The value of corporate coinsurance to the shareholders of diversifying firms: Evidence from marginal tax rate

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Abstract

Comparing the wealth change to shareholders around merger announcement, we test whether conglomerate mergers produce higher gains to shareholders due to corporate coinsurance than horizontal mergers. Conglomerate mergers show higher bidder, target, and size-weighted average of bidder and target marginal tax rate than horizontal mergers on average. The higher marginal tax rates in conglomerate mergers provide extra returns to combined shareholders. Investigating the change in leverage and cash holdings after merger completion, we find higher marginal tax rates of diversifying mergers help the consolidated firm to reduce cash holdings more but they do not have an impact on the leverage change.

Keywords: Corporate coinsurance, Diversification, Mergers and acquisitions, Financial leverage, Cash holdings

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1 Introduction

Why do firms diversify their businesses? Conglomerate mergers appear not to seek operational synergy, such as market power or improved efficiency, as their market shares would not likely to increase from diversification and they would enjoy no economies of scale. In contrast, horizontal or vertical mergers are shown to pursue mainly economic gains.[1] It is widely recognized that the conglomerate merger wave reached its peak in the 1960s, and their contribution to total mergers has since decreased over time. However, Fan and Goyal (2006) document that diversifying mergers still compose a substantial proportion of mergers even in 1980s and 1990s.[2] Given no economic benefits, why does this inferior type of mergers still prevail?[3] We address this important question by examining the wealth change to shareholders arising from corporate coinsurance, one of the most cited sources of financial synergy, in conglomerate versus horizontal mergers.

Carrying out extensive numerical simulation analyses adopting key determinants of corporate coinsurance in Leland's (2007) model, we are able to predict the direction of the change in equity value along several coinsurance determinants: (1) An increase in cash flow correlation

[1]Fee and Thomas (2004) summarize four possible sources of operational benefits from horizontal mergers. They include productive efficiency enhancement, purchasing efficiency improvement, increased market power, and added buying power from monopsonistic collusion. Shenoy (2012) recapitulates the rationale of vertical takeovers. Transaction cost reduction from relational specific investment, foreclosure of supplying key inputs to rivals, and collusion between the consolidated firm and non-integrated competing firms are explanations of why firms acquire supplier or customer firms.

[2]Refer to the Table 3 in Fan and Goyal (2006) to check the proportion of diversifying mergers in terms of number and value for several periods. Based on 1% cutoff of their vertical relatedness measure, diversifying mergers take 64% (64%) during 1962-1970, 65% (67%) during 1971-1980, 49% (49%) during 1981-1990, and 37% (40%) during 1991-1996 period when they measure merger activities by the number (value) of mergers. Throughout this study, conglomerate mergers and diversifying mergers are used interchangeably hereafter, unless otherwise stated.

[3]There are several explanations for why conglomerate mergers could generate operational efficiency. Penrose (1959) argues that diversified firms could benefit from economies of scope. Morck and Yeung (2003) contend that takeovers across industries could increase stockholders' value only when information-based assets, such as R&D or marketing could be enhanced. Matsusaka(2001) suggests that diversification strategy is a dynamic search and matching process which maximizes shareholders' wealth if the process could not be completed due to uncertainty. Financial synergy and operational synergy of conglomerate mergers are in line with neoclassical theory on "diversification discount" literature in that managers of diversifying firms also maximize shareholder's value.

between bidder ant target firm enhances the wealth of combining shareholders. The positive impact of the increase in cash flow correlation on equity value change is due to the call option characteristic of equity value for future cash flow in his model.; (2) An increase in cash flow volatility difference between bidder and target firm enhances (reduces) stock value when cash flow correlation is low (high). This implies that there is an interaction effect between cash flow correlation and cash flow volatility difference between bidder and target.; (3) A merger of bidder and target with high marginal tax rates benefits the shareholders of merging firms more than that with low marginal tax rates. This is intuitive in that interest tax shields in his model are proportional to marginal tax rates.[4] These predictions enable us to test whether firm managers who pursue diversification achieve higher coinsurance benefits accruing to shareholders than those who pursue specialization. There are two cases where diversifying mergers can generate higher gains to shareholders relative to horizontal mergers. The first case is that management teams of bidder and target firms systematically choose each other which produce larger coinsurance benefit to shareholders than management team in horizontal mergers. The second case is that conglomerate mergers earn extra gains to shareholders due to the asset liquidity effect by Shleifer and Vishny (1992) even with the same level of coinsurance determinants.

We first investigate the merger conditions of horizontal versus conglomerate mergers to test whether firm managers pursue diversification select target firms to achieve higher coinsurance benefits to shareholders than firm managers who seek specialization. This analysis reveals that conglomerate mergers have systematically different merger conditions in terms of corporate coinsurance from those of horizontal mergers. Acquiring firms in conglomerate mergers exhibit larger market capitalization, smaller cash flow volatility, and higher marginal tax rate than acquiring firms in horizontal mergers. In addition, aquired firms in diversifying mergers also

[4]Refer to Shih (1994) for other tax considerations than interest tax shields such as depreciation tax shields as a motivation of conglomerate mergers. Shih could not test the direct impact of marginal tax rates although he also provides some evidence that tax could offer incentives for conglomerate mergers because a method which reliably estimates the marginal tax rate of a firm is suggested by Graham (1996).

have higher marginal tax rate and smaller cash flow volatility than acquired firms in horizontal mergers. These features of bidder and target in conglomerate mergers result in higher weighted average of marginal tax rates of bidder and target and lower size-weighted volatility difference than those in horizontal mergers. We observe that cash flow correlation in horizontal mergers exceeds that in conglomerate merger while the difference is not statistically significant.

As a second step, we compare the wealth change to combined shareholders around merger announcement in horizontal mergers with that in conglomerate mergers. We adopt the total percentage gain by Bradely, Desai, and Kim (1988) to measure the wealth change in combined shareholders around merger announcement. Utilizing total merger sample, we regress the total percentage gains on coinsurance determinants and other control variables. We isolate the coinsurance benefit using the estimated impact of each coinsurance determinant on total percentage gain and observed value of each coinsurance determinant in a merger. This assumes that both horizontal mergers and conglomerate mergers achieve the same coinsurance benefits given the same value of coinsurance determinants. The higher marginal tax rates in conglomerate mergers provide extra returns to combined shareholders which vary from 0.23% to 0.46% according to model specification of coinsurance benefit to combine shareholders and the choice of subsample of conglomerate mergers. In contrast, the smaller volatility difference in conglomerate merger does not contribute to the extra value to diversification in comparison of specialization. Higher volatility difference combined with high cash flow correlation in horizontal mergers tend to produce additional wealth to combined shareholders holding other factors constant though it is not statistically significant. This extra gain to horizontal mergers is consistent with the agent behavior of firm managers who pursue diversification. Consequently, the total coinsurance benefit from cash flow correlation, volatility difference, and marginal tax rates in conglomerate mergers exceeds that in horizontal merger but the statistical significance vary along the model specification and subsample of conglomerate mergers.

We further explore the channel through which conglomerate mergers could make the most of extra coinsurance benefit from higher marginal tax rates after the merger is consummated. One channel is the increase in leverage, aiming at achieving higher interest tax shields. The other channel is the reduction in cash holdings based on the report by Duchin (2010). Among coinsurance determinants, only weighted average of marginal tax rate of bidder and target affect the change in cash holdings after the consummation of a merger. The increase in weighted average of marginal tax rates contributes to the reduction in the cash holdings after the merge completion, which could enhance the shareholder wealth of combined firms. Interestingly, other coinsurance determinants do not have an impact on the change in financial leverage after the merger completion. In sum, our test results indicate that conglomerate mergers with higher size-weighted average of bidder and target marginal tax rates enhance the stock value of both bidder and target firm around merger announcement and the combined firms realize this coinsurance benefit by reducing cash holdings rather than increasing financial leverage.

This paper contributes to the literature on diversifying mergers. Our analyses present several new findings. First, conglomerate mergers have substantially different coinsurance determinants from those in horizontal mergers: higher weighted average of bidder and target marginal tax rate, lower cash flow volatility difference, and much larger bidder in comparison of target. Second, conglomerate mergers with high marginal rates of both bidder and target firms enhance shareholder value around merger announcement in comparison of horizontal mergers with low marginal tax rates. Third, we identify the financial policy after merger completion to realize coinsurance benefit from high marginal tax rates. Higher marginal tax rates of bidder and target in conglomerate mergers contribute to the extra reduction in cash holdings while it has no impact on leverage change after merger completion.

The next section develops hypotheses that are tested in this paper. Section 3 describes the sample and methodology. Section 4 documents test results of the effect of corporate coinsurance on the wealth change to shareholders around merger announcement. Section 5 investigates the change in financial leverage and cash holdings after merger completion. Section 6 concludes the paper.

2 Hypotheses development and test design

2.1 Hypothesis development

While sources of gains from horizontal mergers are well established, the sources of gains from conglomerate mergers have received much skepticism because it is assumed that conglomerate mergers lack operational synergy. There are two competing explanations for the motivation of conglomerate mergers. Agency cost theory argues that conglomerate mergers are motivated by entrenched managers who look for their own interests at the expense of shareholders. Self-interested managers can build their empire via diversification, offering them more authority and power and entitling them to greater prestige and compensation (Jensen (1986), Jensen and Murphy (1990)). These managers also can secure their jobs by investing their human capital in manager-specific skills (Shleifer and Vishny (1989), Aggarwal and Samwick (2003)). Managers diversify their portfolios because their assets are tightly tied to a specific firm (Amihud and Lev (1981)). All these different aspects of explanations from the agency cost theory suggest that diversification leads to destruction of shareholder value. This agency cost explanation is also in line with the diversification discount literature.[5]

On the other hand, theories supportive of diversification mostly emphasize that conglomerate mergers pursue financial benefits instead of economic gains. Levy and Sarnat (1970) and Lewellen (1971) argue that conglomerate mergers reduce default risks and increase debt capacity when bankruptcy is possible and the cash flows of two firms are not perfectly correlated. While the reduction of default risk could benefit mainly bondholders, it could also increase

[5]See the survey of Martin and Sayrak (2003)

shareholders' wealth via borrowing more debt, subsequently gaining more interest tax shields. This business risk reduction is called corporate coinsurance effect.[6] Stein (1997) suggests the "efficient internal capital market" benefits in the presence of information asymmetry between outside investors and firm managers. The headquarters of diversified firms can allocate the pooled internal capital to their best projects across divisions. Hubbard and Palia (1999) review the conglomerate merger wave in the 1960s and present evidence supporting the efficient internal capital market hypothesis. They find that bidder returns are maximized when bidders without financial constraints acquire financially constrained targets. Fluck and Lynch (1999) suggest that the combined value of acquirers and targets could be enhanced by financing positive net present value projects which are marginally profitable and cannot be financed without mergers.

In his recent paper, Leland (2007) refines the benefits and the costs of corporate coinsurance arising from a merger and identifies the sources of firm value change, assuming no operational synergy, no information asymmetry, and no agency issue. The total financial synergy, Δ, consists of the benefit from the "leverage effect (LEV)" and the cost from the "limited liability effect (LL)".

$$\Delta = LL(\Delta V_0) + LEV(\Delta TS - \Delta DC) \tag{1}$$

where ΔV_0 refers to the change in unlevered firm value, ΔTS denotes the change in the value of interest tax savings, and ΔDC represents the change in the value of default costs. Intuitively, the limited liability effect measures the cost incurred from the loss of limited liability option when two firms merge. This effect is always negative as Sarig (1985) points out. Limited liability is the option that shareholders could exit from a firm they invest in without bearing extra losses except for their shares when debt value of the firm surpasses total asset value of the firm. The leverage effect measures the change in benefit and cost of debt if a firm adjusts its

[6] There has been long-standing debates on whether the financial benefit from the coinsurance effect mainly goes to bondholders at the expense of shareholders or both stockholders and bondholders could enjoy rewards from conglomerate mergers. Higgins and Schall (1975) and Galai and Masulis (1976) conjecture that the gains from secured debt will be exactly offset by a decrease in the value of equity if the bankruptcy is costless.

debt level. When a firm borrows more money from creditors, the firm would enjoy larger interest tax shields but higher debt elevates default probability in general. Thus, debt increase without raising default probability or higher debt capacity enlarges financial synergy from a merger. Leland (2007) argues that the coinsurance effect is not always positive as early researchers in 1970s assert. The coinsurance effect could be either positive or negative depending on which effect dominates. When this sum of two effects is positive, a merger generates financial synergy. Otherwise, divestiture is preferred given no economic benefits. Leland identifies joint conditions under which positive or negative change in the firm value is generated. First, any increase in the difference of cash flow volatilities would lower the financial gain of a merger when the cash flow correlation between two firms is high. Second, any increase in the difference of cash flow volatilities would produce the financial benefit when two firms have low cash flow correlation, low cash flow volatilities, and market capitalization-weighted difference of cash flow volatilities lower than individual cash flow volatilities.

