond return for each bond and $E(Ret_i)$ is index portfolio return through matching the same rating category.

Prior describing sampling construction of abnormal bond return is at the bond level. However, a firm would issue multiple bonds across year. We use value-weighted approach to form the abnormal bond return at the firm level for analysis:

$$AR_j = \sum_{i=1}^{n} AR_i \times w_i, \quad (3)$$

where AR_j is value-weighted abnormal bond return for each firm, n is the number of bonds for firm j, and w is the weight of the bond i which is market value of the bond i divided by total market value of bonds for firm j.

1.3 Measuring CEO Overconfidence

We estimate CEO overconfidence using the CEO's stock option exercising behaviors. The main idea comes from that once a CEO exhibits overconfidence on his/her operating ability, he/she would delay exercise his/her granted options even the options are in-the-money deeply (Malmendier and Tate, 2005, 2008). Based on the portfolio theory, rational CEOs should diversify their personal wealth on the firm they operated. Therefore, the explanation of such behavior can attribute to overconfidence of their talents.[19]

We use the procedures proposed by Campbell, Gallmeyer, Johnson, Rutherford, and Stanley (2011), which is a modified method based on Malmendier and Tate (2005, 2008) because we do not have the detailed option exercising information as them. First, we estimate the average option moneyness. The average value per option is computed from the value of exercisable unexercised options divided by the number of exercisable unexercised options. The average exercise price per option is the stock price at the fiscal year end minus the average value per option. Then, the percentage of average moneyness is estimated as the average value per option divided by the average exercise price per option.

We divided into three classifications of CEO overconfidence following Campbell et al. (2011). High overconfident CEOs are those who hold stock options more than 100% in the money and display the late exercise behavior at least twice during their tenure. When CEOs exhibit the behavior first time, we classify they are high overconfident CEOs. Conversely, low overconfident CEOs are defined as they excise options less than 30% in the money and do not have other exercisable options which are more than 30% in the money, and they exhibit the conservative behavior at least twice during their tenure. When CEOs display the behavior first time, we classify they are low overconfident CEOs. Moderate overconfident

[19] Except for overconfidence, Malmendier and Tate (2005, 2008), Campbell et al. (2011), Hirshleifer et al. (2012) show that the alternative explanations, including signaling, inside information, risk tolerance, tax reason, board pressure, and past performance, fail to fully explain the relation between CEOs' late option exercise behaviors and investment decisions.

CEOs are defined as they hold or exercise options with moneyness greater than 30% and less than 100%. Goel and Thakor (2008) and Campbell et al. (2011) show that overinvestment behaviors only exhibit in the group of high CEO overconfidence. Thus, consistent with Ho, Huang, Lin, and Yen (2016), the classification of high overconfident CEO is defined as the overconfident group to be presented in our paper, while the classifications of moderate and low overconfident CEOs are defined as the non-overconfident group.

1.4 Descriptive Statistics

Table 1 presents the descriptive statistics for variables of merger characteristics, acquirer firm characteristics, and acquirer CEO characteristics. The data are cross-sectional data and our final sample is composed of 365 observations during the period from 1994 to 2014. All variables are defined in Table A1.

[Insert Table 1 about here]

For merger characteristics, 53.4% of the biddings are paid by cash and the others are by stock or mix in our sample. Hostile attitude transactions are 0.8% and diversification acquisitions are 46% by 2-digit standard industrial classification (SIC) code on average. The average takeover premium over four weeks prior to the announcement date is 43.4% and overbidding acquisitions are about 22.5%. The average stock return correlation between acquirers and targets is positively correlated, 0.33, on average.

For firm characteristics, the average acquirers' stock return volatility is 20.83% and market leverage ratio is 0.27. The percentage of firms with efficient board size (the number of board members ranges from four to 12) and a majority of independent directors is 62.2% of our sample.[20] For CEO characteristics, 31.8% of our sample represents acquirers with overconfident CEOs. The average CEO age is 56.06. The average percentage of common stock outstanding held by the CEO is around 1.71%.

[20] This corporate governance measure is proposed by Kolasinski and Li (2013) which can mitigate the overinvestment problem of overconfident CEOs.

Consistent with findings of Hirshleifer et al. (2012), the untabulated results show that stock return volatility of overconfident acquirers (24.87%) is significantly higher than that of non-overconfident acquirers (18.95%) at the 1% level, indicating that overconfident acquirers experience higher pre-merger risk than non-overconfident acquirers. In addition, the average targets' stock return volatility selected by overconfident acquirers (39.74%) is also significantly greater than that by non-overconfident acquirers (35.09%). It implies overconfident acquirers are more likely to be a risk-lover to search for high-risk investment projects, consistent with the suggestion of Galasso and Simcoe (2011) and Hirshleifer et al. (2012). The average firm size of overconfident acquirers (9.88) is smaller than that of non-overconfident acquirers (10.50), consistent with Forbes (2005).[21] Consistent with Malmendier and Tate (2008) and Harford et al. (2012), the untabulated regression results show that overconfident acquirers are more likely to overbid and pay by cash.[22] All the descriptive statistics of variables in Table 1 are similar to those used in previous studies.

2. CEO Overconfidence and Bondholder Wealth Effect

2.1 Univariate Analysis

On one hand, overconfident CEOs prefer taking higher risk in investment projects to receive more profits (Galasso and Simcoe, 2011; Hirshleifer et al., 2012) and it could damage their bondholders' rights. On the other hand, they are more likely to do diversifying deals (Malmendier and Tate, 2008) and it could enhance the coinsurance effect to benefit their bondholders' wealth during mergers. Table 2 presents the univariate results for cumulative

[21] Forbes (2005) indicates that smaller firms which tend to rely more on CEOs' abilities themselves to probably experience cognitive biases, such as CEO overconfidence, because their resources are more likely to be insufficient in financial funds, human capital to delegate and audit, or corporate governance.

[22] We use the logistic regression model controlling firm and CEO characteristics, industry, and year fixed effects, as well as the standard errors adjusted for heteroscedasticity and clustered by firm. The dependent variables are dummies equal to one if *takeover premium* is higher than or equal to the top quantile and if the deal is cash-bid, respectively, and zero otherwise. Control variables are firm size (*Firm size*), market-to-book ratio (*M/B*), cash flows (*Cash flow*), cash ratio (*Cash*), market leverage ratio (*Leverage*), stock return volatility (*Volatility*), past performance (*Past stock return*), governance (*Siboard*), CEO age (*CEO age*), CEO age square (*CEO age2*), CEO gender (*CEO gender*) and CEO stock holding (*CEO ownership*). The coefficients of CEO overconfidence on overbidding and cash-bids are both significantly positive at the 5% level.

abnormal daily bond returns (CARs) of acquirers during different announcement periods of mergers for full sample, overconfident acquirers, and non-overconfident acquirers and the differences of means and medians between them. CAR (−1, 1) and CAR (−2, 2) are the sum of acquirer abnormal bond returns for the three-day period −1 and 1 and five-day period −2 and 2, respectively, where day 0 is the announcement date of merger.

[Insert Table 2 about here]

We find that the three-day and five-day bond CARs are significantly negative in means and medians in the whole sample except for the mean of CAR (−2, 2). The acquirer bondholders experience a significantly negative wealth effect of −0.15% on average during the three-day announcement period of mergers. The results of daily abnormal bond CARs during the merger announcement periods are consistent with Bessembinder et al. (2009) and Deng et al. (2013) which also use TRACE database to evaluate.

We then separate the sample into overconfident and non-overconfident acquirers to compare their bondholder wealth effects during mergers. We find that the three-day bond CARs for overconfident acquirers are significantly positive about 0.39% on average, while they are significantly negative about −0.40% for non-overconfident acquirers. The bond CARs for overconfident acquirers in means and medians of both windows are significantly positive except for the median of CAR (−1, 1), while they are all significantly negative for non-overconfident acquirers. Moreover, the differences between them are significant at the 1% level in means and medians.[23] The results suggest that, although the acquirer bondholders suffer losses during mergers overall, they experience positive wealth effect when it is announced by overconfident acquirers. Therefore, CEO overconfidence is an important trait for bidders to lead to benefit bondholders through making acquisition decisions.

[23] We also calculate CAR (−5, 5) and CAR (−10, 10), which are similar to the tabulated results. The overall bond returns are insignificantly negative. The overconfident acquirers experience significantly positive bond returns, the non-overconfident acquirers exhibit significantly negative bond returns, and all the differences are significant at the 1% level in means and medians.

