Bond Investor Value Creation through Strategic Alliances

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ABSTRACT

Prior studies find that the formation of strategic alliances creates value for stock holders, but they say nothing about the value created for bond holders. In this study we analogously apply theories of coinsurance from the merger literature to strategic alliances and find that bond holder wealth also increases at the announcement of alliance initiatives. Through an event study of 725 announcements of US industrial firms which formed alliances in the period from 2003 to 2007, we find evidence of coinsurance effects on the bonds of these firms. In particular, we find that bond holders of firms with below investment grade credit ratings benefit more than those with investment grade ratings. The study is important firstly because it may be one of the first to show that the formation of strategic alliances also creates value for bond investors, a significant investor class not yet studied in the alliance literature. Secondly, it shows an empirical link between firms' corporate strategies and their cost of debt financing, in particular revealing how leveraged firms may seek to lower their financial risk and hence debt funding cost by strategically engaging in alliances with partners which have higher quality debt.

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1. INTRODUCTION

Empirical research has confirmed that strategic alliances in general create value for stock investors (McConnell and Nantell, 1985; Chan, Kensinger, Keown, and Martin, 1997). But do they also create value for bond investors? The published studies to date have been silent on this question. Given the much larger size of the corporate bond market compared with equities, lack of attention to the value creation potential for the debt investors is indeed surprising. For example, during the decade 1997 to 2006, US corporations issued $4.6 trillion in corporate bonds compared with $1.5 trillion in new and seasoned equity issues (Bessembinder and Maxwell, 2008). The lack of research on the effects of strategic alliances on corporate debt may be partially explained by difficulties obtaining reliable trade data on corporate bonds. As of 2002, trade data on US corporate bonds became publicly available through the introduction of the Transaction Reporting and Compliance Engine (TRACE) database, opening research opportunities in this area[1].

To illustrate the effects of a strategic alliance announcement on both stock and bond holder wealth, on 31 July 2007, CableVision (CV) Systems Corp and CNET Network (CN) Inc "formed a strategic alliance to provide cable television services in the United States. CV and CN launched "CNET TV-Powered by Optimum" for iO digital cable customers on channel 607. The said free channel features hours of product reviews, commentary shows like the Top 5, Insider Secrets and Prize Fight" (SDC Platinum database). On this day, CV's stock registered a 91.7 basis points abnormal return or a gain of 79 million dollars, while its bonds registered a 212 basis point abnormal return or a 21 million dollar gain (absolute returns were even higher). Clearly

[1] As of July 2002, bond dealers were required to report all trades in publicly issued US corporate bonds to the National Association of Security Dealers, which in turn made transaction data available to the public (Bessembinder and Maxwell, 2008).

in this instance and in many like it, the gains to both stock and bond investors are quite significant. With the number and extent of strategic alliances continuously increasing, attention to the value creation potential for both investor classes is important. Before the turn of the century, almost 20,000 alliances were reported globally (Anand and Khanna, 2000); by 2005, SDC Platinum Alliances and Joint Ventures data base reported over 50,000 pending or completed alliances; and in 2012 in spite of the global financial crisis a Deloitte Corporate Development survey reported that more than half the surveyed executives believed their firm would increase alliance activity.

A strategic alliance is a cooperative agreement or contract between two or more independent firms to commit and combine a subset of their resources for mutual benefit (Parkhe, 1993; Das and Teng, 2000a). An alliance is more than a simple market buyer-supplier agreement implying a certain level of exclusive access to the committed resources above and beyond market agreements (Kogut, 1988). The nature of alliances can be described as a continuum where at one extreme are equity joint ventures in which two or more parent firms agree to invest and establish a separate legal business entity, while at the other extreme are cooperative agreements in which firms work together on specified common activities. The SDC Platinum database offers a practical definition for alliance contracts types by dividing them according to joint ventures, licensing agreements, and strategic alliances. For this paper, we include all three contract types under the generic term *strategic alliance*.

Strategic alliances are in some ways similar to mergers and acquisitions (hereafter mergers) and may be considered alternate forms of combining firm resources (Yin and Shanley, 2008; Wang and Zajac, 2007; Villalonga and McGahan, 2005). Like mergers, firms can combine through alliances their tangible physical assets or intangible knowledge assets (Das and Teng, 2000b; Kogut, 1988). In ways similar to mergers,

asset combinations through alliances have the potential to create value for investors because of synergies such as greater economies of scale, pooling of knowledge, and reducing risk (Hennart, 1988). As an alliance develops, partnering firms learn and co-develop new tangible and intangible assets that have future value creation potential (Simonin, 1997; Dyer and Singh, 1998). Through strategic alliances, firms acquire knowledge both for the common benefit of the alliance and for their own private benefit (Khanna, 1998; Larsson, Bengsston, Henriksson, and Sparks, 1998; Kumar, 2010a). They also learn to acquire knowledge more efficiently from their partners (Inkpen and Crossan, 1995; Kale, Dyer, and Singh, 2002; Anand and Khanna, 2000).

However, strategic alliances are different to mergers because the management executives of the partnering firms continue to keep their jobs and are required to cooperate to ensure the alliance's success. Said differently, while in a merger the acquirer's management is able to eliminate the inefficient or ineffective management of the target firm (which may have been a rival), the managements of allying firms are forced to juggle both the mutual internal tensions (despite potential competitive rivalry) as well as the competitive external tensions of their business environments (Das and Teng, 2000a). The relationship between allying firms is required to co-evolve along these internal and external dimensions, making it unstable and prone to failure (Doz, 1996; Ring and Van de Ven, 1994; Inkpen and Currall, 2004).

McConnell and Nantell (1985) was the earliest study to draw the analogy between mergers and alliances and the effect they have on stock holder returns. Many subsequent studies (e.g. Das, Sen, and Sengupta, 1998; Johnson and Houston, 2000; Anand and Khanna, 2000; Gao and Iyer, 2009; Amici et al, 2013) take for granted McConnell and Nantell's "merger-alliance analogy". Furthermore, like these authors'

study, the measure of performance of these latter studies has almost exclusively been centered on the value creation effect on stock holder wealth.

To our knowledge no study has looked at the effect of alliance formation on the wealth of bond holders. If there is an effect, can the same merger-alliance analogy be used to explain it? The aim of this paper is to study the effect of strategic alliance announcements on bond investor returns and develop the merger-alliance analogy as it applies to corporate bonds. Specifically, in this paper we aim to answer two basic sets of questions: (1) Do strategic alliances create value for the bond investors of allying firms? (2) If so, how is value created for them? Is the merger-alliance analogy useful?

Based on theories from the merger literature that explain the effects of co-insurance on bond holder wealth, we show that the merger-alliance analogy can be extended to explain the effects of strategic alliances on bond holder wealth. Using a sample of 725 strategic alliance announcements by US industrial firms during the period January 2003 to December 2007, we show that bond holders like stock holders in general benefit from alliance formations [2,3]. More specifically, we show that bond holders of allying firms with below investment grade bonds benefit more than those of firms with investment grade bonds. This result has important implications for understanding how leveraged firms can lower their debt funding costs through engaging in a corporate alliancing strategy, in particular allying with firms which have better quality debt than they have.

The rest of the paper is organized as follows. In section 2, we develop in more detail the theory that explains the merger-alliance analogy and propose five hypotheses. In section 3, we explain the data and empirical methods used to test the hypotheses. In

[2] The 725 observations include firm-alliance announcements made in the sample period where each firm has both outstanding stocks and bonds. However, as bonds do not trade daily, the actual sample size of the bond sample reduces to 467 bond observations of which 435 have complete firm-level data.

[3] As explained further in Section 3, for firms with multiple bond issues outstanding, we combine them into one single firm-bond. Thus a "bond" refers to a firm-level bond outstanding, or one bond per firm.

the section 4 the results are shown, and in section 5 we provide a brief discussion of the results and end with some conclusions about directions for future study.