Shleifer and Vishny (1992) suggest a theory that conglomerate mergers could be superior to horizontal mergers in order to achieve higher debt capacity when agency costs or adverse selection costs are involved in market equilibrium. Put another way, conglomerate mergers generate higher financial synergy than horizontal mergers on average. They argue that debt overhang of Myers (1977) increases the odds of costly liquidation in an economic downturn while it is an efficient way to control agency costs. They also suggest an indirect reason why default could be costly.[7] When asset redepolyability of Williamson (1988) is considered, the highest potential bidders for the assets of specific usage are likely to be other firms in the same industry. This fact holds when a target firm defaults due to an idiosyncratic risk not an industry-wide shock. However, the other firms in the same industry might be suffering from the same credit constraints as the seller faces due to an economic shock which affects the seller as well as insiders. Besides,

[7] Refer to example section of Shleifer and Vishny (1992). Two types of liquidations are vividly illustrated there.

potential buyers in the same industry might be prohibited from participating in the asset sales market due to government regulation. In this case, potential buyers in different industries are entitled to buy the assets of a specialized purpose without the best knowledge of running those assets. The outside industry buyers pay higher agency costs than industry insiders in that they should hire managers who will run the newly acquired subdivision. Thus, forced liquidation in a recession could be costly. Liquid assets that are easily redeployable to other usages end up with a higher debt capacity and conglomerate mergers are better able to accomplish asset liquidity than horizontal mergers. Following are the superiority of conglomerates in terms of debt finance other than lower cash flow volatility: first, a conglomerate has the option to choose a liquid industry among several industries it operates when it needs to sell its assets, which make it robust to macroeconomic fluctuation; second, a conglomerate can divest a subdivision with less adverse selection costs by selling it off in smaller and more liquid pieces.

Based on extensive numerical simulation analyses adopting key determinants of corporate coinsurance in Leland's (2007) model, we predict the direction of equity value change along several coinsurance determinants.

1. An increase in cash flow correlation between bidder ant target firm enhances the wealth of combining shareholders.[8]

2. The increase in cash flow volatility difference between bidder and target firm enhances (reduces) stock value when cash flow correlation is low (high).

3. A merger of bidder and target with high marginal tax rate is beneficial to the shareholder of merging firms in comparison of that with low marginal tax rate.

These predictions provide the strong basis that helps us compare the equity value change solely

[8]The positive impact of the increase in cash flow correlation on equity value change which is due to the call option characteristic of equity value in Leland's (2007) model accords with the wealth transfer by Higgins and Schall (1975) and Galai and Masulis (1976) than synergistic gain by Lewellen (1971).

from corporate coinsurance in that we can isolate the contribution of corporate coinsurance to the change in equity value arising from a merger. We empirically test the predictions on the change in equity value change. Utilizing simple linear regression with several model specifications, we jointly identify the effect of each coinsurance determinant on stock value change of combined shareholders from our total merger sample. In these model specifications, we assume that the coinsurance effect is independent of merger type and will generate the same benefit to the shareholders of merging firms when the levels of all coinsurance determinants of two mergers are the same. Furthermore, we incorporate the differential effect of merger type on the increase in debt capacity subsequently equity value change suggested by Shleifer and Vishny (1992). Our approach is to compare the sensitivities for determinants of the coinsurance effect rather than to directly measure the asset liquidity. We argue that favorable sensitivities for the same level of coinsurance determinants come from asset liquidity.

In this paper, we examine whether conglomerate mergers achieve higher coinsurance benefits accruing to stockholders than horizontal mergers do. The possible sources of larger coinsurance gains pertaining to conglomeration are twofold. First, diversifying mergers might be systematically superior to horizontal mergers for higher coinsurance benefit accruing to shareholders. There are two sources that could enhance equity value from corporate coinsurance. One source is the increase in interest tax shields that is proportional to marginal tax rates. Firm managers that pursue a conglomerate merger will seek a merger partner that produces higher interest tax shields to generate higher coinsurance effect compared to firm managers that pursue horizontal mergers if firm managers are in line with stockholders' interest. The other is the higher cash flow correlation of diversifying mergers than horizontal mergers. Firm managers that pursue a conglomerate merger will seek a merger partner that increases higher business risk to generate higher benefits to stockholders than firm managers that pursue horizontal mergers if firm managers are in line with stockholders' interest. Second, conglomerate mergers provide more asset liquidity that benefits shareholders than horizontal mergers. Given that conglomerate mergers show better sensitivity for the same values of coinsurance determinants than horizontal mergers, it implies that the extra increase in stockholders' value for conglomerate mergers are derived from higher liquidation value.

2.2 Test design

We first investigate whether there is any systematic difference of coinsurance determinants between horizontal and conglomerate mergers. We compare the sample distribution of each coinsurance determinant with two sample t-test. This investigation is based on the notion that conglomerate mergers have favorable merger conditions for corporate coinsurance if conglomerate mergers pursue higher coinsurance benefits.

Second, we estimate the impact of coinsurance determinants, such as cash flow correlation, volatility difference between bidder and target firm, marginal tax rates of bidder and target firm on the change in equity value by running the following regression with total merger sample:

$$\Delta E = \alpha + \beta_1 \rho + \beta_2 |\omega_a \sigma_a - \omega_t \sigma_t| + \beta_3 \rho \cdot |\omega_a \sigma_a - \omega_t \sigma_t| + \beta_4 \tau_a + \beta_5 \tau_t + \theta \cdot controls + \epsilon \qquad (2)$$

where ΔE denotes the change in equity value from a merger, ρ, σ, and τ stand for cash flow correlation, cash flow volatility, and marginal tax rate, the subscripts a and t represent an acquiring firm and an acquired firm, MV is the market capitalization of the firm, $\omega_a = \frac{MV_a}{MV_a + MV_t}$ and $\omega_t = \frac{MV_t}{MV_a + MV_t}$, and $controls$ denotes other control variables. In addition, we introduce a couple of different model specification for the impact of marginal tax rates of bidder and target firms on the change in equity value to select the best model specification. The first alternative model specification utilizes the size weighted average of marginal tax rates for the proxy of marginal tax rate of combined firm. This model assumes that the merging firms retain the current marginal tax rates even after the consolidation.

$$\Delta E = \alpha + \beta_1\rho + \beta_2|\omega_a\sigma_a - \omega_t\sigma_t| + \beta_3\rho\cdot|\omega_a\sigma_a - \omega_t\sigma_t| + \beta_4(\omega_a\tau_a + \omega_t\tau_t) + \beta_5(\tau_a - \tau_t) + \theta\cdot controls + \epsilon \quad (3)$$

The second alternative model specification utilizes the maximum of bidder and target marginal tax rate for the marginal tax rate of consolidated firm. This model assumes that the increase in average cash flow will increase the marginal tax rate of the consolidated firm due to the convexity of tax scheme.

$$\Delta E = \alpha + \beta_1\rho + \beta_2|\omega_a\sigma_a - \omega_t\sigma_t| + \beta_3\rho\cdot|\omega_a\sigma_a - \omega_t\sigma_t| + \beta_4 max(\tau_a, \tau_t) + \beta_5(\tau_a - \tau_t) + \theta\cdot controls + \epsilon \quad (4)$$

Third, we employ a nested model using simple indicator variable to test the differential sensitivity to coinsurance determinants between conglomerate mergers and horizontal mergers. The coefficients of products of indicator variables and coinsurance determinants measure the different sensitivity to the same value of financial determinants depending on merger type. First, we run the same regression as above for horizontal versus non-horizontal mergers. Then, we run the following regression where agency costs and adverse selection costs are incorporated. This specification uses Leland's (2007) model:

$$\begin{aligned} \Delta E &= \alpha_0 + \alpha_1 \cdot DM + (\beta_1 + \delta_1 \cdot DM)\rho + (\beta_2 + \delta_2 \cdot DM)|\omega_a\sigma_a - \omega_t\sigma_t| \\ &+ (\beta_3 + \delta_3 \cdot DM)\rho \cdot |\omega_a\sigma_a - \omega_t\sigma_t| + (\beta_4 + \delta_4 \cdot DM)(\omega_a\tau_a + \omega_t\tau_t) \\ &+ (\beta_5 + \delta_5 DM)(\tau_a - \tau_t) + (\theta + \gamma \cdot DM)controls + \epsilon \end{aligned} \quad (5)$$

where DM is an indicator variable which takes 1 when a merger is assigned to be non-horizontal or conglomerate and 0 otherwise. For the exact test of "higher financial synergy for conglomerate mergers" hypothesis, we set the null hypothesis, the financial benefits from conglomerate mergers are the same as those of horizontal mergers. If the financial gains from both types of mergers are the same, the sensitivity of financial synergy from each determinant should be the same regardless of merger type. Thus, the following joint condition should be satisfied when the null hypothesis holds.

$$\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0 \tag{6}$$

α_1 measures the difference of operational gains between horizontal mergers and diversifying mergers. The α_1 is expected to be significantly negative when horizontal mergers have larger operational gains on average than conglomerate mergers.

Finally, we compare the coinsurance benefits to stockholders arising from conglomerate with those from horizontal mergers using the estimated impact of each coinsurance determinant. Given that the first alternative model specification best explains the change in equity value, we estimate the coinsurance benefit of each merger with the following expression:

$$\hat{\beta}_1\rho + \hat{\beta}_2|\omega_a\sigma_a - \omega_t\sigma_t| + \hat{\beta}_3\rho \cdot |\omega_a\sigma_a - \omega_t\sigma_t| + \hat{\beta}_4(\omega_a\tau_a + \omega_t\tau_t) + \hat{\beta}_5(\tau_a - \tau_t) \tag{7}$$

Then, we compare the distribution of coinsurance benefit between diversifying and specializing mergers with two sample t-test.

3 Sample selection and Methodology

3.1 Merger Sample

We construct our sample by obtaining data on merger deals by US firms from the Securities Data Company (SDC) Mergers and Acquisition (M&A) Platinum database.[9] We then obtain stock returns, financial and accounting data for acquirers and targets from the CRSP and COMPUSTAT databases. We impose the following conditions on all observations:

[9] Betton et al (2008) report that tender offers show different characteristics from mergers. A merger deal is mainly the result of negotiations between the bidder and target management teams. In contrast, a tender offer is an offer made by the bidder management directly to target shareholders to purchase target shares and sometimes carries hostility. The significant difference between mergers and tender offers stems from the choice of payment method. While tender offers prefer cash payment over stock payment, mergers are mainly paid by stock including other contingent claims. With the form of contingent payment, bidder and target shareholders are likely to share the risk that the target and/or bidder shares are overvalued ex ante.

1. Transactions are merger deals identified by “M” for the deal form and “No” for the tender offer dummy (Betton et al (2008)).[10]

2. The deal is announced between 1978 and 2007 and ultimately completed.

3. Returns from CRSP and cash flow from the CRSP-COMPUSTAT Merged database are available for both acquirers and targets. This restricts the sample to merger deals between public acquirers and public targets.

4. Market values of merging firms exceed $10 million in constant 2001 dollars adjusted for the Consumer Price Index of the Bureau of Labor Statistics.

