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

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Abstract

We predict the change in equity value due to corporate coinsurance in mergers and test whether conglomerate mergers produce higher coinsurance gains to shareholders than horizontal mergers. Conglomerate mergers have higher bidder, target, and size-weighted average marginal tax rates than horizontal mergers. The higher marginal tax rates in conglomerate mergers provide extra returns to combined shareholders around merger announcement. 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 than horizontal mergers, but they have no impact on the change in leverage.

Keywords: Diversification, M&As, Taxation, Financial leverage, Cash holdings

JEL Classification Number: G32, G34, H20

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1 Introduction

Why do firms diversify their businesses? Conglomerate mergers do not appear to be motivated by operational synergy, as market share is unlikely to increase from diversification and there would be no economies of scale from such a merger. In contrast, horizontal or vertical mergers are shown to pursue mainly economic gains.[1] The conglomerate merger wave reached its peak in the 1960s and has been declining ever since. However, Fan and Goyal (2006) document that diversifying mergers still compose a substantial proportion of merger activity even in the 1980s and 1990s.[2] Given no economic benefits, why does this type of merger 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.

Extensive numerical simulation analyses of key determinants of corporate coinsurance from Leland (2007) enable us to make novel predictions on the direction of the change in equity value along coinsurance determinants. First, 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) for analysis of 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 and Pitelis (2009) argue that diversified firms could benefit from economies of scope. Morck and Yeung (1998) 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 and operational synergy arguments of conglomerate mergers are in line with neoclassicial theory on "diversification discount" literature in that managers of diversifying firms also maximize shareholder's value.

between bidder and target firm enhances the wealth of shareholders of the combined firm. The positive impact of the increase in cash flow correlation is due to the call option characteristic of equity value for future cash flows in his model. Second, 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. Third, 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] Based on these predictions, we 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 produces larger coinsurance benefits for shareholders than management teams 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. We test whether firm managers who pursue diversification on purpose select target firms to achieve higher coinsurance benefits for 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. Ac-

[4]Refer to Shih (1994) for other tax considerations than interest tax shields such as depreciation tax shields as a motivation of conglomerate mergers. He 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 to reliably estimate the marginal tax rate of a firm is suggested by Graham (1996a,b) and further developed by Graham and Mills (2008).

quiring firms in conglomerate mergers exhibit larger market capitalization, smaller cash flow volatility, and higher marginal tax rates than acquiring firms in horizontal mergers. In addition, acquired firms in diversifying mergers also have higher marginal tax rates 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 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 mergers, although 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 Bradley, Desai, and Kim (1988) to measure the wealth change in combined shareholders around merger announcement. Utilizing the 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%, depending on the model specification of coinsurance benefit and the choice of subsample of conglomerate mergers. In contrast, the smaller volatility difference in conglomerate mergers does not contribute to the extra value from diversification relative to specialization. Higher volatility difference combined with high cash flow correlation in horizontal mergers tends to produce additional wealth for combined shareholders holding other factors constant, although this 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 mergers, but the statistical significance varies 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 benefits from higher marginal tax rates after the merger is consummated. One channel is the increase in leverage, which results in higher interest tax shields. The other channel is the reduction in cash holdings based on the report by Duchin (2010). Among coinsurance determinants, only the weighted average marginal tax rate of bidder and target affects the change in cash holdings after the consummation of a merger. The increase in weighted average marginal tax rates contributes to the reduction in cash holdings after merger 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 merger completion. In sum, our test results indicate that conglomerate mergers with higher size-weighted average marginal tax rates increase the stock value of both bidder and target firms around merger announcements, 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 marginal tax rate, lower cash flow volatility difference, and much larger bidder in comparison to the target. Second, conglomerate mergers with high marginal tax rates of both bidder and target firms enhance shareholder value around merger announcement in comparison to horizontal mergers with low marginal tax rates. Third, we identify the financial policy after merger

completion to realize coinsurance benefits from high marginal tax rates. Higher marginal tax rates of bidder and target in conglomerate mergers contribute to the extra reduction in cash holdings, although this has no impact on the change in leverage after merger completion.[5] In addition, this paper sheds light on the role of taxes in a firm's the choice of organizational form, as characterized by **?**.[6] Our results imply that managers of conglomerate firms seem to diversify operations across several industries in order to maintain low cash holdings, whereas managers of specialized firms operating in a single industry could be dependent on high cash holdings to pursue growth opportunities.