2.2 Multivariate Regression Analysis

The econometric model for examining the influence of CEO overconfidence on the acquirer bondholder wealth during the announcement period of mergers is ordinary least-squares (OLS) regression model. The model is as follows:

$$CAR_{i,t} = \alpha_0 + \alpha_1 OC_{i,t-1} + \beta' Merger_{i,t} + \gamma' Firm_{i,t-1} + \delta' CEO_{i,t-1} + v_i + u_t + \varepsilon_{i,t}, \quad (4)$$

where i and t refer to acquirer and year, respectively. $CAR_{i,t}$ is the daily cumulated abnormal bond returns for acquirer i at time t. $OC_{i,t-1}$ is a dummy variable which takes the value of one if the CEO of acquirer i is identified as overconfident in year $t-1$, and zero otherwise. The control variables, following Bhojraj and Sengupta (2003), Billett et al. (2004), Klock, Mansi, and Maxwell (2005), Cremers, Nair, and Wei (2007), and Deng et al. (2013), include merger, firm, and CEO characteristics. $Merger_{i,t}$ refers to the merger characteristics for acquirer i in year t; $Firm_{i,t-1}$ and $CEO_{i,t-1}$ denote to the acquirer and CEO characteristics for acquirer i in year $t-1$, respectively. Merger characteristics contain relative size of the bidder and target (*Relative size*), merge types by cash or stock (*Cash bid*), hostile attitude of the transaction (*Hostile*), and diversification mergers (*Diversify*). Firm characteristics include firm size (*Firm size*), cash flows (*Cash flow*), cash ratio (*Cash*), market leverage (*Leverage*), return on asset (*ROA*), stock return volatility (*Volatility*), and past performance of the firm (*Past stock return*). We also control governance (*Siboard*) and corporate social responsibility (*CSR*), which are important determinants to impact acquisition decisions and bond returns.[24] CEO characteristics cover the CEO age (*CEO age*) and ownership (*CEO ownership*). All independent variables are measured at the beginning of the fiscal year. v_i and u_t are industry and year fixed effects, respectively; and $\varepsilon_{i,t}$ is the regression residual. The standard errors are

[24] In our robustness check, we also control external governance measures (Klock et al., 2005; Cremers et al., 2007). The sample size decreases when we include G-index or E-index (Gompers, Ishii, and Metrick, 2003; Bebchuk, Cohen, and Ferrell, 2009) in our regressions. The numbers of observations become 335 and 347, respectively. The coefficients of CEO overconfidence on the acquirer bondholder wealth are still significantly positive at least 5% level in all models. The results are similar to our main findings.

adjusted for heteroscedasticity and clustered by firm (Petersen, 2009). The detailed definitions are shown in the Table A1 of the Appendix.

Table 3 shows the multivariate regression results. The dependent variable is the cumulative abnormal bond returns of acquirers for the three-day period −1 and 1, CAR (−1, 1). *OC* is the variable of interest representing a dummy variable which equals to one if the acquirer has an overconfident CEO and zero otherwise. Model 1 only controls industry and year fixed effects. We then sequentially add controls with merge characteristics, acquirer firm characteristics, and CEO characteristics in Models 2, 3, and 4.

[Insert Table 3 about here]

We find that the coefficients of CEO overconfidence, *OC*, on the acquirer bondholder wealth are all positive at least 5% level of significance. The result implies that overconfident acquirers significantly enjoy higher abnormal bond returns than non-overconfident acquirers, about 0.51%-0.71%, when they make an acquisition. The influences of control variables are consistent with previous studies. Acquirer bondholders experience a higher wealth effect when relative size of the transaction value to the acquirer is smaller, implying the collateral effect is not supported in overall sample, consistent with findings of Billett et al. (2004). They also enjoy more benefits when their firm size is larger and leverage is lower. Moreover, the stock return volatility is positively related to bond returns, consistent with findings of Cremers et al. (2007).

Combining the univariate and regression analysis results together, they demonstrate the acquirer bondholders experience a significantly stronger positive wealth effect for overconfident acquirers during the announcement period of mergers. Although previous studies suggest CEO overconfidence damages the wealth of stockholders (Malmendier and Tate, 2008; Billett and Qian, 2008; Kolasinski and Li, 2013; Banerjee et al., 2015), we find it benefits that of bondholders during mergers.

2.3 Endogeneity

One may argue that because CEOs are not randomly appointed by firms, an endogeneity concern arises from the effect of CEO overconfidence on the acquirer bondholder wealth. For instance, acquirers with greater announcement returns are more likely to hire overconfident CEOs. However, as indicated by Deng et al. (2013), mergers are strategic investment activities which are largely unexpected and using merger announcement returns can partially mitigate this concern. Our results are unlikely driven by endogeneity concerns. Nevertheless, we deal with this problem by conducting two approaches to verify our results are robust to endogeneity: (1) propensity score matching (PSM) based on firm and/or CEO characteristics; and (2) difference-in-difference estimation through CEO switching.

2.3.1 Propensity Score Matching

The first way to deal with the endogeneity issue is PSM procedure which we employ to mitigate possible selection bias. It examines the differences of the acquirer bondholder wealth effect between overconfident acquirers (i.e., the treatment firms) and propensity score-matched non-overconfident acquirers (i.e., the control firms) when the merger is announced. We select the control firms with similar firm characteristics which have been documented for their significant relation between managerial overconfidence and acquisitions in recent academic literature as well as year and industry effects as the treatment firms to reduce endogeneity effect.

Four methods are employed to match the control firms to the treatment firms following Cremers, Litov, and Sepe (2017). First, we apply one-to-one propensity score matching method using the logistic model. Following the firm characteristics used in Malmendier and Tate (2005, 2008), Goel and Thakor (2008), Billett and Qian (2008), Galasso and Simcoe (2011), Malmendier et al. (2011), Campbell et al. (2011), Hirshleifer et al. (2012), Kolasinski and Li (2013), and Banerjee et al., (2015), the control sample is randomly matched the characteristics of one overconfident acquirer to one non-overconfident acquirer. We start from logistic regressions of CEO overconfidence on three different groups of firm and/or CEO

characteristics to estimate propensity score and construct our matching sample.[25] We then match non-overconfident acquirers with overconfident acquirers by minimizing the difference of absolute value of propensity scores between them. The second approach is that we include propensity score matching method using the Cox proportional hazard model controlling main characteristics, namely, firm size, M/B, R&D, and industry fixed effects. Third, we employ nearest-neighbor matching method (Heckman, Ichimura, and Todd, 1997; Abadie and Imbens, 2006) using main characteristics, year and industry fixed effects. Finally, we use radius matching method, which treatment firms are matched to one or more control firms, with a caliper of 0.15 (Dehejia and Wahba, 2002).[26] Propensity score is estimated the same as the first method with full control variables.

[Insert Table 4 about here]

For samples of all four matching methods shown in Table 4, the results of treatment and control sample are similar to the results reported in Table 2. We find a significantly positive bondholder wealth effect exhibits for overconfident acquirers, while a significantly negative effect is for their matched non-overconfident acquirers. All the differences of acquirer bond returns between treatment and control firms are significant at the 1% level. Thus, the results confirm again that CEO overconfidence effect remains significantly positive affecting the acquirer bondholder wealth across all matching procedures.

2.3.2 CEO switches

The other way to mitigate the endogeneity concern is using CEO turnover as the quasi-exogenous event. Following Galasso and Simcoe (2011), we examine a within-firm analysis of treatment effects before and after CEO changes to confirm that the CEO overconfidence effect on acquirer bondholder wealth in a firm is still positively significant. It is the method

[25] Three different firm and/or CEO characteristics are as follows: (1) firm size, year, and industry fixed effects; (2) firm size, M/B, Leverage, Capital expenditure, R&D, Siboard, and year and industry fixed effects; and (3) firm size, M/B, Leverage, Capital expenditure, R&D, Siboard, CEO equity incentive, CEO gender, CEO age, CEO tenure, CEO ownership, and year and industry fixed effects.

[26] We also use 0.1 as a caliper for radius matching method and the results are similar.

similar to difference-in-difference estimation to compare the change in acquirer bondholder wealth between controlling CEO type switches or not.

[Insert Table 5 about here]

Table 5 presents estimation results. In Panel A, our treated sample is a CEO who was non-overconfident (overconfident) before the switch and then replaced by an overconfident (non-overconfident) CEO, while the control sample is a non-overconfident (overconfident) CEO was replaced by a non-overconfident (overconfident) CEO. The results shows that the acquirer bondholder wealth is higher (lower) for firms with new overconfident CEOs (new non-overconfident CEOs) than those with new non-overconfident CEOs (new overconfident CEOs), i.e. 0.695% (−0.858%). Moreover, the difference-in-differences in the acquirer bondholder wealth comparing the CEO switching group to CEO non-switching group are both significant.