5. To make the measurement of cash flow correlation meaningful, bidding firms have 5 or more years of cash flow data and target firms have at least 3 years of cash flow data immediately prior to merger announcements. The different requirements to bidders and targets are adopted to maximize sample size.

6. Merger deals do not involve financial firms.

7. Marginal tax rates are available for both acquirers and targets.

There are 1,149 merger deals that satisfy the first four restrictions. In the total sample without firm-year restrictions, the median firm-year observations before mergers are 11 years and 6 years for bidder and target firms, respectively. Bidders and targets have 6 and 4 firm-year observations at the 25th percentile. The requirement that target firms have 3 years of target cash flow coincides with the 10th percentile of firm-year observations for not only bidders but also targets. The firm-year restriction reduces the sample size to 848 merger deals. Excluding

[10] Betton et al (2008) report that mergers represent the majority of corporate takeovers. The total takeover sample they study is categorized into initial merger bids (28,994), tender offers (4,500), and control-block trades (2,224).

financial firms and firms with missing marginal tax rates reduces sample size further. The final sample encompasses 365 completed mergers that were announced during 1981-2006.

3.2 Variable Construction

The main variables related to a merger's corporate coinsurance are the cash flow correlation between acquirer and target firms (ρ), an acquirer's cash flow volatility (σ_a), a target's cash flow volatility (σ_t), and size-weighted volatility difference ($|w_a\sigma_a - w_t\sigma_t|$).

Cash flow is defined as income before extraordinary items (COMPUSTAT data item 18) plus depreciation (item 14), normalized by the book value of total assets (item 6).[11] ρ is the Pearson correlation coefficient of cash flow observations for acquirer and target firms. σ_a and σ_t are the standard deviations of cash flows using all available cash flow data in the years prior to the merger announcement. Consequently, the number of years used to calculate the cash flow volatility for the acquirer may be different from the number of years used for the target.[12]

Firm characteristic variables include Tobin's Q, relative market value, leverage, and cash. Tobin's Q is measured by the sum of total book value of assets and market value of equity minus total common equity normalized by total book value of assets. Relative market value (RMV) is computed as the logarithm ratio of the market value of the target to that of the bidder 15 trading days prior to the initial announcement. Cash is the ratio of cash and short term investments to book value of total assets, and leverage is the sum of long term debt and short term debt deflated by total assets. Control variables include deal characteristics such as the proportion of stock payment (PCT_STK item in SDC) and initial attitude of target management toward merger deal (ATTC item in SDC). A merger deal is categorized as hostile if the value of ATTC

[11] Another popular measure for cash flow, Operating Income Before Depreciation (item 13), is also tested. However, our measure has much more observations than the alternative measure.

[12] Given that the standard deviation is linear in time periods, we normalize the standard deviation by the square root of the number of firm-years.

item is not 'F' or friendly.

3.3 Event study methodology

We follow the traditional event study approach suggested by Brown and Warner (1985). The market model is utilized to estimate the abnormal returns over the three-day event window (-1, +1) around merger announcement. We take the CRSP value-weighted index returns as benchmark returns. The parameters for the market model are estimated over the (-300, -60) calendar dates. We estimate the cumulative abnormal returns for bidder and target firms with $C\hat{A}R_i(\tau_1, \tau_2) = \Sigma_{\tau=\tau_1}^{\tau=\tau_2} \epsilon_{i\tau}^*$ where abnormal return $\epsilon_{i\tau}^*$ is estimated by subtracting the value-weighted index return from the firm's returns and τ represents the event window.

As a measure of total synergistic gain that is shared by bidder and target shareholders from a merger deal j, we adopt the total percentage gain (hereafter TPG) which is suggested by Bradley, Desai, and Kim (1988) based on the notion that total synergistic gain will be distributed to both acquiring firm and target firm and we are not interested in the division of the total synergistic gain at this time.

$$\Delta\hat{\Pi}_j = [W_{A_j} \cdot C\hat{A}R_{A_j} + W_{T_j} \cdot C\hat{A}R_{T_j}]/[W_{A_j} + W_{T_j}] \tag{8}$$

where $\Delta\hat{\Pi}_j$ is the estimated total synergistic gain from a merger deal j, W_{A_j} is the market value of acquiring firm in the deal j as of the end of 15 trading days before the announcement, $C\hat{A}R_{A_j}$ is the estimated cumulative abnormal return of acquiring firm in the deal j, W_{T_j} is the market value of target firm minus the value of the target shares held by acquirer in the deal j as of the end of 15 trading days ahead of the announcement, and $C\hat{A}R_{T_j}$ is the estimated cumulative abnormal return of target firm in the deal j.

4 The effect of corporate coinsurance on the wealth change to shareholders around merger announcement

4.1 Merger sample

It is crucial to categorize total merger deals into horizontal mergers or diversifying mergers as correctly as possible in our test.[13] We utilize the standard industry classification (SIC hereafter) code from SDC platinum database to classify the type of a merger deal. As a first step, the industry classification is retrieved from primary SIC code information of merging firm(APSIC) and merged firms(TPSIC) specified in the SDC platinum database.[14] Subsequently, we applied the following scheme to classify all merger deals into horizontal, nonhorizontal, conglomerate3, conglomerate2 mergers: A merger deal is categorized as a horizontal merger when both parties of a merger deal have the same four digit SIC code. Otherwise, it is categorized as a nonhorizontal merger. If the first-three (two) digit of aquirer SIC code differs from the first-three (two) digit of target SIC code, a merger deal is categorized into conglomerate3 (conlomerate2) merger.

Table 1 shows the number of mergers by year and merger types. The number of mergers in the 1990s and 2000s dominates the number of mergers in the 1980s for both horizontal mergers and diversifying mergers. This makes sense that tender offers took significant portion of merger and acquisition activities in the 1980s and our sample excludes tender offers. Consistent with merger wave literature, we observe that merger activities were very active in the late 1990s.

[13]Kahle and Walkling (1996) report the importance of data source and industry classification scheme. They report that (i) COMPUSTAT matched samples are more powerful than CRSP matched samples in detecting abnormal performance (ii) four-digit SIC code matches are more powerful than two-digit SIC code matches.

[14]When we compare the match of industry classification between SDC and COMPUSTAT with the match between SDC and CRSP for several cases(two-digit, three-digit, four-digit), we find the match rate between SDC and COMPUSTAT is much higher than the match rate between SDC and CRSP. In addition, SIC code from SDC provides the least missing observations.

4.2 Merger conditions of horizontal versus conglomerate mergers

We investigate how corporate coinsurance determinants affect the wealth of combined shareholders then compare the relative amount of the increase in shareholder wealth arising from the coinsurance effect to test whether diversifying mergers are superior to specializing mergers and to figure out the sources of extra gains to stockholder if any pertaining to conglomerate mergers. Following the conventional approach suggested by Bradley, Desai, and Kim (1988), we adopt the short-run event study to measure the change in equity value. We first investigate whether diversifying mergers have systematically favorable conditions to generate higher “coinsurance effect” than horizontal mergers. There are two sources that could enhance equity value from corporate coinsurance. One source is the increase in interest tax shields that is proportional to marginal tax rates. The higher are the marginal rates, the higher is the increase in equity value. The other source is the increase in cash flow volatility, which enhances the call option value of equity while reduces the bond value. The higher is cash flow correlation, the larger is the increase in the combined equity value.

The descriptive statistics of coinsurance determinants are presented in Table 2 and Table 3. Panel A and Panel B of Table 2 reports the means, standard deviations, and several percentiles of coinsurance determinants for the horizontal and nonhorizontal merger sample while Panel A and B of Table 3 document the same descriptive statistics for conglomerate mergers where SIC codes of bidder and target differ at the first three digit and conglomerate mergers where SIC codes of bidder and target differ at the first two digit respectively. A notable feature from descriptive statistics is that the cash flow correlation in horizontal mergers(0.146) is on average higher than the cash flow correlation in other mergers(0.037, 0.065, and 0.074). It goes with our expectation that firms in the same industry tend to go through the same business cycle than firms in other industries do, which end up with high cash flow correlation. The market-value weighted difference of cash flow volatilities in horizontal mergers is much larger than that in diversifying mergers. The mean and median volatility difference in horizontal mergers are 2.437 and 0.985 while those in diversifying mergers at SIC 3 digit are 0.871 and 0.486 each. This large difference is mainly derived from the high cash flow volatility of acquiring firms and relatively similar size in the horizontal mergers in comparison of diversifying mergers. The mean and median cash volatility of bidding firms in horizontal mergers are 3.507 and 1.454 while those in diversifying mergers at SIC 3 digit are 1.427 and 0.668 each. The larger and more stable bidder in diversifying mergers are consistent with conventional wisdom of corporate coinsurance.[15] Marginal tax rates of both bidder and target firms in same-industry mergers are lower than those in cross-industry mergers on average. These higher marginal tax rates in conglomerate mergers coincide with the condition for larger interest tax shields.

Table 4 reports two sample t-test results of whether diversifying mergers have the same mean values for coinsurance determinants as those of horizontal mergers. Panel A of Table 4 reports the wealth change of bidder, target, and combined shareholders in a tandem. While the wealth of bidder equityholders is reduced for all types of merger subsample, the wealth of target equityholders is enhanced on average. Interestingly, the wealth of combined shareholders is on average reduced following the direction of bidder wealth change. The difference between average change in stock value of acquiring firms in horizontal mergers (-3.211%) and average change in stock value of acquiring firms in conglomerate 3 mergers (-3.195%) is almost negligible. In contrast, the increase in target shareholder wealth for conglomerate3 mergers (21.278%) are much higher than that for horizontal mergers (17.174%) though they are not statistically different. Average change in wealth of combined shareholders in horizontal mergers outshines that in conglomerate mergers though the difference is not statistically significant.

[15]Scott (1977) argues that "A merger between a large stable firm and a small, profitable, but unstable firm may tend to reduce the present value of future bankruptcy costs and thus increase value. Conversely, a merger between a small stable firm and a large volatile one may reduce value by increasing the present value of future bankruptcy costs".

Panel B of Table 4 presents the main test results for the comparison of coinsurance determinants between horizontal mergers and conglomerate mergers. Two sample t-test fails to reject the null hypothesis that horizontal mergers have different cash flow correlation from diversifying mergers while it goes with our expectation that the average cash flow correlation of horizontal mergers exceeds that of diversifying mergers. In contrast, Horizontal mergers have significantly different means for volatility difference and two candidates for ex ante marginal tax rate of combined firm ($w_a\sigma_a + w_t\sigma_t$ and $max(\tau_a, \tau_t)$) from those of conglomerate mergers regardless of the definition of conglomerate mergers. Horizontal mergers show lower volatility difference and higher ex-ante marginal tax rates of combined firm than conglomerate mergers. The comparison of market capitalization, cash flow volatility, marginal tax rate of acquiring and acquired firms illustrate why volatility difference (ex-ante marginal tax rate of combined firm) of cross-industry mergers are much lower (higher) than that of same-industry mergers. The bidder of conglomerate mergers has on average much higher market capitalization, much lower cash flow volatility, and larger marginal tax rate than the bidder in horizontal mergers. The target of conglomerate mergers is almost the same size as the target of horizontal mergers whereas the target of conglomerate mergers has on average much lower cash flow volatility, and larger marginal tax rate than the target in horizontal mergers.

Panel C of Table 4 shows two sample t-test results of whether diversifying mergers have different merger conditions for other than coinsurance determinants from those of horizontal mergers. It is natural that the log-taken relative market capitalization in horizontal mergers is not the same as that in conglomerate mergers based on the previous observations. Bidders in same-industry mergers retain much larger cash (17.8%) in proportion of total asset than bidders in cross-industry mergers (10.2%). Except for these two conditions, horizontal mergers have similar merger conditions to those of conglomerate mergers.