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 announcements. 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

[5]The negative impact of marginal tax rates on cash holdings is consistent with the transaction cost model of cash holdings which is described in **?**.

[6]Refer to section 4 for a discussion of organizational form.

them more authority and power and entitling them to greater prestige and compensation (Jensen, 1986; Jensen and Murphy, 1990). These managers can also 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 closely tied to a specific firm (Amihud and Lev, 1981). All these different aspects of 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.[7]

On the other hand, theories supportive of diversification mostly emphasize that conglomerate mergers are pursued due to financial benefits instead of economic gains. Levy and Sarnat (1970) and Lewellen (1971) argue that conglomerate mergers reduce default risk 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 shareholder wealth by increasing borrowing capacity and interest tax savings. This business risk reduction is called the corporate coinsurance effect. However, subsequent studies debate whether the coinsurance effect results in real wealth creation or a mere wealth transfer from stockholders to bondholders. Both Higgins and Schall (1975) and Galai and Masulis (1976) contend that if bankruptcy is costless, the coinsurance effect would benefit bondholders at the expense of shareholders.[8] In addition, corporate coinsurance can affect the financial policy of merged firms, particularly leverage and cash holdings. Kim and McConnell (1977) and Scott (1977) argue that shareholders of combined firms can neutralize the wealth transfer from stockholders to bondholders by increasing leverage and can even increase the value of equity if leverage is increased enough. Gosh and Jain (2000) document that combined firms significantly increase financial leverage

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

[8]Interestingly, Jensen and Meckling (1976) suggest the opposite wealth transfer from bondholders to shareholders due to the pursuit of excessive risk by firm managers who are in line with shareholder's interest.

after mergers. Duchin (2010) compares the cash holding of multi-divisional firms with that of stand-alone firms and shows that diversified firms hold much less cash than specialized firms, 11.9% versus 20.9% of their assets on average.

As an another source of financial gains from diversification, Stein (1997) suggests the "efficient internal capital market" benefits in the presence of information asymmetry between outside investors and firm managers. 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 sources of change in firm value, assuming no operational synergy, no information asymmetry, and no agency problems. 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 for shareholders to exit a firm they invest in without bearing extra losses beyond their equity investment when a firm's value of debt surpasses

the total value of a firm's assets. The leverage effect measures the change in benefit and cost of debt if a firm adjusts its debt level. When a firm borrows more money from creditors, the firm would enjoy larger interest tax savings, but higher debt elevates default probability in general. Thus, increasing leverage without raising default probability or higher debt capacity increases 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 (leverage vs. limited liability) dominates. When the sum of the 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 changes in firm value are 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 financial benefits when two firms have low cash flow correlation, low cash flow volatilities, and a 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. They show that firms with liquid assets end up with higher debt capacity and that conglomerate mergers are a better organizational form to improve asset liquidity than horizontal mergers.[9] They argue that the 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

[9] A conglomerate company has an option to choose a liquid industry among several industries it operate when it needs to sell its assets, which make the firm more robust to macroeconomic fluctuations than specialized firms. In addition, a multi-business firm can divest a subdivision with less adverse selection costs by selling it off in smaller and more liquid pieces.

reason why default could be costly.[10] 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 the seller faces due to an economic shock, which affects the seller as well as insiders. Besides, 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 specialized assets without knowledge of how to use those assets. Outside industry buyers pay higher agency costs than industry insiders in that they hire managers who will run the newly acquired subdivision. Thus, forced liquidation in a recession could be costly. Firms with liquid assets that are easily redeployable end up with a higher debt capacity and conglomerate mergers are better able to accomplish asset liquidity than horizontal mergers.