Panel B of Table 5 presents regression results. Following Galasso and Simcoe (2011), we include firm and year fixed effects, but drop all controls. The dependent variable is the three-day abnormal bond returns of acquirers, CAR (−1, 1). *Before switch* is a dummy equals to one for the sample which the year period is prior to a change of CEO, and zero otherwise. *Before switch & Treated* is a dummy equals to one if the firm is in treated sample and the year period is prior to a change of CEO, and zero otherwise. In Models 1 and 2, we find that the acquirer bondholder wealth increases significantly after hiring an overconfident CEO. Moreover, there is no evidence to show that the acquirer bondholder wealth is different between treatment and control firms before CEO switches, implying that the bond performance is not the determinant for firms to decide to dismiss a non-overconfident CEO and replace an overconfident CEO. Likewise, the results in Models 3 and 4 are similar as previous two models. Thus, the CEO overconfidence effect on acquirer bondholder wealth is robust to an endogeneity problem.

3. The Channels of CEO Overconfidence and Bondholder Wealth Effect

In this section, we investigate target selection preference related to the coinsurance effect for overconfident acquirers in the beginning. It is the foundation to explain why bondholders with overconfident acquirers experience a significantly positive wealth effect during the announcement period of mergers. We then discuss the specific determinants which are derived from the behaviors of overconfident CEOs to affect the cross-sectional variation of acquirer bond returns during mergers.

3.1 CEO Overconfidence and Target Selection

We follow the methodology proposed by Albuquerque et al. (2013) in spirit to design our pre-merger target selection model.[27] They examine the CEO's peer pay effect by peer selection model and the sample includes potential peers and selected peers. Therefore, we form a pool data of potential target candidates from 365 acquisitions. For each acquisition deal, all public firms with non-missing stock returns in the same industry as the target are defined as the potential target candidates. Firms with the same 2-digit or 3-digit SIC code as targets are candidates to be merged together.[28] The data are cross-sectional data and final sample is composed of 114,897 observations for the same 2-digit SIC code as targets and 66,088 observations for the same 3-digit SIC code. We conduct the logistic regression model controlling firm and CEO characteristics, industry and year fixed effects, and the standard errors adjusted for heteroscedasticity and clustered by firm. The logistic model is as follows:

$$P\left(D_{i,t}=1\middle|OC_{i,t},Target_{i,t},Firm_{i,t-1},CEO_{i,t-1}\right)=$$

$$L(\alpha_0+\alpha_1 OC_{i,t}+\alpha_2 Target_{i,t}+\alpha_3 OC_{i,t}\times Target_{i,t}+\gamma' Firm_{i,t-1}+\delta' CEO_{i,t-1}+v_i+u_t+\varepsilon_{i,t}), \quad (5)$$

where *i* and *t* refer to acquirer and year, respectively. The dependent variable, $D_{i,t}$, is the characteristic of target selection preference of acquirer *i* in year *t*. $Target_{i,t}$ is a dummy equals to one if the firm is selected to be a target by acquirer *i* in year *t* and zero otherwise. $OC_{i,t}$ is a

[27] We also conduct traditional post-merger target selection model. The results are robust and shown in Section 4.1.

[28] We also replicate this test by selecting potential target candidates with the same 4-digit SIC codes as robustness. The sample is composed of 31,010 observations. We find that the results are similar as the findings of potential target candidates defined as 2-digit and 3-digit SIC code as targets.

dummy equals to one if acquirer *i* has an overconfident CEO in year *t*, following the definition of Campbell et al. (2011), and zero otherwise. We include control variables identified by relevant literature such as Malmendier and Tate (2008), Ferris, Jayaraman, and Sabherwal (2013), and Bernile, Bhagwat, and Rau (2017) as factors to influence merger decisions. $Firm_{i,t-1}$ controls bidder characteristics for acquirer *i* in year *t*−1, such as firm size (*Firm size*), cash flows (*Cash flow*), cash ratio (*Cash*), market leverage (*Leverage*), stock return volatility (*Volatility*), past performance (*Past stock return*), and governance (*Siboard*). $CEO_{i,t-1}$ controls the bidder CEO's characteristics for acquirer *i* in year *t*−1, CEO gender (*CEO gender*), age (*CEO age*), age square ($CEO\ age^2$), and stock holding (*CEO ownership*). v_i, u_t, and $\varepsilon_{i,t}$ capture industry, year fixed effects, and regression residual, respectively.

3.1.1 Correlation between Acquirer and Target

Malmendier and Tate (2008) suggest that overconfident CEOs are more likely to do diversifying deals than within-industry mergers. Thus, it would exhibit lower cash flow correlation between acquirers and targets from diversifying mergers. We use the stock return correlation between acquires and targets to proxy cash flow correlation and measure the degree of risk diversification. The dependent variables are dummies of stock return correlations between acquires and potential target candidates which are firms in the same industry, i.e. firms with the same 2-digit (3-digit) SIC code, as targets. They equal to one if the return correlation between acquirers and targets is lower than or equal to the bottom quantile from each acquisition in Models 1 and 2 (Models 5 and 6) and lower than or equal to zero in Models 3 and 4 (Models 7 and 8), respectively, and zero otherwise. We expect overconfident acquirers are more likely to select targets with low cash flow correlation with them and, thus, the interaction term of $OC \times Target$ is expected to be positive.

[Insert Table 6 about here]

Table 6 reports the results of target correlation preference chosen by overconfident acquirers. We observe that the coefficients of *Target* are significantly negative because most

deals are within-industry mergers and their cash flows are more correlated. The coefficients of interaction terms, *OC* × *Target*, in all models are significantly positive at the 5% level. The results imply that overconfident acquirers have a significantly higher propensity to select a lower stock return correlation or a negative correlation target with them. These are consistent with the findings of Malmendier and Tate (2008) that overconfident CEOs are more likely to conduct diversifying mergers. Also, they are economically significant that the probability of selecting a low stock return correlation target is about 2.08 ($=e^{0.731}$) or 2.16 ($=e^{0.772}$) times higher for overconfident acquirers as compared to non-overconfident acquirers. The probability to choose a negative correlation target for them is much higher, about 2.38 ($=e^{0.868}$) or 2.48 ($=e^{0.909}$) times. Such imperfectly cash flow correlation between bidders and targets can decline risk and decrease default probability for both of them after mergers, which is the coinsurance effect (Lewellen, 1971; Higgins and Schall, 1975; Galai and Masulis, 1976; Scott, 1977).

3.1.2 Relative Risk between Acquirer and Target

In mergers, the coinsurance effect comes from not only imperfectly correlated cash flows between bidders and targets, but risk decreases comparing the firm's risk level from pre-merger to post-merger (Shastri, 1990; Billett et al., 2004). The relative risk between acquirers and targets could affect the acquirer bondholder wealth during mergers. Therefore, in this subsection, we examine whether overconfident acquirers are more likely to select targets with lower risk than themselves. When they encounter the target with lower pre-merger risk than themselves, the post-merger risk exposure for the combined firm would decline through the coinsurance effect. Such risk reduction is beneficial to acquirer bondholders and thus their wealth effect would be positive (Shastri, 1990; Billett et al., 2004).

We use stock return volatility to proxy firm risk. The dependent variables are two kinds of relative risk measures, *Relative volatility* and *Volatility difference*, comparing and evaluating the change of firm risk between pre-merger and post-merger for acquirers. The

dummy of *Relative volatility* equals to one if the acquirer volatility is greater than or equal to combined volatility, the value-weighted average of the acquirer and target volatility, and zero otherwise. When *Relative volatility* equals to one, it implies the acquirer's pre-merger firm risk is higher than post-merger risk and a decrease in firm risk arises after the acquisition. *Volatility difference* is the acquirer volatility minus combined volatility. The dummy of *High volatility difference* equals to one if *Volatility difference* is greater than or equal to the top quantile from each acquisition, and zero otherwise. The higher the stock return volatility difference means the risk reduction effect from mergers would be stronger. Definitions of others variables are the same as Table 6. The control variables we included are identical with Table 6 for the correlation between acquirers and targets and the risk change between pre-merger and post-merger are both proxies to measure the degree of risk decreases from mergers.

