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The Effect of Industry Restructuring on Peer Firms

Alex Holcomb [1,*] and Paul Mason [2]

[1] Walker College of Business, Appalachian State University, 416 Howard Street, Boone, NC 28608, USA
[2] Hankamer School of Business, Baylor University, One Bear Place 98002, Waco, TX 76798, USA; p_mason@baylor.edu
* Correspondence: holcombaj2@appstate.edu

Abstract: We study the bond price reaction of a merged firms peers, in order to better understand how the market responds to a restructuring. We argue that a merger announcement may signal the possibility of a merger wave to the industry, and in doing so, increase the conditional probability that peer firms might themselves be acquired in the future. However, while peer firm equity holders expect a direct benefit from a potential acquisition—in the form of a price premium—peer firm bond holders can only expect an indirect benefit—in the form of a risk reduction. Consistent with these hypotheses, we show that price reactions are stronger for firms that have a higher unconditional probability of being acquired *ex-ante*. In addition, we document that, cross-sectionally, the abnormal returns we observe from peer bondholders are concentrated among firms that have the highest expected risk reduction benefit from a potential acquisition. In order to distinguish a potential reduction in risk as the explicit return driver, we show that abnormal bond returns within firm (between different bond issues) are also concentrated among issues that have the highest expected risk reduction benefit.

Keywords: bond prices; equity prices; competition; mergers; acquisitions

JEL Classification: G12; G14; G32; G34

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1. Introduction

Recent research on financial markets has documented the staggering degree to which firms are interconnected, and to which they react to their peers decisions.[1] Recognition of this has led researchers to look beyond the firms that are engaged in a transaction, such as a merger, and investigate the impact such a transaction has on the web of firms connected to the transaction in some way. In this paper we investigate the impact of the announcement[2] of a corporate merger on the merging firms' peers, through the lens of the peers' bond prices.[3] We provide evidence that peer firm stakeholders react positively to a merger in their industry only if it increases their unconditional probability of being acquired in the near future, *and* if they would expect to benefit from such an acquisition.

Several competing theories describe how stakeholders in peer firms—both stockholders and bondholders—might react to the acquisition of a related firm. We argue that peer firm stakeholders view a contemporary acquisition as a signal about the possibility of subsequent consolidation within the industry. This signal carries enough information for peer firm stakeholders to update their beliefs about potentially being acquired as part of a forthcoming wave. Under this conjecture—which is referred to as the Acquisition Probability Hypothesis (APH) (Song and Walkling 2000)[4], we expect that peer firm stakeholders will have a positive, and symmetric, reaction to an acquisition in their industry as long as they stand to benefit from a potential acquisition. Thus, if the probability of being acquired increases we expect a positive reaction from peer equity holders on average because equity holders stand to benefit from a price premium paid for shares in any potential acquisition. A company's outstanding bonds, on the other hand, are not acquired during a merger since

the obligation is to the firm and not it's ownership; thus, bondholders have no direct benefit from a price premium in the event of an acquisition. There is, however, evidence to suggest that bondholders can only directly benefit from an acquisition which reduces the risk of the borrowing firm (Billett et al. 2004). While this evidence has only been substantiated for the bondholders of the firms directly involved in an acquisition, it does suggest that we should only expect *peer* bondholders to react to an industry-wide increase in the probability of being acquired if they foresee a potential acquisition reducing the risk of their firm. In short, the literature demonstrates that acquisitions typically provide a direct benefit to target equity holders (as a price premium) and potentially provide an indirect benefit to target bondholders (if it reduces the risk of the firm). We expect that these reactions to an actual merger should extrapolate to help predict the reactions for peer firms that may experience a potential merger in the future.

However, while the current literature supports the APH in general, thus far it only does so by investigating the equity reaction of peer firms. A joint test of peers' equity and debt reactions might indicate an alternative explanation than the APH, or it might solidify the existing evidence by ruling out potential alternatives which may not be ruled out by studying equity reactions alone. For instance, a merger by it's very nature decreases the number of firms in an industry, which consequently increases the concentration of firms in the industry. Neoclassical industrial organization theory suggests that if firms operate in an imperfectly competitive market, one less firm might increase the pricing power of the remaining firms (Bresnahan 1989; Eckbo 1983; Stigler 1964). In this scenario, we would also expect a positive, and symmetric, price reaction from peer firm stakeholders; especially if collusion, explicit or otherwise, decreased the default risk of the remaining firms. Alternatively, if an acquisition is financed with a large amount of debt then, other things equal, the combined firm may face greater financial constraints than its peers. This may in turn lead to the combined firm being less able to respond to competitive pressure from those peers. Again, we would expect a positive, and symmetric, price reaction from peer firm stakeholders, because a stronger competitive position should make peer firms better off.

Examining bond prices permits two strategies that will enable the identification of which competing theory better describes the changes that occur in the market following a merger. First, by examining debt and equity price reactions jointly, we are able to exclude hypotheses that would otherwise remain possible alternatives. For example, because we have observed a symmetric price reaction in the two markets we can exclude any alternatives that would predict an asymmetric price reaction. The second identification strategy arises because of a unique feature of the bond market, relative to the equity market—most companies that issue public debt have several outstanding issues. Thus although the majority of our analysis is done between firms using the weighted average price of a peer firms' total bond portfolio, we can also examine the bond price reactions within a firm between its separate bond issues. This is particularly useful because, for instance, the previously stated alternatives do not predict a differing reaction by bondholders within firm, and can be more concretely ruled out by examining the peer bond price reaction than was possible with previous studies that only focused on peer equity price reactions.

To test the validity of these theories, we construct a sample using traded bond prices from TRACE, equity prices from CRSP, and data on mergers and acquisitions from SDC. The availability of TRACE data limits the sample period, but still leaves 1398 deals and more than 15,000 peer firm bond returns. We document positive abnormal returns for the bondholders of peer firms following the announcement of a merger, or an acquisition, during the period 2004–2014. These returns average 6.1 basis points (bp) over a two-week window surrounding the announcement, and are both economically and statistically significant. We also document positive, and significant, abnormal equity returns to stockholders of peer firms consistent with the prior literature.

We posit that positive abnormal stakeholder reactions are evidence in support of the acquisition probability hypothesis. Consistent with this hypothesis, we show that bond

price reactions are stronger for firms that have a higher unconditional probability of being acquired—either because they operate in industries in which acquisitions are more likely, or because the firms themselves are more attractive targets. Furthermore we show that following an initial merger, when the signal about a potential upcoming wave is strongest, the peer bond returns are the highest.

In addition we document that, cross-sectionally, the abnormal returns for peer bondholders are concentrated among firms that have the highest potential benefit from a potential acquisition. In other words, because peer bondholders would earn no premium in the event that they are acquired in the future, they only react positively to an increase in the average probability of being acquired if they foresee some benefit from actually being acquired. Because the evidence suggests that risk reduction is the primary way in which bondholders can benefit from a potential acquisition, peer bondholders would have to foresee that their firm had the potential to benefit from a risk reducing acquisition and that it would happen regardless of the potential acquiror (which couldn't be known in advance). This is a rather strict set of expectations, and would suggest that only holders of the riskiest debt would have any reaction to a peer's merger. We show that this is the case for bondholders between firms and *within* firms. As far as we know, this is the first paper that exploits the cross-sectional difference of risk levels within a firms bond portfolio as an identification strategy.

The paper continues as follows. Section 2.1 discusses the literature and develops the hypotheses. Section 3 discusses the data and empirical methodology. Section 4 reports the results. Section 5 examines the relevance of alternative hypotheses given the evidence, and Section 6 concludes.

2. Literature and Hypothesis Development

This section will develop the hypotheses that are tested throughout the paper, and discusses the relevant literature which describes these hypotheses. A brief discussion of several plausible alternatives will follow.

2.1. The Acquisition Probability Hypothesis

Prior research has established that being acquired is, on average, a value increasing proposition for the stakeholders of a firm (Asquith and Kim 1982; Bradley et al. 1988; Eckbo 1983). However, in practice, it is certainly the case that every firm faces a different opportunity set, and thus stakeholders of a firm may not find it universally beneficial for their firm to become a target. Indeed, more recent literature presents more mixed results concerning shareholder wealth creation for both acquirors and targets (DeYoung et al. 2009; Fich et al. 2018; Megginson et al. 2004). Thus we expect that, given a distribution of values that a potential target might command, it is probable that there exists a relative ranking, cross-sectionally, across firms based on these distributions. For example, suppose that it was possible to rank firms based only on whether their distribution of potential acquisition values first order stochastically dominates a peer's. Based on this ranking, one could argue that a firm which had a higher relative ranking than a peer, would also have a greater expected benefit from a potential merger. *Ceteris paribus*, such a firm would, as a consequence, have a greater unconditional probability of being acquired in the future.

Mergers between public firms tend to cluster across time and within industry. Prior evidence implies that such merger waves are catalyzed by economic, regulatory, or technological shocks within the industry. These shocks may result in rising aggregate industry misvaluation, and given adequate availability of capital (Harford 2005; Mitchell and Mulherin 1996), this misvaluation drives mergers within the industry (Rhodes-Kropf et al. 2005; Rhodes-Kropf and Viswanathan 2004). In particular, Maksimovic et al. (2013) provide evidence that it is misvaluation of the acquiror that drives many acquisitions, but that despite this, these acquisitions realize significant gains in productivity.

If mergers often occur in waves, then any given merger should, at least partially, update the industry's collective belief about a potential wave. Furthermore, the magnitude

of the update will be conditional on prior merger activity. In particular we would expect that the most updating occurs following the first merger that occurs after a period of dormancy in the industry. If the update about the probability of a merger wave is positive, then this increases the unconditional probability of peer firms being acquired.

The acquisition probability hypothesis implies that following the "average merger" the stakeholders of the merged firms' peers should experience an increase in wealth (Eckbo 1983). In particular, for those peer firms that have the highest probability of being acquired, their stakeholders should experience a greater increase in wealth. What's more, a ranking of firms, which is based on the expected value increase to target stakeholders in the event of a merger, is composed of two parts: the gain to target stockholders, and the gain to target bondholders. Stockholders stand to gain directly from a merger in the form of a premium that would be paid by a potential acquiror. This implies that an increase in the probability of being acquired should directly translate into an increase in value for stockholders.