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 shareholders of the combined firm.

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

3. Mergers of bidders and targets with high marginal tax rates is more beneficial to shareholders of merging firms than to those with low marginal tax rates.

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

These predictions provide a strong basis for us to compare the equity value change solely from corporate coinsurance, because 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 and subsequent equity value change suggested by Shleifer and Vishny (1992). Our approach is to compare the sensitivities of determinants of the coinsurance effect rather than to directly measure 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 for stockholders than horizontal mergers. Possible sources of larger coinsurance gains pertaining to conglomeration are twofold. First, diversifying mergers might have systematically higher coinsurance benefits for stockholders than horizontal mergers. There are two ways that coinsurance could enhance equity value. One way is the increase in interest tax savings, which is proportional to marginal tax rates. Firm managers that pursue a conglomerate merger will seek a merger partner that produces higher interest tax savings to generate more coinsurance compared to firm managers that pursue horizontal mergers, assuming firm managers are acting in stockholders' interest. The other way is the higher cash flow correlation of diversifying mergers compared to 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 again, assuming manager and shareholder interests are aligned. The second possible source of coinsurance gains due to conglomerate mergers is the possibility that such mergers provide more asset liquidity than horizontal mergers, which benefits shareholders. Given that conglomerate mergers show higher sensitivity to the same values of coinsurance determinants than horizontal mergers, the extra increase in stockholder value from conglomerate mergers is derived from higher liquidation values. Thus, we attempt to provide evidence on two issues: (1) whether diversifying mergers produce extra wealth to combined shareholders due to corporate coinsurance in comparison to horizontal mergers, and (2) whether corporate coinsurance affects the change in financial leverage and cash holdings after merger completion.

2.2 Test design

We first investigate whether there is any systematic difference in coinsurance determinants between horizontal and conglomerate mergers. We compare the sample distribution of each coinsurance determinant with a 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, and marginal tax rates of bidder and target firm on the change in equity value by running the following regression:

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

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 different model specifications 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 marginal tax rates as a proxy for the marginal tax rate of combined firm. This model assumes that the merging firms retain their current marginal tax rates even after the consolidation.

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

The second alternative model specification utilizes the maximum of the bidder and target marginal tax rate. 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 the tax scheme.

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

Third, we employ a nested model using a simple indicator variable to test the differential sensitivity to coinsurance determinants between conglomerate mergers and horizontal mergers. The coefficients on the products of indicator variables and coinsurance determinants measure the different sensitivity to the same value of coinsurance determinants, depending on the 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:

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

where DM is an indicator variable which takes a value of 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, our null hypothesis is that 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, then 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 a two sample t-test.

3 Sample selection and Methodology

3.1 Merger Sample

We obtain data on mergers by US firms from the Securities Data Company (SDC) Mergers and Acquisition (M&A) Platinum database.[11] We then obtain stock returns, financial and

[11]Betton et al. (2008) report that tender offers show different characteristics from mergers. A merger is mainly the result of negotiations between the bidder and target management teams. In contrast, a tender

accounting data for acquirers and targets from the CRSP and COMPUSTAT databases. We impose the following conditions on all observations:

1. Transactions are merger deals identified by "M" for the deal form and "No" for the tender offer dummy (Betton et al., 2008).[12]

2. The deal is announced between 1981 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 from 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 mergers 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

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.

[12]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).

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 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).[13] 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.[14]

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

[13] 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.

[14] 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.

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 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 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.

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

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 mergers into horizontal mergers or diversifying mergers as correctly as possible in our tests.[15] We utilize the standard industry classification (SIC hereafter) code from SDC platinum to classify a merger as horizontal or diversifying. 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.[16] Subsequently, we apply the following scheme to classify all merger deals into horizontal, nonhorizontal, conglomerate3, conglomerate2 mergers: A merger is categorized as a horizontal merger when both bidder and target have the same four digit SIC code. Otherwise, it is categorized as a non-horizontal merger. If the first-three (two) digits of an aquirer's SIC code differs from that of the target's SIC code, a merger is categorized as a conglomerate3 (conlomerate2) merger.