4.3 The impact of coinsurance determinants on the change in shareholder wealth around merger announcement

We investigate the impact of coinsurance determinants on the change in equity value around the merger announcement by cumulative abnormal returns to bidding firm target firm shareholders, total percentage gain to combined shareholders suggested by Bradley, DeSai, and Kim (1988). In Table 5 and Table 6, we regress excess returns to bidding and target firm shareholders and the total percentage gain to combined stockholders on several determinants of the coinsurance effect as well as other control variables. Table 5 run the regression with only coinsurance determinants while Table 6 include other control variables. All $t-$statistics are based on heteroscedasticity consistent standard errors of White (1980).

Consistent with the predictions based on simulation analysis, an increase in cash flow correlation benefits shareholders. Regardless of different model specification of marginal tax rates, all regression coefficients for cash flow correlation are significantly positive at least 5 % level. This positive impact of cash flow correlation implies that the increase in cash flow correlation enhances bidder shareholders and target shareholders consequently the combined shareholders.

We examine the impact of marginal tax rates of bidder and target with several representations in panel A. Model 1 shows how individual marginal tax rates of bidder and target firms affect the shareholder wealth. Model 1 for bidder, target shareholders exhibits that individual marginal tax rates of bidder and target positively affect the wealth of bidder and target shareholders subsequently combined shareholders though the impact is not statistically significant. An increase in target firm marginal tax rate enhances combine shareholder wealth. Model 2 assumes that the marginal tax rate of combined firm will be the maximum of bidder or target marginal tax rate. This assumption seems to be inferior because the adjusted R^2 is lower than the model 1. Model 3 assumes the marginal tax rate of combined firm will be size weighted average of marginal tax rates of bidder and target firms. This assumption best fits the change in wealth of acquiring, acquired, and total firm gains in that the regression coefficients for bidder and target CAR in addition to total percentage gain are all statistically significant. In addition, we add the difference between bidder and target marginal tax rate to accommodate the impact of target marginal tax rate.

In Table 6, we pick up only the pair of $w_a\tau_a + w_t\tau_t$ and $\tau_a - \tau_t$ as coinsurance determinants of tax impact and test whether all coinsurance determinants still significantly affect the change in shareholder wealth after we introduce control variables. The rightmost three model specifications show that cash flow correlation, the interaction between cash flow correlation and volatility difference, and size-weighted average of marginal tax rates are still statistically significant when we control other merger characteristics.

In Table 7, we test whether conglomerate mergers have favorable sensitivities for the same level of coinsurance determinants in comparison of horizontal mergers. We first look at the sensitivity of coinsurance determinants in horizontal and non-horizontal mergers separately. Using both horizontal and non-horizontal mergers, we adopt simple indicator variable or DM which takes the value of 1 if a merger deal is not horizontal and 0 other wise. Then, we examine whether the coefficients with the indicator variable are statistically significant or not. Because all coefficients with indicator variable are not significantly different from zero, we interpret that there are no favorable sensitivities to diversifying mergers for the same level of coinsurance determinants that might arise from higher asset liquidity.

Table 8 compares the coinsurance benefits to combined shareholders in horizontal mergers and several sub-samples in conglomerate mergers which are examined in Table 2 and Table 3. As we expected from two sample t-test of size-weighted average of marginal tax rate in Table 3, conglomerate mergers generate much higher positive tax impact on combined shareholder wealth than horizontal mergers. Horizontal mergers with high cash flow correlation and high volatility difference provide a higher risk effect than conglomerate mergers although the risk effect is not statistically significant. The total coinsurance benefit from conglomerate mergers is not always significantly higher than the total coinsurance benefit from horizontal mergers.

5 The impact of coinsurance determinants on the change in leverage and cash holdings after merger completion

The previous section shows that conglomerate mergers mainly enhance shareholder wealth from higher marginal tax rates of bidder and target rather than risk shifting. In this section, we examine how coinsurance determinants affect the change in leverage and cash holdings after a merger is consummated. This investigation shed lights on the channel by which firm managers resolve the conflict of interest between bondholders and shareholders. Although low cash flow correlation is not a good condition to enhance shareholder wealth, firm managers can reduce the negative effect by increasing the leverage due to the increased debt capacity.[16] Thus, it is our primary interest whether merger deals of low cash flow correlation increase leverage more than merger deals of high cash flow correlation. In addition, we are also interested how merger deals of high marginal tax rates enhance shareholder wealth after the merger completion. There are two possible ways to enhance the shareholder wealth: one channel is the increase in financial leverage, a utilization of increased debt capacity, the other channel is the reduction in excess cash after merger completion, utilization of unused debt capacity.

5.1 The change in financial leverage and cash holdings around merger announcement

Table 9 presents the change in financial leverage around mergers. Financial leverage is measured as the fiscal year-end ratio of debt to total firm value. Debt is defined as the sum of book value of

[16] Kim and McConnell (1977) emphasize that equityholders of merging firms can protect themselves from potential losses by increasing financial leverage of merged firms.

long-term (COMPUSTAT item 9) and short-term debt (item 34). Total firm value is computed as the sum of book value of debt and preferred stock (item 130), and the market value of common stock (item25*item199). Following Gosh and Jain (2000), we measure the pro-forma financial leverage of the combined firm for pre-merger years by the ratio of the sum of debt of bidder and target to the sum of total firm value of bidder and target.

$$Leverage_{before} = \frac{Debt_a + Debt_t}{Debt_a + MVE_a + PS_a + Debt_t + MVE_t + PS_t} \tag{9}$$

where Debt is the sum of book value of short-term and long-term debt, MVE is the market value of common stock , and PS is the book value of preferred stock. Intuitively, the financial leverage after merger completion is the debt of merged firm normalized by the total firm value of merged firm.

$$Leverage_{after} = \frac{Debt_c}{Debt_c + MVE_c + PS_c} \tag{10}$$

We define the change in financial leverage as the difference between the financial leverage of merged firm and the pro-forma financial leverage of the target and acquiring firms ahead of the merger. We define Year 0 as the fiscal year of merger completion.

$$\Delta Leverage = Leverage_{after} - Leverage_{before} \tag{11}$$

Panel A of Table 9 shows the mean pro-forma financial leverage of the combined firm before merger and financial leverage of the merged firm after the consummation of merger for 4 different types of subsamples. In all subsamples, the mean pro-forma financial leverage declines right before merger announcement and subsequent financial leverage of combined firm is much higher than those of pre-merger period. This feature is most prominent in horizontal mergers in that mean pro-forma financial leverage one year before merger announcement is 18.6% of total firm value while average financial leverage three year after merger completion is 24.7%.

Panel B of Table 9 presents the one sample t-test results for the change in financial leverage. The mean increase in financial leverage one year after merger consummation is 3.6%, 3.3% for horizontal and conglomerate3 mergers each. These leverage increases are significant at 1% and 5% level. The increased leverage does not reverse to the pre-merger level. On the contrary, acquiring firms both in horizontal and conglomerate mergers continue to increase their financial leverage three years after merger completion by 6.7% and 4.1% respectively. The increase in financial leverage around merger is most significant in horizontal mergers as we observed from the time series of financial leverage in Panel A.

Table 10 provides the change in cash holdings around mergers. Following Duchin (2010), cash holdings is measured as the fiscal year-end ratio of cash, cash equivalents, and marketable securities (COMPUSTAT item1) to total book value of asset (item6). We measure the pro-forma cash holdings of the combined firm for pre-merger years by the ratio of the sum of cash of bidder and target to the sum of total book value of asset of bidder and target.

$$Cash_{before} = \frac{Cash_a + Cash_t}{TA_a + TA_t} \tag{12}$$

where Cash is the cash, cash equivalents, and marketable securities, TA is the book value of total assets. The cash holding ratio of combined firm after merger completion is the simple ratio of book value of cash to book value of total assets of combined firm.

$$Cash_{after} = \frac{Cash_c}{TA_c} \tag{13}$$

The change in cash holding is defined as the difference between the cash holdings of merged firm and the pro-forma cash holdings of the target and acquiring firms before the merger.

$$\Delta Cash = Cash_{after} - Cash_{before} \tag{14}$$

Panel A of Table 10 shows the mean pro-forma cash holdings of the combined firm before merger and financial leverage of the merged firm after the merger completion for 4 different types of merger subsamples. All types of acquirer maintains the mean pro-forma cash holdings before merger announcement but the cash holdings of combined firm is sharply reduced after the merger completion. Then, acquiring firm increases cash holdings over time. Interestingly, the cash holdings of combined firm after merger completion springs back to the cash holdings of pre-merger level for non-horizontal, conglomerate3, and conglomerate2 mergers while cash holdings of combined firms after merger completion is lower than the pro-forma cash holdings of combined firm before merger in horizontal mergers. In horizontal merger sample, mean pro-forma cash holdings one year before merger announcement is 17.6% of total book value of asset but it falls to the 14.6% of total book value one year after merger completion then gradually increases to 14.9 and 15.2% two and three after merger completion respectively. In conglomerate3 sample, mean pro-forma cash holdings one year before merger announcement is 11.0% of total book value of asset but it falls to the 9.6% of total book value one year after merger completion then it returns back to the original level to 11.0% and 11.4% two and three after merger completion respectively.

Panel B of Table 10 presents the one sample t-test results for the change in cash holding of four different types of merger subsample. The mean change in cash holdings one year after merger consummation is -2.4% and -1.6% for horizontal and conglomerate3 mergers each. These leverage increase are significant at 1% and 5% level. While the change in cash holding two year after merger completion is significantly negative, -2.0% for horizontal mergers, the change in cash holdings two year after merger completion is statistically insignificant, -0.7%.

5.2 The impact of coinsurance determinants on the change in financial leverage and cash holdings

We investigate the impact of coinsurance determinants on the change in financial leverage and cash holdings. In Table 11, we regress the change in financial leverage and cash holdings for different time spans after merger completion to coinsurance determinants as well as other control variables which were estimated before the merger announcement. All $t-$statistics are based on heteroscedasticity consistent standard errors of White (1980).

All regression coefficients for coinsurance determinants at column 2 through 4 of Table 11 are insignificant. These insignificant coefficients for coinsurance determinants implies that corporate coinsurance does not affect the change in financial leverage after the merger completion although the sign for all regression coefficients of coinsurance determinants in leverage change coincide with the regression coefficients in total percentage gain.

In contrast, column 5 though 7 of Table 11 show that the change in cash holdings after merger completion is affected by size weighted average of marginal tax rates of bidder and target firm while other coinsurance determinants do not have an impact on the cash holdings. In addition to coinsurance determinants, other control variables have an sizeable impact on the cash holding after merger. Especially, cash holding level of bidder and target before merger announcement negatively affect the change in cash holdings. It indicates that cash rich bidders before merger announcement continue to reduce their cash holdings after merger completion.

6 Conclusion

We address the question of why firms diversify their businesses given that diversification obtains little operational gains. As another source of gains from diversification, we test whether corporate coinsurance can provide a rationale of conglomerate mergers. We examine the merger conditions related to corporate coinsurance and the extent to which corporate coinsurance enhances shareholder value for conglomerate versus horizontal mergers, the impact of corporate coinsurance on financial leverage and cash holdings after merger completion.

The investigation of merger conditions reveals that conglomerate mergers take systematically different values for coinsurance determinants from those in horizontal mergers. Bidder in conglomerate mergers are much larger and more stabilized cash flows than target in comparison of horizontal mergers. Furthermore, both marginal tax rate of bidder and target in conglomerate mergers are higher than the marginal tax rate of bidder and target in horizontal mergers. Consequently, conglomerate merger have much lower size-weighted average volatility difference and marginal tax rate than horizontal mergers.

The change in shareholder wealth around merger announcement shows that the higher marginal tax rate of bidder and target firm in conglomerate mergers are favorable condition to generate extra wealth to combined shareholders. When we decompose the wealth change in combined shareholders around merger announcement into two parts or tax effect and risk effect, we confirm that conglomerate mergers generate extra total percentage gains from tax effect which vary from 0.23% to 0.46% according to model specification and choice of conglomerate mergers. The systematically lower volatility difference is an unfavorable condition to produce positive coinsurance effect to shareholders. Thus, the resulting change in the wealth of combined shareholders from conglomerate mergers are not always significantly higher than that from horizontal mergers.