Bondholders, however, only gain indirectly, from a merger, through a potential risk reduction (Levy and Sarnat 1970). Theoretically this occurs when two merging firms have imperfectly correlated cash flows; the "diversification" of cash flows means that each firm coinsures the whole (Higgins and Schall 1975; Levy and Sarnat 1970; Lewellen 1971). However, risk reduction can also occur in other, less obvious, ways; for instance, Renneboog et al. (2017) show that in cross border M&As bondholders respond positively when they gain exposure to a legal system with greater creditor protections. Still, Shastri (1990) and Billett et al. (2004) argue that, practically, coinsurance only occurs when a risky target is purchased by a relatively less risky acquiror.[5] The target bondholders experience a positive wealth effect when the default risk of the combined firm falls, and their previously risky debt becomes less so. However, this implies that for a peer bondholder to experience an increase in wealth they would need to anticipate that their firm had the potential to benefit from a risk reducing acquisition and that it would happen regardless of the potential acquiror. Given that neither of these things can be known for certain, any reaction to a merger by peer bondholders is likely to be concentrated in the holders of the riskiest debt, simply because these debt holders have a larger potential set of value increasing acquisitions. These conjectures lead to the following testable hypotheses:

Hypothesis 1. *We expect a positive abnormal equity return for the average peer firm following a merger or an acquisition, due to an increase in the average acquisition probability of peer firms.*

To the extent that Hypothesis 1 is correct, we should expect to see that the abnormal price reaction is more pronounced for peer firms that have a higher unconditional probability of being acquired. All else equal, we expect that peer firms with a higher probability of being acquired, *ex-ante*, will be those that: operate in industries in which a follow-on acquisition is more likely (i.e., highly competitive industry's, or industry's in which the merger market has been dormant (Shleifer and Vishny 2003), and peer firms which are simply more attractive targets (i.e., firms with low takeover defenses (Cain et al. 2017), or high profitability levels (Ravenscraft and Scherer 1989).

Hypothesis 2. *Peer firms that operate in industries in which acquisition is more likely, or those which are more attractive targets, should experience the largest increase in their acquisition probability. The APH (Hypothesis 1) suggests that these firms will be the primary drivers of any abnormal price reaction.*

However, while stockholders of peer firms stand to gain directly, and uniformly, from an increase in their acquisition probability and a potential merger (via the premium they would receive), bondholders with the highest expected gain from a potential merger are likely to be those that are more likely to be acquired *and* hold the riskiest debt. Billett et al. (2004) and Chen et al. (2020) document that bondholders of actual takeover targets which had lower bond ratings, and higher leverage ratios, relative to their acquirors,

experienced the largest abnormal announcement returns. These characteristics should also predict the peer bondholders that will experience a wealth gain, because the uncertainty surrounding a potential merger wave and it's participants is so great that only the riskiest of debt holders can have any reasonable expectation that they will experience a risk reduction in the event of a possible acquisition. Thus, we expect that:

Hypothesis 3. *Peer firm bondholders that are exposed to the greatest risk, ex-ante, will experience positive abnormal bond returns following the announcement of a merger in their industry, because they have the largest expected benefit from a potentially risk-reducing future acquisition.*

The APH suggests that we should only expect to see an abnormal return for peer firms when those peers have a high probability of being acquired in a subsequent merger. However, since bondholders can't benefit from a price premium in the same manner as equity holders, they only benefit from a potential risk reduction. This means that we should only expect to observe positive abnormal bond returns when peer firms experience an increase in acquisition probability *and* when those same peers have a large expected benefit from a risk reduction. This is not a trivial interaction to test, because the factors which influence a peers acquisition probability may not be the same factors which will result in the peers' bondholders extracting a risk reduction benefit. For instance, while firms with low ratings and high leverage enjoy the largest expected benefit from a risk reducing acquisition, they may not also make attractive takeover targets. To the extent that peer bondholders recognize these interactions it may mean that we find no (or mitigated) results, and that it will be difficult to disentangle the two effects in what results we do observe.

It is also possible that a great deal of consolidation in the industry during a merger wave could increase the recovery risk of the assets-in-place in the event of default. Research by Nozawa (2017) and Zhdanov (2007) has shown that bond returns also reflect a significant amount of recovery risk, and that the absence of competitors in the market place might decrease the potential recovery in an asset sale, and thus exacerbate the recovery risk faced by bondholders. It follows that there is the potential for a merger wave, or the anticipation of a potential merger wave, to induce a somewhat competing effect to our prediction, or at least to indicate an upper boundary for the risk reduction effect we are hypothesizing. While we don't observe the negative abnormal returns that would suggest that this is the dominant consideration for peer bondholders, it's certainly possible that this effect might mitigate our results—particularly in the cross-sections where concentration is already severe, and further consolidation might make recovery risk a significant factor.

A unique benefit of studying bond pricing is that Hypothesis 3 provides a prediction about both the firm level abnormal bond reaction, and the issue level abnormal bond reaction. If this hypothesis is correct, we would expect to observe a difference between, and within, firms according to the relative risk level of the portfolio, or issue, in question. Since by definition the bondholders of a peer firms multiple issues will face the same acquisition probability—and experience the same change in the probability[6]—looking within firm provides a unique test with which to distinguish these Hypotheses from each other, and from the plausible alternatives that have been considered in previous literature.

2.2. Other Relevant Literature

We also help add to a burgeoning literature that focuses on the pricing of corporate bonds (Bai et al. 2019; Goldberg and Nozawa 2021; Goldstein et al. 2019; Lin et al. 2020; Yin et al. 2018), and on the effects of corporate events on bondholders (Fang-Klingler 2019), or on the joint reaction of all stakeholders (Back and Crotty 2014; Kapadia and Pu 2012). This literature has expanded following the advent of the TRACE bond price reporting system that began in 2004 and the seminal papers by Bessembinder et al. (2006) and Bessembinder et al. (2009) which described the best ways to make use of the new data. Additional work by Ederington et al. (2015) and others further refined the processes for estimating bond returns at a daily or weekly frequency, and helped resolve some of the idiosyncratic issues that are endemic to the bond market. These idiosyncrasies make bond

returns, and the bond market, distinct from equities, and work by Edwards et al. (2007) provided the literature with a great deal of practical information about trading and returns in the over-the-counter bond market. We contribute to this literature in a number of ways: first by adding to the literature on bond price reactions to corporate events, which in turn contributes to the ongoing discussion about the integration of the debt and equity markets, and finally contributing an additional technique that allows for finer testing in the bond pricing literature.

2.3. Alternative Hypotheses

The APH conflicts with several alternative theories that could also potentially explain our main results. The simplest alternative stems from neoclassical economics. Following a merger, or a wave of mergers, the number of peer firms operating in a given industry is reduced (Bresnahan 1989; Hackbarth and Miao 2012; Stigler 1964). Industrial organization theory would suggest that when the market is not perfectly competitive, a reduction in the number of firms might increase the pricing power of the remaining firms. All else equal, this should increase the profit margins for the remaining firms, which benefits all the stakeholders of those firms.

A stronger version of this alternative posits that the peer firms which remain in operation in the industry might orchestrate an increase in pricing power through explicit means. In other words, less firms in the market should also make it easier for those that remain to sustain, or establish, collusion (Bresnahan 1987; Bresnahan and Reiss 1991; Eckbo 1983, 1985). Despite the seeming impracticality of collusion in modern times, there is evidence that collusion remains an alluring option for many firms. In fact, specialty consulting firms have even been formed in order to manage the web of incentives that underlie collusive arrangements between firms.[7] Explicit price collusion should provide peer firms with a larger increase in profit margins than implicit or simply mutually beneficial pricing. A rising tide lifts all boats, and so rising profits should benefit all the stakeholders of peer firms.

These two, not entirely distinct, alternatives imply that positive abnormal returns for peer firms' stakeholders occur because these stakeholders are anticipating some form of increased pricing power, and thus increased profits, as a result of the merger. Neither alternative specifically implies that peer firms' bondholders should have different reactions, to implicit or explicit collusive pricing power, based on the relative risk of their bond holdings before the merger. Although it's certainly reasonable to posit that improved margins may provide a larger benefit to more risky firms. However, if that were the case we would expect that the strongest support for either of these alternatives would be to observe the highest abnormal bond returns for peer firms that operate in highly concentrated industries. The more concentrated an industry, the more pricing power the firms operating in that industry should have. Simultaneously, an increase in industry concentration should also make it easier for firms to sustain collusion. Finally, these alternatives imply that abnormal returns for peer firms should be positively correlated with the number of mergers that have occurred within a certain period. This should be the case because each additional merger will further consolidate the industry, and greater concentration should imply greater pricing power.

A third alternative theory applies only in a more limited set of realizations, however it also implies a positive abnormal stakeholder reaction for peer firms following a merger. If the merger, or acquisition, is financed through a large amount of debt, then it might be the case that the interest burden for the combined firm may constrain its cash flows. There is ample evidence of leveraged buy-out deals in which the resulting firm struggles to service its' debt, especially during the spate of massive LBO's in the latter part of the last century. If the merged firms' peers are relatively less cash constrained, they may be able to engage in price competition that drives the merged firm out of the market (Chevalier 1995).

The potential for peer firms to be able to collectively force another peer from the market is not necessarily valuable, to peer firm stakeholders, in and of itself. However, this ability feeds into the two earlier alternatives because driving the merged firm out

of the market results in two less firms than existed before the merger and even greater concentration. Peer firm stakeholders should benefit from this if greater concentration implies greater pricing power, and higher profit margins. However, price competition is not a targeted attack on just the merged firm, and it is likely to have a detrimental effect on any other peer firm with small margins. Thus, at the most, we should only expect this third alternative to affect situations in which the resulting leverage, for the combined firm, is greater than the industry average. Further, we would expect that under this alternative, peer firms with slimmer margins should be worse off than their more profitable peers.

3. Materials and Methods

Data Selection and Return Calculation

The sample of Mergers and Acquisitions is pulled from the SDC U.S. Mergers and Acquisitions Database. We retain only those deals in which: (1) both the target and the bidder are public firms, (2) the deal type is merger and acquisition, (3) the deal size is greater than $50 million dollars, (4) the deal type is either completed or uncompleted, (5) the deal occurred between 1 January 2004 and 1 January 2015. There are 1398 deals that satisfy these 5 criteria, and these deals constitute the initial sample. A peer is defined as a member of the same 2 digit SIC industry as the merged firm—which in 70% of the sample contains both the acquiring, and target, firm. In the remaining cases a peer is defined as a member of the acquiring firms 2 digit SIC industry. Descriptive statistics for both the Mergers and the peer firms are provided in Tables 1 and 2.

Table 1. M&A Sample Distribution.

(**Number of Industries**)				
Year	**Mean Deal Size ($ mil)**	**Median Deal Size ($ mil)**	**Count**	**SIC2**
2004	1624.956	285.500	193	27
2005	1988.331	395.630	182	42
2006	2662.771	486.557	188	32
2007	1750.512	628.287	233	33
2008	1813.108	387.942	171	31
2009	3664.428	328.114	81	22
2010	1794.909	500.000	127	30
2011	2361.616	734.207	95	29
2012	2563.932	603.937	95	26
2013	1907.098	805.725	33	16
Total	2109.898	459.221	1398	

This table provides summary statistics about the proposed mergers in the sample. The merger data is pulled from the SDC Platinum Database and covers the years 2004–2014. I keep all mergers that satisfy the following conditions: (1) Both the target and the bidder are public firms, (2) the deal type is merger and acquisition, (3) the deal size is greater than $50 million dollars, (4) the deal type is either completed or uncompleted. In the table: Mean Deal Size, is the average deal size by year in millions of dollars, Median Deal size, is the median deal size by year in millions of dollars, and SIC2 is the number of 2 digit SIC industries in which at least one deal was announced in a given year.