2. THEORY AND HYPOTHESES

Table 1 presents some of the key theoretical and empirical studies that suggest what we refer to as the "merger-alliance analogy", which we define as the application of theories describing the effects of asset combinations under mergers to asset combinations under alliances[4]. The early finance literature (i.e. the studies that appear in both the stock holder and bond holder columns of Table 1) developed the theoretical foundations of how mergers affected the wealth of merging firms' stock and bond holders. Later researchers, in particular McConnell and Nantell (1985) analogously applied the theory of mergers in their study of the effects of alliance announcements on stock holder wealth, beginning this tradition of the merger-alliance analogy. Many studies that follow McConnell and Nantell thus acknowledge or simply imply the existence of such an analogy between mergers and alliances, but almost all only study the effects of alliances on stock prices. No study that we are aware of, however, has extended this analogy to explain the effects of alliances on bond prices.

Table 1: Key theoretical and empirical literature that suggest a "merger-alliance analogy"

Wealth effect ⇨ Literature ⇩	***Stock holders***	***Bond holders***
Mergers (Theoretical foundations)	• Levy and Sarnat (1970) • Lewellen (1971) • Higgins and Schall (1975) • Galai and Masulis (1976) • Asquith and Kim (1982)	• Levy and Sarnat (1970) • Lewellen (1971) • Higgins and Schall (1975) • Galai and Masulis (1976) • Asquith and Kim (1982) • Kim and McConnell (1977) • Billett, King, and Mauer (2004) • Penas and Unal (2004)
Alliances (Empirical studies)	• McConnell and Nantell (1985) • Koh and Venkatraman (1991) • Das, Sen, and Sengupta (1998)	*Can the merger-alliance analogy extend the literature to describe the effects of alliances on corporate*

[4] Like all analogies, some things are similar while others are different.

	• Chan, et al (1997) • Anand and Khanna (2000) • Johnson and Houston (2000)	*bonds?*

2.1 Stocks and merger-alliance analogy

Two principal motives help explain the effect of merger announcements on stock holder wealth (Jensen and Ruback, 1983; McConnell and Nantell, 1985). First, mergers are driven by a "synergy creation" motive, such as increases in economies of scale, gains from combining complementary assets, increases in market size and power, increases in efficiencies in marketing and product distribution, and better deployment of existing assets. The second is a "management displacement" motive, which are the gains made by replacing the ineffective or inefficient management of the acquired firm. However in a merger, isolating the effects of these two concurrent motives on stock holder wealth can be empirically challenging.

Combining a subset of assets of two or more firms in an alliance, on the other hand, provides an opportunity to separate the effects of the synergy motive from the management displacement motive (McConnell and Nantell, 1985). McConnell and Nantell show that the announcements of strategic alliances have similar effects on stock holder wealth as do the announcements of mergers, with substantial positive excess returns benefitting the stock investors of the allying firms. They attribute these gains to the synergies created by the alliance between the focal firms rather than to management related factors.

Further empirical research has shown that the principal motive firms form alliances is indeed to generate synergies (Johnson and Houston, 2000). Lack of synergy creation under an alliance's cooperative management is in fact a motive for alliance dissolution and/or divestment of one partner's share to another. Such are the internal tensions between partners and the external pressures between each firm and its business

environment that a lack of sustainable value creation for at least one of the partners will lead to a renegotiation of the alliance agreement or its eventual break up (Kogut, 1989; Ariño and de la Torre, 1998; Das and Teng, 2000a).

2.2 Bonds and merger-alliance analogy

The theoretical finance literature suggests that in corporate mergers bond holders should experience significant positive wealth effects. Levy and Sarnat (1970), Lewellen (1971), and Higgins and Schall (1975) argue that mergers increase bond holder wealth through a financial effect called *co-insurance*. Simply stated, co-insurance is the increase in value of outstanding bonds when combining the assets of merging firms because (1) there is greater security offered by the larger asset base of the merged firm's combined assets, and more importantly because (2) the combination of the imperfectly correlated cash flows of the merging firms' assets reduces the volatility of the merged firm's cash flows, which in turn reduces bond default probabilities. Co-insurance due to asset combinations effectively increases the debt capacity or ability of the merged firm to support higher levels of financial leverage because the future debt payment obligations of the bond become more secure.

Other scholars have also argued that because of the effects of coinsurance, the bond holders of merging firms with a lower *credit rating* will benefit more from the merger because of an average decrease in risk, while those of firms with a higher credit rating will lose more because of an average increase in risk (Shastri, 1990; Dennis and McConnell, 1986; Billett, King, and Mauer, 2004). In sum, the coinsurance effect due to a merger has two dimensions, the effects attributed to combining assets and those due to credit rating differences.

Galai and Masulis (1976) argue that if the merger is non-synergistic, bond holder's wealth will increase by an amount that is exactly offset by the decrease in wealth of stock holders. Following their line of argument, Kim and McConnell (1977) argue that if the aim of firm management is to protect stock holder wealth, then firms will increase *financial leverage* after the merger to offset the losses incurred by stock holders expropriating back lost wealth and effectively neutralizing the merger's co-insurance effects.

Given these theories of how mergers affect corporate bonds, how do alliances affect firm's bonds? A merger-alliance analogy that describes the effects of alliance formation on bond holder wealth should include the three effects discussed above, namely the *coinsurance effects* (due to asset combinations and credit rating differences), *synergy effect*, and *financial leverage effect*. We do so in the following three points.

First, we start by assuming that an alliance formation is non-synergistic and that there are no expected changes in financial leverage. Then just as in mergers there is a positive coinsurance effect on bond holder wealth when firms combine *all* their assets, we should also expect some positive coinsurance effect on bond holder wealth of allying firms as they combine a *subset* of their assets[5]. Like mergers as suggested by Galai and Masulis (1976), if the alliance is non-synergistic the increase in bond holder wealth will be accompanied by a concomitant decrease in stock holder wealth, i.e., a wealth transfer between stock and bond investors.

If we continue to assume a non-synergistic alliance and no financial leverage, allying firms with bonds that have a *lower credit rating* relative to their partner will on

[5] The positive effect on bond values assumes that allying firms contribute a significant part of their assets to the alliance. For example, in a dyadic alliance in which the firms agree on an equal share of the alliance benefits, the greater the portion of each firm's assets that are shared in the alliance, the greater will be the coinsurance effect on the bonds of these firms. Alternatively, a relatively smaller firm (by asset size, for example) will receive a stronger positive effect on its bond values by being associated through an alliance with the financial strength of a larger firm.

average experience an *additional increase* in their bond holder wealth, which is also a coinsurance effect. On the other hand, allying firms with bonds that have *higher credit ratings* relative to their partner, will on average experience a *decrease* in their bond holder wealth. In sum, assuming non-synergistic alliances, the group of allying firms with lower credit rating will experience positive coinsurance and positive credit rating effects, while the group of allying firms with higher credit rating will experience positive coinsurance and negative credit rating effects.

Second, if we now assume that alliance formations are synergistic and that there are still no changes in financial leverage, then stock holder wealth will simultaneously experience negative coinsurance and positive synergy effects from the alliance. Depending on which of these two effects dominates, stock holders of allying firms may experience a net positive or negative wealth effect. Bond holders of allying firms, on the other hand, should experience a zero or a net positive effect due to the positive coinsurance and neutral synergy effects[6]. Given the empirical evidence in support of the synergy creation motive of alliances (McConnell and Nantell, 1985; Johnson and Houston, 2000), we should expect that there is at least a *non-negative* effect on bond holder wealth when alliances are announced. The individual effects on both bond and stock investor wealth discussed so far can be summarized in Table A.