We also examine the change in financial leverage and cash holdings after merger completion. Among coinsurance determinants, only weighted average of marginal tax rate of bidder and target affect the change in cash holdings after the consummation of a merger. The increase in weighted average of marginal tax rates contributes to the reduction in the cash holdings after the merge completion, which enhances the shareholder wealth. Interestingly, coinsurance determinants does not have an impact on the change in financial leverage after the merger completion.

Appendices A : Variable definitions

Variable	Definition
ρ	the correlation of acquirer's and target's cash flows during common firm-years ahead of a merger announcement
σ	the cash flow volatility measured as the standard deviation of cash flows in past years ahead of a merger announcement
w_a	the ratio of market capitalization of an acquiring firm to the sum of market capitalization of the acquirer and target, $w_a = \frac{MV_a}{MV_a+MV_t}$
$\lvert w_a\sigma_a - w_t\sigma_t\rvert$	the market value-weighted cash flow volatility difference
τ	the marginal tax rate estimated by John Graham
$w_a\tau_a + w_t\tau_t$	the market value weighted average of marginal tax rates
τ_a - τ_a	the difference between bidder and target marginal tax rate
RMV	log taken relative market capitalization of target and acquirer at 15 trading days before merger announcement, $log(\frac{MV_t}{MV_a})$
PCT STK	the proportion of stock payment from SDC M&A database
Cash	The ratio of cash and marketable securities(item1) to the book value of total assets(item6)
Cash flow	The ratio of the sum of income before extraordinary items(item18) and depreciation(item14) to the book value of total assets(item6)
Leverage	The ratio of total debt or sum of current liabilities(item34) and long term debt(item9) to the book value of total assets(item6)
Tobin's Q	Market value of assets measured as book value of total assets(item6) less book value of equity(item60) plus market value of equity(item25*item199) divided by book value of total assets(item6)

References

[1] Aggarwal, Rajesh K., and Andrew A. Samwick, 2003, Why do managers diversify their firms? Agency reconsidered, *Journal of Finance* 58, 71-118.

[2] Amihud, Yakov, and Baruch Lev, 1981. Risk reduction as managerial motive for conglomerate mergers, *Bell Journal of Economics* 12, 605-617.

[3] Asquith, Paul, and E. Han Kim, 1982, The impact of merger bids on the participating firm's security holders, *Journal of Finance* 37, 1209-1228.

[4] Asquith, Paul, Robert Bruner, and David W. Mullins, Jr., 1983, The gains to bidding firms from merger, *Journal of Finacial Economics* 11, 121-139.

[5] Betton, Sandra, B. Espen Eckbo, and Karin S. Thorburn, 2008, Corporate takeovers, Available at SSRN: http://ssrn.com/abstract=1131033

[6] Bradley, Michael, Anand Desai, and E. Han Kim, 1988, Synergistic gains from corporate acquisitions and their division between the stockholders of target and acquiring firms, *Journal of Financial Economics* 21, 3-40.

[7] Brown, Stephen J., and Jerold B. Warner, 1985, Using daily stock returns: The case of event studies, *Journal of Financial Economics* 14, 3-31.

[8] Bruner, Robert F., 1988, The use of excess cash and debt capacity as a motive for merger, *Journal of Financial and Quantitative Analysis* 23, 199-217.

[9] Devos, Erik, Palani-Rajan Kadapakkam, Srinivasan Krishnamurthy, 2009, How do mergers create value? A comparison of Taxes, Market Power, and Efficiency Improvements as Explanations for Synergies, *Review of Financial Studies* 22, 1179-1211.

[10] Duchin, Ran, 2010, Cash Holdings and Corporate Diversification, *Journal of Finance* 65, 955-992.

[11] Fan, Joseph P. H., and Vidhan K. Goyal, 2006, On the patterns and wealth effects of vertical mergers, *Journal of Business* 79, 877-902.

[12] Fee, C. Edward, and Shawn Thomas, 2004, Sources of gains in horizontal mergers: evidence from customer, supplier, and rival firms, *Journal of Financial Economics* 74, 423-460.

[13] Fluck, Zsuasanna, and Anthony W. Lynch, 1999, Why firms merge and then divest: a theory of financial Synergy, *Journal of Business* 72, 319-346.

[14] Gomes, Joao, and Dmitry Livdan, 2004, Optimal Diversification: Reconciling Theory and Evidence, *Journal of Finance* 59, 507-535.

[15] Gosh, Aloke, and Prem C. Jain, 2000, Financial leverage changes associated with corporate mergers, *Journal of Corporate Finance* 6, 377-402.

[16] Harford, Jarrad, 1999, Corporate cash reserves and acquisitions, *Journal of Finance* 54, 1969-1997.

[17] Higgins, Robert, and Lawrence Schall, 1975, Corporate bankruptcy and conglomerate merger, *Journal of Finance* 30, 93-113.

[18] Hubbard, R. Glenn, and Darius Palia, 1999, A reexamination of the conglomerate merger wave in the 1960s: an internal capital markets view, *Journal of Finance* 54, 1131-1152.

[19] Jensen, Michael C. 1986 Agency costs of free cash flow, corporate finance and takeovers, *American Economic Review* 76, 323-329.

[20] Jensen, Michael C., and Murphy, K. J., 1990, Performance pay and top management incentives *Journal of Political Economy* 102, 1248-1280.

[21] Kahle, Kathleen M., and Ralph A. Walkling, 1996, The impact of industry classifications on financial research, *Journal of Financial and Quantitative Analysis* 31, 309-335.

[22] Kim, E. Han, and John McConnell, 1977, Corporate mergers and the co-insurance of corporate debt *Journal of Finance* 32, 349-365.

[23] Lang, Larry H. P., Rene M. Stulz, and Ralph A. Walkling, 1989, Managerial performance, Tobin's q, and the gain from successful tender offers, *Journal of Financial Economics* 24, 137-154.

[24] Leland, Hayne E., 2007, Financial Synergies and the optimal scope of the firm: Implications for mergers, spinoffs, and structured finance, *Jouranl of Finance* 62, 765-807.

[25] Levy, Haim, and Marshall Sarnat 1970, Diversification, portfolio analysis, and uneasy case for conglomerate mergers, *Jouranl of Finance* 795-802.

[26] Lewellen, Wilbur G., 1971, A pure financial rationale for the conglomerate merger, *Jouranl of Finance* 21, 521-537.

[27] Maksimovic, Vojislav, and Gordon Phillips, 2002, Do conglomerate firms allocate resources inefficiently across industries? Theory and Evidence *Jouranl of Finance* 57, 721-767.

[28] Maksimovic, Vojislav, and Gordon Phillips, 2008, The industry life cycle, acquisitions and investment: Does firm organization matter? *Jouranl of Finance* 63, 673-708.

[29] Martin, John D., and Akin Sayrak, 2003, Corporate diversification and shareholder value: a survey of recent literature, *Journal of Corporate Finance* 9, 37-57.

[30] Matsusaka, John G., 2001, Corporate diversification, value maximization, and organization capabilities, *Journal of Business* 74, 409-431.

[31] Moeller, Sarah B., Frederik P. Schligeman, and Rene M. Stulz, 2005, Wealth destruction on a massive scale? A study on acquiring-firms return in recent merger wave, *Journal of Finance* 60, 757-782

[32] Morck, Randall, Andrei Shleifer, and Robert Vishny, 1989, Alternative mechanism for corporate control, *American Economic Review*, 89, 842-852.

[33] Morck, Randall, and Bernard Yeung, 2003, Why firms diversify: Internalization vs Agency Behavior, In intangible assets, John Hand and Baruch Lev ed, Oxford management readers.

[34] Myers, Stewart C., 1977, Determinants of corporate borrowing, *Journal of Financial Economics* 5, 147-175.

[35] Myers, Stewart C., and Nicholas S. Majluf, 1984, Corporate financing and investment decisions when firms have information that investors do not have, *Journal of Financial Economics* 13, 187-221.

[36] Penrose, E. T., 1959, The theory of the growth of the firm, Wiley, New York.

[37] Roll, Richard, 1986, The hubris hypothesis of corporate takeovers, *Journal of Business* 59, 197-216.

[38] Rubinstein, Mark E., 1973, A mean-variance synthesis of corporate financial theory, *Journal of Finance* 28, 167-181.

[39] Sarig, Oded, 1985, On mergers, divestments, and options: A note, *Journal of Financial and Quantitative Analysis*, 20, 385-389.

[40] Scott, James H., 1977 On the theory of corporate mergers, *Journal of Finance* 32, 1235-1250.

[41] Servaes1991 Servaes, Henry, 1991, Tobin's Q and the gains from takeovers, *Journal of Finance* 42, 409-419.

[42] Shenoy2012 Shenoy, Jaideep, 2012, An Examination of the Efficiency, Foreclosure, and Collusion Rationales for Vertical takeovers, *Management Science* 58, 1482-1501.

[43] Shleifer, Andrei, and Robert W. Vishny, 1989, Managerial entrenchment, the case of manager specific investments, *Journal of Financial Economics* 25, 123 - 139.

[44] Shleifer, Andrei, and Robert W. Vishny, 1992, Liquidation values and debt capacity: a market equilibrium approach, *Journal of Finance* 47, 1343 - 1366.

[45] Stein, Jeremy C. 1997 Internal capital markets and the competition for corporate resources, *Journal of Finance* 52, 111-133.

[46] Travlos, Nickolaos G., 1987, Corporate takeover bids, methods of payment, and bidding firm's stock returns, *Journal of Finance* 42, 943-963.

[47] White, Halbert, 1980, A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity, *Econometrica* 48, 817-838.

[48] Williamson, Oliver E., 1988, Corporate finance and corporate governance, *Journal of Finance* 43, 567-592.

Table 1: Sample distribution by announcement year and merger type

The sample contains all completed U.S. mergers and acquisitions between 1981 and 2006 listed on SDC where the publicly traded acquiring firm acquires a public target. The market value of both firms exceeds 10 million dollar in 2001. The four digit standard industry classification(SIC) code of acquiring firm matches with that of acquired firm in horizontal mergers. The SIC codes of bidder and target do not coincide in non-horizontal mergers. Conglomerate3 and conglomerate2 are subsets of non-horizontal mergers. Bidder's first three (two) digit of SIC code differs from target's first three (two) digit of SIC code in conglomerate3 (conglomerate2) sample. These subsets will be used for the robustness check. This classification implies that some mergers in non-horizontal mergers are vertical mergers which are not the member of conglomerate3 or conglomerate2 subsets.

Announcemnt	Merger type				
year	Horizontal	Non-horizontal	All	Conglomerate3	Conglomerate2
1981	1	2	3	2	1
1982	0	0	0	0	0
1983	0	1	1	1	0
1984	0	0	0	0	0
1985	2	3	5	3	3
1986	3	4	7	3	3
1987	4	6	10	6	4
1988	2	2	4	2	1
1989	0	2	2	0	0
1990	2	4	6	4	4
1991	4	7	11	6	5
1992	3	0	3	0	0
1993	5	4	9	3	2
1994	7	3	10	2	2
1995	13	7	20	5	4
1996	7	9	16	8	8
1997	20	11	31	9	6
1998	27	15	42	10	10
1999	23	26	49	19	12
2000	20	10	30	8	5
2001	19	11	30	9	8
2002	10	7	17	5	5
2003	8	6	14	4	3
2004	10	2	12	1	0
2005	17	5	22	4	4
2006	8	3	11	3	2
Total	215	150	365	117	92

Table 2: Descriptive Statistics of coinsurance determinants for horizontal and conglomerate mergers

This table presents the descriptive statistics of coinsurance determinants in horizontal merger sample and diversifying merger sample. We employ primary SIC code information of acquiring firms (APSIC) and target firms (TPSIC) recorded in the SDC platinum database to classify a merger deal into horizontal, non-horizontal, conglomerate3, and conglomerate2 mergers. A merger deal is categorized as a horizontal merger when both party of a merger deal have the same four digit SIC code. Otherwise, a merger is classified as a non-horizontal merger. There are two subsets of non-horizontal mergers. If first three (two) digit of aquirer SIC code differs from the first three (two) digit of target SIC code, a merger deal is categorized into conglomerate3 (conglomerate2) mergers. ρ indicates the correlation of acquirer's and target's cash flows during common firm-years ahead of a merger announcement. $|w_a\sigma_a - w_t\sigma_t|$ is the market value-weighted cash flow volatility difference. σ_a and σ_t denote the cash flow volatility of the acquirer and target in past years ahead of a merger announcement. w_a is the ratio of market capitalization of an acquiring firm to the sum of market capitalization of the acquirer and target, $\omega_a = \frac{MV_a}{MV_a+MV_t}$. RMV $(= (MV_t/MV_a))$ represents the relative market capitalization of target and acquirer at 15 trading days before a merger announcement. τ_a and τ_t represent the marginal tax rate of the acquirer and target. $w_a\tau_a + w_t\tau_t$ is the market value weighted average of marginal tax rates. Max(τ_a, τ_t) is the maximum value of bidder or target marginal tax rate. τ_a - τ_a is the difference between bidder marginal tax rate and target marginal tax rate.