Table 2. Peer Firms' Summary Statistics.

		Summary Statistics				
		Log (Assets)	**Sales/Assets**	**Book Leverage**	**Rating**	**Profit Margin**
2005	Mean	11.02	9.79	0.313	6.90	0.622
	Std. Dev.	(1.89)	(0.380)	(0.199)	(3.53)	(0.208)
$N = 64$	Median	11.22	0.090	0.241	6.00	0.675
2006	Mean	9.65	0.640	0.318	9.10	0.4719
	Std. Dev.	(1.89)	(0.514)	(0.209)	(4.20)	(0.240)
$N = 2084$	Median	9.61	0.582	0.262	9.00	0.470
2007	Mean	10.23	0.557	0.304	8.25	0.469
	Std. Dev.	(2.07)	(0.524)	(0.213)	(4.14)	(0.223)
$N = 2203$	Median	9.98	0.422	0.251	8.00	0.517
2008	Mean	10.08	0.571	0.320	8.45	0.442
	Std. Dev.	(1.95)	(0.500)	(0.180)	(4.19)	(0.524)
$N = 2365$	Median	9.88	0.483	0.280	8.00	0.469
2009	Mean	10.17	0.674	0.319	8.02	0.387
	Std. Dev.	(1.87)	(0.517)	(0.192)	(3.92)	(0.687)
$N = 1458$	Median	10.07	0.650	0.279	7.00	0.422
2010	Mean	9.67	0.592	0.329	9.097	0.408
	Std. Dev.	(1.53)	(0.429)	(0.189)	(3.37)	(0.277)
$N = 1480$	Median	9.56	0.512	0.294	9.00	0.390
2011	Mean	9.89	0.575	0.280	8.83	0.447
	Std. Dev.	(1.64)	(0.459)	(0.164)	(3.32)	(0.230)
$N = 2419$	Median	9.71	0.495	0.254	8.00	0.412
2012	Mean	9.90	0.517	0.299	9.15	0.460
	Std. Dev.	(1.62)	(0.466)	(0.191)	(3.36)	(0.231)
$N = 1565$	Median	9.76	0.399	0.264	9.00	0.431
2013	Mean	10.10	0.585	0.292	8.53	0.554
	Std. Dev.	(1.82)	(0.412)	(0.203)	(3.42)	(0.254)
$N = 387$	Median	9.73	0.553	0.240	8.00	0.568
Total	Mean	9.96	0.586	0.308	8.68	0.448
	Std. Dev.	(1.83)	(0.490)	(0.193)	(3.84)	(0.371)
N = 14,025	Median	9.79	0.499	0.266	8.00	0.453

This table provides summary statistics about the peer firms in the sample. A peer firm is defined as a member of the same 2 digit SIC industry as the merged firm—which in 70% of the sample contains both the acquiring, and target, firm. In the remaining cases a peer is defined as a member of the acquiring firms 2 digit industry. Peer firms are further identified as all firms with a bond return within the sample period. In the table: Log(Assets) is the log of peer firm assets, Sales/Assets is the sales of peer firms scaled by their assets, Book Leverage is calculated as the ratio of Debt to Assets, Rating is a numerical identifier for the Moody's Bond Rating that is =1 if the bond is rated Aaa and =16 if the bond is rated B3, and Profit Margin is calculated as NI/Sales for peer firms. We report the Mean, Median, and Standard Deviation (in parentheses) sorted by year for all peer firms.

Daily bond prices for all bond issues are gathered from TRACE, however it should be noted that TRACE began collecting bond trades in 2002 and was not fully implemented until February 2005, so that while it now covers virtually all publicly traded corporate debt, the time series of complete prices is somewhat limited. From the full dataset of TRACE we eliminate all canceled, corrected, or commission trades and match the remaining bond issues to the FISD database to obtain bond characteristics such as maturity, yield, and covenant information. Nearly all of the bond issues in TRACE are able to be matched into FISD and thus enter the sample. Because TRACE reports every trade, it is necessary to engineer a decision rule by which we obtain one daily price for each bond. Following Bessembinder et al. (2006), we remove all trades of less than $100,000 as they tend to be non-institutional trades and comprise less than 4% of the total sample. We then compute the trade-weighted average price for each individual bond, over every day in which a trade occurs. This is the variable on which we perform the majority of our analysis.

Bessembinder et al. (2009) show that using this methodology to compute the daily prices produces the lowest standard deviation of abnormal returns in a simulation of several common methods in the literature, and thus is the preferable method.

The observed return OBR in a given window $[-x, +x]$ for each bond is equal to the dirty return[8] of the trade-weighted bond price from day $t - x$ to day $t + x$. Following Bessembinder et al. (2009) and Ederington et al. (2015) we calculate the abnormal bond return ABR by subtracting a benchmark return EBR from the observed return for each bond. The benchmark return is calculated for 24 bond portfolios which are based on Moody's six major rating categories (Aaa-B) and four maturity classes (1 to 3 years, 3 to 5 years, 5 to 10 years, and over 10 years). We then value-weight the matching portfolios as follows:

$$EBR_{i,t} = \sum_{g=1}^{M} OBR_{g,t} w_{g,t}. \quad (1)$$

where $EBR_{i,t}$ is the expected return for bond i on date t, and $OBR_{g,t}$ is the observed return for bond g in the same rating/maturity category as bond i, which trades on the same date t. M is the total number of bonds in the same rating/maturity category as bond i, which trade on same day t, and $w_{g,t}$ is the value-weight of bond g relative to the total market value of the rest of the bonds in the portfolio. We can now calculate the abnormal return for bond i as follows:

$$ABR_{i,t} = OBR_{i,t} - EBR_{i,t}. \quad (2)$$

where $OBR_{i,t}$ is the observed return for bond i, and $EBR_{i,t}$ is the expected return for bond i calculated using the benchmark matching rating/maturity portfolios. Each firm's abnormal bond return is the value-weighted average of the abnormal returns of its different bond issues. Thus we calculate the abnormal return for firm k as:

$$ABR_{k,t} = \sum_{i=1}^{J} ABR_{i,t} w_{i,t}. \quad (3)$$

where $ABR_{i,t}$ is the abnormal return for bond i of firm k's bond issues on date t. J is the total number of bonds outstanding for firm k, which trade on same day t, and $w_{i,t}$ is the market value weight of bond i relative to the total market value of the bonds outstanding for firm k.

Two concerns remain especially relevant for this study. The first is that since corporate debt still trades over the counter, a desired trade by a buyer or seller requires a party to take the opposite position. The lack of a market maker or other facilitator can greatly increase the time it takes to find a partner and complete a trade. In this situation, we believe that the use of a larger window like $[-7, 7]$, will allow our tests to capture a turn-around transaction that is a response to the merger, and yet still be small enough to mitigate the impact of any potential confounding effects. The second is that illiquidity in the bond market makes it more difficult to capture the full effect of a merger on it's peers when restricting the study to exact return windows in the traditional manner of equity event studies Bao et al. (2011). Instead following Ederington et al. (2015) we create a composite return which provides more powerful tests and because it captures the reaction of a great deal more peers it greatly increases the representation in our sample. A composite return contains all potential return "windows" that are a subset of the of the exact window; thus, if an exact return is calculated from trades that occur seven days before and seven days after the announcement, then a composite return allows for any return windows that are a subset of $[-7, 7]$, which then includes $[-7, 4]$, $[-7, 5]$, and $[-7, 6]$ as acceptable windows.[9]

4. Results

In this section we present the evidence compiled in support of our hypotheses. For the purposes of the following analysis each abnormal bond, and stock, return is calculated over the window [−7, 7] surrounding the merger announcement. All bond returns have been winsorized at the 99.5% and 0.5% levels to mitigate the potential impact of outliers.[10] Further, because peer firm reactions to the same merger announcement may not be independent of each other or of other mergers within their industry, we have clustered the standard errors at the industry level in all the following analysis.

4.1. Investor Returns

In the baseline specification, we test the abnormal returns of peer firms following the announcement of a merger, or an acquisition, in their industry. Given this specification, we show in Table 3 that following the announcement, peer firm bond prices exhibit a positive abnormal return in the [−7, 7] window of 4.89 basis points (bp) for all deals, which is statistically significant at the 5% level. For deals in which the target and the acquiring firm operated in the same industry prior to the announcement the abnormal bond return is 6.1 bp, which is also significant at the 5% level.[11]

Table 3. Peer Firms' Stakeholder Reactions.

	Peer Firm Abnormal Bond Return [−7, 7]			
	N	**Mean (Bp)**	**SE**	**St. Dev. (%)**
All Deals	15,033	4.89 **	(0.0002)	1.265
Same Industry Deals	10,884	6.10 **	(0.0002)	1.267
	Peer Firm Abnormal Stock Return [−7, 7]			
	N	**Mean (%)**	**SE**	**St. Dev. (%)**
All Deals	16,032	0.602 **	(0.002)	10.3
Same Industry Deals	15,443	0.604 **	(0.003)	10.3

This table reports the average abnormal bond, and stock, returns for peer firms following the announcement of a merger in their industry. Bond prices are taken from TRACE and bond characteristics from FISD. Stock prices are from CRSP. We report the average abnormal bond return in Basis Points, over a window covering 7 days before and 7 days after the deal is announced. Likewise, average abnormal stock returns are reported in percentage terms over a window covering 7 days before and 7 days after a deal is announced. Bond returns have been winsorized at the 0.5% and 99.5% levels to mitigate the potential impact of errors in data recording. The standard errors in all results have been adjusted to account for clustering at the deal level. All deals contains returns for all peer firms regardless of whether the target and acquiror operate in the same primary industry before the deal is announced. Same industry deals contains returns for all firms only if the target and acquiror operate in the same industry prior to the announcement. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

In order to demonstrate that the announcement of a merger has a symmetric impact on all peer firm stakeholders, we also report the abnormal equity returns. However, not all firms have public debt, and it may be the case that those firms which do, behave differently than the universe of firms. Therefore, we restrict the sample to just those peer firms which have public debt outstanding, and which also have a bond return in our window. We find that following a merger announcement and in agreement with (Song and Walkling 2000), peer firm stock prices exhibit a positive cumulative abnormal return (CAR) in the [−7, 7] window[12] of 0.60%, which is statistically significant at the 5% level. For deals in which the target and the acquiring firm operated in the same industry prior to the announcement the CAR does not change in size or significance.

These baseline results provide support for our first hypothesis, and despite seeming small in magnitude they are economically significant. Over the time period in which we conduct our study, the average annual abnormal bond return has ranged from 50 bp to 200 bp (Bessembinder et al. 2009), depending on the risk level of the bond. This means that on average corporate debt issues earn 1.4 to 5.7 bp over an equivalent time period to the window we use. Likewise, with historical average abnormal equity returns at

approximately 8% per annum, the average equity return for a public firm over an equivalent window to ours is just under 0.33%. Thus the average abnormal stock return for peer firms following the announcement of a merger—where both the target and the acquiror operate in the same industry—significantly exceeds the abnormal stock return earned by the average firm during an equivalent window.