Table A: The effects of coinsurance and synergy on investor wealth

	Bond holder wealth		***Stock holder wealth***	
Higher relative credit rating	Coins. effect due to asset combinations Coins. effect due to credit rating diff. Synergy effect	+ – 0	Coins. effect due to asset combination Coins. effect due to credit rating diff. Synergy effect	– 0 +
Lower relative credit rating	Coins. effect due to asset combinations Coins. effect due to credit rating diff. Synergy effect	+ + 0		

[6] In general, bond holders should not expect to receive any of the benefits of synergy from an alliance formation unless synergy gains have an effect on the risk of the bond. Said differently, the corporate bonds of a firm belong to a certain credit risk class (e.g., Moody's credit rating Aaa, Aa, etc.) and will stay in that class unless there are changes in the conditions affecting the risk of the bond. So assuming no change in credit risk class and given that the expected future cash flows of the bond are fixed, any synergy gains or losses from an alliance will bypass the bond holders and go mainly to the stock holders.

Thus given the large body of empirical evidence that show that stock holders on average benefit from strategic alliance formations, we hypothesize the following:

Hypothesis 1: Strategic alliances create value for both stock and bond holders of the same firm.

Hypothesis 2: Strategic alliances create more value for bond holders of firms with lower credit rated bonds than those with higher credit rated bonds.

Third, in general financial leverage has a positive effect on stock holder wealth because of the tax benefits of debt and a neutral effect on bond holder wealth so long at the level of leverage is not too high. However, if the financial leverage of a firm is high, then, as in mergers, bonds of a highly leveraged firm forming an alliance should experience a *reduction* in default risk when combining it is assets with a less leveraged firm and are therefore expected to experience a positive wealth effect, while bonds of the less leveraged firm should experience a negative wealth effect (Billett, King, and Mauer, 2004). We thus hypothesize that:

Hypothesis 3: High levels of firm leverage at the announcement of an alliance will be positively correlated with the value creation for bond holders.

Forming an alliance may be a positive signal to investors of improvements in the future growth and cash flows of the firm. This would mean an increase in its ability to

support more debt financing, i.e., increased debt capacity. If investors foresee this, bond values will rise. Hence we hypothesize as follows:

Hypothesis 4: Positive changes in the level of firm leverage after forming a strategic alliance will be positively correlated with value creation for bond holders.

The four hypotheses, if supported, will be evidence that bond holders are affected in the same way as stock holders. If true, they will also help extend the merger-alliance analogy to include bond holders.

3. DATA AND METHODS

3.1 Data

Sources: Our sample is built from merging together data from five different data base sources: TRACE US Corporate bond data, Mergent FISD bond issue data[7], SDC Platinum alliance data, CRSP stock prices, and COMPUSTAT firm-level data. We limit to US based alliances by industrial firms that have issued US dollar dominated corporate bonds. The period of data is from 1 July 2002 until 31 December 2007.[8] The starting date coincides with the beginning of the TRACE bond data and the ending date is chosen to avoid the events of the 2008 global financial crisis.

Defining Partner A vs. Partner B: The main empirical objective of this paper is to investigate whether firms that form alliances create or destroy value for their bond holders. In order to ensure that the value created (or destroyed) for bond holders is not

[7] "FISD" stands for the Fixed Income Securities Database provided by Mergent.
[8] Because we require a 126 trading day estimation period (i.e. about 6 months) starting from when the data begins, the first event date of the event study occurs in January 2003 and goes to December 2007.

transferred to or from either the stock holders of the same firm or the stock or bond holders of the partner firm, we need to statistically test for possible value transfers between these asset groups (see Tests for Value Creation vs. Value Transfer)

Few alliances involve firms with outstanding corporate bonds and even fewer still involve firms in which more than one of the partner firms in the alliance have outstanding bonds. Each observation of our sample is a single alliance announcement containing data for "Partner A" firms and "Partner B" firms. We select all "Partner A" firms to have valid return data for *both* their stocks and bonds, while "Partner B" firms usually only have valid stock data. After employing data cleaning routines described below, the final Partner A sample contains 725 firm-events or alliance announcements, while the final Partner B sample contains 262 firm-events. There are only 22 observations in which both Partner A and B have valid stock and bond data, and only 5 observations which involve more than two alliance partners (i.e. partners A, B, and C) and for which we have valid return data.

Of the 725 announcements, all 725 firms have outstanding stock that trade daily. However very few bonds trade daily, reducing the sample of bond returns to 467 observations (on Day 0, which is used for regression analysis). Removing those firms with no valid firm-level data, the bond sample size reduces further to 435 observations.

Data Cleaning: Prior research has reported problems with the accuracy of the alliance announcement dates reported in the SDC Platinum Alliance database (Anand and Khanna, 2000; Schilling, 2009). For the alliance announcement dates in our sample, we cross-checked against Lexis-Nexis and if there was a disagreement in the dates we used the earliest one between the two data sources, which meant usually deferring to the media source within Lexis-Nexis. For other data items such as SIC codes and types of

alliance, we used what was reported in SDC given that this data is for the most part quite accurate (Anand and Khanna, 2000).

Bond return data: As the principal results of this study hinge on the analysis and interpretation of corporate bond return data we provide a more detailed explanation about how this data was prepared. Unlike stock return data which is easily available through WRDS and CRSP, firm-level bond return data needs to be assembled and calculated separately. Given the particular nature and trading characteristics of corporate bonds, such as thin trading, a market dominated by institutional investors, multiple issues by the same firm, non-fungibility[9], limited maturity, etc, certain adjustments need to be made in the procedure, as will be discussed in some detail here.

Reliable and publicly accessible US corporate bond data is now available via WRDS in the TRACE[10] fixed income database. TRACE's data coverage began on 1 July 2002 and by 2004 extended to include over 99% of all corporate bond trades representing 95% of traded dollar value (Glushkov, 2007). The Mergent FISD provides complementary bond issue information, such as coupon rates and credit rating histories for example, that is not as available in TRACE.

The initial intersection of the TRACE, SDC, and FISD databases yields more than 8000 strategic alliances in which at least one of the partners had bond data in TRACE. To be included in the Partner A sample, we followed criteria similar to those

[9] Common stocks of a firm, for example, are fungible because each share is exchangeable for another, whether bought at IPO or in a seasoned issue or through the secondary market. Different bond issues, however, may not be interchangeable with other issues even by the same firm as each issue differs in seniority, coupon rate, maturity, credit rating, etc, which means that they are not completely fungible.

[10] TRACE is the Trade Reporting and Compliance Engine and is available through the Wharton Research Data Service (WRDS). Its purpose is to increase transparency in the corporate bond, agency bond, asset-backed and mortgage-backed securities markets through the accurate and timely distribution of fixed income data, including real-time dealer price quotes, trade volumes, yield offers, etc. In January 2001, the SEC approved rules that obliged all US corporate bond over-the-counter (OTC) secondary market trading to be reported through TRACE. It is owned and operated by FINRA, the Financial Industry Regulatory Authority, the largest regulator for all securities firms doing business with the US public (TRACE Factbook, 2011).

used by Bessembinder, Kahle, Maxwell, and Xu (2009) and Elton, Gruber, Agrawal, and Mann (2001): (a) Only bonds issued by industrial firms are included; (b) Only straight coupon and variable coupon rate bonds are included, eliminating those with special features for example, bonds that are putable, callable, sinking fund, index bonds, etc; (c) Daily observations with an absolute value of returns greater than 20% are excluded; (d) All bonds must have a corresponding credit rating and maturity index amongst the Barclays Capital (formerly Lehman Brothers) corporate bond indices.

There are several empirical challenges conducting an event study on corporate bonds that require certain adjustments to the standard event study methodology (see Bessembinder, et al, 2009). First is the problem of thin trading. Unlike equities which trade almost daily, bonds trade at a wide range of frequencies. Some large issues may trade daily, but the majority of issues do not. Furthermore, unlike stock trading, bond trading is dominated by institutional or large investors resulting in wide range of prices depending on dollar volume of trades. The lack of liquidity in the bond market requires care in calculating the abnormal returns required for the event study. Secondly, unlike equities where each firm typically has only one outstanding issue, firms often have multiple bond issues each with its own return series. For the purposes of this study, we combine abnormal bond returns of multiple issues from the same firm into a single value-weighted abnormal bond return (following Bessembinder et al, 2009; Billett, King, and Mauer, 2004). Thirdly, unlike stocks which are theoretically perpetual assets, the time to maturity of bond issues progressively decreases, such that their value is less sensitive to risk factors[11]. Finally, while daily trade data is the norm in equities, earlier research using bond data has been typically with monthly data. Since the advent of the TRACE fixed income database, daily trade data is now easily available to researchers.