[Insert Table 7 about here]

The results are shown in Table 7. If the interaction term of *OC* × *Target* is positive, overconfident acquirers are more likely to merge targets with lower risk than themselves which strengthens the coinsurance effect. We demonstrate that the coefficients of interaction terms are positive but not significant in all models. They imply the tendency of merging lower risk targets than themselves or greater risk difference between bidders and combined firms is not significantly higher for overconfident acquirers. Moreover, we examine financial and asset risk using the selection model. We apply market leverage to proxy financial risk and unlevered stock return volatility to proxy asset risk (Billett et al., 2004).[29] The unreported results are similar as those of firm risk and still not significant in all models. Therefore, although overconfident CEOs are more likely to undertake risky projects to choose a high-risk target (Galasso and Simcoe, 2011, Hirshleifer et al., 2012), we do not find

[29] An unlevered stock return is calculated as a monthly stock return multiplies one minus the leverage ratio. Unlevered stock return volatility is calculated as the rolling standard deviation of 24-month unlevered stock returns.

evidence that overconfident acquirers have more preference to select targets with lower firm risk, financial risk, or asset risk than themselves when they make an acquisition. It would be caused by their pre-merger risk exposure is also greater than non-overconfident acquirers (Galasso and Simcoe, 2011, Hirshleifer et al., 2012).

In summary, both correlation and relative risk effect can strengthen coinsurance to benefit bondholders. We demonstrate that overconfident acquirers prefer choosing low correlation targets with them, but do not select lower risk targets than them. The former, correlation effect, leads their bondholders to enjoy stronger coinsurance effect, while the latter, relative risk effect, does not. The findings provide an explanation for why the significant differences of bondholder wealth effect exist between overconfident and non-overconfident acquirers during mergers.

3.2 The Channels

We then explore determinants for the CEO overconfidence effect on acquirer bondholder wealth during mergers. We apply the multivariate cross-sectional regression model conditional on merger, firm, and CEO characteristics. We also control industry and year fixed effects, as well as the standard errors adjusted for heteroscedasticity and clustered by firm. The model is as follows:

$$CAR_{i,t} = \alpha_0 + \alpha_1 OC_{i,t-1} + \alpha_2 D_{i,t-1} + \alpha_3 OC_{i,t-1} \times D_{i,t-1} + \beta' Merger_{i,t} + \gamma' Firm_{i,t-1} + \delta' CEO_{i,t-1} + v_i + u_t + \varepsilon_{i,t}, \quad (6)$$

where i and t refer to acquirer and year, respectively. $CAR_{i,t}$ is the daily cumulated abnormal bond returns for acquirer i at time t. $OC_{i,t-1}$ is a dummy variable which takes the value of one if the CEO of acquirer i is identified as overconfident in year $t-1$, and zero otherwise. $D_{i,t-1}$ represents the factors which affect acquirer i's abnormal bond returns in year $t-1$. The detailed definitions of these determinants are discussed in the following subsections. $Merger_{i,t}$, $Firm_{i,t-1}$, and $CEO_{i,t-1}$ denotes to merger, acquirer, and CEO characteristics of acquirer i in year t or $t-1$ as our control variables. All definitions are the same as Equation 4. v_i and u_t are

industry and year fixed effects, respectively. $\varepsilon_{i,t}$ is the regression residual.

3.2.1 Coinsurance Effect

The coinsurance effect hypothesis is derived from Malmendier and Tate (2008) and our previous finding that diversifying mergers and low cash flow correlation targets with acquirers are more likely to be targeted by overconfident acquirers. Imperfect cash flow correlation between acquirers and targets would result in strengthening the coinsurance effect to benefit acquirer bondholders from risk decreases. We use stock return correlation between acquirers and targets to proxy the coinsurance effect. The dummies of *Low return correlation* in Model 1 and *Negative return correlation* in Model 2 equal to one if *Return correlation* is less than or equal to the bottom quantile and zero, respectively, and zero otherwise.

[Insert Table 8 about here]

The results are presented in Table 8. The coefficients on interaction terms of CEO overconfidence and correlation measures, *OC* × *Low return correlation* and *OC* × *Negative return correlation*, are both significantly positive, supporting our hypothesis. The numbers in coefficients reveal economically significant effects that overconfident acquirers, on average, experience a 1.01% or 1.32% higher abnormal bond return than rational acquirers when they select a low or negative return correlation target to merge.[30] The results provide evidence that bondholders with overconfident acquirers can enjoy a higher wealth effect and stronger coinsurance effect than non-overconfident acquirers. It is due to the coinsurance effect should be more pronounced for high pre-merger risk acquirers, such as overconfident firms, and their bondholders exhibit greater sensitivity on risk reduction. Therefore, the coinsurance effect is an important determinant to influence CEO overconfidence on the acquirer bondholder wealth.

3.2.2 Alternative Explanation: Liquidity Effect

[30] The results are similar when we also include G-index or E-index (Gompers et al., 2003; Bebchuk et al., 2009) as control variable to proxy external governance (Klock et al., 2005; Cremers et al., 2007).

Besides preferring merging a target with low correlation between bidders and targets, the bondholder wealth effect might be driven by other overconfident acquirers' characteristics in merger decisions, such as overbidding or preferring using cash-bid.

Overconfident CEOs tend to overbid in merger bids (Malmendier and Tate, 2008; Harford et al., 2012). It causes firms to face higher acquisition cost. In addition, they are more likely to use cash-bid than stock-bid or mix payment method (Malmendier and Tate, 2008). Both paying too much and payment by cash would reduce cash available to meet the debt obligations and hurt the creditor's rights. These acquisition preferences are closely linked to the level of firm's liquidity and default probability. Therefore, we hypothesize that the negative bondholder wealth effects for overconfident acquirers are stronger when they overpay and use cash-bid during mergers.

When overbidding is appeared, the target's shareholders would experience higher acquisition gains, but otherwise the acquirer's shareholders would have worse return reactions (Niden, 1993; Harford et al., 2012). We follow the above descriptions to construct an overbidding proxy (*Overbid*) which is a dummy equals to one if the acquirer's stock return reaction is less than or equal to the median and the target's is more than or equal to the median. The other overpayment measure is takeover premium (*Takeover premium*) from SDC database. For the payment types, we include the percentage of paying cash in biddings (*Percentage of cash*) and a dummy variable, *Cash bid*, which equals to one if the payment type of the offer is cash only.

[Insert Table 9 about here]

The results of CEO overconfidence and overbidding on the acquirer bondholder wealth are mix and reported in Models 1 and 2 of Table 9. The coefficients on *OC* × *Overbid* and *OC* × *Takeover premium* are significantly negative and insignificantly positive, respectively. They weakly imply, when overconfident acquirers make serious overpayment deals, their bondholders' wealth damages more than non-overconfident acquirers because of the liquidity

effect. For the cash-bidding, the results are presented in Models 3 and 4 of Table 9. We find that the coefficients on interaction terms are both significantly negative, consistent with our liquidity hypothesis. As cash-biddings are executed, acquirers must pay by cash or raising loans. They lead to decline the level of cash holdings or increase financial leverage to expose higher default probability for firms. We suggest the negative bondholder wealth effect for overconfident acquirers is stronger when they use cash-bids during mergers. Therefore, the liquidity effect is a vital determinant to result to a more negative bondholder wealth effect for overconfident bidders.

We then include both effects (i.e. the coinsurance and liquidity effects) in the model simultaneously to compare which effects are dominant for the trait of CEO overconfidence on acquirer bondholder wealth during mergers. The results are shown in Table 10. All definitions of variables are the same as Tables 8 and 9.

[Insert Table 10 about here]

For the positive wealth effect, the coefficients on *OC* × *Low return correlation* and *OC* × *Negative return correlation* are significantly positive. They are similar to the previous findings. Bondholders with overconfident acquirers enjoy stronger positive wealth effects from coinsurance. For the negative wealth effect, the results are changed. Although the coefficients on interaction of CEO overconfidence and two liquidity measures, *OC* × *Overbid* and *OC* × *Cash bid*, are still negative, both of them become not significant. Overconfident acquirer bondholders do not suffer significant damages from overbidding and cash-bids after considering the coinsurance effect. Overall, the results imply that the positive coinsurance wealth effect dominate the negative liquidity wealth effect for overconfident acquirers, consistent with our previous findings that the bond market views positive premiums for the group of overconfident acquirers during mergers.

4. Robustness Tests

4.1 Target Selection Preference

A potential concern about the methodology of our target selection model which follows Albuquerque et al. (2013) in spirit is ex ante analysis. We consider all the potential firms to be targeted during the selection period of mergers and investigate the acquirer's choosing preference. In Table 11, we apply the traditional ex post methodology using 365 observations of merger events. The dependent variables in Models 1 and 2 are the stock return correlation between acquirers and targets using OLS regression model. Those in Models 3 to 6 are dummies equal to one if the return correlation is lower than or equal to zero, and zero otherwise, using OLS (Models 3 and 4) and logistic (Models 5 and 6) regression models. The control variables are the same as Table 6. Industry and year fixed effects and the standard errors adjusted for heteroscedasticity and clustered by firm are also included.