However, although bondholders have a significantly positive abnormal return following an announcement it is of smaller magnitude than abnormal stock returns and Edwards et al. (2007) have estimated transaction costs to be in the range of 4–9 bp for the majority of the trade sizes in our sample. Thus while the average return is likely to be economically significant to an existing peer firm bondholder, a representative investor following a naive buy/sell strategy is more likely to find their return absorbed by transactions costs. This is not surprising given our predictions, and is quite in line with Hypothesis 3. We should only expect to find that the most risky firms and bondholders experience positive abnormal returns and thus we expect that it is precisely those bondholder returns which are driving this overall average effect.

4.2. Firm Level Acquisition Probability

To show that peer firms experience a greater abnormal bond return if they have a larger unconditional probability of being acquired we will rely on several identification strategies. First, by identifying firms whose probability of being acquired is higher—whether because the firms' characteristics make it a more attractive target, or because the firm operates in an industry in which acquisitions are unconditionally more likely[13]. Second, by identifying the mechanism through which value is created for the bondholders of peer firms. Finally, by showing that this mechanism is a predictor of both firm level returns, and individual issue level returns within firms.

This analysis is complicated by the interaction between the value creation mechanism and the APH. The APH suggests that we should only expect to see an abnormal return for peer firms when those peers have a high probability of being acquired in a subsequent merger. However, since bondholders can't benefit from a price premium in the same manner as equity holders, they only benefit from a potential risk reduction. This means that we should only expect to observe positive abnormal bond returns when peer firms experience an increase in acquisition probability *and* when those same peers have a large expected benefit from a risk reduction. This is not a trivial interaction to test, because the factors which influence a peers acquisition probability may not be the same factors which will result in the peers' bondholders extracting a risk reduction benefit. In addition the null for these tests is generally no reaction, rather than a negative reaction. To the extent that peer bondholders recognize these interactions it may mean that we find no (or mitigated) results, and that it will be difficult to disentangle the two effects in what results we do observe.

4.2.1. Industry Concentration

Due to antitrust regulation and a generally higher level of regulatory scrutiny, the average acquisition probability in concentrated industries is relatively low. Consequently, if an industry mechanically increases it's concentration through a merger, the regulatory scrutiny can only increase. As this will only make the antitrust situation worse, the probability of any peer firm becoming a target in a subsequent acquisition should decrease. However, firms operating in industries with very low concentrations[14] would not face any undue regulatory barriers, and peer firms in these industries are more likely to experience an increase in the average unconditional acquisition probability following a merger.

To show this, we sort peer firms into terciles based on their Hirschman-Herfindahl Index Score (HHI). HHI has traditionally been used as a measure of concentration and competition, and we compute this score for each industry using Compustat sales figures. Firms in the lowest tercile of HHI are considered to operate in less concentrated industries (competitive), while firms in the upper tercile of HHI are considered to operate in highly

concentrated industries (monopolistic). In Table 4, we document that firms in the lowest tercile of HHI have positive abnormal bond returns of 6.41 bp, in the [−7, 7] window surrounding a merger announcement, and that these returns are significant at the 5% level. As concentration increases the average abnormal bond return monotonically decreases, and firms in the most concentrated industries have negative, albeit insignificant, abnormal bond returns. At the same time, these results are also consistent with a contemporaneous effect on recovery risk. It's possible that firms in the most concentrated industries are also concerned that further consolidation in the industry will exacerbate the recovery risk they face, and that this plays a part in our results.

Table 4. Univariate Results.

Peer Firms' Abnormal Bond Returns sorted by Industry Competition. The Herfindahl-Hirschman Index (HHI) is computed from Compustat sales figures in the standard way. Peer firms fall into bins based on how their primary industry is classified using HHI.			
Level of Competition HHI (Concentration)	High Low	Med Med	Low High
Abnormal Return (Bp) *Std. Err.*	6.41 ** (0.0003)	2.96 (0.0004)	−0.38 (0.0005)
N	7998	1616	886
Peer Firms' Abnormal Bond Returns sorted by Industry Adjusted Profit. Individual firm profit is defined as a firms' profit margin using Compustat data. Peers are sorted into terciles based on their profit margin, which is calculated as Net Income/Sales.			
Ind Adj. Profit Margin	Low	Med	High
Abnormal Return (Bp) *Std. Error*	6.53 (0.0004)	6.47 ** (0.0003)	4.05 (0.0003)
N	3227	3551	3815
Peer Firms' Abnormal Bond Returns sorted by Own Industry Adjusted Leverage. Individual firm leverage is the book leverage, and is calculated as the ratio of Debt to Assets. Firm leverage is then industry adjusted by averaging the leverage ratios for all firms in every 2 digit SIC industry, and then subtracting the industry average from the individual firms' leverage.			
Firm Leverage	Low	Med	High
Abnormal Return (Bp) *Std. Error*	3.61 (0.0003)	4.95 * (0.0002)	4.52 ** (0.0002)
N	2118	6758	5767
Peer Firms' Abnormal Bond Returns sorted by Combined Firms Industry Adjusted Leverage. The leverage of the combined firm is determined the year after the deal is effective, and is computed as above.			
Firm Leverage	Low	Med	High
Abnormal Return (Bp) *Std. Error*	−0.07 (0.0004)	6.60 (0.0003)	0.65 (0.0003)
N	3711	3713	3743

These tables report the average abnormal bond returns for peer firms following the announcement of a merger in their industry. Bond prices are taken from TRACE and bond characteristics from FISD. Reported is the average abnormal bond return in Basis Points, over a window covering 7 days before and 7 days after the deal is announced. Terciles are formed at the Compustat universe level so that industries are labeled relative to the true population and not just the sample. Bond returns have been winsorized at the 0.5% and 99.5% levels to mitigate the potential impact of errors in data recording. The standard errors in all results have been adjusted to account for clustering at the deal level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Multivariate analysis in Tables 5 and 6 confirms the results of the univariate analysis. The coefficient for HHI is consistently negative, and significant across most regression specifications. The direction of these coefficients suggests that peer firms which operate in highly competitive industries—ones in which regulatory scrutiny for additional consolidation would be less severe—experience greater abnormal bond returns following a merger in their industry. These results are strong evidence in support of Hypothesis 2 and show that peer firm reactions to a merger exhibit cross-sectional differences based on the average acquisition probability in their industry. In addition they are not consistent with any of the

alternatives, which would all suggest that the most pronounced returns should cluster in the most concentrated industries.

Table 5. Between Firms Multivariate Regression 1.

	Peer Firm Abnormal Bond Return [−7, 7]						
	(I)	**(II)**	**(III)**	**(IV)**	**(V)**	**(VI)**	**(VII)**
Initital	15.22 **	15.95 **	18.98 **	6.994	8.995	2.876	24.48
	(6.842)	(6.818)	(7.634)	(30.142)	(7.123)	(30.158)	(14.727)
Rating	0.865 *			0.658	0.849	2.358 *	
	(0.478)			(0.477)	(0.531)	(1.213)	
Competition	−4.524 *	−4.264 *		−3.098	−4.410 *	3.418	−4.597
	(2.464)	(2.262)		(2.481)	(2.318)	(6.330)	(2.912)
Profit	0.341	−0.014		−0.284	−0.616	−1.335	−7.448
	(2.012)	(2.102)		(2.001)	(2.033)	(5.264)	(4.790)
Leverage		1.935		−3.935	−3.568		−0.664
		(7.542)		(9.133)	(8.881)		(11.508)
Ln (Deal Size)	−2.061	−1.854	−1.964	−2.048	−2.040	−2.041	−1.828
	(1.288)	(1.372)	(1.386)	(1.354)	(1.210)	(1.352)	(1.401)
Second Deal			15.78 *				
			(8.341)				
Initial × Rating				3.261		1.815	
				(3.230)		(3.249)	
Initial × Profit				19.088 **		−43.014	15.456 *
				(7.841)		(43.880)	(7.852)
Initial × Competition				−8.392		−6.034	−7.956
				(7.164)		(6.821)	(7.749)
Rating × Profit						−0.909 *	
						(0.454)	
Rating × Competition						−0.967	
						(0.673)	
Profit × Competition						6.865	6.646
						(5.123)	4.921
Rating × Initial × Profit					3.178 **	6.663	
					(1.326)	(4.230)	
Leverage × Profit							17.242 **
							(8.122)
Leverage × Competition							−4.425
							(10.522)
Leverage × Initial							20.545
							(47.571)
Leverage × Initial × Profit							−19.89
							(53.774)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.008	0.007	0.008	0.01	0.01	0.01	0.01
N	10,500	10,490	10,884	10,490	10,490	10,500	10,490

This table reports a regression of peer firms' abnormal bond returns surrounding the announcement of a merger in their industry. Bond prices are taken from TRACE and bond characteristics from FISD. Moody's credit rating for each bond issue is among the bond characteristics taken from the FISD database. Moody's credit rating for each bond issue is among the bond characteristics taken from the FISD database. For the purposes of this regression each credit rating is given a numeric value starting with Aaa = 1, and ending with B3 = 16. The Herfindahl-Hirschman Index (HHI) is computed from Compustat sales figures. Individual firm leverage is the book leverage, and is calculated as the ratio of Debt to Assets, which is then Industry adjusted at the 2 digit SIC industry level. Individual firm profit is the firms profit margin, which is then industry adjusted at the 2 digit SIC industry level. Initial Deal is a dummy = 1 if the deal occurred after a dormant period of 150 days or greater. Deal Size is reported by SDC Platinum database in millions of dollars. Abnormal bond returns are calculated over a window covering 7 days before and 7 days after the deal is announced. Coefficients and Standard Errors are reported in Basis Points for ease of interpretation. Bond returns have been winsorized at the 0.5% and 99.5% levels to mitigate the potential impact of errors in data recording. The standard errors in all results have been adjusted to account for clustering at the deal level. *t* statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 6. Between Firms Multivariate Regression 2.