[11] To illustrate, where present value of future cash flow (PVFCF) = FCF/(1+discount rate)^t and t is the time to maturity of the bond, PVFCF becomes less sensitive to changes in the discount rate as t decreases.

Using daily bond data significantly increases the power of statistical tests to detect shocks (Bessembinder, et al, 2009).

We use daily TRACE data for this paper, implementing several "TRACE cleaning" routines suggested by Bessembinder and colleagues [12]. These include eliminating non-institutional trades and building daily trade-weighted bond prices for each issue's time series, which we use to calculate the issue's returns series. To check robustness, we use three different amounts to define the magnitude of institutional trades, starting from as low as $10,000, then $50,000 and finally $100,000, which is what Bessembinder et al, use. The results we show are based on the $100,000 definition. Access to the Mergent FISD database allows us to calculate the actual daily bond returns as described in Bessembinder et al (2009: 4226):

$$Bond\ Return_{(Actual)} = BR_{it} = \frac{(P_{it} - P_{i,t-1}) + AI}{P_{i,t-1}} \qquad (1)$$

where *AI* is the accrued interest and P_{it} is the bond price for issue *i* on day *t*. Accrued interest is the coupon interest that is owing to the bondholder but not yet paid since the last coupon date. Since trade prices are in practice quoted as "clean prices" (i.e. *P*), adding the accrued interest is closer to the actual price received by the bond seller (i.e. "dirty price"). In order to calculate a return, valid prices on two consecutive trading days are required. Due to thin trading, the number of calculable bond returns is substantially less than the trades made.

[12] See Footnote 7 of Bessembinder, et al (2009). It refers to a SAS program used for bond data cleaning. We introduce improvements to correct errors in the original program, which include inadvertently deleting some observations, not deleting other observations, and inappropriately excluding some trades. The improved program is available on email request.

3.2 Empirical methods

Event Study: For the stock event study around the event day, defined as day 0, we use the standard event study method with a 255 day estimation period ending 15 days prior to event day, followed by a 5 day gap period, and then a 21 day event period or window (-10, +10). We use a standard SAS program with adjustments available through WRDS (Glushkov, 2011) and use the market model estimation method.

For the bond event study, we use the standard methodology with the following adjustments (see Boehmer, Broussard, and Kallunki, 2002). We estimate the model parameters for each bond issue over a 126 trading day estimation period ending 15 days prior to the announcement date of the alliance followed by a 5 day gap period. We use a matched portfolio model according to equation (2) (following Elton, et al, 2001; and Bessembinder, et al, 2009), where BR_{it} is the actual bond return on day t, α_{i0} and α_{i1} are the issue-specific model parameters to be estimated, $MatchedIndex_{it}$ is the Barclays Capital bond index that was matched with the bond issue according to similar credit rating and time to maturity, and ε_{it} is the error term that is assumed to be i.i.d normal with zero mean. Because of infrequent trading of corporate bonds, there may be concerns over the quality of the abnormal return estimates of the event period because of potentially poor quality parameter estimates that are based on infrequent return data during the estimation period. To allay this concern, like Bessembinder, et al (2009), we discard bond issues that had less than 10 trades in the last 20 days of the bond's estimation period[13]. During the estimation, we obtained a corresponding estimate of the variance for each issue, which we later use for hypothesis testing of the firm-bonds.

[13] To be clear, the key time points of the set up are: -20, -15, -10, 0, and 10 days in event time which correspond to: the start of the last 20 days in the estimation period during which there needs to be 10 or more trades for the issue to considered valid, the start of the gap period, the start of the event period, the event day when the alliance is announced, and the end of the event period.

$$BR_{it} = \alpha_{i0} + \alpha_{i1}(MatchedIndex)_{it} + \varepsilon_{it} \quad (2)$$

In the 21 day event period (-10, +10), we calculate the excess or abnormal returns for each issue according to equation (3), where AR_{it} is the abnormal return of bond issue *i* on day *t*, and $\widehat{\alpha_0}$ and $\widehat{\alpha_1}$ are the estimates of the parameters.

$$\mathrm{AR_{it}} = \mathrm{BR_{it}} - [\,\widehat{\alpha_0} + \widehat{\alpha_1}(\mathrm{MatchedIndex})_{\mathrm{it}}\,] \quad (3)$$

For firms with multiple bond issues, we combine the issues of the same firm into a value-weighted portfolio to make one firm-bond. We calculate the combined portfolio variance according to standard portfolio theory assuming a correlation coefficient of 1 (see Brealey, Myers, and Allen, 2008). As a result, all bonds in the sample can be considered firm-bond issues, i.e., one bond per firm.

CAR vs. Daily AR vs. Pooled AR: In order to calculate a cumulated abnormal return (CAR), it is necessary to have a non-missing AR on each consecutive day of the CAR window. However, because of the infrequent trading of bonds, this is usually not possible for the full 21 day event window. In our sample, about one third of the bonds do not have return data on any one trading day during the event window, and if the missing returns on days of no trading were replaced with zero return values, the return distribution will be radically distorted. Although short CAR windows, for example (-2, 2) or (-1, 1) are possible, once again there is the problem of interpreting results based on a substantially reduced sample observations. In sum, although some results using CAR as a measure for performance are provided for robustness, these are not considered the main ones. Instead, in this study we use daily abnormal returns (Daily AR) and pooled abnormal returns (Pooled AR) of several days for hypothesis testing.

Tests for Value Creation vs. Value Transfers: To test whether Partner A bond holders benefit from the value creation effects of strategic alliances, we need to ensure that (1) value is not being transferred from the Partner A stock holders of the same firm (intra-firm transfers); (2) value is not being transferred from its alliance partner, Partner B's stock holders (inter-firm transfers); and (3) value is being created contemporaneously and not simply across the entire cross-section of firm-bonds (contemporaneous transfers). To test for these conditions, we estimate the regression equation given in equation (4) that links the abnormal returns of each of these three investor groups.

$$AR(bond_A, t) = \beta_1 AR(stock_A, t) + \beta_2 AR(stock_B, t) \qquad (4)$$

where AR(. , *t*) is are the abnormal returns of the Partner A bond in the sample, Partner A stock sample, and Partner B stock sample, while β_1 and β_2 are the respective coefficients estimated using OLS.

How should these coefficient estimates be interpreted? If the average abnormal return of bond A is positive and significantly different from zero and $\beta_1 > 0$, then the abnormal returns of the stock and bond holders of Partner A are correlated and the alliance deals can be considered in general to be value creating for both stock and bond holders of Partner A. If however, $\beta_1 < 0$, then the stock and bond returns of Partner A would be moving in opposite directions to each other, in which case would be evidence of value transfer between stock and bond holders.

If again the average abnormal return of bond A is positive and significantly different from zero and $\beta_2 > 0$, then the alliance announcements are causing abnormal returns of Partners A and B to move in the same direction and can be considered value creating for both partners. However, if $\beta_2 < 0$, then the returns of Partners A and B

would be moving opposite directions which would imply that either value is being transferred between the two partners' investors or there is an unequal sharing of value in the value creation of the alliance.