Variable	N Obs	Mean	St. Dev	Min	Q1	Median	Q3	Max
Panel A: Horizontal mergers								
ρ	215	0.146	0.490	-0.994	-0.192	0.180	0.508	0.999
$\lvert w_a\sigma_a - w_t\sigma_t\rvert$	215	2.437	7.435	0.015	0.343	0.985	2.071	98.388
σ_a	215	3.507	11.451	0.123	0.646	1.454	3.169	161.084
σ_t	215	5.700	11.811	0.065	1.117	2.707	5.164	144.216
log(MV$_a$)	215	7.500	1.788	2.713	6.213	7.431	8.670	12.338
log(MV$_t$)	215	5.579	1.828	2.339	4.011	5.463	6.893	11.054
$\frac{MV_t}{MV_a}$	215	0.356	1.032	0.003	0.066	0.160	0.385	13.484
τ_a	215	0.307	0.098	0.000	0.316	0.350	0.350	0.460
τ_t	215	0.269	0.118	0.000	0.187	0.340	0.350	0.460
$w_a\tau_a + w_t\tau_t$	215	0.302	0.092	0.000	0.273	0.342	0.350	0.460
Max(τ_a, τ_t)	215	0.327	0.079	0.000	0.340	0.350	0.351	0.460
τ_a - τ_a	215	0.038	0.119	-0.350	-0.001	0.000	0.108	0.350
Panel B: Non-horizontal mergers								
ρ	150	0.037	0.473	-0.999	-0.259	0.086	0.294	1.000
$\lvert w_a\sigma_a - w_t\sigma_t\rvert$	150	1.061	1.483	0.013	0.320	0.564	1.449	13.603
σ_a	150	1.719	2.416	0.107	0.440	0.941	2.119	16.750
σ_t	150	3.704	5.118	0.107	0.964	1.862	3.888	34.958
log(MV$_a$)	150	7.967	1.962	3.285	6.772	8.076	9.272	12.069
log(MV$_t$)	150	5.534	1.734	2.351	4.234	5.571	6.749	10.586
$\frac{MV_t}{MV_a}$	150	0.382	2.258	0.000	0.030	0.103	0.275	27.702
τ_a	150	0.328	0.096	0.000	0.340	0.350	0.350	0.460
τ_t	150	0.291	0.126	0.000	0.226	0.345	0.350	0.460
$w_a\tau_a + w_t\tau_t$	150	0.326	0.088	0.006	0.332	0.349	0.350	0.460
Max(τ_a, τ_t)	150	0.348	0.069	0.015	0.349	0.350	0.354	0.460
τ_a - τ_a	150	0.037	0.132	-0.348	-0.004	0.000	0.060	0.350

Table 3: Descriptive Statistics of sub-samples of conglomerate mergers

This table presents the descriptive statistics of coinsurance determinants in horizontal merger sample and diversifying merger sample. We employ primary SIC code information of acquiring firms (APSIC) and target firms (TPSIC) recorded in the SDC platinum database to classify a merger deal into horizontal, non-horizontal, conglomerate3, and conglomerate2 mergers. A merger deal is categorized as a horizontal merger when both party of a merger deal have the same four digit SIC code. Otherwise, a merger is classified as a non-horizontal merger. There are two subsets of non-horizontal mergers. If first three (two) digit of aquirer SIC code differs from the first three (two) digit of target SIC code, a merger deal is categorized into conglomerate3 (conglomerate2) mergers. ρ indicates the correlation of acquirer's and target's cash flows during common firm-years ahead of a merger announcement. $|w_a\sigma_a - w_t\sigma_t|$ is the market value-weighted cash flow volatility difference. σ_a and σ_t denote the cash flow volatility of the acquirer and target in past years ahead of a merger announcement. w_a is the ratio of market capitalization of an acquiring firm to the sum of market capitalization of the acquirer and target, $\omega_a = \frac{MV_a}{MV_a+MV_t}$. RMV ($= (MV_t/MV_a)$) represents the relative market capitalization of target and acquirer at 15 trading days before a merger announcement. τ_a and τ_t represent the marginal tax rate of the acquirer and target. $w_a\tau_a + w_t\tau_t$ is the market value weighted average of marginal tax rates. Max(τ_a, τ_t) is the maximum value of bidder or target marginal tax rate. τ_a - τ_a is the difference between bidder marginal tax rate and target marginal tax rate.

Variable	N Obs	Mean	St. Dev	Min	Q1	Median	Q3	Max
Panel A: Conglomerate3 subset of non-horizontal mergers								
ρ	117	0.065	0.467	-0.999	-0.193	0.107	0.311	0.999
$\|w_a\sigma_a - w_t\sigma_t\|$	117	0.871	0.984	0.013	0.307	0.486	1.077	6.355
σ_a	117	1.427	1.919	0.107	0.407	0.668	1.731	12.976
σ_t	117	3.425	5.166	0.107	0.815	1.553	3.720	34.958
log(MV$_a$)	117	8.028	1.949	3.285	6.897	8.123	9.318	12.069
log(MV$_t$)	117	5.485	1.793	2.351	4.148	5.187	6.817	10.586
$\frac{MV_t}{MV_a}$	117	0.201	0.248	0.000	0.028	0.097	0.279	1.448
τ_a	117	0.331	0.097	0.000	0.340	0.350	0.350	0.460
τ_t	117	0.299	0.125	0.000	0.274	0.349	0.350	0.460
$w_a\tau_a + w_t\tau_t$	117	0.331	0.088	0.013	0.335	0.350	0.350	0.460
Max(τ_a, τ_t)	117	0.354	0.063	0.015	0.350	0.350	0.356	0.460
τ_a - τ_a	117	0.032	0.136	-0.348	-0.004	0.000	0.019	0.350
Panel B: Conglomerate2 subset of non-horizontal mergers								
ρ	92	0.074	0.484	-0.999	-0.217	0.108	0.317	0.999
$\|w_a\sigma_a - w_t\sigma_t\|$	92	0.892	1.038	0.040	0.320	0.492	1.128	6.355
σ_a	92	1.453	2.065	0.130	0.414	0.744	1.600	12.976
σ_t	92	3.755	5.514	0.262	0.858	1.827	3.889	34.958
log(MV$_a$)	92	8.054	2.002	3.285	6.715	8.126	9.338	12.069
log(MV$_t$)	92	5.347	1.759	2.351	4.151	5.039	6.439	10.586
$\frac{MV_t}{MV_a}$	92	0.171	0.205	0.000	0.025	0.080	0.233	0.881
τ_a	92	0.331	0.096	0.000	0.340	0.350	0.350	0.460
τ_t	92	0.291	0.131	0.000	0.226	0.346	0.350	0.460
$w_a\tau_a + w_t\tau_t$	92	0.329	0.089	0.013	0.334	0.349	0.350	0.460
Max(τ_a, τ_t)	92	0.350	0.069	0.015	0.350	0.350	0.355	0.460
τ_a - τ_a	92	0.040	0.137	-0.348	-0.004	0.000	0.068	0.350

Table 4: Two sample t-tests of coinsurance determinants and control variables

The mean values of coinsurance determinants and control variables in horizontal mergers are compared with those in diversifying mergers. A merger deal is categorized as a horizontal merger when both party of a merger deal have the same four digit SIC code. Otherwise, it is classified as a non-horizontal merger. There are two subsets of non-horizontal mergers. If first three (two) digit of aquirer SIC code differs from the first three (two) digit of target SIC code, a merger deal is categorized into conglomerate3 (conglomerate2) mergers. CAR denotes the sum of three-day (-1, +1) cumulative abnormal returns (in percent) measured using the market model. The total percentage gain of a merger deal is measured by market-value weighted-average of cumulative abnormal returns of acquirer and target. Variable definitions are provided in the Appendix. The symbols * and ** indicate statistical significance at 10% and 5% levels, respectively.

	HZ	non-HZ	Conglo3	Conglo2	Difference tests		
Variable	(1)	(2)	(3)	(4)	(1)-(2)	(1)-(3)	(1)-(4)
Panel A: Announcement abnormal returns							
$CAR01_a$	-3.211	-3.333	-3.195	-2.471	0.123	-0.016	-0.74
$CAR01_t$	17.174	21.216	21.278	21.291	-4.042*	-4.104	-4.117
tpg01	-0.088	-0.806	-0.834	-0.310	0.718	0.746	0.222
Panel B: Coinsurance determinants							
ρ	0.146	0.037	0.065	0.074	0.109**	0.081	0.072
$\lvert w_a\sigma_a - w_t\sigma_t\rvert$	2.437	1.061	0.871	0.892	1.375***	1.566***	1.545***
$w_a\tau_a + w_t\tau_t$	0.302	0.326	0.331	0.329	-0.024**	-0.028***	-0.027**
$\text{Max}(\tau_a, \tau_t)$	0.327	0.348	0.354	0.350	-0.021***	-0.027***	-0.023**
τ_a - τ_a	0.038	0.037	0.032	0.040	0.001	0.006	-0.002
σ_a	3.507	1.719	1.427	1.453	1.788**	2.08**	2.054**
σ_t	5.700	3.704	3.425	3.755	1.997**	2.275**	1.945*
τ_a	0.307	0.328	0.331	0.331	-0.021**	-0.024**	-0.024*
τ_t	0.269	0.291	0.299	0.291	-0.022*	-0.03**	-0.021
$\log(MV_a)$	7.500	7.967	8.028	8.054	-0.467**	-0.527**	-0.553**
$\log(MV_t)$	5.579	5.534	5.485	5.347	0.045	0.094	0.232
$\frac{MV_t}{MV_a}$	0.356	0.382	0.201	0.171	-0.026	0.155**	0.185**
Panel C: Control variables							
PCT STK	83.735	83.476	80.673	82.938	0.259	3.062	0.797
RMV	-1.922	-2.434	-2.543	-2.707	0.512***	0.621***	0.785***
Tobin's Q_a	2.532	2.912	2.720	2.832	-0.381	-0.188	-0.3
Tobin's Q_t	2.075	2.323	2.389	2.430	-0.248	-0.314	-0.355
Leverage_a	0.230	0.224	0.248	0.224	0.006	-0.018	0.006
Leverage_t	0.245	0.237	0.252	0.246	0.008	-0.006	-0.000
Cash_a	0.178	0.135	0.102	0.106	0.043**	0.076***	0.072***
Cash_t	0.186	0.164	0.154	0.172	0.022	0.032	0.014
CF_a	0.076	0.089	0.094	0.099	-0.012	-0.018	-0.022*
CF_t	0.017	0.047	0.057	0.041	-0.03	-0.04	-0.024