Table 1 shows the number of mergers by year and merger types. The number of mergers

[15]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.

[16]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.

in the 1990s and 2000s dominates the number of mergers in the 1980s for both horizontal mergers and diversifying mergers. This is consistent with the way we formed our sample, as tender offers represented a significant portion of merger and acquisition activity in the 1980s, and our sample excludes tender offers. Consistent with merger wave literature, we observe a high level of merger activity in the late 1990s.

4.2 Merger conditions of horizontal versus conglomerate mergers

We next investigate how corporate coinsurance determinants affect the wealth of combined shareholders. Then we 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 identify any sources of extra gains to stockholders from 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 than horizontal mergers. There are two sources that could enhance equity value from corporate coinsurance. One source is the increase in interest tax savings, which is proportional to marginal tax rates. The other source is the increase in cash flow volatility, which enhances the call option value of equity while reducing the bond values. The higher the cash flow correlation, the larger the increase in combined equity value.

Descriptive statistics of coinsurance determinants are presented in Table 2 and Table 3. Panels A and B of Table 2 reports the means, standard deviations, and several percentiles of coinsurance determinants for the horizontal and non-horizontal merger sample, while Panels A and B of Table 3 document the same descriptive statistics for conglomerate3 and conglomerate2 mergers, respectively. Notably, cash flow correlation in horizontal merg-

ers(0.146) is on average higher than the cash flow correlation in other mergers(0.037, 0.065, and 0.074), consistent with our expectation that firms in the same industry tend to go through the same business cycle. The market-value weighted difference in cash flow volatilities for horizontal mergers is much larger than for 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. This large difference is mainly derived from the high cash flow volatility of acquiring firms and relatively similar size in horizontal mergers in comparison to diversifying mergers. The mean and median cash flow 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. The larger and more stable bidder in diversifying mergers are consistent with conventional wisdom of corporate coinsurance.[17] 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 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 stockholders 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

[17]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".

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 exceeds that in conglomerate mergers though the difference is not statistically significant.

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 than diversifying mergers, contrary to 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 the two measures of ex ante marginal tax rate of combined firm ($w_a\sigma_a + w_t\sigma_t$ and $max(\tau_a, \tau_t)$) are also different than 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 the 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. Bidders in conglomerate mergers has much higher market capitalization, much lower cash flow volatility, and larger marginal tax rates than bidders in horizontal mergers. Targets in conglomerate mergers are almost the same size as targets in horizontal mergers, whereas targets in conglomerate mergers have much lower cash flow volatility and larger marginal tax rates than targets in horizontal mergers.

Panel C of Table 4 shows two sample t-test results of whether diversifying mergers and horizontal mergers have different characteristics besides coinsurance determinants. It is natural that the log relative market capitalization in horizontal mergers is not the same

as that in conglomerate mergers, based on our previous observations. Bidders in same-industry mergers retain much larger cash (17.8%) in proportion to total asset than bidders in cross-industry mergers (10.2%). Except for these two conditions, horizontal mergers have characteristics that are similar 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 merger announcements by measuring cumulative abnormal returns to bidding firm and target firm shareholders, and the total percentage gain to combined shareholders suggested by Bradley, Desai, and Kim (1988). In Table 5 and Table 6, we run regression analysis of the excess returns to bidding and target firm shareholders and the total percentage gain to combined stockholders on several coinsurance determinants as well as other control variables. We run the regression with only coinsurance determinants in Table 5 while we also include other control variables in Table 6. 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 the different model specifications of marginal tax rates, all regression coefficients for cash flow correlation are significantly positive at the 5 % level. This positive impact of cash flow correlation implies that the increase in cash flow correlation benefits both bidder and target shareholders, and thus benefits the combined shareholders.