Cross-sectional analysis of bond returns: In order to explain the effects of strategic alliance announcements on abnormal returns on bonds, we estimate the cross-sectional regression given in equation (7).

$$
\begin{aligned}
\overline{AR}_0 \quad = \quad & \gamma_0 \\
+ \quad & \gamma_1 \text{ (Credit rating dummy: Non-investment = 1)} \\
+ \quad & \gamma_2 \text{ (Financial leverage ratio prior to alliance)} \\
+ \quad & \gamma_3 \text{ (Change in leverage over -1, +1 years)} \\
+ \quad & \gamma_4 \text{ (Alliance experience by alliance type in past 6 years)} \\
+ \quad & \gamma_5 \text{ (Control: Book Value of assets, Market to Book Value)} \\
+ \quad & \gamma_6 \text{ (Control: Relative Size)} \\
+ \quad & \gamma_7 \text{ (Other Controls: Year of Alliance, Alliance Industry, Firm)} \qquad (7)
\end{aligned}
$$

Credit Rating: We define the dummy variable Non Investment Grade that takes the value 1 if the alliance one has a Moody's credit rating of Ba1 or lower, or 0 otherwise. According to Hypothesis 2, a positive coefficient estimate is expected.

Leverage ratio: Leverage ratio is defined as the fiscal year-end ratio of book value of debt to total firm value (Ghosh and Jain, 2000). The book value of debt is equal to the sum of book value of long-term debt and the debt in current liabilities. Total firm value is defined as sum of the book value of debt and the market value of equity. We calculate this ratio with the fiscal year-end data one year prior to the alliance announcement. A positive co-efficient estimate is predicted.

Change in leverage: Two definitions are used to test this variable. The first is the difference between the leverage ratio one year after the alliance formation and the

leverage ratio one year before all divided by the leverage ratio one year before. The second definition is the leverage ratio one year after the alliance announcement divided by the leverage ratio one year before. A positive coefficient estimate is expected.

Alliance experience: Anand and Khanna (2000) find that experience from prior strategic alliance experience significantly explains the returns of stocks following the alliance announcement. The number of prior alliances includes those in the past 6 years to the focal alliance. A longer period of experience could have been chosen, although this may call to question the relevance of alliance experience measured further in time from the focal event. We calculate a separate experience variable for each of the three alliance contract types, namely Joint Ventures, Strategic Alliances, and Licensing Agreements.

Controls: Since larger firms have more resources, they may have a stronger co-insurance effect, hence we control for the firm size effects with the *book value of assets* in the fiscal year-end prior to the alliance announcement.

Firms with a higher market to book ratio have greater growth opportunities and hence greater potential for synergy creation in an alliance, hence we control for *market to book ratio*, where market value is the market value of outstanding common and preferred shares.

As smaller partners of an alliance may benefit relatively more than the larger partner, we control for *relative size effects* with the ratio of the Partner B firm's total assets divided Partner A's total assets.

We control for the *year, industry of the alliance,* and *firm fixed effects*. We use the Fama French 49 Industries to categorize the industry of the alliance.

4. RESULTS

4.1 Descriptive results

Table 2a provides details of the number of alliances carried out in the full sample of 725 Partner A firm-alliance announcements. IBM Corp has the most number of alliance announcements with 55 alliances in the sample during the sample period representing 7.7% of the entire sample. The top 10 and top 20 firms each make up 39% and 52% (268 and 364 announcements) respectively of the full sample while the last 100 firms make up 14% (100 announcements) of the sample. Tables 2b and 2c provide further descriptive details about the nature of the strategic alliances involved.

Put Tables 2a, 2b, and 2c about here

4.2 Event study results

Table 3 shows the parallel event study results of daily abnormal returns (AR) of Partner A bonds and stocks and Partner B stocks for each event day during the 21 day event period window (-10, 10). Comparing the daily sample sizes of the three asset groups shows that almost all 725 Partner A and 262 Partner B stocks trade daily. The sample of Partner A bonds is between 422 and 467 observations, however the reality is that the sample composition changes significantly each day reflecting the fact that corporate bonds trade less frequently than the stocks of the same firms.

For the Partner A bonds, there appears to be some evidence of leakage of information prior to the event day with positive and significant abnormal returns on day -3 for both the mean and median estimates (0.115 bp[14] with $p<.05$ and 2.753 bp $p<.05$).

[14] One "bp" or basis point is equal to one hundredth of one percent, i.e. 1 bp = 0.01% = 0.0001.

Also on day -3, this same leakage seems to be reflected in the opposite direction for the Partner B stocks registering negative and significant mean and median returns (-37.133 bp with $p<.05$ and -25.014 bp with $p<.05$).

Hypothesis 1: The most significant result of Table 3 is the simultaneously positive and highly significant cross-sectional abnormal returns on day 0 for Partner A bonds, Partner A stocks, and Partner B stocks with respective means of 8.5 bp, 38.9 bp, and 267.3 bp all significant at $p<.001$ with medians of 3.4 bp, 11.8 bp, and 52.8 bp respectively. The stock reactions of the Partner A and Partner B firms are on the low and high side respectively compared with earlier studies. For instance, McConnell and Nantell (1985), Chan, et al (1997), Anand and Khanna (2000) obtain 74 bp, 64 bp, and 67 bp respectively for their full samples means.

One explanation for the difference in means with earlier studies is firm size. In order to issue corporate bonds at reasonable interest rates, issuers, which include all the Partner A firms, tend to be larger and more stable firms. Large firms tend to have a lower abnormal return market reaction but a much higher dollar return, while smaller firms show the reverse pattern (see McConnell and Nantell, 1985: 531). Looking at Panel A of Table 6 confirms this. Partner A firms have a high dollar return market reaction of 79.7 million dollars on day 0 (but a relatively low abnormal return), while Partner B firms have a comparatively low dollar reaction of only 22.5 million dollars (but a high abnormal return). These dollar reactions can be compared with Anand and Khanna (2000: 305) which reports a mean dollar reaction of 44 million dollars (and a mid-range abnormal reaction) for their sample of joint ventures whose parent firms may or may not have had outstanding bonds.

These results lend some support to Hypothesis 1 which argues that the formation of strategic alliances will be beneficial for both stock and bond holders of allying firms, but it is not conclusive. It is possible that the Partner A bond and Partner A stock means are cross-sectionally positive and significant on a particular event day, but anti-correlated within each pair of same firm bond and stock abnormal returns, implying a transfer of value between different investor classes of the same firm. Furthermore, Partner A and Partner B investors may be benefitting differently from the alliance.

The regression shown in equation (4) tests for these possibilities and the results are shown the last three columns of Table 3. The positive and highly significant β_1 on many days of the event window indicate that the Partner A bond and stock abnormal returns are moving in the same direction. This is stronger evidence in support of Hypothesis 1, that strategic alliances create value for both stock and bond holders of the same firm. However, the estimates of β_2 are insignificant on most days of the event window except on day 0.

For robustness, Table 5 presents results based on cumulative abnormal returns (CAR) in a similar parallel event study to that shown in Panel A of Table 4. In all tests, only β_1 is positive and significant while β_2 is statistically not different from zero. For reasons explained earlier, these results are less reliable due to loss of observations in working with CAR, however, the results still support Hypothesis 1.

Hypothesis 2: Panel A of Table 4 provides the same parallel event study as Table 3 but for pooled abnormal returns. The regression coefficient estimates in the last three columns of the table show a common pattern of statistically significant and positive β_1 and negative β_2. However, when splitting the full sample into sub-samples according to the Moody's investment grade credit rating of the Partner A bond as we do

in Panels B1 and B2 of Table 4, only statistically significant and positive β_1 are found in the non-investment grade group (Panel B2), while only statistically significant and negative β_2 are found in the investment grade group (Panel B1). This is evidence that credit rating makes a difference to bond holder returns on the formation of an alliance.

Focusing on Panel B1 of Table 4, Partner A bonds and Partner A stock still show positive and significant pooled abnormal returns, although these returns are not significantly correlated as indicate by the insignificant coefficient β_1 estimate. On the other hand, the significant negative β_2 coefficients and significant positive means for Partner A bonds and Partner B stock together indicate that Partner B stock is earning much more relative to Partner A bonds, hence the negative sign on the coefficient. We conclude that for allying firms with investment grade bonds, value is created for both stock and bond holders of those firms. Furthermore, the strategic alliance creates much more value in terms of abnormal returns for Partner B stock holders than Partner A stock holders due to a relative size effect, as described above.