	Peer Firm Abnormal Bond Return [−7, 7]																	
	(I)		**(II)**		**(III)**		**(IV)**		**(V)**		**(VI)**		**(VII)**		**(VIII)**		**(IX)**	
Level of Competition	**High**		**Med**		**Low**	**Profit**	**Low**		**Med**		**High**	**Hostile Takeover Probability**	**Low**		**Med**		**High**	
HHI (Concentration)	**Low**		**Med**		**High**	**Margin**												
Initital	21.014	*	−4.22		16.78		37.44		−23.113		−58.62	*	33.989		2.334		7.892	
	(9.941)		(13.19)		(12.128)		(31.534)		(28.797)		(33.802)		(38.864)		(16.317)		(7.244)	
Rating	1.212	*	−0.450		0.38		1.934	**	0.755		0.348		−0.282		1.087		−2.339	**
	(0.637)		(1.991)		(1.041)		(0.815)		(0.687)		(0.490)		(2.024)		(0.911)		(1.032)	
Competition							−3.822		−4.91		−5.718		−26.802	***	−0.719		−7.820	*
							(2.750)		(4.293)		(3.611)		(7.065)		(4.553)		(4.085)	
Profit	−1.24		16.885	***	−3.290								−3.361		2.249		−10.612	***
	(1.121)		(3.996)		(8.784)								(7.301)		(1.772)		(3.631)	
Leverage	−3.64		−7.622		−8.025		−16.402		−1.731		10.15		23.21		−1.319		32.92	
	(8.904)		(37.399)		(17.142)		(8.576)		(10.731)		(20.205)		(56.90)		(34.26)		(21.90)	
Ln (Deal Size)	−2.102		−3.842		−1.678		−2.425		0.832		−4.493	***	14.484	***	1.59		−5.717	**
	(1.375)		(3.691)		(3.396)		(1.943)		(1.829)		(1.253)		(3.516)		(2.403)		(2.630)	
Initial × Rating							−3.45		4.237		8.581	**						
							(3.361)		(3.020)		(3.502)							
Rating × Initial × Profit													7.566		1.201		4.754	***
													(5.687)		(1.654)		(1.311)	
Year Fixed Effects	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
R−squared	0.01		0.02		0.01		0.01		0.01		0.02		0.06		0.01		0.02	
N	7990		1615		885		3196		3530		3764		734		1671		2910	

This table reports a regression of peer firms' abnormal bond returns surrounding the announcement of a merger in their industry. Bond prices are taken from TRACE and bond characteristics from FISD. Moody's credit rating for each bond issue is among the bond characteristics taken from the FISD database. Moody's credit rating for each bond issue is among the bond characteristics taken from the FISD database. For the purposes of this regression each credit rating is given a numeric value starting with Aaa = 1, and ending with B3 = 16. The Herfindahl-Hirschman Index (HHI) is computed from Compustat sales figures. Individual firm leverage is the book leverage, and is calculated as the ratio of Debt to Assets, which is then Industry adjusted at the 2 digit SIC industry level. Individual firm profit is the firms profit margin, which is then industry adjusted at the 2 digit SIC industry level. Initial Deal is a dummy = 1 if the deal occurred after a dormant period of 150 days or greater. Deal Size is reported by SDC Platinum database in millions of dollars. Abnormal bond returns are calculated over a window covering 7 days before and 7 days after the deal is announced. Coefficients and Standard Errors are reported in Basis Points for ease of interpretation. Bond returns have been winsorized at the 0.5% and 99.5% levels to mitigate the potential impact of errors in data recording. The standard errors in all results have been adjusted to account for clustering at the deal level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4.2.2. Firm Profitability

There is some evidence to suggest that more profitable firms would also make more attractive acquisition targets (Ravenscraft and Scherer 1989). There might be several reasons this is the case. A profitable firm would be more able to cover interest payments if a large amount of debt is used to finance the acquisition. Likewise a firm with high profitability might suffer from the excess cash flow problem as in Shleifer and Vishny (2003), which might make them attractive "turnaround targets". Thus there is reason to expect that highly profitable firms might experience an increase in their unconditional acquisition probability following a merger. On the other hand, a peer firm with the excess cash flow problem might attract interest from buyers who intend to use a great deal of leverage to finance the acquisition under the presumption that high leverage can be sustained by the combined firm which has high profit and excess cash. This would be unlikely to result in any risk reduction benefiting bondholders. Thus, it is possible that we only observe an abnormal bond reaction when a peer firms low profitability might make a highly levered transaction less likely.

We measure firm profitability as the industry adjusted profit margin (NI/Sales) using the Compustat data. A univariate tercile sort in Table 4 does not exhibit a strong relationship between peer firms' pre-merger profit margin and their abnormal bond returns surrounding the merger. In multivariate regressions in Tables 5 and 6 the coefficient for industry adjusted profit is generally negative and insignificant. In addition we observe in Columns IV-VI in Table 6 that peer firms react positively to a merger announcement only when they have both low rating and the lowest profit margins in the industry. This evidence suggests that while a more profitable firm might indeed be a more attractive takeover target, it does not appear that peer bondholders expect a potential acquisition to be risk reducing (and thus beneficial for them) when their firm is highly profitable.

Despite that conclusion, there is some evidence that in certain cases peer bondholders react positively to a merger announcement in their industry when they are highly profitable. For instance, the interaction term of Rating x Profit x Initial Deal, is positive and significant in Table 5 Column V and Table 6 Columns VI and IX. It's possible that an initial deal signals the potential for merger wave, and that bondholders anticipate that any acquisitions which occur during such a wave are more likely to be risk reducing. Regardless, it appears that while peer firm profitability is likely to be a significant factor in its unconditional probability of being acquired in the future, it is simultaneously a much more nuanced and uncertain predictor of benefit for its bondholders.

4.2.3. Hostile Takeover Probability

A good ex-ante measure of a peer firms acquisition probability is likely to include whether or not the firm operates in a state with extensive anti-takeover laws, and/or whether the firm itself has incorporated any anti-takeover provisions in it's bylaws. A firm with a great deal of takeover protection will be very unlikely to have a set of stakeholders with high expectations for a future acquisition, and we would not expect those expectations to be greatly affected by a merger in it's industry. However, takeover protections (including the decision to incorporate in a anti-takeover state) are not exogenously determined, and it is certainly likely that the factors which affect acquisition probability, or the potential for risk reduction, are the same factors which might encourage management to instigate takeover protections. (Cain et al. 2017) develop an index which predicts the probability of hostile takeover for a subset of firms on Compustat—and thus a subset of firms in our sample. They show that the probability of a firm being subject to a hostile takeover is indeed strongly correlated with firm value, ROE, D/E, size, age, and liquidity; which means that this measure is likely to be correlated with our other measures of acquisition probability.

In addition, it not clear ex-ante that bondholders would experience any reduction in risk from a hostile takeover, in the same way that they might from a mutually agreed upon acquisition. This would be particularly the case if the hostility of the deal necessitated a great deal of leverage being used to under take said deal, or reduced the deals potential

value creation. Results utilizing the hostile takeover index are reported in Table 6 columns VII-IX, but as expected the results are difficult to interpret. There is some evidence that peer firms with a high probability of hostile takeover have significantly positive abnormal bond returns following an acquisition announcement. But it does not appear to provide additional explanatory power beyond competition, profitability, and whether the deal was an initial deal or not.[15]

4.2.4. Initial Deals

The relationship between a merger and the probability of a subsequent merger is almost assuredly non-monotonic. The first merger in an industry, following a dormant period, should significantly update the beliefs that market participants hold about the probability of a subsequent merger or a merger wave. If subsequent mergers follow in quick succession, the probability of even more deals occurring during the wave increases but at a decreasing rate. However, as a wave progresses, the probability of subsequent mergers decreases, and likely decreases at an increasing rate after each deal. Thus it should be the case that early mergers, and particularly the first merger in a wave carry the strongest signal about the probability of a wave and subsequent deals in the industry. Consistent with this, we expect that following an initial deal, peer firms will experience a significant increase in their acquisition probability.

We classify initial deals as those that occur after a 150 day period in which no merger activity has occurred in the industry. In the dataset we identify 139 initial deals that affect 1042 peer firms. In keeping with Hypothesis 2, Table 7 exhibits evidence that initial deals provide the industry with a strong signal about the potential for a merger wave. In the $[-7, 7]$ window surrounding an initial merger peer firms experience an abnormal bond return of 24.31 bp (significant at the 1% level). Following a non-initial merger peer firms experience an abnormal bond return of 4.25 bp, which is still significant at the 10% level. These returns are economically, and statistically, significant. Significant to the extent that given the perfect merger prediction model, a representative investor could earn a profit by trading peer firm debt surrounding an initial merger - even after accounting for transactions costs.

Table 7. Peer Firms' Abnormal Bond Returns for Initial Mergers.

	Peer Firm Abnormal Bond Return [−7, 7]	
Deal Type	**(Non-Initial Deal)**	**(Initial Deal)**
Abnormal Return (Bp)	4.25 *	24.31 ***
Std. Err.	(0.0002)	(0.0007)
N	9842	1042

This table reports the average abnormal bond returns for peer firms following the announcement of a merger in their industry. Bond prices are taken from TRACE and bond characteristics from FISD. Initial deals are identified as those deals which occur after a dormant period of 150 days or greater. Peers are sorted into bins based on whether they have a return in an industry following the announcement of one of these initial deals. We report the average abnormal bond return in Basis Points, over a window covering 7 days before and 7 days after the deal is announced. Bond returns have been winsorized at the 0.5% and 99.5% levels to mitigate the potential impact of errors in data recording. The standard errors in all results have been adjusted to account for clustering at the deal level. *t* statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Multivariate regression analysis in Table 5 provides robust confirmation for the univariate test in Table 7. The dummy variable for initial deal is positive and significant in specifications I, II, and III, which are the most general specifications that lack any interaction terms. The interaction of the initial deal dummy with other factors that may influence acquisition probability (profit or competition) have the expected sign and significance. Highly profitable peers of initial deals have positive and significant abnormal returns (Table 5 specification IV), while peers that operate in competitive industry's which experience an initial deal also have positive and significant returns (Table 6 specification I).

Broadly speaking, whether a deal was an initial deal appears to be the most significant factor driving a shift in peer firms expectations about their acquisition probability. Whereas

competition is more a factor in the ex-ante level of a peer firms acquisition probability, given that in the most competitive industries (which are where merger waves are most likely) one deal is not likely to change the relative competition to a large degree. Finally profitability appears to be largely a second order factor in peer expectations about their acquisition probability, it may be significant when it interacts with other factors, but not unilaterally.

4.3. Value Creation Mechanism

4.3.1. Risk Reduction

The extant literature shows that the bondholders of target firms[16], only benefit during an acquisition if their risk is subsequently reduced. This implies that bondholders of peer firms should react positively to an acquisition announcement only if they expect that a future acquisition attempt will bring them a similar risk reduction. In other words we should only expect to observe an abnormal bond return if the peer firm experiences both an increase in it's acquisition probability and has the potential to benefit from a risk reduction. Specifically, Billett et al. (2004) document that sorting target firms by two common risk proxies uncovers evidence of this effect. Consequently we use credit rating, and firm leverage, to show that peers which are relatively riskier have larger abnormal announcement returns. We argue that, because of a rising acquisition probability, bondholders of risky firms are anticipating risk reduction through acquisition.

Because the factors which influence a peers acquisition probability may not be the same factors which will result in the peers bondholders extracting a benefit, it is difficult to test whether firms which are expected to exhibit an abnormal return actually do exhibit an abnormal return. For instance, while firms with low ratings and high leverage enjoy the largest expected benefit from a risk reducing acquisition, they may not also make attractive takeover targets. This makes our hypotheses difficult to test for using normal interaction terms within a standard regression analysis. We overcome this complexity by utilizing a unique feature of the bond market—most firms have multiple bond issues—and the fact that our third hypothesis should also predict *within* firm abnormal bond return differences based on risk.