We next examine the impact of bidder and target marginal tax rates with several representations in panel A. Model 1 shows how individual marginal tax rates of bidder and target firms affect shareholder wealth. Model 1 shows that individual marginal tax rates

of both bidder and target firms positively affect the wealth of bidder, target, and combined shareholders, though the impact is not statistically significant. An increase in target firm marginal tax rate enhances combined shareholder wealth. Model 2 assumes that the marginal tax rate of the combined firm will be the maximum of the bidder or target marginal tax rates. This assumption seems to be inferior because the adjusted R^2 is lower than model 1. Model 3 assumes the marginal tax rate of the combined firm will be the size weighted average of the bidder and target marginal tax rates. 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 and 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 the target's 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 marginal tax rate are still statistically significant when we control other merger characteristics.

In Table 7, we test whether conglomerate mergers have favorable sensitivities to the same level of coinsurance determinants in comparison to 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 a simple indicator variable or DM which takes a value of 1 if a merger is not horizontal and 0 other wise. Then, we examine whether the coefficients on the indicator variables are statistically significant or not. Because all coefficients on indicator variables are not significantly different from zero, we conclude 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 for 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 marginal tax rates in Table 3, conglomerate mergers generate a 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 through 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 sheds light on the channel by which firm managers resolve the conflict of interest between bondholders and shareholders. Although low cash flow correlation is not associated with enhanced shareholder wealth, firm managers can reduce the negative effect by increasing leverage due to increased debt capacity.[18] Thus, we are interested in whether mergers between firms with low cash flow correlation increase leverage more than mergers of firms with high cash flow correlation.

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

In addition, we are also interested in how mergers between firms with high marginal tax rates enhance shareholder wealth after 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 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, financial leverage after merger completion is the debt of the merged firm normalized by the total value of the 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 the merger and financial leverage of the merged firm after the consummation of the merger for 4 different subsamples. In all subsamples, the mean pro-forma financial leverage declines right before merger announcement, and the financial leverage of the combined firm is much higher than during the pre-merger period. This relation 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 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% for horizontal mergers and 3.3% for conglomerate3 mergers. These leverage increases are significant at the 1% and 5% level. The increased leverage does not revert to pre-merger levels. On the contrary, acquiring firms both in horizontal and conglomerate mergers continue to increase financial leverage three years after merger completion by 6.7% and 4.1% respectively. The increase in financial leverage around mergers 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), we measure cash holdings 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 as 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 a 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 combined firms before a merger and cash holdings of the merged firm after merger completion for 4 different subsamples. All types of acquirer maintain their mean pro-forma cash holdings before merger announcement, but the cash holdings of combined firms are sharply reduced after merger completion. The acquiring firm increases cash holdings over time. Interestingly, the cash holdings of combined firms after merger completion increases to pre-merger levels 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 firms before a merger in horizontal mergers. In the horizontal merger subsample, mean pro-forma cash holdings one year before merger announcement is 17.6% of total book value of assets, but it falls to 14.6% of total book value one year after merger completion and gradually increases to 14.9 and 15.2% two and three years after merger completion. In the conglomerate3 subsample, mean pro-forma cash holdings one year before merger announcement is 11.0% of total book value of asset, but it falls to 9.6% of total book value one year after

merger completion then returns back to the original level of 11.0% and 11.4% two and three years after merger completion.

Panel B of Table 10 presents the one sample t-test results for the change in cash holding of four different merger subsamples. The mean change in cash holdings one year after merger consummation is -2.4% and -1.6% for horizontal and conglomerate3 mergers. These leverage increases are significant at the 1% and 5% level. While the change in cash holding two years after merger completion is significantly negative, -2.0% for horizontal mergers, the change in cash holdings two years after merger completion is statistically insignificant for conglomerate3 mergers, -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 and other control variables which were estimated before merger announcement. All $t-$statistics are based on heteroscedasticity consistent standard errors of White (1980).