Looking at Panel B2 of Table 4 and in particular AR(0,0) corresponding to day 0 in event time, Partner A bonds and stocks and Partner B stocks all have positive and significant mean and median abnormal returns as well as positive and significant β_1 estimates. Again we conclude that for allying firms with non-investment grade bonds, value is created for both stock and bond holders of those firms on the alliance announcement day. However, the β_2 coefficient is insignificant, indicating that the strategic alliance again creates value for both Partner A and Partner B investor, although the value creation is not correlated.

Panels B1 and B2 of Table 6 show the corresponding dollar gains for the sub-samples by investment grade. For Partner A firms with investment grade bonds, bond

holders lose money by an average of 1.2 million dollars (median 0.70 million dollars)[15], while those with non-investment grade bonds benefit significantly with an average gain of 7.6 million dollars (median 0.95 million dollars).

In sum, compared with non-investment grade bonds, investment grade bonds display smaller abnormal returns and smaller dollar returns. Taken together, the evidence strongly confirms Hypothesis 2.

4.3 Regression Results

Tables 7a and 7b provide the results of multivariate regression model expressed in equation (7). Table 7a presents the leverage effects on Partner A abnormal bond returns, and Table 7b presents the organizational learning effects.

Hypothesis 3: In Table 7a, Model 1 is the full sample model of 435 firm-bond abnormal return observations controlling for year and industry fixed effects but not firm fixed effects. The positive and significant coefficient for Credit Rating once again confirms Hypothesis 2. However, the negative and significant coefficient for Leverage Ratio (-0.0125, $p<.001$) is the opposite of what is predicted in Hypothesis 3. Model 2 is the same as model 1 but controls for relative size between the Partner B and Partner A firms. It also shows the same negative correlation for the coefficient on Leverage Ratio as model 1. However, in models 3 and 4, which control for firm fixed effects, the Leverage Ratio coefficient estimate becomes insignificant. Table 7b shows that across all three models, the estimated coefficients on Leverage Ratio are also consistently the opposite of what is predicted by Hypothesis 3, although these models do not control for

[15] That the median of the dollar gain of investment grade bonds is positive and that the sample contains large firms that skew the mean together suggest that the mean is actually not significantly different from zero.

firm fixed effects. Given this fairly consistent result, especially when not controlling for firm fixed effects, it would seem that either the statistical model is incorrectly specified or in fact the opposite of Hypothesis 3 is the case; that high levels of leverage of firms that form alliance is seen by bond investors as an increase in risk for these firms, decreasing the value of bonds.

Hypothesis 4: Model 1 in Table 7a is the only model to show that the Change in Leverage Ratio is positive and statistically significant (0.00347, $p<.01$). This is at best weak evidence that supports Hypothesis 4.

Controlling for firm fixed effects seems to have a strong effect on the results as reflected, amongst other things, in the dramatic change in the R-squared values of models 1 and 3. Other models (not shown) were also shown to be "adversely" affected by the addition of this control variable. Further investigation is required.

5. DISCUSSION & FURTHER RESEARCH

We argue that our main empirical result, which originates from our tests of Hypothesis 1, fills a significant gap in the alliance literature: that not only does the formation of strategic alliances create value for stock holders, strategic alliances *also* create value for bond holders. The result is important because it affects the greater part of the financial capital markets, which up until this study has received no attention in the alliance literature as far as we are aware. The fact that so little is known about how alliances affect the debt of firms, albeit bank debt or publicly traded corporate bonds, leaves much room for further research. The whole question of how interconnected firms affect debt funding costs is still to be explored.

The empirical support for Hypothesis 2, which said that alliances create more value for the bonds of firms with lower credit rating than those with higher credit rating,

leads to an important observation: firms whose debt is more risky engage in strategic alliances to improve their risk profiles, allowing them to lower their debt funding cost.[16] Strategic alliances are therefore a way to improve the debt capacity of allying firms, especially for firms with riskier debt. Looking deeper into this observation, we argue that firms try to *further* lower their debt funding costs by seeking to ally with firms which have better quality debt than they have. This leads to another interesting question: To what propensity do firms with higher quality debt have to engage in alliances with firms with lower quality debt? Furthermore, if indeed firms can lower their debt funding cost as a result of forming strategic alliances, an interesting question for further research is whether leveraged firms with a network of alliances have lower debt cost in general compared with leveraged firms *without* such a network. Answers to these questions may lead to deeper insights into the relationship between firm capital structure and strategic corporate activities such as alliance formation.

Hypothesis 3 predicted that because of the effect of coinsurance, high levels of firm leverage would be correlated with positive increases in bond holder returns on the announcement of alliances, but the results revealed otherwise. Similarly Hypothesis 4, which said that changes in firm financial leverage before and after an alliance announcement would be positively correlated with bond returns, was also not supported. Instead of a coinsurance effect, what could be happening is a trade-off theory effect. (Myer, 1977; Brealey et al, 2008). Trade-off theory says that firms will increase their debt to the point where the marginal tax benefits of debt equal the marginal losses due to the financial distress costs, at which point the firm will reach optimal debt levels and maximize its firm value (value of debt and equity). Increasing debt levels beyond this

[16] Bond returns, which are a function of bond prices (see equation (1)) are inversely related to bond yields, which are a direct measure of the public debt funding cost of a firm. Thus, an increase in bond return of a firm's outstanding bond indicates an increase in bond prices or a decrease in its bond yield.

optimal point (*ceteris paribus*) makes outstanding debt more risky, decreasing its value and so too the value of the firm.

When a firm with high debt levels announces that it intends to engage in an alliance, the bond market does not believe it has the free cash to invest in the alliance, even though the alliance may of itself be a positive NPV project. As the alliance has no guarantee of success for the cash constrained firm, the benefits of the alliance outweigh the risks of default on the outstanding debt obligations, leading investors to take short positions on the firm's bond. Said differently, the value of the firm equals the sum of the market value of equity and debt, which in turn equals the sum of the value of the assets in place (AiP) and the growth options (GO), as in equation (8) (Myer, 1977):

$$E + D = V_{AiP} + V_{GO} \quad (8)$$

The value of equity rises by virtue of the additional value created by the growth options of the alliance (Reuer and Tong, 2010; Kogut, 1991; Chi, 2000), but since the investment required to exercise the option puts debt holders more at risk *further value is shifted* to the equity holders at the expense of debt holders. This may partly explain the contrary results to the prediction of Hypotheses 3 and 4. Further research on this point may reveal some interesting findings concerning the relationship between the variables in equation (8).

6. CONCLUSION

Based on theories of coinsurance that predict the effects of mergers on corporate bonds, we have argued that the merger-alliance analogy that was used to describe the effects of alliance formation on stock holder wealth can be extended to explain the

effects of alliance formation on bond holder wealth. Through the results of an event study, we found (1) strong evidence suggesting that the formation of strategic alliances creates value for *both* bond and stock holders of the same firm; and (2) strong evidence to say that bond holders of allying firms with below investment grade bonds benefit more than bond holders of firms with investment grade bonds. These are significant results considering that up until this study (as far as we are aware), there are no published studies that look at the effect of alliances on bond investors, who make up more than half of the financial capital markets.

However, there seems to be a limit to how far the merger-alliance can explain bond holder reactions to alliance formations. Unlike the known positive effects that organizational learning from prior alliance experience has on stock holder wealth, it appears that alliance experience has no effect on bond holder wealth (see Table 7b). This could be because of differences in the residual versus fixed-income claims of stock and bond holders respectively. Because of these differences in claims, stock holder wealth is affected more by changes in strategic factors while bond holder wealth is affected more by firm risk and debt capacity related factors.