[Insert Table 11 about here]

In Models 1 and 2 of Table 11, we find that CEO overconfidence and stock return correlation between acquirers and targets is negatively correlated, implying that overconfident acquirers tend to select a lower correlation target with them. In the rest models of Table 11, the coefficients of *OC* are all significantly positive at least 5% level, indicating that targets with negative return correlation are more likely to be chosen by overconfident acquirers. The results are similar to our prior findings in Table 6. As a result, we demonstrate again that the coinsurance effect by risk reduction should be stronger for overconfident acquirers.

4.2 Sample Selection Bias

A concern for our examinations is that our sample only includes firms with corporate bond returns, but the bond transactions are not frequent as stock. In addition, the characteristics of bond issuing firms would differ from firms without issuing bonds. Our results may suffer the potential sample selection bias. We follow Chen (2012) to use the Heckman's two-step selection model to mitigate this problem. In the first step, we apply all the S&P 1500 firms which make an acquisition during our sample period. We then use firm

age as the instrument to reflect the capacity to issue corporate bonds. We control firm characteristics, namely, firm size (*Firm size*), B/M (*B/M*), return on asset (*ROA*), market leverage (*Leverage*), stock return volatility (*Volatility*), and corporate governance (*Siboard*), and year and industry fixed effects. The inverse Mills ratio (*Lambda*) is calculated from the first step regression. In the second step, the dependent variable is the three-day cumulative abnormal bond returns of acquirers. We include *Lambda* in all our main regressions to control any potential sample selection bias. The definitions of all main and control variables are the same as Tables 8 and 9.

[Insert Table 12 about here]

Table 12 summarizes all specifications of this study regarding the acquirer bondholder wealth effect with correcting sample selection bias. Panel A indicates CEO overconfidence effect. We find that the CEO overconfidence effect is still significantly positive at least 5% level on acquirer bond returns after controlling sample selection bias. Panels B presents the effect of CEO overconfidence interacted with coinsurance and liquidity measures. All results are similar as previous main findings. Thus, after controlling sample selection bias, the coinsurance and liquidity effects are two still significant channels to impact the wealth of overconfident acquirer bondholders. We manifest again that overconfident acquirer bondholders experience a significant stronger positive wealth effect from coinsurance increases and negative wealth effect from firm liquidity reductions.

4.3 Alternative Measure of Abnormal Bond Returns

A concern about the measure of abnormal bond returns, the cumulative abnormal bond returns of acquirers for the three-day period −1 and 1, CAR (−1, 1), is not robust for our analysis. One way to solve this problem is to include alternative announcement periods of acquirer abnormal bond returns, CAR (−2, 2), CAR (−5, 5), and CAR (−10, 10), as the dependent variables in all our specifications. As univariate results shown in Table 2, unreported results show that the acquirer bondholder wealth effect using five-day, 11-day, and

21-day period abnormal bond returns is similar to that using three-day period, so are the results in the regression models. The bondholders enjoy higher premiums when overconfident acquirers announce mergers. Moreover, the results of CEO overconfidence interacted with channels on CAR (−2, 2), CAR (−5, 5), and CAR (−10, 10) are also qualitatively similar to those on CAR (−1, 1) in the main models.

4.4 Alternative Measure of CEO Overconfidence

To ensure our results are robust to different definition of overconfidence, we construct an alternative measure. Following Hirshleifer et al. (2012), we define a confidence variable, *Holder67*, which equals to one if overconfident CEOs hold or exercise options with moneyness greater than 67%. This variable is created by the idea from Malmendier and Tate (2008) using publicly option data. The results (unreported for brevity) are similarly robust if we use *Holder67* instead as our overconfidence measure.

5. Conclusion

Early studies suggest that mergers and acquisitions can bring coinsurance effects to benefit bondholders from two imperfect cash-flow correlated firms combined, while recent literature recognizes bondholders cannot obtain wealth or even suffer losses from mergers. Our study examines the CEO overconfidence effect of acquisition announcements on the acquirer bondholder wealth. We document that a negative market reaction for acquirers' daily abnormal bond returns during mergers is shown in our whole sample. However, we find that acquirer bondholders exhibit a significantly positive wealth effect when overconfident acquirers announce an acquisition, while they suffer a significant bond return decrease when the acquisition is announced by non-overconfident acquirers. These results suggest that the trait of CEO overconfidence benefits the acquirer bondholder wealth during mergers.

Based on Malmendier and Tate (2008) showing that overconfident CEOs prefer making diversifying mergers, we find that they are more likely to select targets with low or negative correlation between acquirers and targets. It provides an explanation for why overconfident

acquirers would enjoy higher coinsurance effect from risk reduction during mergers to lead to experience greater bondholder wealth.

We then discuss the channels of CEO overconfidence on the acquirer bondholder wealth effects during mergers from two perspectives, coinsurance and liquidity effects. The coinsurance effect is stronger for diversified firms because of low cross-segment correlations (Hann et al., 2013; Franco et al. 2015). For overconfident CEOs tend to undertake diversifying mergers (Malmendier and Tate, 2008) and select targets with low cash flow correlation between acquirers and targets (our suggestion), we find that their bondholders experience stronger positive wealth effects when they merge targets with lower or negative stock return correlation. Therefore, we suggest that the coinsurance effect is stronger for bondholders with overconfident acquirers to lead to be more favorable for them.

Overconfident CEOs are more likely to overbid and prefer using cash-bids (Malmendier and Tate, 2008; Harford et al., 2012). Both overpayment and cash-bids reduce cash available, increase the probability of financial deficit, and decrease the firm's liquidity. We find that bondholders with overconfident acquirers experience a stronger negative wealth effect from a decrease of firm liquidity through overbidding or cash-bids.

To conclude, we indicate that overconfident acquirers prefer selecting targets with low correlation with them to lead to have stronger coinsurance effect for bondholders. Based on these results, our study provides evidence that a positive bondholder wealth effect is stronger for overconfident acquirers from coinsurance increases, while a negative wealth effect is stronger from firm liquidity reduction. Overall, we suggest the coinsurance effect dominants the liquidity effect to result in higher bondholders' wealth for overconfident acquirers. Although the characteristics of CEO overconfidence damage shareholders' wealth of bidders deeply, it brings a bright-side view to bondholders during mergers.

Appendix

Table A1 Variable Definitions

Below is a detailed description of the definition of all the variables used in this study.

Variable	Definitions
Panel A: M&A Characteristics	
Cash bid	Cash bid is a dummy variable which equals to one if the payment type of the offer is cash and zero if the payment type is stock or mix.
Percentage of cash	Percentage of cash is calculated as the offer is paid by cash divided by the bidding amount.
Hostile	Hostile is a dummy variable which equals to one if the offer is hostile and zero otherwise.
Diversify	Diversify is a dummy variable which equals to one if acquirer and target have different 2-digit SIC code and zero otherwise.
Relative size	Relative size is the deal value of transaction reported in SDC to acquirer market value of equity (*ME*).
Overbid	Overbid is a dummy variable which equals to one if acquirer *Stock CAR* (−5, 5) is less than or equal to the median and target *Stock CAR* (−5, 5) is more than or equal to the median, and zero otherwise.
Takeover premium	The data of takeover premium is from SDC database, which is calculated as the percentage of offer price divided by target closing stock price four weeks prior to the announcement date minus one.
Return correlation	Return correlation is the correlation coefficient of monthly stock returns between the acquirer and the target over the five-year period prior to the merger.
Panel B: Firm characteristics	
Firm size	Firm size is the logarithm of total asset.
M/B	Market-to-book ratio is calculated as market value of equity divided by book value of equity.
Cash flow	Cash flow is calculated as earnings before extraordinary items plus depreciation divided by total asset.
Cash	Cash ratio is calculated as cash and equivalents divided by total asset.
ROA	Return on asset is calculated as the ratio of net income to total assets.
Volatility	Annualized stock return volatility which is calculated as the rolling standard deviation of prior 24 monthly stock returns.
Leverage	Market leverage is calculated as the sum of current liabilities and long-term debt divided to the sum of the numerator and market value of equity.
PPENT	PPENT is the net property, plant, and equipment.
Stock CAR (−5, 5)	The abnormal stock return is the daily stock return of the firm minus the value-weighted CRSP index. Cumulative abnormal stock return is summed up 11-day-period abnormal stock returns during the announcement window of the merger, day −5 to 5.
Past stock return	Past stock return is the cumulative monthly stock return from month −2 to −1 before the announcement month of the merger.
Siboard	Siboard is a dummy variable which equals to one if the board has a majority of independent directors and the board size ranges from four to 12.
CSR	The sum of the strength of community activities, corporate governance, diversity, employee relations, environmental record, human rights, and product quality and safety, then minus the sum of the concern of them.
Capital expenditure	Capital expenditure ratio is calculated as capital expenditure divided by property, plant, and equipment.
R&D	R&D ratio is calculated as R&D divided by total assets.
Panel C: CEO Characteristics	
OC	CEO overconfidence is a dummy variable which equals to one if the firm has an overconfident CEO and zero otherwise. Following Campbell et al. (2011), overconfident CEOs are those who hold stock options more than 100% in the money at least twice during their tenure. We classify they are overconfident CEOs when they exhibit the behavior first time.
CEO age	CEO age is the age of CEO.
CEO gender	The dummy of CEO gender equals to one if the CEO is a male, and zero if the CEO is a female.
CEO ownership	CEO ownership is calculated as the percentage of common stock outstanding held by the CEO at the fiscal year-end.