All regression coefficients for coinsurance determinants in columns 2 through 4 of Table 11 are insignificant. These insignificant coefficients for coinsurance determinants imply that corporate coinsurance does not affect the change in financial leverage after merger completion although the signs for all regression coefficients of coinsurance determinants in leverage change are consistent with the regression coefficients in total percentage gain.

In contrast, columns 5 though 7 of Table 11 show that size weighted average marginal tax rate negatively affects the change in cash holdings after merger completion, while other coinsurance determinants do not have an impact on cash holdings. The negative impact

of marginal tax rates on cash holdings is consistent with static trade-off theory of cash holdings in **?**.[19] They explain why marginal tax rates negatively affect cash holdings: the higher the amount of cash holdings, the higher the cost of double taxation on interest income from liquid assets when firms have higher marginal tax rates. In addition to coinsurance determinants, other control variables have an sizeable impact on cash holdings after a merger. In particular, the cash holding level of bidder and target before merger announcement negatively affects the change in cash holdings. This suggests 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 offers little operational gains. As another source of gains from diversification, we test whether corporate coinsurance can provide a rationale for conglomerate mergers. We examine merger characteristics related to corporate coinsurance and the extent to which corporate coinsurance enhances shareholder value for conglomerate versus horizontal mergers. We also analyze the impact of corporate coinsurance on financial leverage and cash holdings after merger completion.

Our investigation of merger characteristics reveals that coinsurance determinants of conglomerate mergers are systematically different from those in horizontal mergers. Bidders in conglomerate mergers are much larger and have more stabilized cash flows than targets relative to horizontal mergers. Furthermore, marginal tax rates of bidders and targets in conglomerate mergers are higher than the bidders and targets in horizontal mergers. Consequently, conglomerate mergers have much lower volatility difference and size-weighted

[19] Refer to the transaction cost model subsection in theory and empirical hypotheses section.

average marginal tax rates than horizontal mergers.

The change in shareholder wealth around merger announcements shows that the higher marginal tax rates of bidder and target firms in conglomerate mergers help generate extra wealth for combined shareholders. When we decompose the wealth change in combined shareholders around merger announcement into tax effects and risk effects, we confirm that conglomerate mergers generate extra gains from tax effects, which vary from 0.23% to 0.46% according to model specification and choice of conglomerate mergers. The systematically lower volatility difference reduces the positive coinsurance effect for shareholders. Thus, the resulting change in the wealth of combined shareholders from conglomerate mergers are not always significantly higher than that of horizontal mergers.

We also examine the change in financial leverage and cash holdings after merger completion. Among coinsurance determinants, only the weighted average marginal tax rates of bidder and target affect the change in cash holdings after consummation of a merger. The increase in weighted average marginal tax rates contributes to the reduction in cash holdings after merger completion, which enhances shareholder wealth. Interestingly, coinsurance determinants does not have an impact on the change in financial leverage after 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, $w_a = \frac{MV_a}{MV_a+MV_t}$
$\|w_a\sigma_a - w_t\sigma_t\|$	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)

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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
$\log(\mathrm{MV}_a)$	215	7.500	1.788	2.713	6.213	7.431	8.670	12.338
$\log(\mathrm{MV}_t)$	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
$\log(\mathrm{MV}_a)$	150	7.967	1.962	3.285	6.772	8.076	9.272	12.069
$\log(\mathrm{MV}_t)$	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
$\lvert w_a\sigma_a - w_t\sigma_t\rvert$	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
$\log(\mathrm{MV}_a)$	117	8.028	1.949	3.285	6.897	8.123	9.318	12.069
$\log(\mathrm{MV}_t)$	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
$\lvert w_a\sigma_a - w_t\sigma_t\rvert$	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
$\log(\mathrm{MV}_a)$	92	8.054	2.002	3.285	6.715	8.126	9.338	12.069
$\log(\mathrm{MV}_t)$	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**
Max(τ_a, τ_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)
$\lvert w_a\sigma_a - w_t\sigma_t\rvert$	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)
$\rho \cdot \lvert w_a\sigma_a - w_t\sigma_t\rvert$	-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