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8. RESULT TABLES

Table 2a: Alliance announcements by the top 10 firms for Partner A sample (Jul 2002 to Dec 2007)

The full sample consists of Partner A alliance announcements made by 185 unique firms. Each of the firms has outstanding bonds that trade on at least one day during the event period (-10, 10). Although we report 725 observations with alliance announcements in the period, three have missing data in various parts of the analysis.

Number of alliance Announcements	*Portion of sample*	*Firm Name*	*CUSIP6*
55	7.68%	IBM Corp	459200
45	6.28%	Merck & Co Inc	589331
37	5.17%	Motorola Inc	620076
31	4.33%	Pfizer Inc	717081
24	3.35%	Bristol-Myers Squibb Co	110122
23	3.21%	Hewlett Packard Co	428236
14	1.96%	Cisco Systems Inc	17275R
14	1.96%	DuPont	263534
13	1.82%	Lockheed Martin Corp	539830
12	1.68%	Lucent Technologies Inc	549463
457	60.9%	(others)	
TOTAL: 725	**100.0%**		

Table 2b: Strategic alliance announcements by year and type

As the TRACE bond database began on 1 July 2002 and an estimation period of 126 trading days was used to estimate the model parameters, the earliest alliance announcements began in 2003.

Year Announced	*Strategic Alliance*	*Joint Venture*	*Licensing*
2003	78	6	14
2004	61	12	22
2005	116	14	36
2006	128	24	31
2007	136	16	31
TOTAL	**519**	**72**	**134**

Table 2c: Strategic alliance announcements by industry and type

The industries are based on the Fama French 49 industries definitions.

Industries	*Strategic Alliances*	*Joint Ventures*	*Licensing*
Business services	207	6	50
Computer Software	137	1	6
Wholesale	50	2	7
Telecommunication	23	1	.
Electronic equipment	20	4	.
Pharmaceutical products	10	1	3
Autos	9	8	.
Retail	8	.	1
Petroleum and natural gas	7	1	.
Entertainment	6	.	1
Real estate	3	1	.
Restaurants, hotel, motel	3	5	.
Apparel	2	.	.
Chemicals	2	13	.
Computers	2	1	.
Others	30	28	66
TOTAL	**519**	**72**	**134**

Table 3: Parallel Event Study: Daily Abnormal Returns of Partner A Stocks and Bonds vs. Partner B Stocks
Regression: DailyAR($Bond_A$,t) = β_1DailyAR($Stock_A$,t) + β_2DailyAR($Stock_B$,t)

	Partner A BONDS			Partner A STOCKS			Partner B STOCKS			REGRESSION		
Event Time (in days)	No. of obs in sample	Partner A Bond Mean AR (basis points)	Partner A Bond Median AR (basis points)	No. of obs in sample	Partner A Stock Mean AR (basis points)	Partner A Stock Median AR (basis points)	No. of obs in sample	Partner B Stock Mean AR (basis points)	Partner B Stock Median AR (basis points)	No. of obs in sample	$\beta_1$estimate	$\beta_2$estimate
-10	450	2.899	0.733	725	3.765	-0.080	263	10.001	5.320	172	0.026	0.012
-9	467	3.022†	2.278	725	6.421	0.743	263	22.196	7.040	182	0.071*	0.023*
-8	463	0.495	1.780	725	0.380	-3.047	262	33.395†	-2.885	183	0.156***	0.011
-7	437	0.746	1.212	725	-1.242	-7.588	262	7.286	-6.836	168	0.151***	0.006
-6	447	-0.909	2.017	725	-0.503	-2.388	262	11.557	-7.408	176	0.098***	0.015
-5	453	-7.424	0.185	725	-9.361	-5.235	262	3.319	7.230	177	0.022	-0.002
-4	451	1.382	2.516	725	-1.128	-11.905	262	21.074	-4.252	181	-0.004	-0.004
-3	448	0.115*	2.753*	724	1.845	-5.910	262	-37.133*	-25.014*	174	0.064*	-0.027
-2	441	-1.708*	2.308	725	10.479	1.284	262	16.388	-5.232	169	0.043†	0.040
-1	453	-1.761	0.344	725	-3.688	1.333	261	2.722	16.662	171	0.233***	-0.028
0	467	8.527***	3.391**	725	38.891***	11.844**	262	267.294***	52.789***	183	0.145***	-0.019**
1	468	2.901*	2.990†	725	16.962*	5.279*	262	-6.411	3.519	191	0.175***	-0.009
2	446	1.400	2.365	725	4.162	-6.170	262	-47.692*	-2.287†	171	0.047	-0.008
3	455	2.052*	2.237	723	-2.564	-3.994	262	23.567	-5.018	172	0.052	-0.025
4	427	0.693	2.681	721	6.826	3.658	261	3.401	11.922	167	0.112**	0.019
5	443	-7.479	1.417	721	-16.043*	-13.998**	261	-12.813	-0.556	174	0.459***	-0.022
6	447	-6.221	-0.661	721	-10.854	-9.052	261	36.456†	2.583	175	0.208***	0.004
7	438	-2.165	1.107	720	4.236	-3.448	261	-23.810	-16.232*	169	-0.152**	0.025
8	422	-3.868	-0.044	719	11.916†	-4.115	261	-9.004	-12.532	169	0.098**	0.033
9	427	6.527†	2.800	719	-9.351	-8.336*	261	10.314	-5.144	174	0.044†	0.023
10	431	5.660	1.250	717	10.531	3.356	260	2.154	5.913	162	0.080***	0.013

Statistical significance p-levels (two tail tests): † p<.1; * p<.05; ** p<.01; *** p<.001. Stock means tests: Brown & Warner (1980); Stock median tests: Wilcoxon Ranked Sign; Bond means tests: Sign Test; Bond median tests: Wilcoxon Ranked Sign.

Table 4: Parallel Event Study: Pooled Abnormal Returns of Partner A Stocks and Bonds vs. Partner B Stocks
Regression: PooledAR(Bond$_A$,t) = β_1PooledAR(Stock$_A$,t) + β_2PooledAR(Stock$_B$,t)

Pooling of Abnormal Returns	Partner A BONDS			Partner A STOCKS			Partner B STOCKS			REGRESSION		
	No. of obs in sample	Partner A Bond Mean AR (basis points)	Partner A Bond Median AR (basis points)	No. of obs in sample	Partner A Stock Mean AR (basis points)	Partner A Stock Median AR (basis points)	No. of obs in sample	Partner B Stock Mean AR (basis points)	Partner B Stock Median AR (basis points)	No. of obs in sample	β_1 estimate	β_2 estimate
Panel A: Partner A Bond Grade=ALL GRADES												
Pooled AR(-1,1)	1388	3.272***	2.514**	2175	17.389***	5.800**	785	87.977***	18.327**	545	0.180***	-0.018**
Pooled AR(-2,2)	2275	1.940***	2.514***	3625	13.361***	2.770*	1309	46.494***	9.289	885	0.139***	-0.013†
AR(0,0)	467	8.527***	3.391**	725	38.891***	11.844**	262	267.294***	52.789***	183	0.145***	-0.019**
Pooled AR(0,1)	935	5.711***	3.210**	1450	27.927***	7.925***	524	130.442***	20.848***	374	0.156***	-0.018**
Pooled AR(0,2)	1381	4.319***	3.052***	2175	20.005***	4.036*	786	71.064***	11.928†	545	0.142***	-0.016*
Panel B1: Partner A Bond Grade=INVESTMENT												
Pooled AR(-1,1)	1019	0.750***	2.367**	1572	9.792**	4.185*	608	105.512***	18.104**	437	0.018	-0.021***
Pooled AR(-2,2)	1679	-0.808***	2.235***	2620	4.830†	2.318	1014	57.729***	9.505†	710	0.020	-0.019***
AR(0,0)	345	1.178**	2.560*	524	16.713**	10.263*	203	313.681***	55.172***	147	0.015	-0.018***
Pooled AR(0,1)	688	1.294***	2.831**	1048	11.792**	6.248*	406	154.152***	19.289**	301	0.006	-0.020***
Pooled AR(0,2)	1023	0.357***	2.584**	1572	7.359*	3.058	609	83.155***	10.121	439	0.014	-0.018**
Panel B2: Partner A Bond Grade=NON-INVEST												
Pooled AR(-1,1)	369	10.237	4.353	603	37.193**	14.255†	177	27.744	19.274	108	0.270***	-0.022
Pooled AR(-2,2)	596	9.681	4.111†	1005	35.603***	4.736†	295	7.876	8.070	175	0.195***	0.027
AR(0,0)	122	29.307*	10.269*	201	96.708***	18.949*	59	107.691**	32.778*	36	0.247***	-0.043
Pooled AR(0,1)	247	18.014†	6.655†	402	69.989***	21.688**	118	48.861*	23.250	73	0.242***	-0.018
Pooled AR(0,2)	358	15.639†	6.399†	603	52.973***	7.028*	177	29.463	17.970	106	0.223***	-0.009