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Table 1 Descriptive Statistics

The table contains 365 acquisitions during the period 1994 to 2014 and reports descriptive statistics of mean, median, standard deviation, and sample size for merger characteristics, acquirer firm characteristics, and acquirer CEO characteristics, respectively. All variables are defined in Table A1.

	Mean	Median	Std	N
Merger Characteristics				
Cash bid	0.534	1.000	0.500	365
Hostile	0.008	0.000	0.090	365
Diversify	0.460	0.000	0.499	365
Return correlation	0.328	0.351	0.236	363
Overbid	0.225	0.000	0.418	365
Takeover premium (%)	43.375	34.815	44.864	338
Relative size	0.209	0.037	0.396	365
Firm Characteristics				
Firm size	10.301	10.266	1.498	365
M/B	1.903	1.516	1.397	365
Volatility (%)	20.833	17.618	13.699	365
Leverage	0.269	0.184	0.226	365
Cash	0.130	0.088	0.122	365
Cash flow	0.092	0.097	0.072	365
ROA	0.059	0.054	0.066	365
Past stock return (%)	2.948	2.470	12.369	365
CSR	2.499	2.000	4.401	365
Siboard	0.622	1.000	0.486	365
CEO Characteristics				
OC	0.318	0.000	0.466	365
CEO age	56.058	56.000	5.809	365
CEO gender	0.981	1.000	0.137	365
CEO ownership (%)	1.713	0.328	5.578	365

Table 2 Acquirer Abnormal Bond Returns for Full sample, Overconfident Acquirers, and non-Overconfident Acquirers

This table reports the daily cumulative abnormal bond returns (CARs) of acquirers around the announcement date of merger for full sample, firms with overconfident CEOs and non-overconfident CEOs, and the difference. Abnormal bond returns are calculated as the bond observed return minus the index portfolio return using matching portfolio model. The index portfolio return is estimated by matching eight major categories of Moody's rating (Aaa, Aa, A, Baa, Ba, B, CCC, and C) and weighted by bond sizes for each date. CAR (−1, 1) and CAR(−2, 2) are the sum of abnormal bond returns of acquirers for the three-day period −1 and 1 and five-day period −2 and 2, respectively, where day 0 is the announcement date of merger. *, **, and *** denote statistical significance of the coefficients based on two-sided tests at the 10%, 5%, and 1% level, respectively.

		Overall (N=365)	Overconfident CEO (N=116)	non-Overconfident CEO (N=249)	Difference
CAR (−1, 1)	Mean	−0.148 *	0.389 **	−0.398 ***	0.787 ***
	Median	−0.085 ***	0.115	−0.129 ***	0.244 ***
CAR (−2, 2)	Mean	−0.128	0.457 ***	−0.401 ***	0.858 ***
	Median	−0.066 **	0.164 **	−0.236 ***	0.400 ***

Table 3 Regressions of CEO Overconfidence on Acquirer Abnormal Bond Returns

The dependent variable is the cumulative abnormal bond returns of acquirers for the three-day period −1 and 1, where day 0 is the announcement date of merger. All independent variables are defined in Table A1. Firm and CEO characteristics variables are measured at the beginning of the fiscal year. The dummies of two-digit SIC codes are included and used to control for industry fixed effects. The dummies of year variables are included to control for year fixed effects. The numbers in parentheses for regression models are *p*-values based on standard errors adjusted for heteroscedasticity and firm-level clustering. *, **, and *** denote statistical significance of the coefficients based on two-sided tests at the 10%, 5%, and 1% level, respectively.

	Models			
VARIABLES	(1)	(2)	(3)	(4)
OC	0.709***	0.658***	0.568***	0.511**
	(0.001)	(0.003)	(0.009)	(0.023)
Relative size		−0.883***	−0.617**	−0.614**
		(0.002)	(0.030)	(0.030)
Cash bid		−0.109	−0.061	−0.042
		(0.583)	(0.747)	(0.823)
Hostile		−0.011	−0.069	−0.063
		(0.983)	(0.898)	(0.911)
Diversify		0.256	0.236	0.203
		(0.215)	(0.245)	(0.326)
Firm size			0.210**	0.207**
			(0.030)	(0.036)
Cash flow			−1.477	−0.794
			(0.636)	(0.778)
Cash			−0.437	−0.642
			(0.552)	(0.412)
Leverage			−1.354*	−1.305*
			(0.071)	(0.075)
ROA			1.746	0.980
			(0.610)	(0.739)
Volatility			0.036**	0.035**
			(0.026)	(0.023)
Past stock return			−0.012	−0.012
			(0.141)	(0.153)
Siboard			0.202	0.177
			(0.315)	(0.367)
CSR			−0.012	−0.013
			(0.739)	(0.724)
CEO age				−0.005
				(0.741)
CEO ownership				0.021
				(0.198)
Constant	0.336	−0.173	−2.582**	−2.283*
	(0.718)	(0.793)	(0.032)	(0.078)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Observations	365	365	365	365
Adjusted R-squared	0.171	0.210	0.252	0.251

Table 4 Propensity Score Matching

This table reports univariate analysis of treatment effects and differences in the acquirer's abnormal bond returns between overconfident acquirers (the treated sample) and their matched non-overconfident acquirers (the control sample) using four methods. CAR (−1, 1) is the sum of abnormal bond returns of acquirers for the three-day period −1 and 1, where day 0 is the announcement date of merger. In Panel A, the control sample is randomly matched one overconfident acquirer to one non-overconfident acquirer using propensity score matching method. Propensity score is estimated as regressing logistic model of CEO overconfidence on three different groups of controls (G1, G2, and G3): firm size, year, and industry fixed effects; firm size, M/B, Leverage, Capital expenditure, R&D, Siboard, and year and industry fixed effects; firm size, M/B, Leverage, Capital expenditure, R&D, Siboard, CEO equity incentive, CEO gender, CEO age, CEO tenure, CEO ownership, and year and industry fixed effects. In Panel B, propensity score is estimated using the Cox proportional hazard model of CEO overconfidence on firm size, M/B, R&D, and industry fixed effects. In Panel C, we apply nearest-neighbor matching method of CEO overconfidence on firm size, M/B, R&D, and year and industry fixed effects. In Panel D, we use radius matching with a caliper of 0.1. Propensity score is estimated as regressing logistic model of CEO overconfidence on firm size, M/B, Leverage, Capital expenditure, R&D, Siboard, CEO equity incentive, CEO gender, CEO age, CEO tenure, CEO ownership, and year and industry fixed effects. All independent variables are defined in Table A1. The dummies of Fama-French 12 industry group are included and used to control for industry fixed effects. *, **, and *** denote statistical significance of the coefficients based on two-sided tests at the 10%, 5%, and 1% level, respectively.

			Treated Sample (A)		Control Sample (B)		Difference (A−B)	
Panel A: Propensity Score Matching Using Logistic Model								
CAR(−1, 1)	G1	Mean	0.389	**	−0.676	***	1.065	***
		t-statistics	2.40		−5.26		4.32	
	G2	Mean	0.389	**	−0.450	***	0.839	***
		t-statistics	2.40		−3.62		3.39	
	G3	Mean	0.389	**	−0.625	***	1.014	***
		t-statistics	2.40		−6.27		4.17	
		N	116		116			
Panel B: Propensity Score Matching Using Cox Proportional Hazard Model								
CAR(−1, 1)		Mean	0.383	**	−0.419	***	0.802	***
		t-statistics	2.30		−2.71		3.21	
		N	111		111			
Panel C: Nearest-Neighbor Matching								
CAR(−1, 1)		Mean	0.532	**	−0.369	**	0.900	***
		t-statistics	2.04		−1.97		2.94	
		N	64		64			
Panel D: Radius Matching								
CAR(−1, 1)		Mean	0.389	**	−0.677	***	1.066	***
		t-statistics	2.40		−8.44		3.73	
		N	116		236			

Table 5 CEO Switches and Acquirer Abnormal Bond Returns

This table reports univariate and regression analysis of treatment effects and differences in the acquirer's abnormal bond returns between CEO type switches (the treated sample) and CEO type non-switches (the control sample). CAR (−1, 1) is the sum of abnormal bond returns of acquirers for the three-day period −1 and 1, where day 0 is the announcement date of merger. In panel A, the treated sample is the CEO who was non-overconfident (overconfident) was replaced by an overconfident (non-overconfident) CEO, while the control sample is the CEO who was non-overconfident (overconfident) was replaced by a non-overconfident (overconfident) CEO. DID is the difference-in-difference estimation. Panel B reports regression results. The dependent variable is CAR (−1, 1). *Before switch* is a dummy equals to one for the sample which the year period is prior to a change in CEO, and zero otherwise. *Before switch & Treated* is a dummy equals to one if the firm is in treated sample and the year period is prior to a change in CEO, and zero otherwise. All independent variables are defined in Table A1. The dummies of two-digit SIC codes are included and used to control for industry fixed effects. The dummies of year variables are included to control for year fixed effects. The numbers in parentheses for regression models are *p*-values. *, **, and *** denote statistical significance of the coefficients based on two-sided tests at the 10%, 5%, and 1% level, respectively.