4.3.2. Credit Rating

One of the ways in which target firms can benefit from risk reduction is if they have a lower bond rating than their acquiror. In this case, the target firm adopts the higher credit rating, and has its risk effectively insured by the better financial position of the acquiror. *Ceteris paribus*, this is good news for the targets' bondholders, and the target experiences a positive abnormal bond price reaction. Therefore, we expect that peer firm bondholders should have a bond price reaction that is inversely related to their current bond rating, because firms with lower credit ratings should have higher expected gains from a potential risk reducing acquisition. While it is possible that we observe some average effect according to the peer firms' rating, we expect that any abnormal returns are concentrated among those firms which have low ratings and have a high acquisition likelihood. Thus we expect that impact of rating is much more significant when interacted with variables which help explain a high acquisition probability.

We use Moody's credit ratings to determine the rating for peer firms. In order to focus on bonds that are not in or near default we have excluded anything below B from our sample, and so we only retain firms within the 6 major rating categories[17]. Univariate sorts according to rating are excluded from the main text for succinctness however we observe that significantly positive abnormal bond returns are concentrated among peer firms with non-investment grade bond ratings, while peers with investment grade ratings do not have a significant abnormal return[18]. A finer sort along the 6 major rating categories (Aaa-B) shows that abnormal returns are largely increasing monotonically in both size and significance for peer firms that have successively lower bond ratings.

Table 5 shows multivariate regressions on peer firms abnormal bond returns. We assign an ordinal variable in place of the bond rating, so that firms rated Aaa are assigned a 1

and firms rated B are assigned a 16. Column I shows the coefficient for rating is positive and significant at the 10% level, which is further evidence that peer firms with poor credit ratings, experience greater abnormal returns following a merger. The relative insignificance of rating on it's own is not too surprising given that rating is likely to be negatively correlated with peer firm acquisition probability. If this is the case, then we should expect to find stronger results when interacting rating with factors affecting acquisition probability (i.e., Rating × Profit × Initial Deal) and the coefficient of this interaction is significant in Column V. Which is further evidence that peer firms with more to gain from a risk reducing acquisition, experience greater abnormal returns following a merger in their industry.

Table 6 provides additional evidence for this interaction. Columns I-III show that peers have a significant abnormal reaction to a merger only when they operate in highly competitive industry's—which implies that their acquisition probability is high—and when their credit rating is low—so that they have high expected benefit. Columns VII-IX give a sense of the reaction of peer firms that should be the most likely to react to a merger. The interaction for Rating × Profit × Initial Deal is highly significant and positive when the probability of a hostile takeover is highest. These are the peers for which the acquisition probability should be highest, and they only have an abnormal bond return when they also have a low rating and their expected benefit is highest. Overall, although the interactions can be somewhat convoluted, the analysis provides support for Hypothesis 3: peer firms must be both likely to become an acquisition target, and have some expected risk reduction benefit, in order to react to a merger in their industry.

4.3.3. Peer Firms' Leverage

Another way that target firms benefit from risk reduction is if they have a higher leverage ratio than their acquiror. The combined firm will emerge with a lower leverage ratio overall than the target had initially, and other things equal this decreases the risk of the firm.[19] The targets' bondholders benefit from the reduced risk of the firm, and experience a positive abnormal bond price reaction. Once again, we expect that the bondholders of peer firms should have a greater reaction to an acquisition in their industry, if they have a higher expected benefit through acquisition. The peer firms which are most likely to benefit from this, may be those which have a high leverage ratio at the time of the announcement.

We calculate the industry adjusted book leverage for all peer firms using data from Compustat, and sort firms into terciles based on their leverage ratios. In Table 4, we document peer abnormal bond returns for each leverage tercile. Consistent with our predictions, peer firms in the lowest leverage tercile have insignificant abnormal returns, while peer firms in the highest tercile have a positive abnormal return of 4.52 basis points, which is significant at the 5% level. These results, taken together with those from Section 4.3.2, jointly support our third hypothesis.

However, a peer firms' leverage ratio is even more likely than their rating to negatively affect their acquisition probability. Firms with very high leverage are likely to make unattractive takeover targets, even though bondholders of such firms would have the most to gain. Multivariate results in Tables 5 and 6 bear out this intuition. We observe that even though the coefficients for leverage generally have a positive sign, they are almost never significant. The evidence suggests that while peer bondholders of highly levered firms might benefit from risk reduction if they are acquired, having high leverage probably makes them ex-ante less likely to be acquired, and thus we observe much smaller abnormal bond reactions.

4.3.4. Within Firm Issue Risk

If Hypothesis 3 is correct and the potential for a risk reducing acquisition is driving abnormal bond returns among peers, we would expect to observe a difference between, and within, firms according to the relative risk level of the portfolio, or issue, in question. Since by definition the bondholders of a peer firms multiple issues will face the same acquisition probability—and experience the same change in that probability as a result

of a merger in the industry[20]—looking within firm provides a unique test with which to identify the true driver of any peer firm abnormal bond return. This is in contrast to the alternative theories we consider in Section 5, which mostly imply a consistent effect within a firms own portfolio. Because the most common measure of risk—rating—does not often differ across separate issues within the same firm, we test this conjecture in two separate ways. First, by comparing the return on the firms' riskiest issues with the return on its least risky issues. Second, with a multivariate specification that regresses measures of risk on abnormal returns at the individual issue level.

In Table 8, a firms' bond issue is denoted as its most risky if it has the longest current maturity in the firms' portfolio, *and* it has the lowest seniority of the bonds in the firms' portfolio, *and* it has the lowest rating of the bonds in the firms' portfolio. Conversely a bond is denoted as a firms least risky if: it has the shortest current maturity in the firms' portfolio, *and* it has the highest seniority of the bonds in the firms' portfolio, *and* it has the highest rating of the bonds in the firms' portfolio[21]. We calculate the difference in the average abnormal bond return for all the firms' bond issues that qualify as most risky, and the average abnormal return of all the bond issues that qualify as least risky. We report that this difference is on average 11.1 basis points, and that it is significant at the 1% level. This means that *within* the same peer firm, the bondholders of the most risky issues have a stronger reaction to a merger announcement; which follows because they have the largest expected gain from potential risk reduction through acquisition, while having the same acquisition probability.

Table 8. Within Firm Individual Issue Returns.

	Difference in Average Abnormal Bond Returns (Within Firm) [−7, 7]			
	N	Mean (Bp)	SE	St. Dev. (%)
Total	5468	11.1 **	(0.0004)	2.09
	With Year Fixed Effects			
Total	5468	11.1 **	(0.0005)	2.08

This table reports the difference, in the abnormal bond returns, between a peer firms' most risky bond issue and a peer firms' least risky bond issue. A firms' bond issue is denoted as most risky if: it has the longest current maturity in the firms' portfolio, and it has the lowest seniority of the bonds in the firms' portfolio, and it has the lowest rating of the bonds in the firms' portfolio. Conversely a bond is denoted as the least risky if: it has the shortest current maturity in the firms' portfolio, and it has the highest seniority of the bonds in the firms' portfolio, and it has the highest rating of the bonds in the firms' portfolio. We calculate the difference in the average abnormal bond return for all the bonds in the firms' portfolio that qualify as most risky and the average abnormal return of all the bonds that qualify as least risky. We report the average abnormal bond return in Basis Points, over a window covering 7 days before and 7 days after the deal is announced. Bond returns have been winsorized at the 0.5% and 99.5% levels to mitigate the potential impact of errors in data recording. The standard errors in all results have been adjusted to account for clustering at the deal level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

In Table 9, We regress individual issue abnormal returns against several common measures of risk. We include four measures of risk in the regression: the issues' current maturity, the issues' credit rating, the issues' seniority, and the issues' original offering amount, as well as various interactions of those variables. So that we are only analyzing the within firm differences, we also include a firm fixed effect in the regression. Our results are largely consistent with the interpretation of the results in Table 8. In the base specification in Column I the signs are generally consistent with our expectations, but because there is very little variation within firm the results are not significant. However, in columns II, III, and V we interact the various measures of risk in order to identify the issues that have higher risk within a firms bond portfolio. In particular the interaction of rating, security level, and issue size in Column III exhibits a significantly positive relationship with abnormal bond return following a merger announcement.

Table 9. Within Firm Multivariate Regression.

	Individual Issue Abnormal Return											
	(I)		**(II)**		**(III)**		**(IV)**		**(V)**		**(VI)**	
Current Maturity	0.0771		−0.0060		−0.0291		7.611		18.547	*	13.968	
	(0.231)		(0.224)		(0.229)		(5.891)		(8.303)		(8.547)	
Credit Rating	2.61		−64.084	***	−10.936		2.026		1.629		−65.819	***
	(5.051)		(17.447)		(5.539)		(4.570)		(4.541)		(17.645)	
Security Level	−7.656	*	−133.059	***	−34.329	***	−6.884		−5.918		−122.013	***
	(3.481)		(13.130)		(4.228)		(3.781)		(3.615)		(14.489)	
Log(Offer Amount)	−4.165		−47.975	***	−8.372		0.488		1.524		−42.101	***
	(5.519)		(9.387)		(4.552)		(5.166)		(5.280)		(10.016)	
Rating × Offer			4.068	**							4.303	**
			(1.215)								(1.270)	
Rating × Security			4.380	***							3.974	***
			(0.681)								(0.709)	
Security × Offer			7.291	***							6.796	***
			(0.889)								(0.995)	
Rating × Security × Offer					0.341	***						
					(0.062)							
Rating × Maturity							0.086		−0.524	*	−0.163	
							(0.155)		(0.212)		(0.219)	
Maturity × Offer							−0.611		−1.089		−0.951	
							(0.428)		(0.564)		(0.569)	
Maturity × Security							−0.0453		−1.605	***	−0.521	
							(0.148)		(0.317)		(0.340)	
Rating × Security × Offer × Maturity									0.019	***	0.003	
									(0.003)		(0.004)	
Firm Fixed Effects	Yes		Yes		Yes		Yes		Yes		Yes	
Year Fixed Effects	Yes		Yes		Yes		Yes		Yes		Yes	
R-squared	0.066		0.069		0.068		0.067		0.068		0.069	
N	9982		9982		9982		9982		9982		9982	

This table reports a regression of peer firms' abnormal bond returns surrounding the announcement of a merger in their industry. The bond returns are at the individual issue level (which means there may be several for every peer firm) and the regression includes firm fixed effects. Bond prices are taken from TRACE and bond characteristics from FISD. Moody's credit rating for each bond issue is among the bond characteristics taken from the FISD database. For the purposes of this regression each credit rating is given a numeric value starting with Aaa = 1, and ending with B3 = 16. Deal Size is reported by SDC Platinum database in millions of dollars. Current maturity is the length of time left until the issue matures. Security Level is a range from 1 if the issue is senior secured and = 6 if the issue is subordinated. Log(Offer Amount) is the log of the original offer amount for the issue. Firm fixed effects have been added to this regression so that the remaining variation is within firm. Abnormal bond returns are calculated over a window covering 7 days before and 7 days after the deal is announced.Coefficients and Standard Errors are reported in Basis Points for ease of interpretation. Bond returns have been winsorized at the 0.5% and 99.5% levels to mitigate the potential impact of errors in data recording. The standard errors in all results have been adjusted to account for clustering at the deal level. *t* statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

These results strongly suggest that peer firm bondholders only expect to benefit from a potential acquisition if they can benefit from a risk reduction in their risky bond holdings. This distinction is observable even for bondholders that have the same probability of acquisition in the future, i.e., bondholders of an individual firms different issues. The expected benefit from risk reduction appears to be larger for firms that also have a high acquisition probability, and this relationship holds whether the peers' acquisition probability was high ex-ante (because of firm or industry characteristics) or the peers acquisition probability rises due to the nature of the industry merger itself.