Statistical significance p-levels (two tail tests): † p<.1; * p<.05; ** p<.01; *** p<.001. Stock means tests: Brown & Warner (1980); Stock median tests: Wilcoxon Ranked Sign; Bond means tests: Sign Test; Bond median tests: Wilcoxon Ranked Sign.

Table 5: Parallel Event Study: Cumulative Abnormal Returns of Partner A Stocks and Bonds vs. Partner B Stocks

Regression: $CAR(Bond_A,t) = \beta_1 CAR(Stock_A,t) + \beta_2 CAR(Stock_B,t)$

	Partner A BONDS			Partner A STOCKS			Partner B STOCKS			REGRESSION		
CAR (day start, day end)	No. of obs in CAR sample	Partner A Bond Mean CAR (basis points)	Partner A Bond Median CAR (basis points)	No. of obs in sample	Partner A Stock Mean CAR(basis points)	Partner A Stock Median AR (basis points)	No. of obs in sample	Partner B Stock Mean CAR(basis points)	Partner B Stock Median CAR(basis points)	No. of obs in sample	β_1 estimate	β_2 estimate
CAR(-2,2)	109	-17.901	6.255	109	78.210*	2.136	109	69.850	0.494	109	0.073**	0.013
CAR(-1,1)	147	17.502*	6.348†	147	93.020***	13.400†	147	93.807*	51.575*	147	0.200***	-0.022
CAR(0,1)	169	23.833†	4.189†	169	111.382***	46.210**	169	177.840***	72.894***	169	0.213***	-0.017
CAR(0,2)	143	11.831	2.639	143	113.199***	13.345*	143	144.329**	38.871†	143	0.137***	-0.007

Statistical significance p-levels (two tail tests): † p<.1; * p<.05; ** p<.01; *** p<.001. Stock means tests: Brown & Warner (1980); Stock median tests: Wilcoxon Ranked Sign; Bond means tests: Sign Test; Bond median tests: Wilcoxon Ranked Sign.

Table 6: Wealth Effects on Day 0 of Strategic Alliance announcement

	Partner A BONDS				Partner A STOCKS				Partner B STOCKS			
Event Time (days)	Number of firm-bonds in daily portfolio	Partner A Bonds Outstdg -15 days	Partner A Bonds Mean Dollar Gain	Partner A Bonds Median Dollar Gain	Number of stocks in daily portfolio	Partner A Stocks Outstdg -15 days	Partner A Stocks Mean Dollar Gain	Partner A Stocks Median Dollar Gain	Partner B Number of stocks in daily portfolio	Partner B Stocks Outstdg -15 days	Partner B Stocks Mean Dollar Gain	Partner B Stocks Median Dollar Gain
Panel A: Partner A Bond Grade=ALL GRADES												
0	467	2,998.460	1.089	0.817	725	53,122.627	79.663	11.507	262	28,941.869	22.503	2.840
Panel B1: Partner A Bond Grade=INVESTMENT												
0	345	3,432.789	-1.198	0.702	524	71,129.820	108.946	26.333	203	24,239.402	16.645	2.960
Panel B2: Partner A Bond Grade=NON-INVEST												
0	122	1,866.177	7.556	0.949	201	6,178.501	3.321	2.680	59	44,851.883	42.658	1.686

Outstanding values and Dollar gains are in millions of dollars. Outstanding bond values are based on issued amounts outstanding. Outstanding stock values are based on market values of outstanding stock. Dollar Gain equals the Day 0 stock (bond) abnormal return (AR) multiplied by the outstanding value of stocks (bonds) 15 days before the alliance announcement day, Day 0. Wealth effects are calculated based on a single day AR (Day 0) as their calculation based on CAR for bonds are distorted by the infrequent trading of bonds. See AR(0,0) in Table 4 for the mean and median AR that correspond with mean and median Dollar Gains of this Table.

Table 7a: Regressing Partner A Bond AR against Leverage

Day 0 Abnormal Return:	Model 1	Model 2	Model 3	Model 4
Credit Rating (Non Invest=1)	0.00736***	0.00858***	0.00909**	0.0319***
	(0.0014)	(0.0020)	(0.0029)	(0.0051)
Leverage Ratio	-0.0125***	-0.0131**	-0.00648	0.0175
	(0.0028)	(0.0042)	(0.0091)	(0.018)
Chg in Lev. Ratio	0.00347**	-0.000423	-0.00152	-0.000702
	(0.0012)	(0.0017)	(0.0012)	(0.0019)
Assets	1.65e-08*	2.43e-08*	4.52e-08*	1.98e-08
	(7.6e-09)	(0.0000)	(0.0000)	(0.0000)
Market to Book	-0.0000601	-0.00000831	0.000170**	0.000376***
	(0.000059)	(0.000074)	(0.000061)	(0.000098)
Rel size PtnB/PtnA		0.000229***		-0.000871*
		(0.000023)		(0.00038)
Constant	0.00459	0.00428	-0.00246	-0.00601
	(0.0083)	(0.0072)	(0.0091)	(0.011)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	No	No	Yes	Yes
Observations	435	173	435	173
R^2	0.200	0.554	0.707	0.855

Standard errors in parentheses; $^{+}$ $p < .1$, * $p < .05$, ** $p < .01$, *** $p < 0.001$
Model 2 and 4 have fewer observations because not every Partner A observation has the corresponding Partner B data.

Table 7b: Regressing Partner A Bond AR against Alliance Experience

Day 0 Abnormal Return:	Joint Ventures	Strategic Alliances	Licensing Agree.
Credit Rating (Non Invest=1)	0.0158*	0.00704***	0.00753+
	(0.0069)	(0.0015)	(0.0042)
Leverage Ratio	-0.0301+	-0.0125***	-0.0307**
	(0.017)	(0.0030)	(0.010)
Chg in Lev. Ratio	-0.00505	0.000163	0.00364
	(0.0088)	(0.0015)	(0.0024)
JV Experience prior 6 yrs	0.00119		
	(0.0012)		
SA Experience prior 6 yrs		-0.0000125	
		(0.000014)	
LIC Experience prior 6 yrs			0.0000232
			(0.00022)
Assets	-2.25e-08	2.47e-08**	-1.70e-08
	(0.0000)	(8.3e-09)	(0.0000)
Market to Book	0.00165	0.0000537	-0.00155***
	(0.0016)	(0.000058)	(0.00025)
Constant	-0.0105	0.00212	0.0161**
	(0.0098)	(0.0077)	(0.0055)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Firm fixed effects	No	No	No
Observations	42	318	75
R^2	0.888	0.108	0.579

Standard errors in parentheses; $^{+}$ $p < .1$, * $p < .05$, ** $p < .01$, *** $p < 0.001$
The full sample 435 bond AR observations are split according to alliance contract type.