Panel A: Univariate Analysis

		Switching from non-Overconfidence to Overconfidence					Switching from Overconfidence to non-Overconfidence				
		CEO before Switches		CEO after Switches		DID	CEO before Switches		CEO after Switches		DID
Sample of Treated (A)	Mean / N	−0.513 *	5	0.701	5		0.315 *	23	0.017	47	
Sample of Controls (B)	Mean / N	−0.014	23	0.007	76		−0.126	18	0.876	16	
Difference (A−B)	Mean	−0.499		0.695		−1.194 *	0.441		−0.858 **		1.299 **

Panel B: Regressions Analysis

	Models			
	Switching from non-Overconfidence to Overconfidence		Switching from Overconfidence to non-Overconfidence	
VARIABLES	(1)	(2)	(3)	(4)
OC	1.964**	2.617*	1.039*	3.259*
	(0.024)	(0.066)	(0.076)	(0.099)
Before switch & Treated		0.827		−1.653
		(0.540)		(0.407)
Before switch		−0.010		−1.040
		(0.981)		(0.107)
Constant / Year / Firm fixed effects	Yes / Yes / Yes	Yes / Yes / Yes	Yes / Yes / Yes	Yes / Yes / Yes
Treated Switches	5	5	16	16
Control Switches	17	17	10	10
Observations	109	109	104	104
Adjusted R-squared	−0.145	−0.176	0.112	0.137

Table 6 Correlation Selection by Overconfident Acquirers

We form a pool data of potential target candidates from 365 acquisitions. The public firms in the same industry as targets with non-missing stock returns are defined as the potential target candidates. The same industry is defined as firms with the same 2-digit SIC code as targets in Models 1 to 4 and 3-digit SIC code as targets in Models 5 to 8. We apply the logistic regression model. The dependent variables are dummies equal to one if *Return correlation* is lower than or equal to the bottom quantile from each acquisition and lower than or equal to zero, respectively, and zero otherwise. *Target* is a dummy equals to one if the firm is the target and zero otherwise. All independent variables are defined in Table A1. Firm characteristics variables are measured at the beginning of the fiscal year. The dummies of two-digit SIC codes are included and used to control for industry fixed effects. The dummies of year variables are included to control for year fixed effects. The numbers in parentheses for regression models are *p*-values based on standard errors adjusted for heteroscedasticity and firm-level clustering. *, **, and *** denote statistical significance of the coefficients based on two-sided tests at the 10%, 5%, and 1% level, respectively.

	Models							
	Candidates with the same 2-digit SIC code				Candidates with the same 3-digit SIC code			
	Correlation ≦ bottom quantile		Correlation ≦ 0		Correlation ≦ bottom quantile		Correlation ≦ 0	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
OC	0.139	0.171	0.150	0.236*	0.093	0.155	0.125	0.252*
	(0.256)	(0.114)	(0.275)	(0.058)	(0.504)	(0.183)	(0.425)	(0.060)
Target	−0.839***	−0.849***	−0.525**	−0.530**	−0.939***	−0.949***	−0.559**	−0.576**
	(0.000)	(0.000)	(0.050)	(0.042)	(0.000)	(0.000)	(0.047)	(0.035)
OC × Target	0.743**	0.731**	0.864**	0.868**	0.840**	0.772**	0.950**	0.909**
	(0.030)	(0.031)	(0.026)	(0.023)	(0.015)	(0.026)	(0.017)	(0.022)
Firm size		−0.012		0.028		−0.028		0.033
		(0.803)		(0.614)		(0.608)		(0.591)
M/B		−0.042		−0.055		−0.097*		−0.106**
		(0.276)		(0.134)		(0.074)		(0.032)
Cash flow		2.132**		2.897***		3.247**		4.197**
		(0.025)		(0.009)		(0.011)		(0.011)
Cash		−0.324		−0.331		−1.428**		−1.408*
		(0.578)		(0.622)		(0.039)		(0.090)
Leverage		−0.346		−0.552		−0.273		−0.684
		(0.477)		(0.365)		(0.631)		(0.332)
Volatility		0.002		0.004		0.004		0.008**
		(0.592)		(0.354)		(0.202)		(0.048)
Past stock return		0.005		0.007		0.008		0.010
		(0.166)		(0.157)		(0.112)		(0.148)

Siboard		−0.130		−0.150		−0.121		−0.137
		(0.381)		(0.302)		(0.463)		(0.384)
CEO gender		0.243		0.433		0.269		0.666
		(0.448)		(0.246)		(0.437)		(0.109)
CEO age		0.389***		0.406***		0.428***		0.439***
		(0.000)		(0.000)		(0.000)		(0.000)
CEO age^2		−0.003***		−0.004***		−0.004***		−0.004***
		(0.000)		(0.000)		(0.000)		(0.000)
CEO ownership		0.014		0.008		0.032**		0.027*
		(0.337)		(0.558)		(0.045)		(0.067)
Constant	−2.213***	−12.875***	−2.152***	−13.767***	−2.443***	−13.998***	−2.298***	−15.075***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	87,925	87,925	87,925	87,925	49,569	49,569	49,569	49,569
Pseudo R-squared	0.119	0.126	0.118	0.126	0.126	0.138	0.132	0.145

Table 7 Relative Risk Selection by Overconfident Acquirers

We form a pool data of potential target candidates from 365 acquisitions. The public firms in the same industry as targets with non-missing stock returns are defined as the potential target candidates. The same industry is defined as firms with the same 2-digit SIC code as targets in Models 1 to 4 and 3-digit SIC code as targets in Models 5 to 8. We apply the logistic regression model. The dependent variables are *Relative volatility* and *High volatility difference*. The dummy of Relative volatility equals to one if the acquirer volatility is greater than or equal to combined volatility, and zero otherwise. The combined volatility is calculated as the value-weighted average of the acquirer and target volatility, where the sum of the book value of total debt and market value of equity is used for the weight. The dummy of *High volatility difference* equals to one if *Volatility difference* is greater than or equal to the top quantile from each acquisition, and zero otherwise. *Volatility difference* is the acquirer volatility minus combined volatility. *Target* is a dummy equals to one if the firm is the target and zero otherwise. All independent variables are defined in Table A1. Firm characteristics variables are measured at the beginning of the fiscal year. The dummies of two-digit SIC codes are included and used to control for industry fixed effects. The dummies of year variables are included to control for year fixed effects. The numbers in parentheses for regression models are *p*-values based on standard errors adjusted for heteroscedasticity and firm-level clustering. *, **, and *** denote statistical significance of the coefficients based on two-sided tests at the 10%, 5%, and 1% level, respectively.

	Models							
	Candidates with the same 2-digit SIC code				Candidates with the same 3-digit SIC code			
	Relative volatility		High volatility difference		Relative volatility		High volatility difference	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
OC	0.246	−0.288	−0.009	−0.293*	0.270	−0.094	−0.114	−0.193
	(0.382)	(0.140)	(0.969)	(0.057)	(0.436)	(0.624)	(0.656)	(0.174)
Target	−0.290	−0.478**	−0.645***	−0.797***	−0.188	−0.458*	−0.722***	−0.858***
	(0.174)	(0.040)	(0.001)	(0.000)	(0.431)	(0.077)	(0.001)	(0.000)
OC × Target	0.046	0.086	0.205	0.157	0.222	0.198	0.456	0.365
	(0.895)	(0.836)	(0.529)	(0.688)	(0.581)	(0.660)	(0.198)	(0.369)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	114,897	114,897	114,897	114,897	66,088	66,088	66,088	66,088
Pseudo R-squared	0.126	0.257	0.0990	0.190	0.182	0.323	0.112	0.201

Table 8 Regressions of CEO Overconfidence and Coinsurance Effect on Acquirer Abnormal Bond Returns

The dependent variable is the cumulative abnormal bond returns of acquirers for the three-day period −1 and 1, where day 0 is the announcement date of merger. The dummies of *Low return correlation* and *Negative return correlation* equal to one if *Return correlation* is lower than or equal to the bottom quantile and zero, respectively, and zero otherwise. All independent variables are defined in Table A1. Firm characteristics variables are measured at the beginning of the fiscal year. The dummies of two-digit SIC codes are included and used to control for industry fixed effects. The dummies of year variables are included to control for year fixed effects. The numbers in parentheses for regression models are *p*-values based on standard errors adjusted for heteroscedasticity and firm-level clustering. *, **, and *** denote statistical significance of the coefficients based on two-sided tests at the 10%, 5%, and 1% level, respectively.