5. Alternative Explanations

There are a number of other possible theories that could explain our results. In this section we will discuss the most plausible cases, and present evidence showing that these alternate explanations do not explain our results.

5.1. Imperfect Competition

The first alternative explanation stems from neoclassical economic theory, and has two interpretations. This alternative is very simple, and it follows because the merger leaves the industry with one less firm. In doing so the merger mechanically increases industry concentration. If neoclassical industrial organization theory governs firm behavior, and firms compete in an imperfectly competitive market, then fewer firms in a given industry should increase the pricing power of the remaining firms. This should lead to increased profit margins for peer firms, which in turn will positively impact the current value of peer firms' future cash flows. If this is the case, then we would expect to see positive abnormal price reactions in both the bond, and stock, markets. In addition, this alternative implies that peer firms abnormal bond returns should be positively correlated with the number of mergers that have occurred during a certain period. Each additional merger should further concentrate the industry, and greater concentration should lead to greater pricing power for the remaining peers.

While we do observe positive abnormal bond and stock price reactions, we do not find any other evidence that might support this alternative. We show in Table 4, that peer firms have the highest abnormal bond returns in the most competitive industries. However, under imperfect competition pricing power is inversely related to industry concentration. Thus we should expect to see the highest abnormal bond return in industries that are the most concentrated (least competitive). In addition, we find in Table 8, that there is significant variation across risk levels for individual bond issues within firm. If peer firms were reacting to an expected increase in their pricing power, it is not clear why there should be differing reactions for bondholders in the same firm with different risk levels. Finally we do not find that peer firm abnormal returns get larger for successive mergers. In fact, in Table 4, we show the opposite. The strongest abnormal bond reaction for peer firms occurs following an initial merger, and the average reaction for subsequent mergers is much smaller in magnitude and significance.

5.2. Collusion

If the logic of imperfect competition is extended, then increased concentration in the industry could also make it easier for the remaining firms to collude. Explicit price collusion should provide peer firms with an even larger increase in profit margins, than that which accompanies a simple increase in pricing power. However, with stronger assumptions come stronger predictions. For instance, firms that are actively colluding are strictly better off when there are less firms to collude with. Thus to the extent that a merger makes it easier for the remaining firms to engage in collusive behavior, firms that are in already concentrated markets should be strictly better off (Bresnahan and Reiss 1991). Yet, we find no support for this hypothesis in the data. Table 4 sorts firms by HHI, and shows that only firms in highly competitive industries exhibit positive abnormal returns following a merger. In fact, firms in highly concentrated industries, (in which sustaining collusion ought to be easiest) experience negative, albeit insignificant, abnormal bond returns. Further, we show in Tables 8 and 9 that there are significant differences in the returns of the peer firms individual bond issues. Finally, we do not find that peer firm abnormal returns get larger for successive mergers. In fact, in Table 7, we show the opposite. The strongest abnormal bond reaction for peer firms occurs following an initial merger, and the average reaction for subsequent mergers is insignificant. These results, taken together, do not support the theory that peer firms are reacting to a decrease in the cost of collusion, and given the regulatory stance towards collusion in the U.S. this should not be surprising.

5.3. Competition

The third alternative hypothesis is largely dependent on how the combined firms' eventual leverage compares to the leverage of its' peers. If the combined firms leverage ratio exceeds the industry average, then *ceteris paribus*, it faces greater financial constraints than the majority of its peers. This is because the combined firm now has higher interest

payments to cover, which in turn can reduce its ability to respond to competitive pressure. Indeed, Chevalier (1995) shows that peer supermarkets with relatively low leverage, reduce prices in an attempt to prey on rivals that have recently been acquired in a leveraged buy-out. These attempts are shown to be associated with the LBO firms exiting the market. If this theory is governing firm behavior, then we expect that a merger will positively affect the current value of the peer firms' future cash flows, because the combined firms' excess leverage weakens its competitive position, and this essentially acts as a negative shock to competition. This should be accompanied by increasing peer bond, and stock, prices following the merger. In addition, this alternative should imply that higher rated peer firms should have higher abnormal bond returns. In the event that peer firms engage in price competition to drive the merged firm out of the market, lower rated firms (who are also likely to have higher debt burdens) should also struggle. In addition, this theory implies a symmetric impact across all of a peer firms individual issues, because price competition occurs at the firm level.

If this hypothesis is correct, then the combined firms' competitive position should be most affected when its leverage ratio greatly exceeds the industry average. We show that this is not the case in Table 4. We construct the combined firms industry adjusted leverage using Compustat data from the year following the merger completion.[22] In Table 4, we sort peer firms into terciles based on the combined firms eventual leverage. We find no significant relationship between peer bond returns and the combined firms eventual leverage. In addition, our results on the effect of a potential risk reduction in Table 5 show that peer firms with higher ratings have lower abnormal bond returns. Furthermore, we show in Tables 8 and 9 that there are significant differences in the returns of the peer firms individual bond issues. The results in these tables do not support the hypothesis that peer firms are reacting to the, potentially, weakened competitive position of the combined firm.

6. Conclusions

In this paper we examine the effect of a merger, or an acquisition, on the merging firms' peers. Through the lens of the peers' bond prices we provide evidence that a merger leads to an increase in the average acquisition probability for its peer firms within industry; or at the very least we argue that our result indicate that the market participants believe this is the case. We document that this leads to a positive abnormal bond price return, and confirm a positive abnormal stock price return from previous work. We provide evidence that strongly suggests that peer firm bondholders only expect to benefit from a potential acquisition if they can benefit from a risk reduction in their risky bond holdings. However, this is not a trivial hypothesis to test because the firms that are likely to make tempting targets are not necessarily the riskiest firms who would benefit the most from a risk reduction. Thus in cross-sectional results we show that the expected benefit from a potentially risk reducing acquisition appears to be larger for firms that also have a high acquisition probability, and this relationship holds whether the peers' acquisition probability was high ex-ante (because of firm or industry characteristics) or the peers acquisition probability rises due to the nature of the industry merger itself (because the merger was the first merger following a dry period). Finally, we do not find any evidence to support the other prominent theories about the market impact of a merger, or an acquisition. In fact, we provide a novel test that demonstrates that these theories do not match the existing empirical evidence, by showing that support for our hypotheses is observable even for bondholders that have the same probability of acquisition in the future, i.e., bondholders of an individual firms different issues.

There are a number of limitations associated with both our current research and with bond pricing event studies in general. First, not all firms have both debt and equity outstanding, and the sub-sample of firms which do (those peers that make up our sample), may be different from the universe of firms which make up an industry. It's possible this subset of firms would exhibit different return behavior which, in turn, might lead us to incorrectly assume our hypotheses are satisfied; however, the wealth of alternative

supporting evidence for our conclusions are substantial. In addition, some peer firms that are part of an industry during a merger *and* have outstanding public debt may not experience a bond trade within our window (the bond market is highly illiquid), which may make our results less generalizable to all bondholders of peer firms. A final limitation to our study is that although bondholders have a significantly positive abnormal return following an announcement, estimated transaction costs are in the range of 4–9 bp for the majority of the trade sizes in our sample. Thus while the average return is likely to be economically significant to an existing peer firm bondholder, a representative investor following a naive buy/sell strategy is more likely to find their return absorbed by transactions costs. This is not surprising given our predictions, and is quite in line with both our Hypotheses and our results. We only expected to find that the most risky firms and bondholders experience positive abnormal returns and our sub-sample and multivariate results suggest that it is precisely those bondholder returns which are driving this overall average effect.

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Notes

1 Ahern and Harford (2014); Cai et al. (2011); Eckbo (1983, 1985) etc.

2 We examine the reaction surrounding the announcement of the deal, but only for deals that were ultimately completed.

3 Specifically a peer is defined as a member of the same 2 digit SIC industry as the merged firm—which in 70% of the sample contains both the acquiring, and target, firm. In the remaining cases a peer is defined as a member of the acquiring firms 2 digit SIC industry.

4 (Song and Walkling 2000) developed this hypothesis using peer firms equity price reactions.

5 More recent evidence comes from Chen et al. (2020) who make use of the much more complete TRACE data to confirm these earlier results.

6 Although potentially these bondholders may still have different expectations of the overall probability, and any change in that probability.

7 In a Financial Times article from November 11, 2009, Nikki Tait writes: "A consultancy company has, for the first time, been slapped with a significant fine for cartel involvement by Europe's competition regulators—even though its alleged role was in organizing the market-rigging rather than participating directly. According to the European Commission, Zurich-based AC Treuhand prepared the operational framework for cartels involving "heat stabilizers", which are used as additives in the plastics industry. It then monitored implementation of the illegal agreements by nine companies—including Holland's Akzo, France's Elf-Aquitaine and Switzerland's Ciba.

8 The dirty return is inclusive of the accrued interest earned during the return period: $BondReturn_{Dirty} = \frac{(P_t - P_{t-1}) + AI}{P_{t-1}}$.

9 For example any trade that occurs in one of the following windows is included in the $[-7, 7]$ return window: $[-7, 4]$, $[-7, 5]$, $[-7, 6]$, $[-7, 7]$, $[-6, 4]$, $[-6, 5]$, $[-6, 6]$, $[-6, 7]$, $[-5, 4]$, $[-5, 5]$, $[-5, 6]$, $[-5, 7]$, $[-4, 4]$, $[-4, 5]$, $[-4, 6]$, and $[-4, 7]$.

10 The OTC nature of the bond market means that trades must be manually recorded and reported rather than being automatically captured like stock trades. This leads to errors in bond pricing data being rather more common than in equity price data. Thus winsorizing significant outliers can help account for any errors in data recording.

[11] For simplicity, in the remaining analyses we will continue to use the sample of same industry deals as the main sample. However while the results are similar when using all deals, any inference drawn is less straightforward. For instance, in cross industry deals which set of peers might predict a merger wave following a merger—the acquiring firms peers, the target firms peers, or some combination of both? To avoid conflicting inferences we restrict our analysis to same industry deals.