Table 5: The impact of marginal tax rates on the change in combined equity value

We investigate the abnormal returns accruing to bidder, target, and combined shareholders using coinsurance determinants and control variables. CAR denotes the three-day cumulative abnormal return (in percent) measured using the market model. The total percentage gain of a merger deal is measured by market-value weighted-average of cumulative abnormal returns of acquirer and target. Especially, we explore the best combination of different representation of marginal tax rates in panel A. τ_a and τ_t represent the marginal tax rate of the acquirer and target. $w_a\tau_a + w_t\tau_t$ is the market value weighted average of marginal tax rates. Max(τ_a, τ_t) is the maximum value of bidder or target marginal tax rate. τ_a - τ_a is the difference between bidder marginal tax rate and target marginal tax rate. The best representation is utilized in panel B. Other variables related to corporate coinsurance are ρ, $|w_a\sigma_a - w_t\sigma_t|$, $\rho \cdot |w_a\sigma_a - w_t\sigma_t|$. ρ indicates the correlation of acquirer's and target's cash flows during common firm-years ahead of a merger announcement. $|w_a\sigma_a - w_t\sigma_t|$ is the market value-weighted cash flow volatility difference between bidder ant target. σ_a and σ_t denote the cash flow volatility of the bidder and target in past years ahead of a merger announcement. w_a is the ratio of market capitalization of an acquiring firm to the sum of market capitalization of the acquirer and target, $w_a = \frac{MV_a}{MV_a+MV_t}$. $\rho \cdot |w_a\sigma_a - w_t\sigma_t|$ measures the interaction between cash flow correlation and volatility difference between bidder and target. All $t-$statistics are adjusted for heteroskedasticity consistent standard errors. The symbols * and ** indicate statistical significance at 10% and 5% levels, respectively.

	bidder CAR			target CAR			total percentage gain		
	Model1	Model2	Model3	Model1	Model2	Model3	Model1	Model2	Model3
ρ	2.103**	1.955**	2.198**	5.209**	5.023**	5.331**	2.511***	2.366***	2.573***
	(2.39)	(2.24)	(2.50)	(2.03)	(2.04)	(2.07)	(3.15)	(2.98)	(3.25)
$\|w_a\sigma_a - w_t\sigma_t\|$	0.069	0.045	0.084	0.230	0.216	0.247	0.101**	0.080*	0.110**
	(1.31)	(0.83)	(1.55)	(1.35)	(1.32)	(1.44)	(2.23)	(1.76)	(2.38)
$\rho \cdot \|w_a\sigma_a - w_t\sigma_t\|$	-0.770***	-0.759***	-0.802***	-1.214	-1.270	-1.259	-0.725***	-0.721***	-0.747***
	(-2.87)	(-2.71)	(-3.00)	(-1.66)	(-1.74)	(-1.74)	(-3.29)	(-3.21)	(-3.44)
τ_a	7.236			14.528			5.042		
	(1.33)			(0.91)			(1.07)		
τ_t	4.649			15.581			8.114**		
	(1.14)			(1.60)			(2.17)		
Max(τ_a, τ_t)		9.659			33.000**			11.596*	
		(1.33)			(2.33)			(1.90)	
$w_a\tau_a + w_t\tau_t$			14.648**			33.357**			14.873***
			(2.47)			(2.30)			(3.00)
$\tau_a - \tau_t$		-1.017	-3.123		-6.549	-11.129		-4.112	-6.215*
		(-0.27)	(-0.83)		(-0.65)	(-1.16)		(-1.19)	(-1.80)
Intercept	-6.999	-6.569	-7.910	8.209	7.394	8.129	-4.506	-4.340	-5.086
	(-3.47)	(-2.48)	(-3.82)	(2.05)	(1.49)	(1.62)	(-2.64)	(-1.95)	(-2.96)
N Obs	365	365	365	365	365	365	365	365	365
Adj. R^2(%)	2.88	2.02	3.79	1.05	0.88	1.39	4.32	3.21	5.06

Table 6: The impact of coinsurance determinants on the change in combined equity value

We check the impact of coinsurance determinants on change in equity value with control variables. We choose $w_a\tau_a + w_t\tau_t$ and τ_a - τ_a in that those two variables better explain the change in equity value. Refer to Table 5 for the variable descriptions of other coinsurance determinants. RMV ($= log(MV_t/MV_a)$) represents the relative market capitalization of target and acquirer at 15 trading days before a merger announcement. The percentage of stock payment is retrieved from Pct_STK item in SDC. The control variables of firm characteristics are Tobin's Q, leverage, cash, and cash flow. Tobin's Q is computed as $[item6 + (item25 * item199) - item60]/item6$. Leverage is the sum of long term debt and short term debt deflated by book value of total assets, and is computed as $[item9 + item34]/item6$. Cash is measured by the ratio of cash and short term investments to book value of total assets, and is equaled to $item1/item6$. Cash flow is the ratio of earnings before extraordinary items plus depreciation to book value of total assets or $[item18 + item14]/item6$. All $t-$statistics are adjusted for heteroskedasticity consistent standard errors. The symbols * and ** indicate statistical significance at 10% and 5% levels, respectively.

	bidder CAR			target CAR			total percentage gain		
	Model1	Model2	Model3	Model1	Model2	Model3	Model1	Model2	Model3
ρ	1.784**	1.471*	1.206	4.930*	5.577**	5.910**	2.210***	2.076***	1.975**
	(2.11)	(1.77)	(1.42)	(1.93)	(2.21)	(2.32)	(2.85)	(2.69)	(2.51)
$\|w_a\sigma_a - w_t\sigma_t\|$	0.096*	0.098*	0.056	0.187	0.129	0.120	0.114**	0.111**	0.066
	(1.76)	(1.70)	(0.80)	(1.16)	(0.96)	(0.85)	(2.36)	(2.10)	(1.04)
$\rho \cdot \|w_a\sigma_a - w_t\sigma_t\|$	-0.694***	-0.604***	-0.414	-1.171	-1.300**	-1.575**	-0.657***	-0.614***	-0.560**
	(-2.73)	(-2.70)	(-1.63)	(-1.62)	(-1.99)	(-2.45)	(-2.87)	(-2.75)	(-2.30)
$w_a\tau_a + w_t\tau_t$	10.057*	4.060	5.387	14.969	25.742*	28.128**	12.322**	9.627*	12.041**
	(1.70)	(0.69)	(0.89)	(1.10)	(1.92)	(1.97)	(2.39)	(1.79)	(2.26)
$\tau_a - \tau_t$	-3.985	-2.176	-4.330	-19.328*	-19.955**	-16.814*	-4.765	-3.753	-4.363
	(-1.19)	(-0.64)	(-1.22)	(-1.94)	(-2.08)	(-1.74)	(-1.58)	(-1.20)	(-1.37)
$log(\frac{MV_a}{MV_t})$	-1.639***	-1.635***	-1.517***	-4.576***	-4.794***	-4.990***	-0.429*	-0.443*	-0.422
	(-6.08)	(-5.89)	(-5.38)	(-5.21)	(-5.37)	(-5.53)	(-1.72)	(-1.69)	(-1.57)
PCT STK	-0.019	-0.017	-0.016	-0.002	-0.010	-0.012	-0.013	-0.012	-0.013
	(-1.29)	(-1.13)	(-1.06)	(-0.05)	(-0.25)	(-0.30)	(-0.95)	(-0.88)	(-0.90)
Tobin Q_a	-0.696***	-0.631***	-0.586**	-0.124	-0.274	-0.273	-0.524***	-0.497**	-0.453**
	(-3.20)	(-2.71)	(-2.49)	(-0.25)	(-0.54)	(-0.54)	(-2.71)	(-2.51)	(-2.22)
Tobin Q_t	0.235	0.364	0.311	-0.645	-0.625	-0.501	-0.184	-0.107	-0.100
	(0.78)	(1.21)	(1.00)	(-0.81)	(-0.77)	(-0.62)	(-0.57)	(-0.33)	(-0.31)
Leverage_a	2.453	0.446	1.281	-8.123	-2.371	-4.604	1.989	1.250	1.007
	(0.89)	(0.15)	(0.40)	(-0.98)	(-0.28)	(-0.52)	(0.85)	(0.48)	(0.37)
Leverage_t	-2.916	-4.602**	-5.383**	-4.341	-4.363	-3.773	-3.452**	-4.441**	-4.921**
	(-1.48)	(-2.20)	(-2.56)	(-0.75)	(-0.72)	(-0.61)	(-1.98)	(-2.31)	(-2.55)
Cash_a		-4.492	-4.376		20.113**	19.646**		-1.107	-1.214
		(-1.35)	(-1.36)		(2.54)	(2.48)		(-0.39)	(-0.44)
Cash_t		-4.171	-5.414**		-4.606	-4.421		-2.790	-3.910*
		(-1.55)	(-2.13)		(-0.66)	(-0.62)		(-1.21)	(-1.69)
CF_a			3.369			-12.436			-2.598
			(0.78)			(-1.60)			(-0.82)
CF_t			-5.072*			5.143			-2.499
			(-2.14)			(1.13)			(-1.13)
Intercept	-6.841**	-3.344	-3.344	9.364	2.940	2.902	-1.970	-0.410	-0.428
	(-2.53)	(-1.18)	(-1.17)	(1.52)	(0.43)	(0.42)	(-0.83)	(-0.16)	(-0.16)
N Obs	365	365	365	365	365	365	365	365	365
Adj. R^2(%)	14.82	16.43	17.82	10.78	11.54	13.14	9.83	10.11	10.69

Table 7: Test of differential sensitivity to coinsurance determinants between horizontal and diversifying mergers

We test whether conglomerate mergers have favorable sensitivities for the same level of coinsurance determinants in comparison of horizontal mergers due to asset liquidity by Shleifer and Vishny (1992). In all models, the dependent variable is total percentage gain of a merger deal which is measured by market value weighted average of cumulative abnormal return of acquirer and target. ρ indicates the cash flow correlation between acquirer and target during the common firm-year observations ahead of merger announcement. The market-value weighted difference of cash flow volatilities in years ahead of merger announcement is symbolized by $|w_a\sigma_a - w_t\sigma_t|$. $\rho \cdot |w_a\sigma_a - w_t\sigma_t|$ measures the interaction between cash flow correlation and volatility difference between bidder and target. $w_a\tau_a + w_t\tau_t$ is the market value weighted average of marginal tax rates. τ_a - τ_a is the difference between bidder marginal tax rate and target marginal tax rate. DM is an indicator variable which determines whether a merger deal is not categorized as horizontal. All $t-$statistics are adjusted for heteroskedasticity consistent standard errors. The symbols * and ** indicate statistical significance at 10% and 5% levels, respectively.

	Horizontal	Non-horizontal	Total
ρ	3.250***	1.679	3.250***
	(3.05)	(1.37)	(3.04)
$\|w_a\sigma_a - w_t\sigma_t\|$	0.145**	-0.107	0.145**
	(2.55)	(-0.24)	(2.54)
$\rho \cdot \|w_a\sigma_a - w_t\sigma_t\|$	-0.891***	-0.688	-0.891***
	(-3.28)	(-1.15)	(-3.27)
$w_a\tau_a + w_t\tau_t$	16.507**	14.535*	16.507**
	(2.59)	(1.72)	(2.58)
τ_a - τ_a	-2.495	-10.254*	-2.495
	(-0.66)	(-1.74)	(-0.66)
DM $\times\rho$			-1.571
			(-0.97)
DM $\times\|w_a\sigma_a - w_t\sigma_t\|$			-0.253
			(-0.55)
DM $\times\rho \cdot \|w_a\sigma_a - w_t\sigma_t\|$			0.203
			(0.31)
DM $\times(w_a\tau_a + w_t\tau_t)$			-1.972
			(-0.19)
DM $\times(\tau_a - \tau_a)$			-7.759
			(-1.11)
Intercept	-5.424**	-5.160*	-5.424**
	(-2.52)	(-1.67)	(-2.52)
DM			0.264
			(0.07)
N Obs.	215	150	365
Adj. R^2	5.82%	3.51%	4.92%

Table 8: Comparison of the coinsurance benefit to shareholders from horizontal mergers with that from conglomerate mergers

We compare the average coinsurance benefits in horizontal with those in conglomerate mergers that accrue to combined shareholders utilizing the estimated regression parameters from previous model specifications:

$$Coinsurance\ benefit = \hat{\beta}_1\rho + \hat{\beta}_2|w_a\sigma_a - w_t\sigma_t| + \hat{\beta}_3\rho \cdot |w_a\sigma_a - w_t\sigma_t| + \hat{\beta}_4(w_a\tau_a + w_t\tau_t) + \hat{\beta}_5(\tau_a - \tau_t)$$

where $\hat{\beta}_1\rho + \hat{\beta}_2|w_a\sigma_a - w_t\sigma_t| + \hat{\beta}_3\rho \cdot |w_a\sigma_a - w_t\sigma_t|$ and $\hat{\beta}_4(w_a\tau_a + w_t\tau_t) + \hat{\beta}_5(\tau_a - \tau_t)$ measure the benefit of business risk reduction and tax deduction each. A merger is categorized in horizontal if the four digit standard industry classification(SIC) code of acquiring firm matches with that of acquired firm in horizontal mergers. Otherwise, the merger is categorized into non-horizontal mergers. Conglomerate3 and conglomerate2 are subsets of non-horizontal mergers. Bidder's first three (two) digit of SIC code differs from target's first three (two) digit of SIC code in conglomerate3 (conglomerate2) sample.