	Models	
VARIABLES	(1)	(2)
Low return correlation	−0.125	
	(0.625)	
OC × Low return correlation	1.008**	
	(0.048)	
Negative return correlation		−0.049
		(0.901)
OC × Negative return correlation		1.321**
		(0.044)
OC	0.172	0.231
	(0.512)	(0.282)
Constant	Yes	Yes
M&A characteristics	Yes	Yes
Firm characteristics	Yes	Yes
CEO characteristics	Yes	Yes
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Observations	363	363
Adjusted R-squared	0.274	0.280

Table 9 Regressions of CEO Overconfidence and Liquidity Effect on Acquirer Abnormal Bond Returns

The dependent variable is the cumulative abnormal bond returns of acquirers for the three-day period −1 and 1, where day 0 is the announcement date of merger. All independent variables are defined in Table A1. Firm characteristics variables are measured at the beginning of the fiscal year. The dummies of two-digit SIC codes are included and used to control for industry fixed effects. The dummies of year variables are included to control for year fixed effects. The numbers in parentheses for regression models are *p*-values based on standard errors adjusted for heteroscedasticity and firm-level clustering. *, **, and *** denote statistical significance of the coefficients based on two-sided tests at the 10%, 5%, and 1% level, respectively.

	Models			
VARIABLES	(1)	(2)	(3)	(4)
Overbid	0.161			
	(0.478)			
OC × Overbid	−0.645*			
	(0.098)			
Takeover premium		−0.001		
		(0.572)		
OC × Takeover premium		0.006		
		(0.390)		
Percentage of cash			0.002	
			(0.381)	
OC × Percentage of cash			−0.007*	
			(0.058)	
Cash bid				0.123
				(0.590)
OC × Cash bid				−0.580*
				(0.071)
OC	0.673***	0.263	0.994***	0.835***
	(0.008)	(0.477)	(0.006)	(0.005)
Constant	Yes	Yes	Yes	Yes
M&A characteristics	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes
CEO characteristics	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Observations	365	338	365	365
Adjusted R-squared	0.252	0.268	0.256	0.255

Table 10 Regressions of CEO Overconfidence and Combined Effects on Acquirer Abnormal Bond Returns

The dependent variable is the cumulative abnormal bond returns of acquirers for the three-day period −1 and 1, where day 0 is the announcement date of merger. The dummies of *Low return correlation* and *Negative return correlation* equal to one if *Return correlation* is less than or equal to the bottom quantile and zero, respectively, and zero otherwise. All independent variables are defined in Table A1. Firm characteristics variables are measured at the beginning of the fiscal year. The dummies of two-digit SIC codes are included and used to control for industry fixed effects. The dummies of year variables are included to control for year fixed effects. The numbers in parentheses for regression models are *p*-values based on standard errors adjusted for heteroscedasticity and firm-level clustering. *, **, and *** denote statistical significance of the coefficients based on two-sided tests at the 10%, 5%, and 1% level, respectively.

	Models	
VARIABLES	(1)	(2)
Coinsurance effect		
Low return correlation	-0.132	
	(0.605)	
OC × Low return correlation	0.909*	
	(0.082)	
Negative return correlation		-0.081
		(0.845)
OC × Negative return correlation		1.247*
		(0.055)
Liquidity effect		
Overbid	0.099	0.126
	(0.662)	(0.582)
OC × Overbid	-0.426	-0.459
	(0.316)	(0.286)
Cash bid	0.125	0.116
	(0.592)	(0.615)
OC × Cash bid	-0.319	-0.295
	(0.353)	(0.343)
OC	0.490	0.531*
	(0.185)	(0.059)
Constant	Yes	Yes
Controls	Yes	Yes
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Observations	363	363
Adjusted R-squared	0.272	0.278

Table 11 Robustness: Correlation Selection by Overconfident Acquirers

The dependent variables are *Return correlation* in Models 1 and 2 and dummies in Models 3 to 6 equal to one if *Return correlation* is lower than or equal to zero, and zero otherwise. We apply the OLS regression model in Models 1 to 4 and logistic regression model in Models 5 and 6. All independent variables are defined in Table A1. Firm characteristics variables are measured at the beginning of the fiscal year. The dummies of two-digit SIC codes are included and used to control for industry fixed effects. The dummies of year variables are included to control for year fixed effects. The numbers in parentheses for regression models are *p*-values based on standard errors adjusted for heteroscedasticity and firm-level clustering. *, **, and *** denote statistical significance of the coefficients based on two-sided tests at the 10%, 5%, and 1% level, respectively.

	Models					
	Correlation		Correlation $\leqq$ 0			
	OLS		OLS		Logit	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
OC	−0.060*	−0.072*	0.106**	0.125**	1.692***	2.367**
	(0.088)	(0.056)	(0.016)	(0.010)	(0.000)	(0.015)
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Controls as Table 6	No	Yes	No	Yes	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	363	363	363	363	363	363
Adjusted R-squared or Pseudo R-squared	0.257	0.271	0.153	0.158	0.498	0.616

Table 12 Robustness: Sample Selection Bias

We use the Heckman's two-step selection model to mitigate potential sample selection bias of corporate bond returns. In the first step, we apply all the S&P 1500 firms which make an acquisition during 1994 and 2014. We use firm age as the instrument to reflect the issuance corporate bonds and control firm size (*Firm size*), B/M (*B/M*), return on asset (*ROA*), market leverage (*Leverage*), stock return volatility (*Volatility*), and corporate governance (*Siboard*), and year and industry fixed effects. The inverse Mills ratio (*Lambda*) is calculated from the regression. In the second step, we include *Lambda* in all our main regressions. The dependent variable is the cumulative abnormal bond returns of acquirers for the three-day period −1 and 1, where day 0 is the announcement date of merger. Panel A indicates CEO overconfidence effect. Panel B presents the effect of CEO overconfidence interacted with coinsurance and liquidity measures. The dummies of *Low return correlation* and *Negative return correlation* equal to one if *Return correlation* is less than or equal to the bottom quantile and zero, respectively, and zero otherwise. All independent variables are defined in Table A1. Firm characteristics variables are measured at the beginning of the fiscal year. The dummies of two-digit SIC codes are included and used to control for industry fixed effects. The dummies of year variables are included to control for year fixed effects. The numbers in parentheses for regression models are *p*-values based on standard errors adjusted for heteroscedasticity and firm-level clustering. *, **, and *** denote statistical significance of the coefficients based on two-sided tests at the 10%, 5%, and 1% level, respectively.

Panel A: CEO Overconfidence

	Models			
VARIABLES	(1)	(2)	(3)	(4)
OC	0.763***	0.683***	0.591***	0.531**
	(0.001)	(0.002)	(0.006)	(0.018)
Lambda	−0.373	−0.161	0.832	0.860
	(0.111)	(0.468)	(0.170)	(0.179)
M&A / Firm / CEO characteristics	No / No / No	Yes/ No / No	Yes / Yes / No	Yes / Yes / Yes
Constant / Year and industry fixed effects	Yes / Yes	Yes / Yes	Yes / Yes	Yes / Yes
Observations	365	365	365	365
Adjusted R-squared	0.176	0.208	0.255	0.253

Panel B: Coinsurance and Liquidity Effects

	Models					
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Determinant (D)	Low return correlation	Negative return correlation	Overbid	Takeover Premium	Percentage of cash	Cash bid
OC × D	0.950*	1.293**	−0.644*	0.006	−0.007*	−0.516
	(0.059)	(0.042)	(0.074)	(0.375)	(0.098)	(0.121)
Lambda	0.866	0.976*	0.765	0.547	0.643	0.687
	(0.154)	(0.088)	(0.220)	(0.467)	(0.325)	(0.297)
Constant, OC, D and Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	363	363	365	338	365	365
Adjusted R-squared	0.277	0.284	0.255	0.267	0.257	0.256