[12] Although a [−7, 7] window is larger than what is typically used in equity event studies, we employ it here for consistency and comparison purposes. The results are similar for shorter and more typical windows.

[13] There is some evidence that any expectation of a potential wave is not unfounded among peer firms. Within our sample more than 10% of the deals (166) were the peer of an earlier merger at some point. Supplementary Materials documents that the peers who are eventually acquired in the future exhibit large and statistically significant abnormal bond returns. While there is little evidence to support the idea that these bondholders are more accurate predictors of their future acquisition than any other investor, this is evidence in support of the APH.

[14] That is to say, highly competitive industries.

[15] In addition the inclusion of the hostile takeover measure drastically reduces overall sample size by nearly two thirds.

[16] Here we refer to the literature which references bondholders of firms which have been the target of a successful acquisition.

[17] This includes all 16 minor rating categories in between the major categories of: Aaa, Aa, A, Baa, Ba, and B.

[18] Univariate results for rating category are included in the Supplementary Materials.

[19] We look at a potential leverage reduction separately from credit rating, as we would argue that it is not strictly equivalent to a potential ratings increase. That is to say, a leverage reduction does not strictly imply a ratings increase. Thus the benefit of reducing risk through a leverage reduction may be wholly separate from that achieved by a ratings reduction.

[20] This does not discount the fact that peer bondholders may have different expectations of the overall acquisition probability, and different expectations about any change in that probability.

[21] It should be noted that these are not the only proxies for issue risk, and that there are various other attributes that can affect the actual, or perceived, risk of an individual issue. However, these three measures are: readily available, easily quantifiable, and generally accepted measures of risk for bond issues. Creating a ranking of risk that incorporates all three should help to alleviate the concern that might arise from potentially omitting some alternative sources of risk.

[22] There is some concern, that using future data like this in our regressions, constitutes some form of look-ahead bias. While we agree that this is a potential concern, we would contend that this information is, in fact, contemporaneous. At the time of the announcement, peer firms should be able to, at least, approximate the eventual capital structure of the combined firm. Thus, assuming that the bondholders of peer firms can react, at the announcement date, to the eventual leverage of the combined firm should not be an issue.

References

Ahern, Kenneth R., and Jarrad Harford. 2014. The Importance of Industry Links in Merger Waves. *Journal of Finance* 69: 527–76. [CrossRef]

Asquith, Paul, and E. Han Kim. 1982. The Impact of Merger Bids on the Participating Firms' Security Holders. *The Journal of Finance* 37: 1209–28. [CrossRef]

Back, Kerry, and Kevin Crotty. 2014. The Informational Role of Stock and Bond Volume. *The Review of Financial Studies* 28: 1381–427. [CrossRef]

Bai, Jennie, Turan G. Bali, and Quan Wen. 2019. Common risk factors in the cross-section of corporate bond returns. *Journal of Financial Economics* 131: 619–42. [CrossRef]

Bao, Jack, Jun Pan, and Jiang Wang. 2011. The Illiquidity of Corporate Bonds. *The Journal of Finance* 66: 911–46. [CrossRef]

Bessembinder, Hendrik, Kathleen M. Kahle, William F. Maxwell, and Danielle Xu. 2009. Measuring Abnormal Bond Performance. *The Review of Financial Studies* 22: 4219–58. [CrossRef]

Bessembinder, Hendrik, William Maxwell, and Kumar Venkataraman. 2006. Market transparency, liquidity externalities, and institutional trading costs in corporate bonds. *Journal of Financial Economics* 82: 251–88. [CrossRef]

Billett, Matthew T., Tao-Hsien Dolly King, and David C. Mauer. 2004. Bondholder Wealth Effects in Mergers and Acquisitions: New Evidence from the 1908s and 1990s. *The Journal of Finance* 59: 107–35. [CrossRef]

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

Bresnahan, Timothy F. 1987. Competition and Collusion in the American Automobile Industry: The 1955 Price War. *The Journal of Industrial Economics* 1: 457–82. [CrossRef]

Bresnahan, Timothy F. 1989. *Handbook of Industrial Organization*. Amsterdam: Elsevier, chapter Empirical studies of industries with market power, pp. 1011–57.

Bresnahan, Timothy F., and Peter C. Reiss. 1991. Entry and Competition in Concentrated Markets. *Journal of Political Economy* 99: 977–1009. [CrossRef]

Cai, Jie, Moon H. Song, and Ralph A. Walking. 2011. Anticipation, Acquistions, and Bidder Returns: Industry Shocks and the Transfer of Information across Rivals. *The Review of Financial Studies* 24: 2242–85. [CrossRef]

Cain, Matthew D., Stephen B. McKeon, and Steven D. Solomon. 2017. Do Takeover Laws Matter? Evidence from Five Decades of Hostile Takeovers. *Journal of Financial Economics* 124: 464–85. [CrossRef]

Chen, Fan, Krishnan Ramaya, and Wei Wu. 2020. The wealth effects of merger and acquisition announcements on bondholders: New evidence from the over-the-counter market. *Journal of Economics and Business* 107: 105862. [CrossRef]
Chevalier, Judith A. 1995. Do LBO Supermarkets Charge More? An Empirical Analysis of the Effects of LBOs on Supermarket Pricing. *The Journal of Finance* 50: 1095–112. [CrossRef]
DeYoung, Robert, Douglas D. Evanoff, and Philip Molyneux. 2009. Mergers and Acquisitions of Financial Institutions: A Review of the Post-2000 Literature. *Journal of Financial Services Research* 36: 87–110. [CrossRef]
Eckbo, B. Espen. 1983. Horizontal mergers, collusion, and stockholder wealth. *Journal of Financial Economics* 11: 241–73. [CrossRef]
Eckbo, B. Espen. 1985. Mergers and the market concentration doctrine: Evidence from the capital market. *Journal of Business* 1: 325–49. [CrossRef]
Ederington, Louis Wei Guan, and Lisa Yang. 2015. Bond Market Event Study Methods. *Journal of Banking and Finance* 58: 281–93. [CrossRef]
Edwards, Amy K., Lawrence E. Harris, and Michael S. Piwowar. 2007. Corporate bond market transaction costs and transparency. *The Journal of Finance* 62: 1421–51. [CrossRef]
Fang-Klingler, Jieyan. 2019. Impact of Readability on Corporate Bond Market. *Journal of Risk and Financial Management* 12: 184. [CrossRef]
Fich, Eliezer M., Tu Nguyen, and Micah Officer. 2018. Large Wealth Creation in Mergers and Acquisitions. *Financial Management* 47: 953–91. [CrossRef]
Goldberg, Jonathan, and Yoshio Nozawa. 2020. Liquidity Supply in the Corporate Bond Market. *The Journal of Finance* 76: 755–96. [CrossRef]
Goldstein, Michael A., Edith S. Hotchkiss, and David J. Pedersen. 2019. Secondary Market Liquidity and Primary Market Pricing of Corporate Bonds. *Journal of Risk and Financial Management* 12: 86. [CrossRef]
Hackbarth, Dirk, and Jianjun Miao. 2012. The dynamics of mergers and acquisitions in oligopolistic industries. *Journal of Economic Dynamics & Control*36: 585–609.
Harford, Jarrad. 2005. What drives merger waves? *Journal of Financial Economics* 77: 529–60. [CrossRef]
Higgins, Robert C., and Lawrence D. Schall. 1975. Corporate bankruptcy and conglomerate merger. *Journal of Finance* 30: 93–113. [CrossRef]
Kapadia, Nikunj, and Xiaoling Pu. 2012. Limited arbitrage between equity and credit markets. *Journal of Financial Economics* 105: 542–64. [CrossRef]
Levy, Haim, and Marshall Sarnat. 1970. Diversification, portfolio analysis, and the uneasy case for conglomerate mergers. *Journal of Finance* 25: 795–802. [CrossRef]
Lewellen, Wilbur G. 1971. A pure financial rationale for the conglomerate merger. *Journal of Finance* 26: 521–37. [CrossRef]
Lin, Hai, Xinyuan Tao, Junbo Wang, and Chunchi Wu. 2020. Credit Spreads, Business Conditions, and Expected Corporate Bond Returns. *Journal of Risk and Financial Management* 13: 20. [CrossRef]
Maksimovic, Vojislav, Gordon Phillips, and Liu Yang. 2013. Private and Public Merger Waves. *The Journal of Finance* 68: 2177–217. [CrossRef]
Megginson, William L., Angela Morgan, and Lance Nail. 2004. The determinants of positive long-term performance in strategic mergers: Corporate focus and cash. *Journal of Banking & Finance* 28: 523–52. [CrossRef]
Mitchell, Mark L., and J. Harold Mulherin. 1996. The impact of industry shocks on takeover and restructuring activity. *Journal of Financial Economics* 41: 193–229. [CrossRef]
Nozawa, Yoshio. 2017. What Drives the Cross-Section of Credit Spreads?: A Variance Decomposition Approach. *The Journal of Finance* 72: 2045–72. [CrossRef]
Ravenscraft, David J., and Frederic M. Scherer. 1989. The Profitability of Mergers. *International Journal of Industrial Organization* 7: 101–16. [CrossRef]
Renneboog, Luc, Peter G. Szilagyi, and Cara Vansteenkiste. 2017. Creditor rights, claims enforcement, and bond performance in mergers and acquisitions. *Journal of International Business Studies* 48: 174–94. [CrossRef]
Rhodes-Kropf, Matthew, David T. Robinson, and Steven Viswanathan. 2005. Valuation waves and merger activity: The empirical evidence. *Journal of Financial Economics* 77: 561–603. [CrossRef]
Rhodes-Kropf, Matthew, and Steven Viswanathan. 2004. Market Valuation and Merger Waves. *The Journal of Finance* 59: 2685–718. [CrossRef]
Shastri, Kuldeep. 1990. The differential effects of mergers on corporate security values. *Research in Finance* 8: 179–201.
Shleifer, Andrei, and Robert W. Vishny. 2003. Stock market driven acquisitions. *Journal of Financial Economics* 70: 295–311. [CrossRef]
Song, Moon H., and Ralph A. Walkling. 2000. Abnormal returns to rivals of acquisition targets: A test of the 'acquisition probability hypothesis'. *Journal of Financial Economics* 55: 143–71. [CrossRef]
Stigler, George J. 1964. A Theory of Oligopoly. *Journal of Political Economy* 72: 44–61. [CrossRef]
Yin, Hong-Ming, Jin Liang, and Yuan Wu. 2018. On a New Corporate Bond Pricing Model with Potential Credit Rating Change and Stochastic Interest Rate. *Journal of Risk and Financial Management* 11: 87. [CrossRef]
Zhdanov, Alexei. 2007. Competitive Equilibrium with Debt. *The Journal of Financial and Quantitative Analysis* 42: 709–34. [CrossRef]