	HZ	non-HZ	Conglo3	conglo2	Difference tests		
Variable	(1)	(2)	(3)	(4)	(1)-(2)	(1)-(3)	(1)-(4)
Panel A: $\hat{\beta}_1$ = 2.573, $\hat{\beta}_2$ = 0.110, $\hat{\beta}_3$ = -0.747, $\hat{\beta}_4$ = 14.873, $\hat{\beta}_5$ = -6.215							
Coinsurance benefit	4.580	4.880	4.953	4.893	-0.2996	-0.3727**	-0.3127
					(-1.64)	(-2.05)	(-1.59)
Risk effect	0.318	0.258	0.229	0.246	0.0598	0.0888	0.0714
					(0.46)	(0.71)	(0.53)
Tax effect	4.263	4.622	4.724	4.647	-0.3594**	-0.4614***	-0.3841**
					(-2.43)	(-2.91)	(-2.20)
Panel B: $\hat{\beta}_1$ = 2.210, $\hat{\beta}_2$ = 0.114, $\hat{\beta}_3$ = -0.657, $\hat{\beta}_4$ = 12.322, $\hat{\beta}_5$ = -4.765							
Coinsurance benefit	3.859	4.086	4.139	4.093	-0.227	-0.279*	-0.234
					(-1.50)	(-1.87)	(-1.44)
Risk effect	0.313	0.243	0.213	0.228	0.070	0.101	0.085
					(0.63)	(0.94)	(0.74)
Tax effect	3.546	3.844	3.926	3.865	-0.297**	-0.380***	-0.319**
					(-2.46)	(-2.93)	(-2.24)
Panel C: $\hat{\beta}_1$ = 2.076, $\hat{\beta}_2$ = 0.111, $\hat{\beta}_3$ = -0.614, $\hat{\beta}_4$ = 9.627, $\hat{\beta}_5$ = -3.753							
Coinsurance benefit	3.074	3.234	3.270	3.236	-0.160	-0.196	-0.163
					(-1.23)	(-1.55)	(-1.19)
Risk effect	0.304	0.232	0.203	0.217	0.072	0.101	0.087
					(0.67)	(1.01)	(0.80)
Tax effect	2.770	3.002	3.067	3.019	-0.232**	-0.297***	-0.249**
					(-2.46)	(-2.93)	(-2.23)
Panel D: $\hat{\beta}_1$ = 1.975, $\hat{\beta}_2$ = 0.066, $\hat{\beta}_3$ = -0.560, $\hat{\beta}_4$ = 12.041, $\hat{\beta}_5$ = -4.363							
Coinsurance benefit	3.681	3.944	4.006	3.962	-0.263*	-0.325**	-0.282*
					(-1.81)	(-2.25)	(-1.81)
Risk effect	0.204	0.177	0.160	0.173	0.027	0.044	0.031
					(0.27)	(0.46)	(0.30)
Tax effect	3.477	3.767	3.846	3.789	-0.290**	-0.370***	-0.313**
					(-2.48)	(-2.94)	(-2.26)

Table 9: Change in financial leverage around mergers

We examine the change in leverage around merger. Following Gosh and Jain (2000), we calculate pro-forma financial leverage of combined firm before merger as the sum of debt of acquirer and target to the sum of debt, market equity value, book value of preferred stock of bidder and target.

$$Leverage\ before\ merger = (Debt_a + Debt_t)/(Debt_a + MVE_a + PS_a + Debt_t + MVE_t + PS_t)$$

where Debt is the sum of book value of short-term and long-term debt, MVE is the market value of common stock, and PS is the book value of preferred stock. The financial leverage of combined firm after merger completion is the simple ratio of book value of debt to the sum of book value of debt, market value of common stock, and book value of preferred stock of the combined firm.

$$Leverage\ after\ merger = Debt_c/(Debt_c + MVE_c + PS_c)$$

The change in financial leverage is defined as the difference between the financial leverage of combined firm and the pro-forma financial leverage of the bidder and target firm prior to the merger. We define Year 0 as the fiscal year of merger completion. The one sample t-test statistics are presented in the parenthesis. The symbols * and ** indicate statistical significance at 10% and 5% levels, respectively.

	horizontal	nonhorizontal	conglomerate3	conglomerate2
Panel A: yearwise financial leverage around merger				
3yr before announcement (-3)	0.193	0.192	0.216	0.216
2yr before announcement (-2)	0.191	0.182	0.207	0.204
1yr before announcement (-1)	0.186	0.175	0.195	0.189
1yr after completion (+1)	0.218	0.205	0.229	0.207
2yr after completion (+2)	0.245	0.209	0.236	0.209
3yr after completion (+3)	0.247	0.203	0.230	0.208
Panel B: the change in financial leverage around merger				
$\Delta Leverage_{(-1,+1)}$	0.036***	0.030***	0.033**	0.022
	(3.54)	(2.78)	(2.60)	(1.58)
$\Delta Leverage_{(-1,+2)}$	0.064***	0.032**	0.039**	0.019
	(4.82)	(2.39)	(2.30)	(1.10)
$\Delta Leverage_{(-1,+3)}$	0.067***	0.036**	0.041**	0.016
	(4.74)	(2.42)	(2.17)	(0.88)

Table 10: Change in cash holdings around mergers

We examine the change in cash holdings around merger. Following Duching (2010), we calculate pro-forma cash holding ratio of combined firm before merger as the sum of cash holdings of bidder and target to the sum of book value of total asset of bidder and target.

$$Cash\ holding\ before\ merger = (Cash_a + Cash_t)/(TA_a + TA_t)$$

where Cash is the cash, cash equivalents, and marketable securities, TA is the book value of total assets. The cash holding ratio of combined firm after merger completion is the simple ratio of book value of cash to book value of total assets of merged firm.

$$Cash\ holding\ after\ merger = Cash_c/TA_c$$

The change in cash holding ratio is defined as the difference between the cash holding ratio of combined firm and the pro-forma cash holding ratio of the combined firm prior to the merger. We define Year 0 as the fiscal year of merger completion. The one sample t-test statistics are presented in the parenthesis. The symbols * and ** indicate statistical significance at 10% and 5% levels, respectively.

	horizontal	nonhorizontal	conglomerate3	conglomerate2
Panel A: yearwise cash holdings around merger				
3yr before announcement (-3)	0.174	0.134	0.104	0.111
2yr before announcement (-2)	0.171	0.132	0.105	0.108
1yr before announcement (-1)	0.172	0.134	0.110	0.111
1yr after completion (+1)	0.146	0.116	0.098	0.105
2yr after completion (+2)	0.149	0.126	0.110	0.114
3yr after completion (+3)	0.152	0.132	0.114	0.122
Panel B: cash holding change around merger				
$\Delta Cash_{(-1,+1)}$	-0.024***	-0.019***	-0.016**	-0.013
	(-3.48)	(-2.96)	(-2.29)	(-1.62)
$\Delta Cash_{(-1,+2)}$	-0.020**	-0.012	-0.007	-0.004
	(-2.63)	(-1.57)	(-0.83)	(-0.47)
$\Delta Cash_{(-1,+3)}$	-0.012	-0.005	-0.001	0.009
	(-1.24)	(-0.58)	(-0.08)	(+0.87)

Table 11: The impact of coinsurance determinants on the change in leverage and cash holdings

We predict the change in financial leverage and cash holdings after merger completion using coinsurance determinants and control variables before the merger announcements. The change in financial leverage is defined as the difference between the financial leverage of combined firm and the pro-forma financial leverage of the bidder and target firm prior to the merger. We measure the change in cash holding as the difference between the cash holding ratio of combined firm after merger completion and the pro-forma cash holding ratio of the combined firm prior to the merger. Variable definitions are provided in the Appendix. All $t-$statistics are adjusted for heteroskedasticity consistent standard errors. The symbols * and ** indicate statistical significance at 10% and 5% levels, respectively.

	Leverage change			Cash holding change		
	(-1, +1)	(-1, +2)	(-1, +3)	(-1, +1)	(-1, +2)	(-1, +3)
ρ	0.005	0.010	0.004	0.007	0.020	0.026**
	(0.26)	(0.47)	(0.18)	(0.76)	(1.59)	(2.29)
$\lvert w_a\sigma_a - w_t\sigma_t\rvert$	0.001	0.005***	0.002	-0.001	0.002	-0.002
	(0.60)	(3.31)	(1.29)	(-0.98)	(0.84)	(-1.62)
$\rho \cdot \lvert w_a\sigma_a - w_t\sigma_t\rvert$	-0.004	-0.008	-0.005	-0.002	-0.005	-0.003
	(-0.89)	(-1.40)	(-1.08)	(-0.40)	(-0.57)	(-0.69)
$w_a\tau_a + w_t\tau_t$	0.016	0.137	0.106	-0.163**	-0.156**	-0.160*
	(0.16)	(0.96)	(0.67)	(-2.16)	(-2.02)	(-1.67)
$\tau_a - \tau_t$	0.018	-0.078	-0.231	0.033	-0.023	0.018
	(0.25)	(-0.82)	(-2.06)	(0.81)	(-0.45)	(0.32)
$log(\frac{MV_t}{MV_a})$	0.004	0.009	0.006	-0.008***	-0.007**	-0.009**
	(0.80)	(1.26)	(0.75)	(-2.94)	(-2.01)	(-2.32)
PCT STK	0.000	0.000	0.000	0.000	0.000	0.000
	(-0.64)	(-0.43)	(-0.81)	(0.19)	(-0.34)	(1.42)
hostile	0.031	0.034	0.012	-0.011	0.001	-0.020
	(0.82)	(0.76)	(0.33)	(-1.34)	(0.07)	(-0.96)
Tobin Q_a	0.001	-0.001	0.002	0.006***	0.008***	0.006*
	(0.18)	(-0.25)	(0.50)	(2.75)	(2.84)	(1.82)
Tobin Q_t	0.007	0.008	0.001	0.001	0.000	0.000
	(2.04)	(1.07)	(0.18)	(0.20)	(-0.09)	(0.04)
Leverage_a	0.016	-0.035	-0.011	0.038	0.020	0.004
	(0.26)	(-0.43)	(-0.12)	(1.19)	(0.59)	(0.09)
Leverage_t	-0.041	-0.024	-0.028	-0.025	-0.021	-0.011
	(-1.00)	(-0.45)	(-0.49)	(-0.79)	(-0.53)	(-0.25)
Cash_a	-0.077	-0.188***	-0.112	-0.109**	-0.170***	-0.217***
	(-1.52)	(-2.73)	(-1.57)	(-2.49)	(-3.09)	(-3.19)
Cash_t	-0.037	0.069	0.057	-0.143***	-0.130***	-0.067
	(-0.93)	(1.06)	(0.95)	(-3.39)	(-2.82)	(-1.17)
Intercept	0.063	0.056	0.087	0.030	0.049	0.025
	(1.17)	(0.74)	(0.98)	(0.94)	(1.40)	(0.63)
N obs	325	310	293	323	308	293
Adj. R^2(%)	-1.20	0.41	-0.83	19.96	20.94	16.41